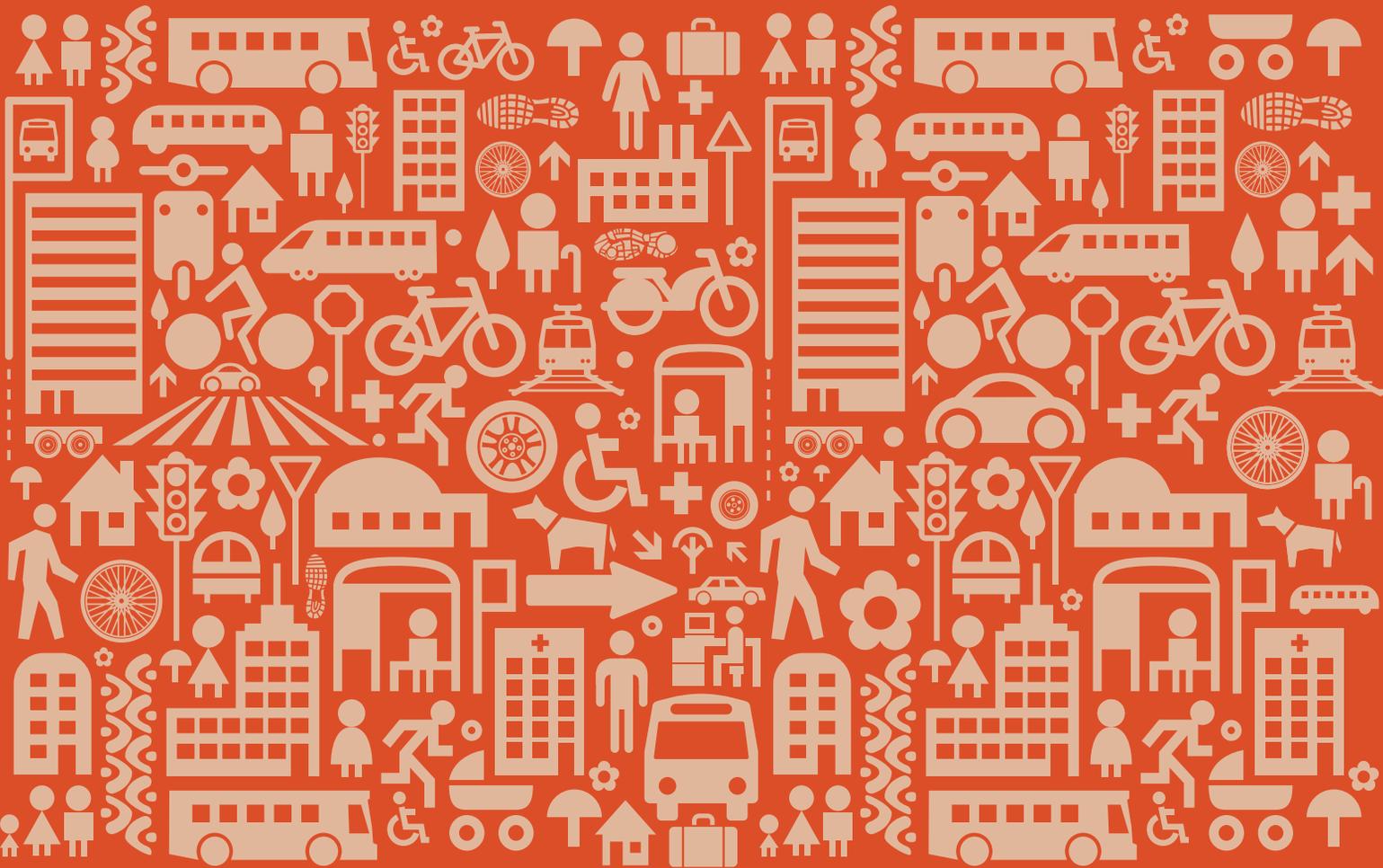




Healthy, Equitable Transportation Policy
RECOMMENDATIONS AND RESEARCH





PolicyLink

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Prevention Institute

Putting prevention and equitable health outcomes at the center of community well-being.

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Healthy, Equitable Transportation Policy Recommendations and Research

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Foreword Congressman James Oberstar

Discussions of public health and wellness often are limited to the health and medical fields. It is my hope that soon, the transportation sector will be part of the discussion and play a role in providing solutions to improving the nation's overall health, well-being, and quality of life.

One of my goals as Chairman of the Committee on Transportation and Infrastructure is to create a new model for surface transportation, one that invests in alternative modes and promotes active, healthy lifestyles. Public health and transportation policy choices are inextricably linked. The transportation sector is responsible for one-third of the greenhouse gas emissions in the United States. Our infrastructure and land use choices often dictate our daily travel, and whether or not we have access to clean, healthy transportation options. And in any given year, approximately 40,000 Americans are killed on our roadways. The policy decisions we make regarding transportation have repercussions on public health throughout our society.

For too long now, our transportation decision making has failed to address the impacts that our infrastructure network has on public health and equity. The asphalt poured and lane miles constructed enhanced our mobility and strengthened our economic growth; but too often, this auto-centric mindset took hold and crowded out opportunities to invest in a truly sustainable intermodal transportation system, in particular a system that meets the needs of underserved communities.

The failure to link transportation and land use decision making, and to consider the public health effects of these choices, has led to a tilted playing field that has made driving the easiest—and often the only—option available in many parts of the country. Our transportation policies and investments must do more to provide access for all through various modes. Transit, walking, and bicycling all have a significant role to play in lowering our dependence on foreign oil, reducing our greenhouse gas emissions and air pollutants,

and helping Americans incorporate exercise and fresh air into their daily travel routines. We must also continue our pursuit to reduce the number—and rate—of traffic fatalities and injuries that occur each year.

Our most recent surface transportation legislation, enacted in 2005, took important steps toward building a healthier infrastructure by investing billions of dollars in safety, public transit, walking, and bicycling. This legislation is helping to construct safer infrastructure, enable workforce development, build new transit lines, repair existing systems, and establish non-motorized transportation networks. We also enacted the Safe Routes to School program, which allows states to invest in safety improvements and education campaigns to get kids walking and biking to school again. This program has shown great early success and has the ability to change the habits of an entire generation.

Environmental sustainability, access, and our collective well-being must combine with mobility and safety as the cornerstones of our transportation investments. The following report represents an important contribution to our emerging understanding of the connections between transportation and public health and is an invaluable resource for policymakers and all those interested in building healthy communities. With a greater recognition of the strong linkage between public health and transportation, I believe we can build a network that supports our mobility and creates access and economic strength while promoting equity, sustaining our good health and quality of life.



Jim Oberstar

Congressman James Oberstar

Chairman of the House Transportation and Infrastructure Committee

Preface Angela Glover Blackwell

Transportation policy has enormous potential to catalyze the development of healthy communities of opportunity. The upcoming authorization of the federal surface transportation bill represents the single biggest federal opportunity to influence how our communities, cities, and regions are shaped.

Transportation impacts health directly; it affects air quality, injury risk, physical activity levels, and access to necessities such as grocery stores. Transportation is also one of the largest drivers of land use patterns; it thus determines whether communities have sidewalks and areas to play and be physically active as well as whether communities are connected to or isolated from economic and social opportunities.

Research shows that low-income communities and communities of color often do not have access to the benefits our transportation system can provide, yet they bear the burdens of that system. For example, many low-income neighborhoods have little or no efficient, reliable public transportation to get them to jobs and essential goods and services. But these communities are often situated near bus depots, highways, and truck routes, where pollution levels are high—and not coincidentally, asthma rates are high as well. In addition, many of these same communities live without safe, complete sidewalks or bike paths, making walking and biking difficult and often dangerous. As a result, these neighborhoods

have low levels of physical activity and high rates of chronic diseases. Creating a more equitable transportation system must lie at the core of any analysis of transportation or health, and it must guide all reform.

The Convergence Partnership, the collaborative of funders that commissioned this project, embraces the imperative that health and equity be central to transportation policy debates. Further, the Convergence Partnership recognizes how transportation policy is connected to the Partnership's broader efforts to support environmental and policy changes that will create healthy people and healthy places. The Partnership's steering committee includes: The California Endowment, Kaiser Permanente, the Kresge Foundation, Nemours, the Robert Wood Johnson Foundation, and the W. K. Kellogg Foundation. The Centers for Disease Control and Prevention serves as technical advisor.

In this project, leading academic researchers and advocates working at the intersection of transportation policy, equity, and public health identify opportunities for creating transportation systems that promote health and equity. This report synthesizes their insights and offers concrete recommendations for change.

Reform is long overdue. Climate change, shameful health disparities, growing rates of chronic diseases—transportation policy has contributed to these problems, and now it must

address them. Increasing rates of poverty and a severe economic downturn add to the urgency for reform.

This report intentionally uses the term *authorization* and not the more common word, *reauthorization*, in reference to the surface transportation bill. We want to make clear that new thinking and innovative approaches are necessary to meet the needs of a changing and diverse America.

Many advocates are already working hard to push for fundamental reform. This report was written for community leaders, policymakers, funders, practitioners, and advocates interested in an overarching strategy to promote active living and to build healthy communities of opportunity. PolicyLink, Prevention Institute, and the Convergence Partnership believe that building healthy communities requires a collaboration of stakeholders from diverse fields and sectors. Together, we can identify and support shared solutions.

The project recognizes that effective strategies to improve health, particularly in vulnerable communities, often fall outside the conventional domain of health policy, yet deserve equal attention. Federal transportation policy is a critical opportunity at our fingertips. Leveraging the strength of collaboration and networking can yield powerful results. Let's seize the moment.



Angela Glover Blackwell

Founder and CEO
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The Transportation Prescription: A Summary of Findings and a Framework for Action

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In St. Louis, MO, major cuts in bus service this spring left workers, students, disabled people, and elderly residents stranded and feeling bereft. Stuart and Dianne Falk, who are both in wheelchairs, told CNN they no longer would be able to get to the gym or the downtown theater company where they volunteer. “To be saddled, to be imprisoned, that is what it is going to feeling like,” Stuart Falk said.¹

In West Oakland, CA, families have no escape from the diesel exhaust belching from trucks at the nearby port: The air inside some homes is five times more toxic than in other parts of the city. “I’m constantly doing this dance about cleaning diesel soot from my blinds and window sills,” 57-year-old Margaret Gordon told the San Francisco Chronicle.²

In Seattle, WA, Maggie Rathbun, a 55-year-old diabetic who has no car, takes an hour-long bus ride to buy fresh fruits and vegetables. She cannot haul more than a few small bags at a time so she shops frequently—if she feels well enough. “It depends on what kind of day I’m having with my diabetes to decide whether I’m going to make do with a bowl of cereal or try to go get something better,” she told the Seattle Post-Intelligencer.³

Our transportation system has an enormous impact on our way of life, on the air we breathe, and on the vitality of our communities. Transportation choices influence personal decisions about where to live, shop, attend school, work, and enjoy leisure. They affect stress levels, family budgets, and the time we spend with our children. Although most people don’t think of it as a determinant of health, our transportation system has far-reaching implications for our risk of disease and injury. Transportation policies and accompanying land use patterns contribute to the glaring health disparities between the affluent and the poor and between white people and people of color.

This report demonstrates that transportation policy *is*, in effect, health policy—and

environmental policy, food policy, employment policy, and metropolitan development policy, each of which bears on health independently and in concert with the others. Longstanding transportation and land use policies are at odds with serious health, environmental, and economic needs of the country, and they have harmed low-income communities and communities of color especially. Forward-thinking transportation policies must promote healthy, green, safe, accessible, and affordable ways of getting where we need to go. They also must go hand in hand with equitable, sustainable land use planning and community economic development.

Streets and roads are the largest chunks of property owned by most cities and states. We have choices to make about how to use, and share, that real estate. Who decides? Who benefits? Who pays? Transportation policy at all levels of government can be a vehicle to promote public health, sustainability, equitable opportunity, and the economic strength of neighborhoods, cities, and regions. But that will happen only if advocates, experts, and organizers steeped in all these issues bring their knowledge and passion to critical transportation decisions. The upcoming authorization of the most important transportation legislation in the United States, the federal surface transportation bill, makes this a pivotal moment to bring a broad vision for health and equity to transportation policy.

Transportation in America: A New Vision

Underlying this report is a vision of transportation as more than a means to move people and goods, but also as a way to build healthy, opportunity-rich communities. Health is often viewed from an individual perspective. Yet, each resident in a region is both an individual and part of a larger community. Therefore, our vision for healthy, equitable communities is one that extends beyond

individual outcomes and creates conditions that allow all to reach their full potential. It does not force us to balance one individual against another. It provides the opportunity for everyone to participate in their community, be healthy, and prosper.

Transportation systems are essential to the competitiveness of the nation and the viability of regions. Building America's Future, a bipartisan coalition of elected officials, views increased transportation investment as a key to the economic growth and job creation needed to strengthen cities and rural communities.⁴ *The American Recovery and Reinvestment Act (ARRA)*, the nearly \$1 trillion stimulus package passed by Congress and signed by President Obama in early 2009, emphasizes transportation investments to revive the ailing economy and rebuild regions.⁵ The act galvanized advocates to push government agencies to spend the money in ways that promote health, protect the environment, and benefit everyone. Now momentum is building to bring a focus on health and equity to the next version of the federal surface transportation bill.⁶

Over the past half-century, federal transportation policy has changed the American landscape, physically, socially, and culturally. Beginning with the *Federal-Aid Highway Act of 1956* authorizing the Interstate Highway System, the leading transportation priority by far has been what planners call mobility and which became synonymous with the movement of more and more cars and goods farther and faster. Mobility advanced the nation's growth and prosperity, and it formed our sense of identity as well as our image abroad. The car was more than a machine to get us around; it stood as a symbol of American freedom, ingenuity, and manufacturing prowess.

While some have few or no transportation choices due to limited transportation infrastructure and resources in their communities, many Americans do have the

opportunity to make choices about how to travel and where to go. For these people, the car provides the means to flee the city, buy a quarter-acre patch of suburbia, and drive to their hearts' content without giving much thought to the disinvested neighborhoods left behind, or the farmland lost to development, or the fossil fuels and other natural resources their lifestyles consumed. Community environments, however, affect the choices individuals make, and public policy molds those environments. As the nation confronts severe economic, environmental, and health challenges as well as the widening gulf between rich and poor, it is becoming clear that we must make different choices as individuals and as a society.

A new framework for transportation policy and planning is emerging. Rather than focus almost exclusively on mobility (and its corollaries, speed and distance), this framework also emphasizes transportation accessibility. In other words, instead of designing transportation systems primarily to move cars and goods, the new approach calls for systems designed to serve people—all people—efficiently, affordably, and safely. This approach prioritizes investments in: (1) public transportation, walking, and bicycling—transportation modes that can promote health, opportunity, environmental quality, and indeed mobility for people who do not have access to cars; and (2) communities with the greatest need for affordable, safe, reliable transportation linkages to jobs, and essential goods and services—chiefly, low-income communities and communities of color.

The goal is to improve transportation for everyone while delivering other important payoffs, including better respiratory and cardiovascular health; improved physical fitness; less emotional stress; cleaner air; quieter streets; fewer traffic injuries and deaths; and greater access to jobs, nutritious foods, pharmacies, clinics, and other essentials for healthy, productive living.

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This new vision is at the core of a burgeoning movement to shape transportation policy to support work in a number of critical areas, such as climate change, sustainable agriculture, the prevention of chronic diseases, workforce development, and neighborhood revitalization. Advocates and experts in public health, environmental justice, labor, community economic development, food policy, and other fields and disciplines have important roles to play in transportation debates. A broad range of interests working in partnership, can craft innovative, environmentally sound solutions that benefit everyone, rather than plans that reflect the motor vehicle orientation of road engineers and builders. Government transportation agencies and developers—the architects of our transportation systems for decades—must be held accountable for how their investments affect the economic prospects of regions, the health of communities, and the well-being of residents.

This shift in thinking about what transportation policy must achieve and who should drive it stems from a long list of factors. Among them: near-crippling congestion in many metropolitan areas; renewed interest in city living and a hunger for shorter commutes; demographic changes (including the increasing number of people over 65 and immigrants, two groups less likely to drive or own cars); the rise in obesity; the enduring poverty in inner-city and rural communities; the growing understanding of the connections among health, the built environment, and transportation plans; and the increasing frustration among residents and advocates about the limited accountability and inequitable transportation decision-making processes at the state and regional levels which over represent suburban and white male interests.

But the push to reform transportation (along with its cousin, land use planning) has gained urgency in the face of three massive challenges that are upending the status quo of every field and that go to the heart of our love affair with the car: (1) Climate change, with its threat of global ecological upheaval. (2) U.S. dependence

on foreign oil, which carries grave risks for our economy and security. (3) A healthcare system crumbling under the demands of skyrocketing rates of diabetes and other chronic diseases associated with sedentary lifestyles, and astronomical costs. Transporting goods, services, and people accounts for about one-third of greenhouse gas emissions and two-thirds of petroleum consumption in the United States.⁷ As the National Surface Transportation Policy and Revenue Study Commission noted in its landmark report, *Transportation for Tomorrow*, the environmental gains we achieve through incremental fixes such as higher fuel-efficiency standards, though important, will be trumped by increases in driving and traffic if we continue on our current policy course.

The good news is that change *can* happen, and inspiring examples abound. In the rural San Joaquin Valley in California, where public transportation has been virtually nonexistent, a new system of publicly managed vanpools is connecting farm worker families to jobs, schools, and medical services.⁸

In Chicago's West Garfield Park, an alliance of residents, activists, and faith-based organizations not only successfully fought the closure of the rail line that linked the neighborhood to downtown; they also transformed a transit stop into an anchor of development of shops, community services, and moderately priced housing.⁹

In port cities around the country, many groups are working to reduce pollution from ships, locomotives, and trucks, some of the worst emitters of soot and greenhouse gases. In the Los Angeles region—one of a number of regions where the movement of goods represents a significant part of transportation investment and economic activity, and where ports and freeways abut low-income neighborhoods—the Coalition for Clean and Safe Ports has formed an effective alliance of residents, truck drivers, public health experts, environmentalists, environmental justice

activists, unions, immigrant groups, and public officials to push for clean air solutions.¹⁰

The authorization of the next federal surface transportation bill presents an immense opportunity to broaden such engagement and to forge an equitable policy response to the unprecedented challenges facing the country. The bill authorizes federal funding for highways, highway safety, public transportation, and bicycling and pedestrian infrastructure for approximately six years.¹¹ It transfers hundreds of billions of dollars from the federal government to states and localities. It also triggers hundreds of billions more in matching state and local spending. The bill marks the largest transportation expenditure in the United States.

But the legislation does more than provide money. It also communicates national policy priorities. Will we build roads on the farthest edges of regions or fix aging roads and bridges in cities and inner-ring suburbs? Will we invest in healthy, green transportation—bicycle lanes, safe sidewalks for walking, clean buses, ridesharing, light rails? Will we ensure that all voices are equitably represented in transportation decision-making processes? And will we include incentives and requirements for affordable housing near public transportation to ensure broad access to the job opportunities and services that transit oriented development stimulates? Or will we spend most of the money as we have for decades: on new and bigger highways with little public accountability? The bill establishes funding categories and requirements and in some cases gives communities and metropolitan regions flexibility to shape strategies to local needs. The new law is a chance to design communities for health, sustainability, and opportunity—and to give all Americans physically active, clean, affordable, convenient, reliable, and safe options to get where they need to go.

What Does Healthy, Equitable Transportation Policy Look Like?

Our current transportation system has many direct health consequences: pollution-related asthma, steep declines in physical activity, and the associated rise in obesity and chronic illnesses are just a few examples. Transportation affects health indirectly by connecting people—or by failing to provide connections—to jobs, medical care, healthy food outlets, and other necessities. For more details on the connections between transportation and health see Chapter 2, Health Effects of Transportation Policy.

The National Surface Transportation Policy and Revenue Study Commission—created by Congress in 2005 to examine the condition and future needs of our network of highways, ports, freight and passenger railroads, and public transportation systems—reached a sobering conclusion: “The nation’s surface transportation network regrettably exacts a terrible toll in lost lives and damaged health.”¹² Nowhere is the toll higher than among low-income people and people of color.

Research shows that when properly designed, transportation systems can provide exercise opportunities, improve safety, lower emotional stress, link poor people to opportunity, connect isolated older adults and people with disabilities to crucial services and social supports, and stimulate economic development. Healthy, equitable transportation policy draws on that research to create transportation systems that benefit everyone.

Specifically, healthy, equitable transportation policy:

- Supports the development of accessible, efficient, affordable, and safe alternatives to car travel, and especially to driving solo. These alternatives enable everyone to walk more, travel by bicycle, and use public

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transportation more—in other words, to get around in ways that improve health, expand access to opportunity, and reduce toxic pollutants and greenhouse gas emissions.

- Works hand in hand with sustainable land use planning. Together, they encourage and support high-density, mixed-use, mixed-income metropolitan development and affordable housing with good access to transportation options. Together, they focus, particularly, on underserved and economically isolated communities.
- Recognizes that income is important to health, and that good transportation has an impact on family income. Healthy, equitable transportation policy support systems that connect all people, especially low-income and underserved communities, to employment and other opportunities. It also encourages hiring low-income residents of color for well-paying jobs in transportation construction, maintenance, and service.
- Understands the importance of ensuring equal representation. All community members, regardless of race, gender or geographical location should be equitably represented and involved in making decisions which impact their communities, their infrastructure and their options for travel.
- Recognizes that access to healthy foods is integral to good health and that transportation systems are integral to food production and distribution. Healthy, equitable transportation policy explicitly addresses food access issues, including transportation to grocery stores and food transport practices.

This summary draws on the six thematic chapters in this book authored by academics and advocates working at the intersection of transportation, health, and equity. Each chapter describes innovative transportation and land use policies, strategies, and programs built on

a foundation of equity and sustainability. Three chapters in this collection address transportation options:

- Todd Litman, M.E.S., founder and executive director of the Victoria Transport Policy Institute in British Columbia, identifies numerous economic, social, and environmental benefits that can result from **public transportation** improvements. Among them: reduced traffic crashes, improved physical fitness and health, energy conservation, reduced pollution emissions, increased community livability, increased affordability, consumer savings, economic development, and expanded opportunity. Litman contends that improving public transportation is one of the most cost-effective ways to improve public health, and better health is one of the most significant potential benefits of public transportation improvements. He identifies policy and planning reforms to create a more diverse and efficient transportation system. He recommends developing a strategic vision of high-quality public transportation services, with supportive land use policies to provide basic mobility to people who are socially isolated, economically disadvantaged, or physically disabled, as well as to attract “discretionary” travelers, or people who would otherwise drive for a particular trip.
- Susan Handy, Ph.D., director of the Sustainable Development Center at the University of California at Davis, argues that increasing **walking and bicycling** while assuring safety, particularly for low-income families, children, and older adults, is an important goal for federal transportation policy. Walking and bicycling, or “active travel,” are low-cost, physically active, and environmentally clean alternatives to driving, yet they represent fewer than 10 percent of all trips in the United States. In addition to expanding specialized programs for active travel, the federal government should assist, enable, encourage, and, in some instances,

require state, regional, and local governments to address pedestrian and bicycling needs.

- Catherine L. Ross, Ph.D., the Harry West Chair and director of the Center for Quality Growth and Regional Development at Georgia Institute of Technology, argues that **roadways** are more than transport routes; they are also our primary spaces for civic, social, and commercial enterprise. Roadways—highways in particular—receive the largest share of federal transportation dollars by far. Federal policy has historically emphasized highways designed to move large numbers of cars and freight vehicles at high speeds. Ross argues for greater investments in roadways that integrate physical activity, enrich social interaction, increase safety, and provide transportation linkages in underserved communities. She urges policymakers and others to consider expanded assessments of the effects of roadways on health, through the use of methodologies similar to health impact assessment (HIA).¹³

The remaining papers offer transportation policy perspectives in key areas that have a significant impact on public health and equity:

- Todd Swanstrom, Ph.D., the E. Desmond Lee Professor of Community Collaboration and Public Policy Administration at the University of Missouri, St. Louis, makes the case that federal transportation policy can and should address **economic development**, particularly in communities left behind by decades of transportation planning that favored car travel and encouraged sprawl. Targeted transportation investment can promote economic opportunity and reduce health disparities by (1) improving transportation linkages between housing and employment hubs and between residential neighborhoods and clinics, pharmacies, and grocery stores; and (2) encouraging affordable, high-density, mixed-use transit

oriented development¹⁴; and (3) creating workforce strategies to ensure that jobs in the large, growing transportation sector are open to all, including minority and women workers and contractors. Swanstrom also asserts that while the goals of equity and environmental sustainability are not mutually exclusive, policymakers and advocates must address the short-term needs of low-income families who live in places where driving is essential.

- Kami Pothukuchi, Ph.D., associate professor of urban planning at Wayne State University, and Richard Wallace, M.S., senior project manager at the Center for Automotive Research, argue that federal transportation policy should seek to increase **access to healthy foods**. Today's transportation networks make large quantities of foods from around the nation and the globe readily available for many Americans, but industrialized agriculture and the concentrated structure of food retail have negative health and environmental consequences for low-income communities, especially people of color, inner-city and rural residents, and immigrant farm workers. For example, urban and rural communities often have fewer and smaller supermarkets than suburban communities (if they have any at all) as well as more limited selections of healthy foods. As a result, residents eat fewer fruits and vegetables and have higher rates of diet-related illnesses. In addition, long-distance food hauling has a disproportionate impact on the air quality and noise levels in poor and minority communities along freight routes. Although food access falls outside the traditional realm of transportation policy, improved public transportation, transit oriented development, and cleaner methods to move freight can increase access to healthy foods in underserved communities, reduce air and noise pollution, and foster local, sustainable agri-food systems.

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- Larry Cohen, M.S.W., Leslie Mikkelsen, R.D., M.P.H, and Janani Srikantharajah, B.A., of Prevention Institute argue that traffic crashes are preventable and that federal transportation policy must make **safety for all travelers** a priority. Traffic crashes rank as the leading cause of death for people ages one to 34 and contribute to unnecessary human, social, and economic costs. Resources should be directed to communities with the least infrastructure to support safe walking, bicycling, and public transportation use and continue to support effective vehicle safety and occupant protection strategies. Traffic safety is an important strategy not only to reduce injuries and death but also to encourage physical activity, improve air quality, and increase transportation accessibility.

The Federal Transportation Legacy and Challenges Ahead

Transportation in America is a federal system, not a centralized, national system. Federal policy plays a critical role, not by dictating practices but by enabling and encouraging innovation by states, regional transportation organizations, transit operators, and other agencies. This happens in several ways.

First, the federal government sends billions of dollars for transportation to states and localities. For example, the *American Recovery and Reinvestment Act* provides nearly \$50 billion to build and repair roads, bridges, railways, and ports. The current surface transportation bill, *SAFETEA-LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users)*, set to expire in September 2009, guaranteed \$244.1 billion over six years. These dollars, in turn, leverage direct infrastructure investments by state governments, local governments, and private investors.

Second, the policies and requirements embedded in federal transportation programs influence state and local land use decisions and transportation priorities. Many observers contend that transportation stands as one of the biggest policy successes in United States history. *The Federal-Aid Highway Act of 1956* and its progeny promoted mobility, which contributed mightily to American growth and prosperity. However, many advocates take a more nuanced view of the federal legacy. They point to the health, equity, and environmental consequences of an ethic that held the faster, the farther, the better, as well as the consequences of policies focused almost wholly on car and truck travel, with little accountability to goals beyond mobility.

Either way, the current transport system is no longer sustainable or fixable by incremental changes such as pilot projects, encouragements, and small incentives. As the National Surface Transportation Policy and Revenue Study Commission, created by *SAFETEA-LU*, wrote in its final report to Congress: “The strong and dynamic American surface transportation system is becoming a thing of the past.”

At 300 million people, the nation’s population has doubled since the creation of the Interstate Highway System. We will number 420 million by 2050. “Congestion was once just a nuisance. Today gridlock is a way of life,” the commission’s report said. Growing transportation demand threatens to dwarf regulatory and legislative efforts to mitigate its health and environmental consequences. Increases in total vehicular mileage have all but wiped out the gains achieved through hard-won regulations on fuel efficiency and emissions control. Expansion of freeways cannot get us out of these problems; it will only make them worse. The more we have expanded highways, the more traffic we have created. The United States needs multi-modal systems with public

transportation that efficiently serves a large segment of the population, using existing streets and highways.

The *Intermodal Transportation Efficiency Act (ISTEA)*, the 1991 version of the federal surface transportation bill, was supposed to lead us there. The act incorporated significant policy change. Since then, the stated goal of federal transportation policy has been to expand access and improve efficiency through an interconnected multi-modal system that supports highways, public transportation, walking, and biking. This goal has yet to be achieved. Funding mechanisms and formulas have continued to favor highway construction and car travel. For example, the allocation formula for the Surface Transportation Program (STP), the largest program within the federal bill, rewards states that consume more gas, have more miles of highway, and have residents who drive a lot.¹⁵ Alternatives to driving remain underinvested. Approximately 80 percent of the surface transportation bill is allocated for distribution through the Federal Highway Administration for mostly highway programs, while less than 20 percent goes to the Federal Transit Agency for public transportation. Other modes of travel constitute a minute amount of spending in comparison to highways and public transportation.

Case in point: walking is the only travel mode that has not had significant declines in casualties in 40 years. Yet only a tiny share of transportation funding goes to infrastructure initiatives that would make walking and biking safer. Walking and bicycling accounted for 8.6 percent of all trips in 2001 but 12 percent of traffic deaths.¹⁶

Another case in point: operating costs for public transportation systems present a huge challenge for many communities. Yet federal transportation investment is focused on capital projects. For example, cities with 200,000 people or more may not use grants from the

U.S. Department of Transportation's main public transportation programs for transit operating costs.¹⁷ In the face of budget shortfalls, local and regional transportation agencies throughout the country have cut service, hiked fares, and deferred maintenance—arguably at a time when people need affordable, reliable links to jobs more than ever.

While federal policy plays a significant role in shaping transportation systems, states and metropolitan regions are also critical agents of change. The new surface transportation bill offers an opportunity to increase support, encouragement, and pressure for integrating land use and transportation planning to promote balanced regional growth, equitable economic opportunity, and healthy communities for all.

A Foundation for 21st-Century Transportation Policy

Healthy, equitable transportation policy is grounded in four principles. These may also serve as benchmarks to assess the impacts of transportation plans on public health, equity, and environmental quality:

- 1. Develop transportation policies and plans that support health, equity, and environmental quality.** Federal, state, and local transportation policies should be aligned with the top health and environmental goals of federal departments and agencies. For example, transportation policies should be aligned with the Department of Health and Human Services' strategic goals to promote health equity and foster the economic and social well-being of individuals, families, and communities. Transportation policies should also support the CDC's commitment to eliminate health disparities and to promote its "healthy people in healthy places" goals.

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2. Prioritize transportation investments in distressed regions, low-income neighborhoods, and communities of color. Federal, state, and local transportation agencies should emphasize projects that will revitalize the economy of struggling communities, lower health disparities, and will connect vulnerable populations to jobs, business opportunities, healthy food outlets, medical services, and other necessities. Government agencies must ensure that these projects are financially sustainable by providing adequate funding for maintenance and operations. The jobs associated with transportation construction, maintenance, and service should be available to low-income people and communities of color.

3. Emphasize accessibility, instead of simply mobility, in transportation policies and programs at all levels of government as well as across sectors and policy silos. Transportation systems should give communities wider access to all the things that are necessary for a good life, not to move people faster and farther. The definition of access must also include affordability. If transportation is physically accessible, yet unaffordable, it is not truly accessible.

4. Ensure transparency, accountability, and meaningful participation by residents, advocates with diverse interests, and experts from different fields. State and regional transportation officials and private developers must engage new partners in decision making and provide the data, training, and resources to allow full, informed participation by the people affected most by decisions and investments. Voices and expertise from local communities, public health, environmental justice, community development, and other arenas can help ensure that transportation plans respond to local needs and deliver health, environmental, and economic benefits broadly.

Policy and Program Priorities to Improve Health and Equity

Government at all levels must consider the health and equity impacts of transportation investments at the beginning of decision-making processes. Public and private transportation investments must be designed to promote health rather than to erode it. The following recommendations can help policymakers and planners achieve these ends:

1. Prioritize investments in public transportation, including regional systems that connect housing and jobs as well as local services that improve access to healthy foods, medical care, and other basic services. Investments should include capital costs as well as costs for maintenance and operations. Because older diesel buses have high emission rates and since bus depots and other facilities are often concentrated in low-income and minority neighborhoods, policies must be in place to ensure that expanded public transportation does not lead to increased exposure to pollutants in these same communities.

2. Prioritize investments in bicycle and pedestrian infrastructure to make walking and biking safer and more convenient. Strategies include complete streets designed with all users in mind, not just drivers; traffic-calming measures; and safe routes to transit and Safe Routes to Schools programs, which create infrastructure and programming to support safe walking and bicycling to bus stops, rail stations, and schools. Targeted infrastructure investments should also support walking and bicycling in rural communities by, for example, improving road shoulders and building trails to town centers.

3. **Encourage equitable transit oriented development by creating incentives for integrated land use and transportation planning.** Transit oriented development must emphasize affordability and accessibility. It also must incorporate affordable housing and commercial properties that provide jobs, services, and essential goods near people's homes. Because people of all income levels desire walkable neighborhoods and shorter commutes, displacement of longtime neighborhood residents can be an unintended consequence of transit oriented development. Policymakers must ensure that the local residents guide planning and development and that equity is a goal from day one.
4. **Create incentives and accountability measures to ensure that transportation plans account for their impacts on health, safety, and equity.** New projects must be held accountable for better results. Government investment should support the creation of tools that more sensitively and accurately measure walking and bicycling practices and improved outcomes. Health impact assessment is an emerging methodology to evaluate the effects of policies, programs, and plans on the health of a population and should be considered an important tool. People should also have the right to sue under Title VI of the *Civil Rights Act of 1964* if they suffer disparate impacts from federal transportation investments, and the U.S. Department of Transportation should have the power to withhold dollars if investments are not made equitably.¹⁸
5. **Give state, regional, and local government agencies and organizations more flexibility to move dollars among funding categories and to target spending to meet local needs.** Greater flexibility would give communities more leeway to fund walking, bicycling, and public transportation programs. It would

also enable communities to invest in fixing, maintaining, and operating local bus and rail systems. Flexibility should be strongly tied to new standards for accountability, transparency, and inclusion which ensure all people impacted by transportation decisions are equitably represented in the decision-making process.

6. **Prioritize transportation investments in communities with high unemployment and poverty rates to stimulate economic growth and provide access to jobs.** The American Recovery and Reinvestment Act (ARRA) has language to direct resources to struggling and disinvested communities. The new version of the surface transportation bill should include similar language and expand on this commitment by creating strong accountability and enforcement measures tied to achieving equitable economic benefits.
7. **Make sure that jobs and contracts created by federal transportation investments reach low-income people and communities of color.** A Sense of Congress amendment to *SAFETEAU-LU*, passed in 2005, encourages local hiring provisions for highway construction projects. Some projects aim for 30 percent of workforce hours to be filled by employees who live in the community. Local hiring should be made a requirement, not just encouraged. It should also be expanded beyond highway projects to include public and mass transit development. Capital investments should also fund workforce development programs to train local residents for jobs in the transportation sector.¹⁹
8. **Support the development of cleaner bus and truck fleets and invest in freight rail infrastructure** to reduce greenhouse gas emissions, improve local air quality, promote health, and foster energy independence.

The Transportation Prescription

9. Advance safety for all travelers, with particular emphasis on those at the highest risk of car injuries and death. Investments should continue advancing known vehicle safety and occupant-protection strategies as well as roadway and community design modifications to protect the safety of pedestrians, bicyclists, drivers, and passengers.

10. Support policies and programs that increase access to healthy foods. Promote public-private van and bus systems to shuttle customers to grocery stores. Expand weekend bus service to connect low-income neighborhoods to supermarkets and other food outlets. Invest in safe and affordable transportation for farm and food production workers. Promote sustainable modes of transporting foods from farms to stores as well as policies to increase the viability of local and regional farming.

11. Give low-income rural communities greater access to public transportation funds from the surface transportation bill providing the opportunity to access employment and education opportunities. Low-density and long travel distances make developing and operating conventional bus and rail systems financially challenging. Federal public transportation dollars should support economically efficient innovations, such as vanpools and voucher programs.

Conclusion

The authorization of the next federal surface transportation bill can be a starting point for creating many changes Americans say they want: better health, cleaner air, more time with our families, opportunities to connect with our neighbors. The new legislation can also mark an important step toward building a society in which everyone can participate and prosper, and no community is left behind.

Change will not come easily. The car culture has deep roots in America. The interest groups supporting highway investment are powerful and well-funded. But advocates and grass-roots activists around the country have demonstrated that change can happen. They have successfully fought for cleaner buses and for public transportation in communities that never had it. They have transformed train stations into centers of vibrant community development in disinvested neighborhoods. They have pressured local officials and supermarket operators to provide free bus rides so families can shop for food.

Now is the time to tap into that kind of energy and lift successes like these to the level of federal policy. Leaders, experts, and advocates from many spheres—public health, environmental justice, food policy, agriculture, labor, equity, community economic development, business, and government—must join in partnership to push for broad reform. Collectively, we can gain power and build political support for creating transportation systems that address the big challenges we face and that nourish healthy communities throughout our nation.

Health Effects of Transportation Policy

ch. 1

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ABSTRACT >> *There is a deep and evolving knowledge base about the links between transportation and health. Research shows that when properly designed, transportation systems can provide exercise opportunities, improve safety, lower emotional stress, link poor people to opportunity, connect isolated older adults and people with disabilities to crucial services and social supports, and stimulate economic development. Conventional auto mobility-focused planning by local, regional, and state transportation agencies generally overlooks or undervalues the impacts of transportation investments on health and equity.*

This chapter provides an overview of the impacts of transportation on health. Subsequent chapters on transportation options and key issues provide further detail.

Health Effects of Transportation Policy

Introduction

Our current transportation system has many direct health consequences: pollution-related asthma, steep declines in physical activity, and the associated rise in obesity and chronic illnesses are just a few examples. Transportation affects health indirectly by connecting people—or by failing to provide connections—to jobs, medical care, healthy food outlets, and other necessities. The National Surface Transportation Policy and Revenue Study Commission—created by Congress in 2005 to examine the condition and future needs of our network of highways, ports, freight and passenger railroads, and public transportation systems—reached a sobering conclusion: “The nation’s surface transportation network regrettably exacts a terrible toll in lost lives and damaged health.”¹ Nowhere is the toll higher than among low-income people and people of color.



Direct Health Effects

Pollution

Pollutants from cars, buses, and trucks are associated with impaired lung development and function in infants² and children,³ and with lung cancer,⁴ heart disease, respiratory illness,⁵ and premature death.⁶ Long-term exposure to pollution from traffic may be as significant a threat for premature death as traffic crashes and obesity.⁷ In California alone, pollution is a factor in an estimated 8,800 premature deaths a year.⁸

The main culprits are fine particulate matter, including diesel exhaust particles; ground-level ozone, a toxic component of smog formed when tailpipe emissions from cars and trucks react with sunlight and oxygen; and nitrogen oxide (NOx), which contributes to the formation of ozone and smog. The health risks are exacerbated by transportation patterns that often embed heavy traffic and diesel-spewing facilities in poor and predominantly minority neighborhoods. The American Lung Association has found that 61.3 percent of African American children, 67.7 percent of Asian American children, and 69.2 percent of Latino children live in areas that exceed air-quality standards for ozone, compared with 50.8 percent of white children.⁹ Ground-level ozone, a gas, can chemically burn the lining of the respiratory tract.

Air pollution is also “one of the most underappreciated” triggers of asthma attacks, according to the Centers for Disease Control and Prevention (CDC).¹⁰ More than 20 million Americans—roughly seven percent of adults and nearly nine percent of all children—have asthma. In poor and minority communities, the rates are considerably higher. For example, in Harlem and Washington Heights in northern Manhattan, home to mostly low-income African American and Latino residents, one in four children suffers from the disease.¹¹ Research shows that air pollution can trigger the wheezing, coughing, and gasping for breath

that signal an attack in people with asthma. But a study in 10 Southern California cities raises the troubling possibility that pollution can also lead to the onset of the disease. The study found that the closer children live to a freeway, the more likely they are to develop asthma.¹²

Environmental justice activists have called attention for years to the connections among pollution, illness, and transportation policy—and the burden on communities of color. For instance, in the mid-1990s, West Harlem Environmental Action (WE ACT) used mapping, air monitoring, and resident surveys to show that the neighborhood’s asthma rates were linked to its dubious status as the diesel capital of New York City. When WE ACT began work on the issue, Harlem housed six of the city’s eight bus depots and 650 Port Authority buses. The group played an important role in getting the city to convert buses to clean fuel.¹³

Pollution from freight transport is another big concern around the country. To meet America’s insatiable demand for goods, ports and highways are continually expanding to accommodate more ships, locomotives, and trucks. Ports frequently border low-income and minority neighborhoods, and highways often run through them. The upshot: some of the worst emitters of fine particles, soot, and greenhouse gases (GHGs) are a growing presence in already vulnerable communities.

Climate Change

GHGs are not pollutants in the classical sense. They cause the atmospheric changes and resulting climate disruptions that are projected to alter the natural and built environments on which society relies.¹⁴ The health risks come largely from those environmental alterations. In a major shift in federal policy, the Environmental Protection Agency in April 2009 adopted the position that greenhouse gases pose a danger to human health and welfare. A few weeks later, the Climate Change and Health Protection and Promotion Act, H.R. 2323, was introduced

in the House of Representatives.¹⁵ The bill would direct the Department of Health and Human Services to develop a national strategic action plan to prepare for and respond to the health effects of climate change.

Researchers are just beginning to assess the specific health dangers in the United States; most of the published data to date come from abroad. A recent report predicts that kidney stones, linked to dehydration, may increase by as much as 30 percent in the driest regions of the United States.¹⁶ So far, however, there are more questions than answers. How will less rainfall affect the potential for waterborne diseases? Food supplies? Food prices? How will extreme weather conditions such as heat waves or hurricanes affect mental health? Physical activity? Population displacement?

Scientists believe that climate change could exacerbate a number of current health problems, including heat-related deaths, diarrheal diseases, allergies, and asthma.¹⁷ Those already at highest risk—the poor, minorities, children, and older adults—will be even more vulnerable. Policy neglect would compound the problems. Hurricane Katrina revealed, to a horrified public, the disastrous results that can occur when nature (the sort of extreme storm that experts expect to occur more frequently as the earth’s temperature changes) combines with government disregard (in this case, the poorly maintained levees that failed to protect New Orleans from catastrophic flooding) as well as resource inequities (the lack of transportation, which made evacuation impossible for thousands of people).

The urgent need to reduce GHGs has catapulted transportation policy into the limelight. The United States has only about five percent of the world’s population but contributes nearly 25 percent of GHGs, mainly because of fossil fuel consumption, motor vehicle emissions, and industrial agricultural practices (which themselves are promoted by our transportation system).

Health Effects of Transportation Policy

Improving vehicle technology, while important, is not enough. Americans need to drive less. That will happen only if walking, bicycling, and public transportation become feasible, efficient alternatives to driving in many more communities, and if land use patterns are changed so people no longer have to jump in the car for every trip.

Physical Activity

Sixty percent of adults in the United States do not meet recommended levels of physical activity, and 25 percent are completely sedentary.¹⁸ African Americans and Latinos are less likely than whites to get enough daily physical activity.¹⁹ The links between physical activity and health are well established. Sedentary lifestyles are estimated to contribute to as many as 255,000 deaths each year.²⁰ Many children and teens are already at risk for heart disease and type 2 diabetes, once considered “adult” ailments. Today’s youth may turn out to be the first generation in modern history to live shorter lives than their parents.²¹

Physical inactivity is an important factor in the rising rates of obesity and chronic disease—and transportation practices strongly influence physical activity habits. The more time a person spends in a car, the more likely he or she is to be overweight. Conversely, higher rates of walking and bicycling are associated with lower rates of obesity. A 2004 study found that every additional hour spent in a car is associated with a six percent increase in the likelihood of obesity, and every additional kilometer walked is associated with a 4.8 percent reduction.²²

There are many ways to be physically active, but quite a few require time, skill, and money. Walking and bicycling not only for recreation but also for transportation are the most practical ways to improve fitness. They are often the only viable option for low-income residents who live in neighborhoods without parks, who cannot



afford gym memberships, and who do not have the luxury of leisure time.

People who use public transportation tend to walk to and from bus stops and train stations, increasing their likelihood of meeting physical activity recommendations.²³ Residents of compact neighborhoods walk, bike, and use public transportation more than residents of spread-out communities, and they have lower rates of obesity.

Mental Health

Rush-hour gridlock, long waits for the bus, and arduous commutes are stressful. They take time away from family, friends, and the activities that provide emotional sustenance: hobbies, religion, sports, clubs, civic engagement, and volunteer commitments. Every 10 minutes spent commuting is associated with a 10 percent drop in the time spent traveling for social purposes.²⁴

Many people find commuting by high-quality public transportation to be less stressful than commuting by car. As we discuss below, the financial costs associated with long commutes

exacerbate the stress, particularly in low-income households.

Safety

Traffic crashes are a leading cause of death and injury for Americans in the prime of life.²⁵ In 2000, motor vehicle crashes cost \$230.6 billion in medical costs, property damages, lost worker productivity, travel delays, and other expenses.²⁶ That figure equals about half of all spending on public education from kindergarten through 12th grade.

Native Americans die in traffic crashes at more than 1.5 times the rate of other racial groups.²⁷ African Americans drive less than whites but die at higher rates in car crashes. Walking, too, is also more dangerous in communities of color. CDC data in the mid-1990s revealed that the pedestrian death rate for Latino males in the Atlanta metropolitan area was six times greater than for whites.²⁸ African Americans make up 12 percent of the U.S. population but account for 20 percent of pedestrian deaths.²⁹

Inequitable transportation policies and resources contribute to these disparities. Low-income people and people of color have fewer resources to buy products that improve safety, such as late-model cars and new child safety seats. In underinvested neighborhoods, poorly designed streets, neglected road maintenance, inadequate lighting, limited sidewalks, and minimal traffic enforcement place residents at higher risk of injury.

Safety is also a huge concern for older adults—the fastest-growing segment of the population—and for rural residents. Driving skills decline with age, and frailty makes older adults especially vulnerable in a collision.³⁰ They are more likely to be killed or injured in a crash of a given severity than any other age group.³¹ Older adults also walk slower and are more susceptible to pedestrian injuries.

Although less than a quarter of all driving in the United States takes place in rural settings,³² more than half of all motor vehicle crashes occur there.³³

The more we drive, the more likely we are to get hurt or die in a crash; there is a strong positive relationship between per capita vehicle miles traveled and traffic casualty rates.³⁴ Communities with high annual mileage tend to have higher traffic death rates than communities where people drive less. Passengers on buses, light rail, and commuter rail have about one-tenth the traffic death rate as people in cars.

Investments in public transportation and walking and bicycling infrastructure can reduce injuries and deaths. Contrary to popular belief that more walkers and cyclists lead to more casualties, greater numbers of walkers and bicyclists actually decrease the risks.³⁵

Indirect Health Effects

Transportation is a lifeline. We depend on it to get to work, school, the doctor's office, the bank, the supermarket, the gym, or a friend's house. People without reliable, efficient, affordable ways to get around are cut off from jobs, social connections, and essential services. Access to transportation, to economic and social opportunity, and to resources for healthy living are inextricably linked. Gaps in all three areas feed on one another in complex ways. Policy reforms that put health equity objectives at the center of transportation planning and funding decisions can reduce these inequities.

Transportation, Income, and Health

As housing and jobs have moved farther apart, the distance has created employment barriers for anyone without unlimited ability to drive. Nineteen percent of African Americans and 13.7 percent of Latinos lack access to automobiles,

Health Effects of Transportation Policy

compared with 4.6 percent of whites. Poverty complicates the problem: 33 percent of poor African Americans and 25 percent of poor Latinos lack automobile access, compared with 12.1 percent of poor whites.³⁶ Cars owned by low-income people tend to be older, less reliable, and less fuel-efficient. This makes commuting to work unpredictable and more expensive, at best.

Income is an important determinant of health.³⁷ The association between poverty and poor health is well documented. Jobs with good wages, including those in the transportation sector, are essential to sustaining health.

Transportation impacts not only family earnings but also expenses. The cost of getting around takes a significant bite out of household budgets. The general standard holds that a family should spend no more than 20 percent of income on transportation, or the costs will eat into other necessities, such as nutritious foods and medical care.³⁸ The average family in the United States spends about 18 percent of after-tax income on transportation, but this varies significantly by income and geography. For example, low-wage households (earning \$20,000 to \$35,000) living far from employment centers spend 37 percent of their incomes on transportation.³⁹ In neighborhoods well served by public transportation, families spend an average of nine percent.⁴⁰

Older Adults and People with Disabilities

More than one in five Americans ages 65 and older do not drive because of poor health or eyesight, limited physical or mental abilities, concerns about safety, or because they have no car. More than half of nondrivers, or 3.6 million Americans, stay home on any given day—and more than half of that group, or 1.9 million, have disabilities.⁴¹ Isolation is especially acute in rural communities, sprawling suburbs, and black and Latino communities. Compared with

older drivers, older nondrivers take 15 percent fewer trips to the doctor; 59 percent fewer trips to shops and restaurants; and 65 percent fewer trips for family, social, and religious activities.⁴²

When affordable, high-quality public transportation and safe, walkable streets are available, older adults take advantage of them. More than half of older adults make walking a regular activity. More than half of older nondrivers in dense communities use public transportation at least occasionally, compared with one in 20 in spread-out communities.⁴³

The Americans with Disabilities Act (ADA) of 1990 significantly expanded transportation options for people with disabilities. ADA required public bus and rail operators to provide accommodations, such as lifts and ramps, to enable people in wheelchairs to ride. But street design in most communities makes traveling to and from bus stops challenging—and often unsafe—for people with disabilities. Paratransit systems, which use vans or shared taxis to transport people door-to-door, are helpful, but many systems are stretched thin and require appointments well in advance.

Conclusion

Transportation and health: until recently, policymakers, government officials, advocates, and indeed, most Americans thought of these as distinct realms. But research shows that how we get around and how we transport goods and services have a profound impact on individual, community, and public health. Further, inequities in transportation resources contribute to the pronounced health disparities in the United States and to the growing income gap between the affluent and the poor. An overarching transportation policy that does not seriously consider public health, environmental quality, and equitable access will inevitably damage all three. Health and equity must be at the center of transportation planning and investments.

Transportation Authorization 101: ch. 2 A Backgrounder

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ABSTRACT >> *For most people, federal policy seems removed from day-to-day life in their communities. But the federal surface transportation bill is a critical determinant of how our communities are formed, how they grow, and what types of transportation choices—if any—are available to us. Highways, rail systems, sidewalks, biking and walking paths, transit oriented development—all of these, and more—are shaped in large part by the federal transportation authorization. And federal transportation dollars are a major source of funding for states and metropolitan areas as they build new infrastructure and maintain existing transportation systems.*

This publication discusses the connections between transportation and health; the analysis and the recommendations focus on the upcoming authorization of the federal surface transportation bill as a key opportunity for promoting health and equity. This section orients readers to the bill by briefly describing what the legislation includes, how it is authorized, and by whom—naming key committees and policymakers. This chapter also explains how federal funding is allocated to states and metropolitan regions to pay for public transportation systems, highways, bridges, sidewalks, bike paths, and other transportation projects in our communities.

Transportation Authorization 101

Overview

Approximately every five years, Congress passes a new surface transportation bill and authorizes the U.S. Department of Transportation (DOT) to implement it. This bill sets federal transportation policy and designates transportation funding to states directly through formulas or through competitive grant programs for which states can apply. The programs and projects in the bill are funded through the Highway Trust Fund, which draws on a nationwide 18-cent per gallon tax on gas. The current law, passed in 2005, is called the *Safe, Accountable, Flexible, Efficient, Transportation Equity: A Legacy for Users*, or *SAFETEA-LU*. It represents a \$244.1 billion federal investment in transportation infrastructure. *SAFETEA-LU* is set to expire September 30, 2009, and Congress must authorize a new bill. A new bill may also be postponed through extension of *SAFETEA-LU* until lawmakers are prepared to pass a new bill.

This report intentionally uses the term *authorization* and **not** *reauthorization* when referring to the process of developing a new surface transportation bill. “Authorization” symbolizes the significant reform necessary in the existing bill to meet current and future needs of a changing and diverse U.S. population. Reform is long overdue. With imperatives such as climate change, growing rates of chronic diseases and health disparities, increasing poverty rates, and an economic downturn, transportation policy must connect with national priorities, consider its impacts on these critical issues, and help to significantly change them. A reauthorization of the current bill will not address these challenges. A new federal transportation policy is needed to align its goals and actions to national priorities, address critical issues facing Americans, and ensure accountability and equity.

SAFETEA-LU includes a whopping 108 programs, each with distinct funding allocations and eligible activities for which funding may be used. For example, the eligible activities for one

program, the Safe Routes to School Program, includes activities related to the planning, design, and construction of infrastructure projects that improve the ability of students to walk and bike to school; states can use a portion of the funds for noninfrastructure-related activities to encourage walking and bicycling to school. The overall goal of the program is to enable and encourage walking and bicycling to school in a safe and appealing manner.¹

An authorization establishes programs and sets ground rules under which the programs operate including the amount of funding available, how the funds are distributed, the length of time the funds can be used, and a list of eligible activities. Subsequent authorizations can change programs, eliminate programs, and create programs.

In the past several months, Congress and the DOT have been preparing to introduce a new federal surface transportation bill. Advocates have been gearing up to make sure this immense investment reflects the needs of *all* Americans. Right now is a crucial time to engage in transportation policy and to work to ensure that the policies and funding levels set for the next several years are aligned with important goals and ideals—health, safety, sustainability, economic opportunity, and equity.

The new bill could have enormous impacts on the funding available for various modes of travel as well as specific projects, thus influencing the decisions transportation planners and engineers make at the local level. For example, a region could expand a roadway instead of creating a subway system because there is more federal funding readily available for the highway project and the project evaluation and approval process for major transit investments is substantially more burdensome than the highway process. The federal pot of money for highway projects is far bigger than the pot available for public transportation. Currently, approximately 80 percent of federal transportation dollars go to the Federal Highway Administration (FHWA) as part of highway programs, while merely

one-fifth, or 20 percent, goes to the Federal Transit Agency (FTA) to be used for public transportation infrastructure. Only a very small portion of overall transportation funds are used for walking and biking infrastructure or other programs and most are administered through FHWA and FTA.

The first federal surface transportation bill, the *Federal Aid Highway Act* (popularly known as the *National Interstate Defense Highways Act*), was passed in 1956 as a means to fund a massive interstate highway system from coast to coast. Since the inception of the federal surface transportation bill, it has focused on highways as the key mode of travel. The 1991 surface transportation bill, the *Intermodal Surface Transportation Efficiency Act (ISTEA)*, critically shifted the focus of federal transportation policy. In addition to funding traditional highway and transit programs, *ISTEA* included money for projects aimed at improving air quality, reducing congestion, and providing pedestrian and biking infrastructure. It launched the beginning of a more environmentally sensitive and multi-modal approach to transportation planning.² While these laws made great strides at the time, we are far from implementing a truly multi-modal system where public transportation, walking, and biking are on equal footing with highways.

The next surface transportation bill must set about the urgent task of repairing and maintaining our transportation assets, building new transportation connections, and making our current system work more efficiently and safely to create complete and healthy communities that address the transportation needs of all communities. Modern and affordable public transportation, safe places to walk and bicycle, smarter highways that use technology to better manage congestion, land use policies that reduce travel demand by locating more affordable housing near jobs and services, and long-distance rail networks all have the potential to help us reduce our dependency on foreign oil, slow climate change, improve social equity, enhance public health, and fashion a vibrant new economy.

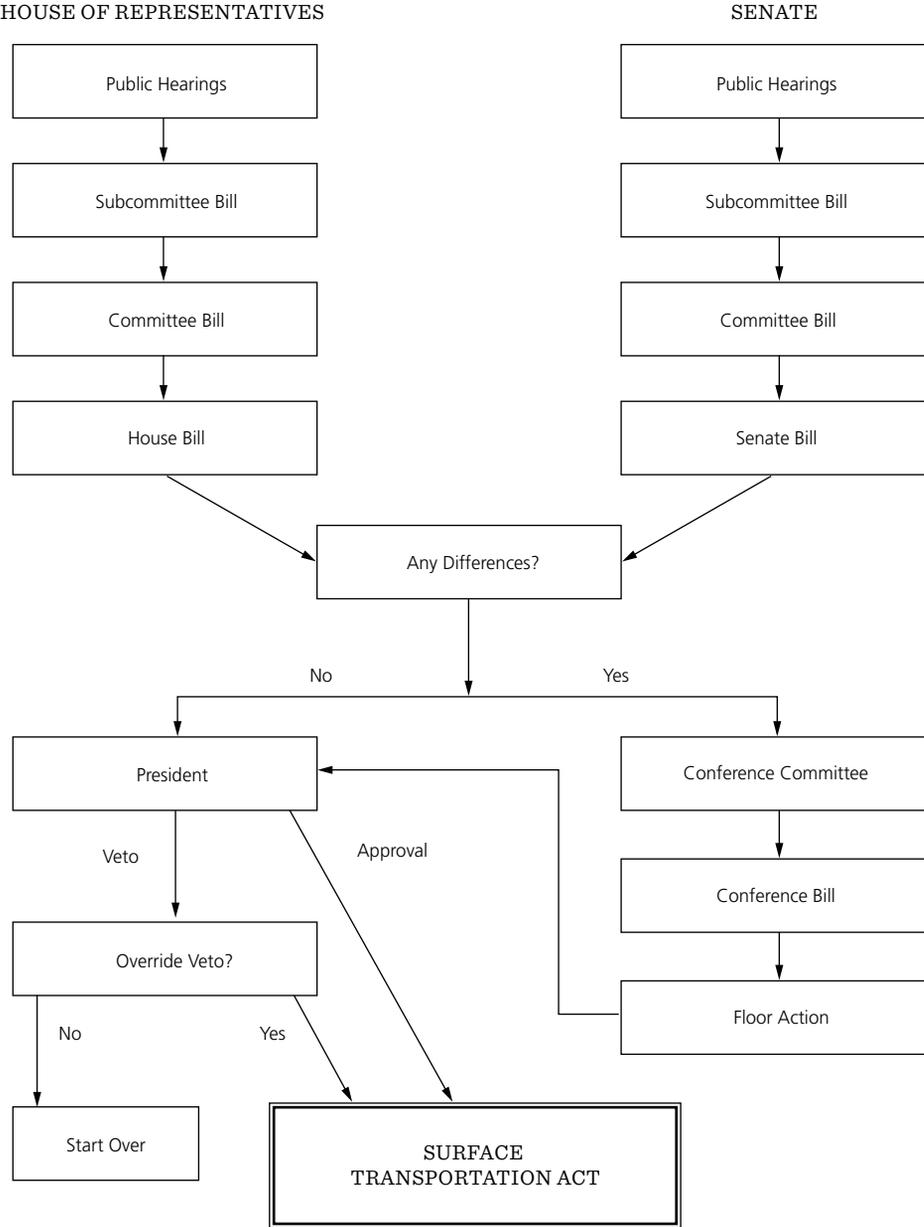
The Authorization Process

The U.S. Senate and the U.S. House each develops a transportation bill and then reconciles their differences before presenting a final bill to the president. In the House, the Transportation and Infrastructure Committee (T&I Committee), chaired by Rep. James Oberstar (D-MN), has primary jurisdiction over the bill. At time of printing, Chairman Oberstar has been working hard to write and pass a new bill with limited to no extensions to the current bill, SAFETEA-LU. Since SAFETEA-LU expires on September 30, 2009, some form of extension is likely to take place though it still remains unclear whether it will be a short extension or a longer 18-month extension as suggested by the administration.

The House T&I Committee has two counterparts in the Senate, where the jurisdiction is slightly more diffused. The Senate Environment and Public Works Committee (EPW Committee), chaired by Sen. Barbara Boxer (D-CA), has primary jurisdiction over the highway portion of the transportation bill, while the Senate Banking, Housing and Urban Affairs Committee (Banking Committee), chaired by Sen. Christopher Dodd (D-CT), has primary jurisdiction over public transportation portions. Both T&I, EPW and Banking have subcommittees focused on surface transportation that must develop and pass the first draft of the bill out of the subcommittees: the Highway and Transit Subcommittee of T&I, chaired by Rep. Peter DeFazio (D-OR); EPW's Transportation and Infrastructure Subcommittee, chaired by Sen. Max Baucus (D-MT), and the Banking Committee's Housing, Transportation and Community Development Subcommittee, chaired by Sen. Robert Menendez (D-NJ). Because of its financing mechanisms, the bill must also go through the House Ways and Means Committee, chaired by Rep. Charles Rangel (D-NY), and the Senate Finance Committee, chaired by Sen. Baucus. Other committees are also involved on the Senate side to a lesser degree. The following diagram traces the path of the transportation bill

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Diagram 1. *Surface Transportation Bill Authorization Process through Congress*



Source: Chart from Federal Highway Administration, <http://www.fhwa.dot.gov/reports/financingfederalaid/authact.htm>.

through Congress.

At each level of deliberation—whether subcommittee, committee, or floor—there is an opportunity to educate policymakers and their staff about the connections among transportation, equity, and health and to propose recommendations that will benefit the American public. While all representatives are important when the bill hits the floor of the Senate and House, key committee members are particularly influential in how the bill develops. Each subcommittee and committee has numerous representatives who can weigh in. Members of Congress are elected to serve us, the American people, and they often look to their various constituencies for advice. Advocates on Capitol Hill are making their interests known, and those outside of the nation’s capital are building coalitions, calling their elected representatives, and setting up appointments to voice their needs. The time to act is now.

Federal Oversight and Administration

The U.S. Department of Transportation and its implementing agencies—including the Federal Transit Agency, the Federal Highway Administration, and the National Traffic Highway Safety Administration—administer the funds authorized by the surface transportation bill.

The Highway Trust Fund (HTF) is the primary funding source for transportation. Like other federal trust funds the HTF is a financing mechanism to account for taxes collected by the federal government which are earmarked for a specific purpose or program. Initially, the HTF funded highways only. Later, Congress established that a portion of the funds should be used for public transportation creating the Mass Transit Account as part of HTF in 1983. Currently the Mass Transit Account receives 2.86 cents out of the 18 cent per gallon gasoline tax.³ Recently the HTF has not collected

enough revenue from the gas tax to cover the expenditures it supports. Congress has supplied funds from the general treasury to stop the gap, but this is not a sustainable solution. Congress and advocates are exploring new revenue streams to close the immense funding shortfalls. These include indexing the gas tax to inflation, imposing user fees such as toll or congestion pricing, or levying a sales tax on oil. Financing is an important debate, given the regressive nature of some forms of taxation and fees and the public’s resistance to raising taxes.

At the national level, there are three broad categories of federal transportation funding—highways, public transportation, and highway and motor vehicle safety. Each of these categories represents funding from numerous programs. Walking and biking infrastructure is not listed as a category because it is only a sliver of overall federal transportation spending, primarily through the Transportation Enhancements Program.

Most of the money from the surface transportation bill is distributed to states in two ways—through formula grant programs and through competitive grant programs. Formula-funded programs are by far the largest portion of this funding. The Surface Transportation Program (STP)—the largest program authorized in the surface transportation bill, which many call the highway program—allocates funds directly to state Departments of Transportation using the following formula:

- 25 percent based on total lane miles of federal-aid highways
- 40 percent based on vehicle miles traveled on lanes of federal-aid highways
- 35 percent based on estimated state contributions to the Highway Account⁴

This program therefore rewards states and regions that drive more, build more highways, and use more gas—a combination that does little

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to promote health and environmental quality.

Another significant formula-funded program is the Urbanized Area Formula Grants Program (also called the Large Urban Cities Program), which allocates funds used for public transportation. Urbanized areas of 200,000 or more receive this money directly instead of having the funds go through state departments of transportation. The funds are distributed based on the following formulas:

For areas of 50,000 to 199,999 in population, the formula is based on population and population density. For areas with populations of 200,000 and more, the formula is based on a combination of: (1) the distance in miles that a revenue vehicle (a vehicle that is charging a fare) is operated while it is available for passenger service (also called bus revenue vehicle miles), (2) bus passenger miles, (3) revenue vehicle miles that run along exclusive or controlled rights-of-way or rails (also called fixed guideway revenue vehicle miles), (4) the number of miles of exclusive or controlled right-of-ways or rails for transit (also called fixed guideway route miles), and (5) population and population density.⁵

The Urbanized Area Formula Grants Program provides funds for public transportation, both rail and bus service. Transit dollars are explicitly prohibited from being used for operations in jurisdictions of 200,000 people and above. Therefore, most federal transit dollars can only be used on capital expenditures and not on operations. Many transit operators have huge gaps in their budgets and are raising fares and decreasing services—often at the same time—to stay afloat; many transit-dependent populations are suffering from this combination. Cutting routes that many residents depend on can create a situation where people cannot get to work or access goods and services. Raising fares particularly hurts low-income people who comprise the majority of the transit-dependent population. Many find themselves struggling even more to budget their transportation costs.

Another important formula program, the Highway Safety Improvement Program, is allocated via formula. The program was specifically created to improve highway safety. Funds are distributed to states based on the following three factors, all of which are weighed equally: (1) lane miles of Federal-aid highways, (2) vehicle miles traveled on Federal aid-highways, and (3) the number of fatalities on the Federal-aid system.⁶ Thus, the program awards more money to states which drive more, have more highways and more fatalities.

Some programs allow, encourage, or require a portion of the formula funds to be used for specific programmatic goals. For example, the Transportation Enhancements Program (TEP) is allocated using a portion of STP funds. TEP requires the use of a small percent of STP dollars for 12 eligible activities of which walking and biking infrastructure is a significant portion.

Competitive grants are also available for which states and locales can compete. These programs include money for specific program goals. For example, the Job Access and Reverse Commute Program (JARC) provides funding for projects that specifically help connect low-income workers to job centers.⁷ Another key example of competitive grant programs is the New Starts Program. This is the federal government's primary financial resource for supporting locally planned, implemented, and operated major transit capital investments. It funds new and extensions to commuter rail, light rail, heavy rail, bus rapid transit, streetcars, and ferries, among others.⁸ Local entities must match the dollars provided by the Program. While the federal portion of the match can be up to about 80 percent, in reality locales have paid about 50 percent for projects funded by New Starts due to the high demand for this program and the competitive nature of funding. This adds a high financial burden on locales to support the creation of new transit projects.

State and Local Oversight

Federal dollars typically require a match by states or local agencies. The exact requirement of matching funds for competitive grants and formula grants varies by program.

Generally, transportation projects have been funded accordingly:

- Highways: 25 percent federal, mostly for capital investments; 50 percent states, for capital and maintenance; remaining 25 percent local governments⁹
- Transit: 25 percent federal, for largely capital investment; the remaining funds are split, 70–80 percent funded directly from transit users and local governments for operational costs; the remaining 20–30 percent is provided by state governments.¹⁰

At the local level, metropolitan planning organizations (MPOs) share \$300 million a year in federal transportation funds. MPOs make policy at the regional level and work with state transportation agencies and regional officials to develop regional transportation plans. MPOs' composition varies significantly from region to region, with representatives from local government, transportation authorities, and other stakeholders. About 385 MPOs operate in the United States. MPOs are required for urbanized areas with populations of more than 50,000 residents. The U.S. Secretary of Transportation can also designate transportation management areas (TMAs) for metropolitan areas with populations greater than 200,000.

While the needs of rural communities have been somewhat overlooked in transportation planning and decision making, rural planning organizations (RPOs)—consisting of networks of local planners, officials, and other stakeholders—do exist in smaller communities.



Transportation Authorization 101

RPOs are not federally mandated. State DOTs control planning and project selection outside of MPO areas. Therefore, rural areas have very little say in how transportation investments are made in their communities. Previous transportation bills provided some flexibility for transferring funds and suballocating dollars to cities and regions, but they lacked federal direction on what kind of national objectives should be promoted through these investments. Local and regional empowerment has been stunted in most states, given the lack of authority at the regional or local level in the project selection process or the direct funding allocation decision making. The impending bill should seek to provide direction on national objectives and create opportunities for appropriate ways to empower regional and local decision making that is equitable and provides a voice for all residents.

A Time for Reform

There is no doubt that the U.S. transportation system critically needs reforming. Many of the most pressing issues and challenges our nation faces today—obesity, air quality, climate change, congestion, energy independence, lack of access, and sprawl—are linked to transportation.

Public health and equity advocates have vital roles to play among the many partners who will shape this new system. In fact, *all* of our transportation policies, programs, and decisions should be steeped in the understanding that safety, health, equity, and well-being of the general public is a *national* priority, that public health and equity must always be considered when creating transportation policy. National transportation objectives are being considered in the next surface transportation bill. Objectives would guide transportation investments to correspond with national goals of environmental quality, safety, equity and public health. National objectives also improve accountability of transportation investments by setting performance measures which help eliminate disparate funding between modes and ensure the country's transportation system helps America move towards a healthy and sustainable future.

The coming authorization of the federal surface transportation bill affords the crucial opportunity to help shape and, more importantly, reform our transportation system. And this time around: *public health and equity considerations must not be confined to a small number of specialty program areas; they should be an overriding theme throughout **all** transportation programming.*

How we get around—in cars or on foot, by bus, bicycle, light rail, or commuter train—affects public health, environmental quality, economic vitality, and social equity. The following section examines specific surface modes of transportation that have significant potential to improve health, reduce emissions, and increase access to jobs and other opportunities, particularly in underserved communities. These travel options also hold enormous opportunity for reform through the upcoming authorization of the federal surface transportation bill.

TRANSPORTATION OPTIONS

The chapters in this section cover:

>> **Public transportation**

>> **Walking and bicycling**

>> **Roadways**

While modes of travel are important to highlight in debates over the bill and in the national priorities it will ultimately reflect, federal transportation policies and funding should not fall into mode silos. Rather, policies and funding should be driven by performance measures that hold states and locales accountable for creating transportation systems that promote health, environmental quality, and opportunity for all.

Modes of travel should not compete with one another. Instead, each mode should be placed on equal footing to allow American cities and towns to incorporate and connect various modes of travel in order to meet the needs of diverse and changing populations.

Public Transportation and Health

ch. 3

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ABSTRACT >> *Improving public transportation service, encouraging its use, and integrating it into community development plans can make Americans healthier by reducing per capita automobile travel and associated risks, increasing walking and cycling activity, and improving mobility for disadvantaged people. Conventional transportation policies and planning practices tend to favor the automobile. Various reforms can help create more efficient and equitable transportation systems that, among other benefits, help improve public health. This paper investigates these issues, examines the role public transportation plays in an efficient and equitable transport system, and presents specific recommendations for transportation and land use policies to help achieve public health objectives.*

Public Transportation and Health

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Introduction

Public transportation (also called *public transit* and *mass transit*) refers to various services using shared vehicles to provide mobility to the public, including buses, trains, and shared taxis. High-quality and affordable public transportation can help achieve various public health and equity goals by reducing traffic fatality rates, reducing air pollution emissions, increasing physical fitness, and improving nondrivers' access to elemental goods and services—fresh, healthy food and healthcare—and reducing financial burdens on low-income households. In addition, public transportation can bolster a community's quality of life by easing traffic congestion, energy costs, and pollution. Consequently, policies and investments that improve public transportation can be considered win-win strategies, providing diverse benefits and attracting broad support from a variety of interest groups.

However, current policies and planning practices fail to support public transportation to the degree justified by these benefits. Current evaluation practices overlook many benefits of public transportation, including many health benefits, and transportation financing systems provide inadequate funding. Without policy and planning reforms, public transportation will fail to provide its full potential benefits.

This paper examines the role public transportation plays in an efficient transportation system, the health benefits that can accrue from such a system, and models for creating a more equitable community by reforming transport policies and planning practices.

Public Transportation's Roles

Public transportation plays multiple roles in an efficient and equitable transportation system. It provides basic mobility for people who cannot use or access an automobile; it provides

efficient transportation on major urban corridors; and it serves as a catalyst for more compact, walkable communities, called transit oriented development.

Public transportation consists of:

- **Heavy rail**—relatively large, higher-speed trains, operating on separate rights-of-way, with infrequent stops, providing service between communities.
- **Light-rail transit**—moderate-size, medium-speed trains, operating mainly on separate rights-of-way, with variable distances between stations, providing service within an urban area.
- **Bus rapid transit**—bus systems with premium features, including grade separation, quick boarding, and frequent service.
- **Express commuter bus**—direct bus service from residential to employment areas.
- **Conventional urban bus transit**—medium- and full-size buses on fixed route, scheduled service.
- **Mini bus**—smaller buses or large vans used for public transportation.
- **Demand response paratransit**—small buses or vans that provide direct (door-to-door) service, often intended primarily for people with disabilities.

Each type of public transportation has its niche. Bus rapid transit and light-rail transit are the most appropriate on major urban corridors connecting large activity centers. Express commuter service is most appropriate on longer-distance commuter corridors with large employment centers (such as between suburbs and downtown). Conventional buses are most appropriate on urban and suburban roadways. Demand response is most appropriate in lower-density areas as well as for serving people with special needs.

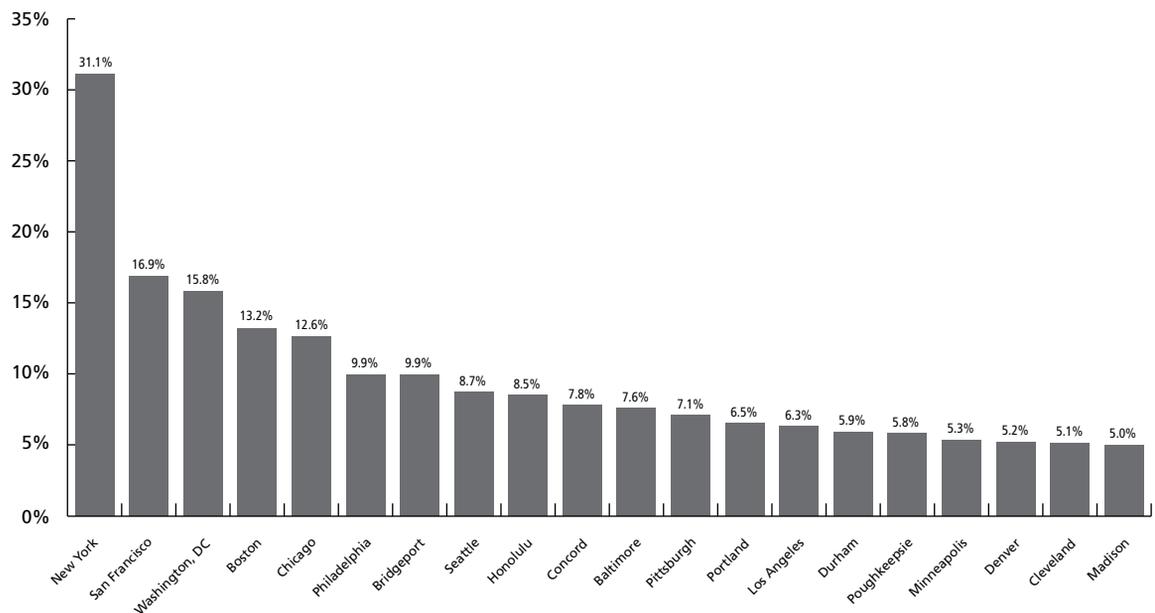
Public Transportation and Health

Although public transportation accounts for only a small portion of total travel in North America, it accommodates trips that are particularly important and costly to serve by other modes. In big cities, public transportation typically serves five to 15 percent of all commutes (figure 1) and as much as 20 to 60 percent of trips to major activity centers such as downtowns and university campuses. It provides mobility to people who are physically, economically, and socially disadvantaged and who would otherwise need to walk, bicycle, pay for a taxi, or simply not travel, sometimes to critical activities such as a doctor’s appointment, work, or school.

bus service that is convenient, fast, comfortable, and affordable) reduces automobile travel directly, by attracting travelers who would otherwise drive, and indirectly, by serving as a catalyst to help create more compact, walkable communities where residents drive less and rely more on alternative modes.² These indirect, or *leveraged*, impacts often produce bigger results: studies indicate that each passenger-mile traveled in quality public transportation reduces the number of automobile vehicle-miles traveled by two to nine automobile vehicle-miles.³ As a result, residents of communities with access to good public transportation systems tend to drive 20 to 40 percent fewer annual miles than they would if they lived in more automobile-dependent communities.⁴

High-quality public transportation (either rail or

Figure 1. *Transit Commute Mode Split in Selected Cities*¹



Although transit serves only a small portion of total travel, it serves a significant portion of urban trips.

Table 1. *Transit Level-of-Service Indicators*⁵

Feature	Description	Indicators
Availability	Where and when transit service is available	<ul style="list-style-type: none"> • Annual service-kilometers and service-hours per capita • Daily hours of service
Frequency	Frequency of service and average wait time	<ul style="list-style-type: none"> • Trips per hour or day • Headways (time between trips) • Average waiting times
Travel speed	Transit travel speed	<ul style="list-style-type: none"> • Average vehicle speeds • Transit travel speed relative to driving speed for the same trip
Reliability	How well service actually follows published schedules	<ul style="list-style-type: none"> • On-time operation • Portion of transfer connections made
Boarding speed	Vehicle loading and unloading speed	<ul style="list-style-type: none"> • Dwell time (time spent waiting at a stop or station) • Boarding and alighting speeds
Safety and security	Users' perceived safety and security	<ul style="list-style-type: none"> • Perceived transit passenger security • Number of accidents and injuries • Reported security incidents
Price and affordability	Fare prices, structure, payment options, ease of purchase	<ul style="list-style-type: none"> • Fares relative to average incomes • Fares relative to other travel mode costs • Targeted discounts or exemptions as appropriate • Payment options (cash, credit cards, etc.)
Integration	Ease of transferring between transit and other travel modes (bus, train, ferry, airport, etc.)	<ul style="list-style-type: none"> • Quality of transit service to transport terminals • Ease of accessing transit service information from transport terminals
Comfort	Passenger comfort	<ul style="list-style-type: none"> • Seating availability and quality • Space (lack of crowding) • Quiet (lack of excessive noise) • Temperature (neither too hot nor too cold) and air quality • Cleanliness
Accessibility	Ease of reaching transit stations and stops	<ul style="list-style-type: none"> • Transit oriented development • Distance from transit stations and stops to destinations • Walkability in areas serviced by transit
Baggage capacity	Accommodation of baggage	<ul style="list-style-type: none"> • Ability to carry onboard baggage, including special items such as pets • Ease and cost of carrying on baggage

Public Transportation and Health

Table 1 continued

Feature	Description	Indicators
Universal design	Accommodation of diverse users, including people with special needs	<ul style="list-style-type: none"> • Accessible design for transit vehicles, stations, and nearby areas • Accommodation for people with limited language ability
User information	Ease of obtaining user information	<ul style="list-style-type: none"> • Availability, accuracy, and understandability of route, schedule, and fare information • Real-time transit vehicle arrival information
Courtesy and responsiveness	Courtesy with which passengers are treated	<ul style="list-style-type: none"> • How passengers are treated by transit staff • Ease of filing a complaint • Responsiveness with which complaints are treated
Attractiveness	The attractiveness of public transportation facilities	<ul style="list-style-type: none"> • Attractiveness of vehicles and facilities • Attractiveness of documents and websites • Quality of nearby buildings and landscaping • Parks and recreational areas accessible by transit • Provision of public art
Marketing	Effectiveness of efforts to encourage using public transportation	<ul style="list-style-type: none"> • Popularity of promotion programs • Effectiveness at raising the social status of transit travel • Increase in public transportation ridership in response to marketing efforts

This table summarizes various factors to consider when evaluating public transportation services.

There are many ways to improve transit service and increase ridership (table 1). For instance, in the short-term, it is often possible to add new routes, increase service frequency, improve security, offer fare discounts, provide new amenities such as on-board refreshments and wireless Internet service (particularly for longer-distance express commuter service), and provide incentives such as parking cash out (offering commuters who currently receive subsidized parking the option of choosing its cash equivalent if they use alternative modes) and other rewards. In the medium-term, it is often possible to accelerate transit travel speeds,

increase reliability, improve stops and stations, provide real-time vehicle arrival information, upgrade vehicles for smoother and quieter rides, make trips more comfortable through better temperature control and fresh air, and provide park-and-ride facilities. In the long-term, it is often possible to create more transit oriented development so that more destinations (homes, worksites, and recreation and cultural centers) are located along major transit routes, with convenient pedestrian and bicycle access.

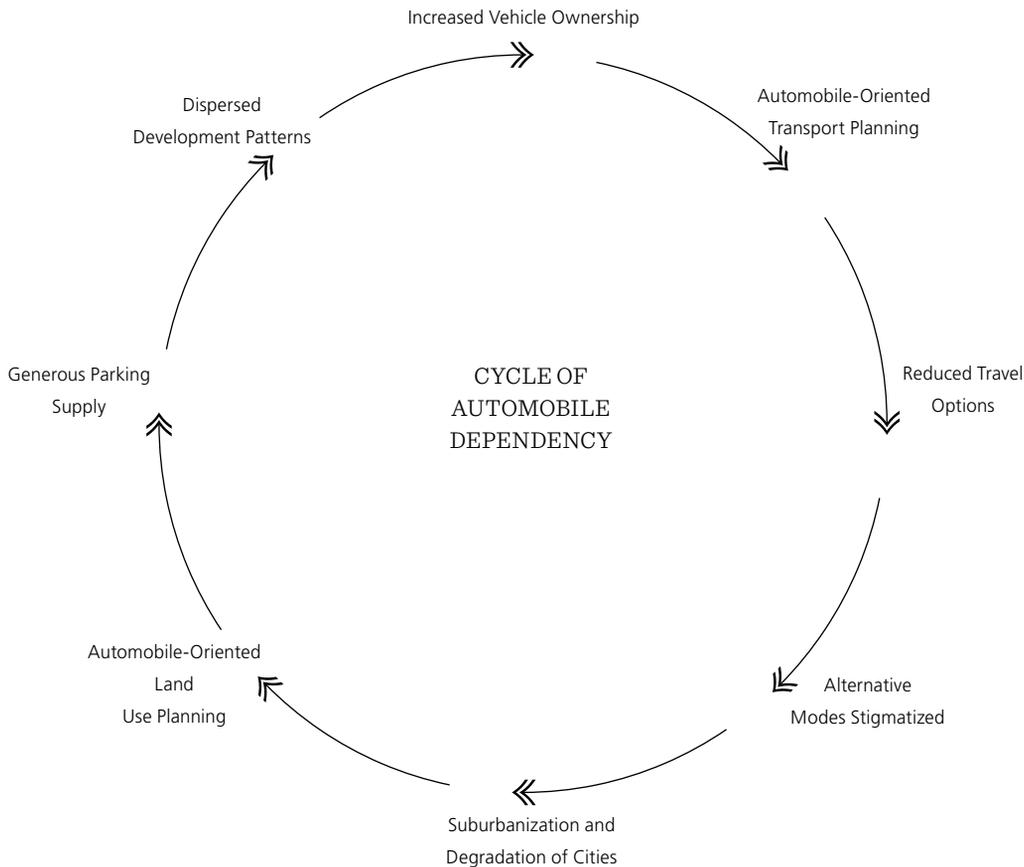
People sometimes mistakenly assume that these strategies are only feasible in large cities, but

some alternative modes are suitable for use in suburban and rural areas.⁶ These include ridesharing (car- and vanpooling), demand response transit (shuttle vans and buses that operate on flexible routes to provide door-to-door service in more dispersed areas), improved walking and cycling facilities (such as wider road shoulders and separated paths), telework (use of telecommunications as a substitute for physical travel, such as improving Internet networks and having more online public services in rural areas), and delivery services.⁷ Rural and suburban areas can become more accessible and multi-modal by encouraging village

development, where shops, public services, and housing (particularly for older adults and other nondrivers) are located close together and served by regional public transportation.

Improving and encouraging public transportation is a timely issue. During the past century, transportation planning focused primarily on cars, and transit systems were evaluated primarily in terms of automobile travel speed, affordability, and safety. Transportation improvements consisted primarily of building more roads and parking facilities. Planners barely considered other modes, which were

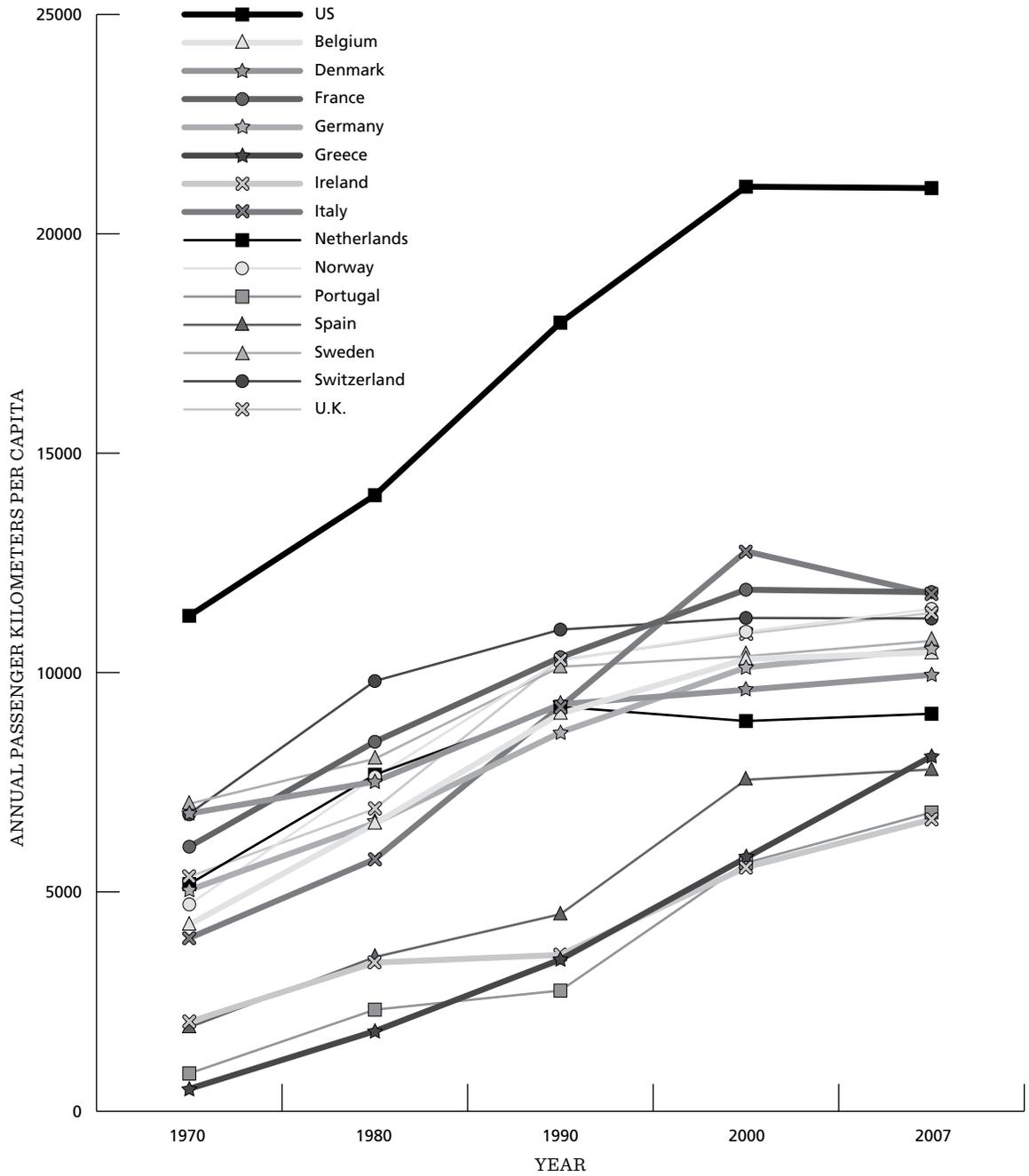
Figure 2. *Cycle of Automobile Dependency and Sprawl*



This figure illustrates the self-reinforcing cycle of increased automobile dependency and sprawl.

Public Transportation and Health

Figure 3. *International Vehicle Travel Trends*⁸



Per capita vehicle travel grew rapidly between 1970 and 1990 but has since leveled off in most OECD (Organizations for Economic Cooperation and Development) countries and is much lower in European countries than in the United States.

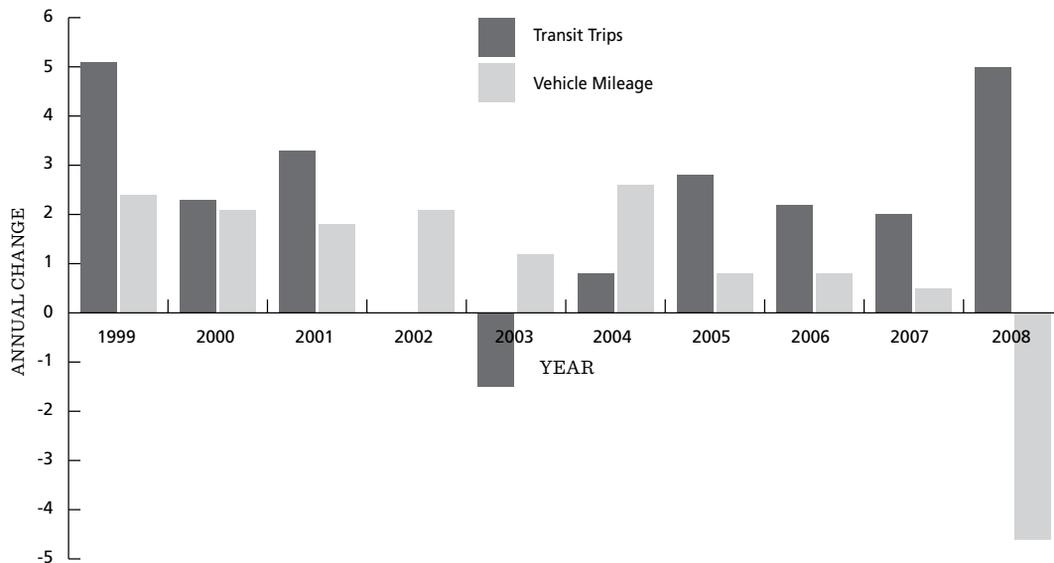
considered of declining relevance in a culture increasingly dependent on automobile travel. The result was a self-reinforcing cycle of increasing automobile dependency and sprawl, as illustrated in figure 2.

But per capita automobile travel has peaked and has recently started to decline slightly in most economically developed countries, as illustrated in figure 3.

These changes reflect demographic and economic trends that are reducing demands for automobile travel and increasing demands for alternative modes⁹:

- **Increasing health and environmental concerns.** Numerous individuals, organizations, and jurisdictions are now committed to reducing pollution and increasing physical fitness.
- **Aging population.** As the baby boom generation retires, per capita vehicle travel will decline and their demand for alternatives will increase.

Figure 4. *Annual Change in Transit and Vehicle Travel*¹⁰



Transit trips increased more than vehicle mileage during seven of the last 10 years.

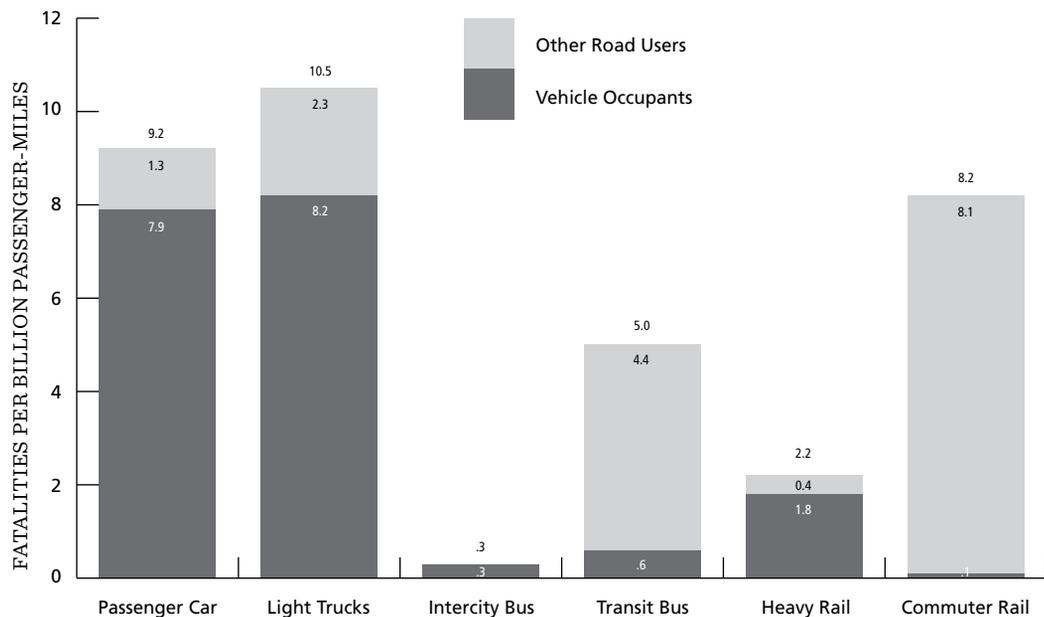
Note: Annual percent change in 2002 was zero. Therefore the chart does not include a visible bar for transit trips.

Public Transportation and Health

- Uncertain future fuel prices.** This uncertainty increases demand for energy-efficient travel options and more accessible, multi-modal locations for homes and businesses.
- Increasing urbanization.** An increasing portion of households are choosing to live in existing cities, and many suburbs are becoming more urbanized. This increases demand for urban modes (walking, bicycling, and public transportation).
- Increasing traffic congestion and roadway construction costs.** This increases the relative value of alternative modes that reduce congestion.
- Shifting consumer preferences.** Various indicators suggest that an increasing number of consumers prefer living in more densely populated urban neighbourhoods and using multiple modes of travel.

As a result of these shifts, public transportation travel grew more than automobile travel during seven of the last 10 years and each of the last four years, as illustrated in figure 4. During this period, transit travel increased 24 percent compared to a 10 percent increase in automobile vehicle miles traveled. Many transit systems now carry their maximum capacity during peak periods, constraining further growth. Increasing capacity and improving service quality would allow further growth in

Figure 5. *Transport Fatalities*¹³



Public transportation travel has lower crash rates than automobile travel, taking into account risks to all road users.

public transportation ridership and additional reductions in automobile travel.

There is also growing demand for housing in multi-modal communities.¹¹ The 2004 *American Community Survey* found that consumers place a high value on urban amenities such as shorter commute time and neighborhood walkability. Sixty percent of prospective homebuyers surveyed indicated that they preferred a neighborhood that offered sidewalks, a shorter commute, and amenities such as shops, restaurants, libraries, schools, and public transportation over more sparsely populated areas with larger lots but longer commutes and poorer walking conditions.¹²

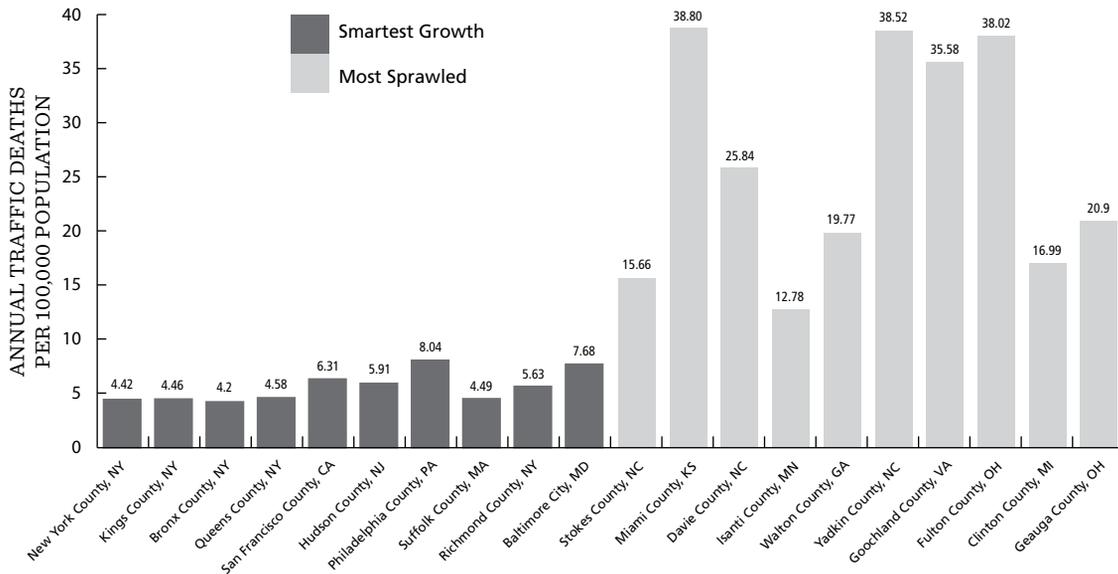
Public Transportation Health Impacts

This section describes ways that improving public transportation can help achieve health objectives.

Traffic Crashes

Public transportation is relatively safe, as indicated in figure 5. Transit vehicle occupants have about one-tenth the fatality rate as car occupants, and even considering the risk to other road users, public transportation causes fewer than half the total deaths per passenger-mile as automobile travel.

Figure 6. *Annual Traffic Death Rates*¹⁵



The smartest growth counties in the United States have one-fifth of the average per capita traffic fatality rate as the most sprawled counties.

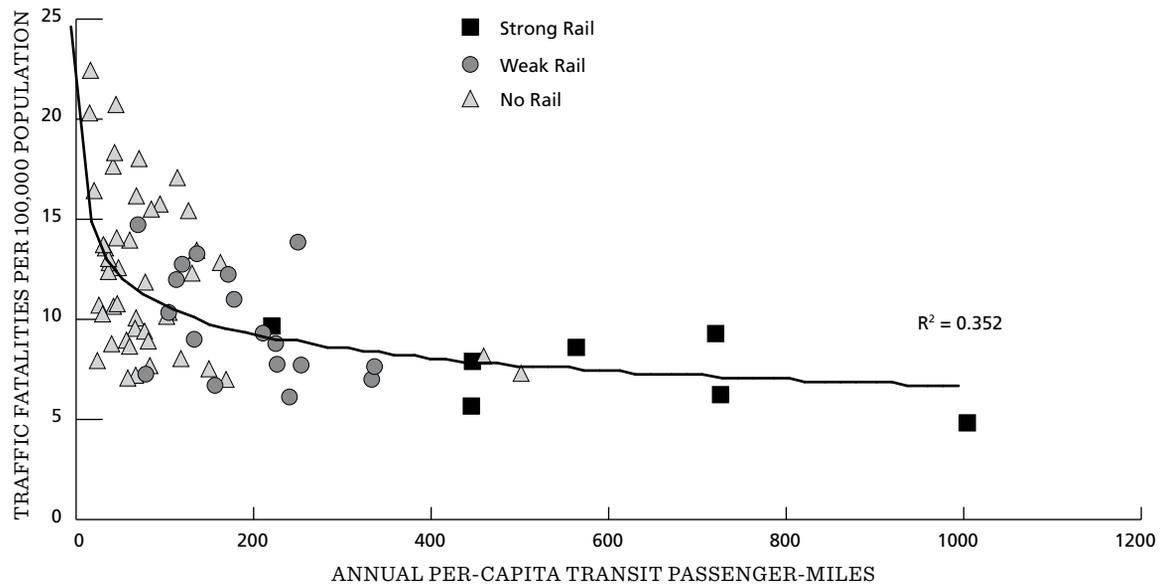
Public Transportation and Health

High-quality public transportation provides even greater safety benefits than indicated by these distance-based fatality rates because it tends to leverage additional reductions in per capita vehicle travel. People who live or work in transit oriented areas tend to drive less (due to more accessible, multi-modal community design), drive at lower traffic speeds (due to more compact development), and do less high-risk driving (for example, teenagers are less likely to have a driver's license and own a vehicle).¹⁴ As a result, such communities have about one-fifth of the total per capita traffic fatality rate as sprawled, automobile-dependent communities, taking into account all traffic deaths, including risks to pedestrians, bicyclists, and public transportation travelers (figure 6). Traffic deaths

are a subcategory of violent deaths and overall, urban residents have significantly lower rates of violent deaths, even taking into account homicide risk.¹⁶

Per capita traffic fatalities decline as transit ridership increases in a community, as indicated in figure 7. The reduction in per capita crash rates is much larger than the reduction in per capita mileage in these cities, reflecting the combined effects of various transportation and land use factors associated with transit oriented development that increase safety, as previously described.

Figure 7. *U.S. Traffic Deaths*¹⁷



Per capita traffic deaths (including transit and automobile occupants as well as pedestrians) tend to decline with increased transit ridership and are particularly low in cities with strong rail transit systems.

Pollution Emissions

A second category of transport-related health impacts involves vehicle pollution emissions, including tailpipe emissions; also included are emissions from fuel production and distribution (“upstream” emissions), hot soak (evaporative emissions that occur after an engine is turned off), and particulates from road dust, brake linings, and tire wear.¹⁸

Many factors affect vehicle pollutant human health impacts, including emission rates per vehicle mile, per capita mileage, and exposure (the number of people located in areas where emissions are concentrated). Motor vehicle air pollution is estimated to cause a similar order of magnitude of total premature deaths as traffic crashes, although the victims tend to be older; thus air pollution causes smaller reductions in Potential Years of Life Lost (PYLL) than traffic crashes.¹⁹

Public transportation tends to produce less pollution per passenger-mile, particularly electric-powered trains and newer buses with state-of-the-art engines. And, as previously discussed, transit oriented development tends to reduce automobile travel and, therefore, emissions. On the other hand, older diesel buses tend to have high emission rates; public transportation tends to concentrate activity close to roadways; and bus depots are often located in low-income communities. Consequently, in some situations, increased transportation service and transit oriented development may *increase* human exposure to harmful air pollutants such as particulates and carbon monoxide unless implemented with bus emission reduction programs.

Physical Activity and Fitness

Another category of health impacts concerns the effects transport has on physical activity and fitness.²⁰ Public health officials have become increasingly alarmed about declining physical fitness, increasing body weight, and

resulting increases in diseases associated with a sedentary lifestyle.²¹ There are many ways to be physically active, but many, such as team sports and gym exercise, require special time, skill, and expense, which discourage consistent, ongoing participation. Many experts believe that increasing community walking and bicycling (together called “active transportation”) are the most practical ways to improve public fitness, particularly for vulnerable populations—children, older adults, and people with low incomes who may be unable to participate in structured exercise programs due to financial and time constraints.²²

Public transportation and active transportation tend to be complementary: most public transportation trips involve walking links; transit oriented development includes walking and biking improvements; and efficient transit systems incorporate amenities such as bike racks on buses and bike lockers at transit stations.²³ As a result, increased transit travel tends to increase physical activity.

The National Household Travel Survey (NHTS) indicates that people who use public transportation on a particular day spend a median of 19 minutes daily walking to and from transit, and 29 percent achieve 30 minutes of physical activity during transit access trips—much higher than the rates by nontransit users.²⁴ Using pedometers and surveys to track walking activity, Wener and Evans found that train commuters walked an average of 30 percent more steps daily, more frequently reported walking for 10 minutes or more, and were four times more likely than automobile commuters to achieve the 10,000 steps daily recommended for fitness and health.²⁵

Similarly, a travel survey conducted in Atlanta, GA, found that public transportation users are more likely to walk, to walk longer average distances, and to meet recommended physical activity targets by walking than nontransit users.²⁶ The study revealed that the chance a person meets minimum walking targets (2.4

Public Transportation and Health

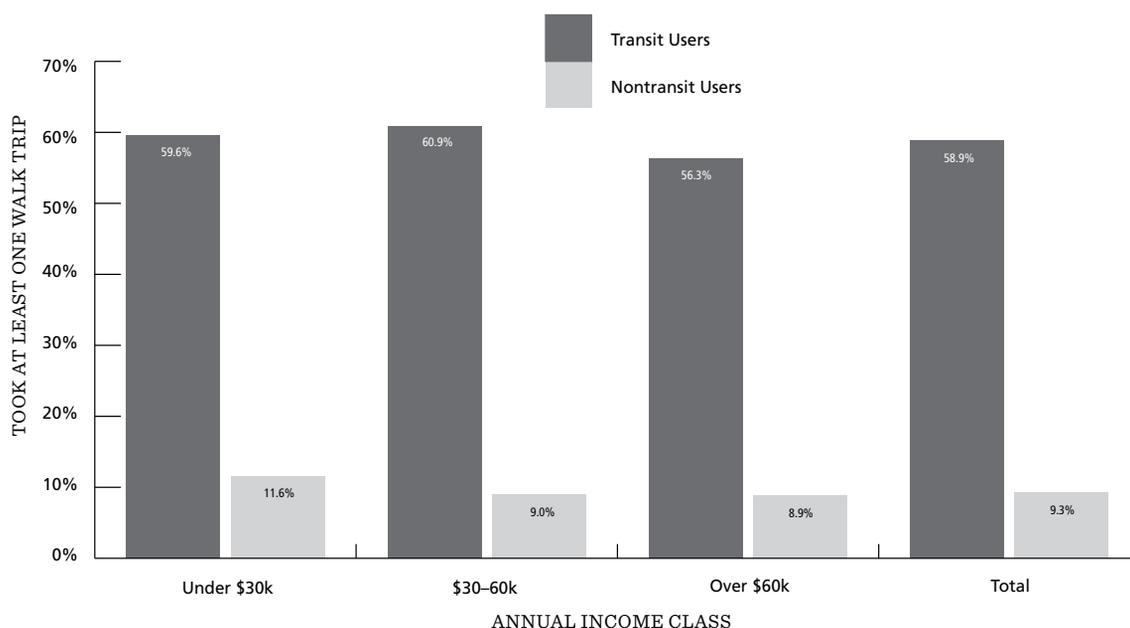
kilometers walked daily) increases by 3.87 for each transit trip taken and is 2.23 times greater for commuters who use an employer-sponsored public transportation pass. Public transportation travel increased walking activity for all income classes, as illustrated in figure 8, indicating that encouraging transit travel can support public health for a variety of demographic groups.

Residents of transit oriented communities tend to walk more and have lower rates of obesity and hypertension than residents in sprawled areas. A recent study collected transportation mode split and obesity rate data for various economically developed countries, as summarized in table 2 and figure 9. Two important points are illustrated: travel

patterns are highly variable, even among similar countries, and national obesity rates tend to be inversely related to rates of active transportation (walking and biking), suggesting that transport policy affects public fitness and health.

As a result, policies and planning practices that support public transportation tend to increase public fitness and health. Sturm estimates that shifting from a sprawled area such as San Bernardino, CA, to a areas which reflect smart growth principles such as Boston, MA, reduces chronic medical conditions about 16 percent, with greater reductions for older adults and low-income people because they tend to be most sedentary.³⁰

Figure 8. *Daily Walking Trips and Transit Travel*²⁷



Public transportation users are much more likely to take walking trips and walk much farther than nontransit users.

The total health costs that result from inadequate physical activity are far greater than those from traffic crashes. Cardiovascular diseases cause about 10 times the loss in productivity as do road crashes, and sedentary living contributes to a variety of other health problems—hypertension, non-insulin-dependent diabetes, colon cancer, osteoarthritis, osteoporosis, and probably depression. Even modest reductions in these illnesses could provide large health benefits. However, it is difficult to determine how a particular transportation policy will affect these diseases overall because it depends on the ability of otherwise sedentary people to increase their physical activity. The Health Benefits Economic

Model provides a methodology for valuing the health benefits of more active transportation.³¹

Community Cohesion

Community cohesion refers to the quantity and quality of positive interactions among residents in a local community.³² It affects human health in various ways, including the mental health benefits of friendly social interactions and the health benefits of increased neighborhood security.³³ Although many demographic and geographic factors affect neighborhood interactions, cohesion tends to increase with walkability and local services.³⁴ High-quality public transportation and transit oriented

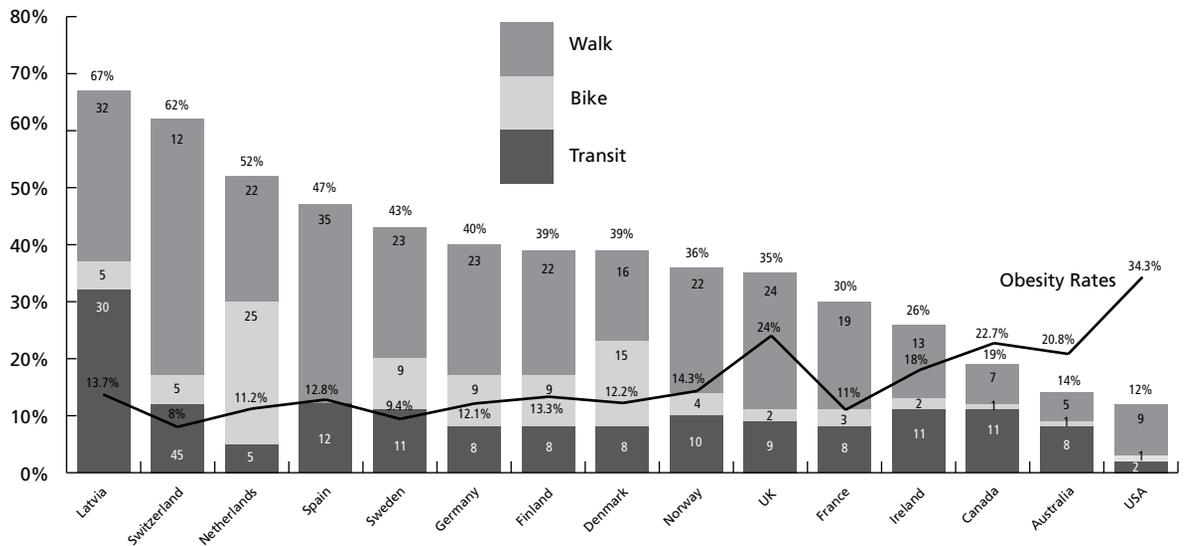
Table 2. *Personal Travel Mode Split of Various Countries*²⁸

Country	Year	Transit	Bike	Walk	Obesity Rates*
Latvia	2003	32%	5%	30%	(13.7%*)
Switzerland	2005	12%	5%	45%	8%
Netherlands	2006	5%	25%	22%	8.1% (11.2%*)
Spain	2000	12%	N/A	35%	12.8%
Sweden	2006	11%	9%	23%	9.4%
Germany	2002	8%	9%	23%	12.1%
Finland	2005	8%	9%	22%	13.3%
Denmark	2003	8%	15%	16%	12.2%
Norway	2001	10%	4%	22%	14.3%*
U.K.	2006	9%	2%	24%	24%*
France	1994	8%	3%	19%	11%
Ireland	2006	11%	2%	13%	18%
Canada	2001	11%	1%	7%	15.2 (22.7%*)
Australia	2006	8%	1%	5%	16.2% (20.8%*)
U.S.	2001	2%	1%	9%	34.3%*

* Combined male and female obesity prevalence based on body mass index (BMI). Values in parentheses are from national health examination surveys. Other values are based on self-reported weight and height.

Public Transportation and Health

Figure 9. *Mode Split vs. National Obesity Rates*²⁹



This data set indicates that transportation mode split is highly variable, even among economically developed countries, and national obesity rates are inversely related to rates of active transportation (walking and bicycling).

development can increase community cohesion by creating opportunities for residents to interact while walking, waiting at transit stops, and riding on transit vehicles. Further, they reduce total automobile traffic, which improves the public realm, for example, by reducing traffic noise on sidewalks and front yards.³⁵ This can increase connections and contacts among dissimilar groups, helping to bridge social distance and widening opportunities by introducing disadvantaged children to more affluent families and broadening the pool of role models and mentors available to low-income youths.³⁶ Long-term social and economic benefits can result by increasing educational and

employment opportunities and reducing crime and dependence on social assistance.

Mental Health Impacts

Public transportation improvements such as increased service, improved climate control, more comfortable waiting conditions, and improved service reliability can improve mental health by reducing physical and emotional stresses (crowding, fear, and frustration), increasing affordability (and therefore reduced financial stress), influencing access to education and employment activities (and therefore long-term economic opportunities), and helping

to create more walkable communities, which increases physical activity and fitness.³⁷ With high-quality service, many commuters find public transportation less stressful than driving.³⁸ These mental health benefits are difficult to quantify but potentially large.

Basic Mobility

Basic mobility refers to people’s ability to access services and activities that society considers *basic* or *essential*, including medical and dental services, food and other basic goods, banking, education, and employment opportunities.³⁹ Basic mobility is important for physical and mental health and is a critical equity objective. Public transportation provides basic mobility and accessibility, including access to medical services, affordable and healthy food, education, and employment. Inadequate transport options can result in patients missing appointments, which can exacerbate medical problems and waste medical resources, or force patients or medical service providers to pay for more costly transport services such as taxis.⁴⁰ One survey found that four percent of U.S. children (3.2 million in total) either missed a scheduled healthcare visit or did not schedule a visit during the preceding year because of transportation restrictions.⁴¹ Although it is difficult to quantify the ultimate health benefits from basic mobility provided by public transportation, anecdotal evidence suggests that these impacts can be significant.

Policy Opportunities and Barriers

As noted, alternative modes—walking, cycling, and public transportation—can provide many economic, social, and environmental benefits. Yet current policy analysis and planning practices tend to undervalue alternative

modes and thus provide less support for and investment in them than is optimal.⁴² Some specific ways that alternative modes are undervalued are described below.

Conventional transportation planning analysis tends to focus on a limited set of impacts and objectives and overlooks others, as summarized in table 3. The impacts that conventional planning focuses on most—travel speed, congestion, and vehicle operating costs—tend to favor automobile transportation. Many benefits of public transportation, such as basic mobility for nondrivers and parking cost savings, are generally overlooked in conventional policy and planning analysis. Some of these omissions reflect the difficulty of quantifying impacts such as equity and sprawl costs, but others (parking costs and mileage-based depreciation, for example) are ignored simply out of tradition.

For example, when comparing highway expansion projects with public transportation improvements, conventional planning generally ignores the effects of generated traffic (the additional peak-period vehicle travel that results if congested roads are expanded), additional downstream congestion (additional traffic on surface streets), parking costs, vehicle ownership costs, traffic accidents, energy consumption, and pollution emissions—all costs that can be reduced if improved service allows the same trips to be made by public transportation. In addition, conventional analysis assumes that everybody (or, at least, everybody who matters) has a vehicle and can drive and thus assigns no explicit value to improving mobility for nondrivers.

Conventional analysis assigns no value to the fitness, health, and enjoyment benefits of increased walking and cycling activity⁴⁴; conventional planning analysis would recognize

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the value of a motor vehicle trip to a gym to allow passengers to exercise on a treadmill, or to a park to walk or bike on public paths, but would not recognize the value of being able to walk or bike, rather than drive, for local errands.

Conventional planning tends to evaluate transport system performance based on the speed, convenience, and affordability of automobile travel, using indicators such as roadway level of service, average traffic speeds, congestion delay, parking supply per 1,000 square feet of building floor area, crash risk per 100 million vehicle-miles, and vehicle operating costs (particularly fuel costs). Comparable indicators are not usually provided for alternative modes, so it is more difficult to identify walking, cycling, and public transportation problems

as well as opportunities to improve these modes. For example, urban transportation models are often used to produce maps that show roadway congestion delays, indicated by roadway level-of-service grades from A to F, but no comparable indicators are provided for walking, cycling, and public transportation problems, putting these modes at a competitive disadvantage for investment.

This type of analysis often implies that public transportation investments are not cost effective, but this results, in part, from biases in conventional traffic models that tend to exaggerate the benefits of highway expansion and understate the benefits of improving alternative modes, particularly high-quality public transportation.

Table 3. *Scope of Conventional Planning Analysis* ⁴³

Usually Considered	Often Overlooked
Financial costs to governments	Downstream congestion impacts
Travel speed (reduced congestion delays)	Generated traffic impacts
Vehicle operating costs (fuel, tolls, tire wear)	Nondriver mobility, convenience, and comfort
Per-mile crash risk	Transportation diversity value (e.g., mobility for nondrivers)
Project construction environmental impacts	Parking costs
	Vehicle ownership and mileage-based depreciation costs
	Project construction traffic delays
	Total energy consumption and pollution emissions
	Strategic land use objectives
	Per capita crash risk
	Impacts on physical activity and public health
	Some travelers' preference for transit (lower travel time costs)

Conventional transportation planning tends to focus on a limited set of impacts, exaggerating the benefits of highway expansion and undervaluing transit improvements.

Transportation financing is also biased in favor of roadway improvements. A major portion of transportation funding is legally or practically restricted to automobile facilities and cannot be used to improve public transportation services, even when such improvements are more cost effective and beneficial overall.⁴⁵ Thirty of the 50 states have constitutional amendments that limit fuel tax revenue to be spent only on highways, and most zoning codes require developers to provide generous amounts of vehicle parking—a large subsidy of driving that is difficult to convert into transit subsidy, even if preferred by some travelers (a concept called *parking cash out*). More neutral financing (sometimes called *least cost planning*) tends to increase funding for alternative modes and mobility management strategies.

Current transportation markets are further distorted in favor of automobile travel by underpricing. Although automobiles are expensive to own, they are relatively cheap to drive because most of the costs are either fixed or external. This gives motorists an incentive to drive more annual miles than optimal. An efficient transportation market would require increased road, parking, and fuel prices, along with distance-based insurance and registration fees, which would significantly increase the marginal cost of driving, particularly under urban peak conditions.

Together, these planning and market distortions increase automobile travel beyond what is economically optimal, reduce use of alternative modes, and stimulate more dispersed, automobile-oriented land use development. Described differently, with more optimal transport planning and pricing, consumers would choose to drive less, rely more on alternative modes, select more multi-modal communities, and be better off overall as a result.⁴⁶ Although it is difficult to predict the exact magnitude of these changes, they are likely to be large, particularly over the long-term.

Recommendations

Various transportation policy and planning reforms can improve public safety, fitness, and health by creating more efficient and multi-modal transportation systems where people drive less and rely more on alternative modes.⁴⁷ Improved public safety, fitness and health are just three of many possible justifications for these reforms: they would help solve a variety of transportation problems, they reflect market principles and so increase economic efficiency, and they respond to changing consumer demands.⁴⁸

The following are specific policies and planning strategies that can help create more diverse, more efficient, and healthier transportation systems:

- **Educate decision makers** concerning the relationships among transportation, land use, and public health; the full benefits of a more diverse, less automobile-dependent transportation system; and the trends that are changing future travel demands and strategic objectives.⁴⁹ These all tend to increase the value of alternative modes, mobility management solutions, and smart growth land use development.
- **Create a strategic vision** of a more efficient and diverse transportation system and supportive land use development to accommodate changing demands and planning objectives, including public health objectives. This vision, which should be created by the federal government, should guide individual transportation and land use policies and planning practices, such as how transportation system quality is evaluated and how transportation funding is allocated.
- **Increase public transportation funding for capital and operation costs.** Transportation funding practices that currently favor investments in roads and parking facilities should be changed to allow significant new investments

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in public transportation. For example, economic stimulation and other economic development funds should be invested in public transportation. Transportation funds currently dedicated to roadways should be spent on public transportation improvements whenever it is more cost effective overall, taking into account *all* benefits and costs. Similarly, resources currently spent by governments and developers on parking facilities should be reinvested in public transportation whenever it is a cost-effective way to provide access. New funding sources should be developed to help finance public transit improvements, including parking taxes, congestion pricing, local property taxes, land value capture, and dedicated sales taxes.⁵⁰ Higher levels of government (federal and state) should provide grants that leverage additional regional and local match funding. Regional and local governments must create stable sources of transit funding through dedicated fuel, sales, property, and parking taxes.

- **Improve public transportation affordability.** Insure that public transit services are affordable, particularly for lower-income users. This may include targeted discounts and exemptions, and research to identify better ways to meet the mobility needs of economically, physically and socially disadvantaged people.
- **Establish transportation and land use** policies that support *transit oriented development* so that more people are able to live and work in areas with high-quality public transportation services, good walking and biking conditions, compact and mixed land use development, and other supportive features.
- Implement transportation and land use policies that **increase housing affordability** in transit oriented communities.⁵¹ This includes changing development practices to encourage development of more compact and *diverse* housing types (small-lot single-family, townhouses, multi-family, etc.) with

unbundled parking in transit-rich, walkable areas with mixed land use and appropriate public services (schools, shops, parks, etc.), and employment.⁵² Public infrastructure investments and housing subsidies should be structured to support these objectives.

- **Improve walking and bicycling conditions** and promote active transportation. Encourage transportation professionals to recognize the importance of walking as a transport mode and to develop tools for evaluating the full benefits of improved walking and biking conditions and increased active transportation. Improve walking and bicycling access to transit stops and stations. Have bike racks on buses and trains, *bike parking* at stations, and bike rental services. Promote “walk and bike to school” and community walking and cycling events.
- Work to **integrate affordable housing and affordable transportation** so that physically, economically, and socially disadvantaged households can live in accessible, multi-modal communities. This requires a suitable mix of housing (affordable and subsidized housing included), public services (stores, medical and dental clinics, schools, parks, etc.), and high-quality public transportation located within convenient walking distance, with universal design features to ensure that everybody (including people using wheelchairs, walkers, pushing strollers, and hand carts) can easily travel to common destinations.
- Develop and apply **multi-modal level-of-service standards** to evaluate the service quality of various modes, including walking, biking, public transportation, taxi, car-sharing, and telecommunications within a community. Transportation agencies and professionals should use these to identify mobility and accessibility problems, particularly for the most vulnerable populations (children, older adults, people with disabilities, people with low incomes, immigrants, etc.).



- Apply **least-cost planning** so that transportation improvement resources (public funds and land) are invested in the most cost-effective improvements and consider all impacts and objectives, including public health objectives. Allow funds currently dedicated to roads and parking to be used for alternative modes and management strategies when they are more beneficial overall or support strategic planning objectives.
- Implement **mobility management strategies and programs** that encourage the use of alternative modes, such as efficient road and parking pricing, distance-based vehicle fees, and commute-trip reduction programs. Implement these in conjunction with transit service improvements.
- Develop and apply more **comprehensive transportation planning tools** for evaluating transit service quality, transportation affordability, basic mobility, equity, affordability, and public health impacts.
- Sponsor research to **improve public transit vehicles** so that they are quieter, smoother, more spacious, climate controlled, less polluting, and easier to board; they should accommodate people with disabilities and offer amenities such as wireless Internet service. Give transit priority in traffic (bus lanes and signal control systems).
- Sponsor research and development to **improve transit stops and stations** so that they are more spacious, more comfortable, and safer; they should include amenities such as washrooms and refreshments.
- Develop **convenient, integrated fares** (for example, one payment system that can be used on various public transportation systems within a region) using electronic payment systems.
- Improve **transit user information and marketing**, such as real-time vehicle arrival signs, better-way finding, and culturally appropriate promotion programs.
- Apply **more efficient parking management**, such as efficient sharing, regulation, and pricing of parking facilities. Apply more flexible and reduced minimum parking requirements in transit oriented areas, particularly to increase housing affordability.
- **Build coalitions** involving public health and safety advocates and other interest groups that can benefit from transportation policy and planning reforms creating more efficient and diverse transportation systems—existing transit and community advocacy groups, transportation professionals, environmental organizations, local public officials, and economic development advocates. Use these coalitions to create the political support needed to achieve this vision.

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Table 4. *Healthy Transportation Policy Implementation*

Reforms and Actions	Leaders	Federal Legislative Role
Educate decision makers	Professional and advocacy organizations	Support policy analysis, research, and information sharing
Create a strategic vision	All levels of government; professional and advocacy organizations	Establish a national vision and encourage other levels of government to develop complementary visions
Increase public transportation funding	All levels of government	Change transport funding to support public transportation, increase federal funding for public transportation programs, and use federal policies to leverage funding by other levels of government
Insure public transport affordability	All levels of government	Provide funding, research and other support to insure that transit service is affordable and responds to the needs of disadvantaged people.
Support transit oriented development	All levels of government; transportation and land use planning agencies and professions	Change transport and land use policies to support transit oriented development and smart growth
Improve walking and cycling conditions	All levels of government; transportation and land use planning agencies and professions	Change transport funding and planning practices to support active transportation and walkable community development
Integrate affordable housing and affordable transportation	All levels of government	Change transport and housing policies to support development of affordable housing in transit oriented areas
Apply multi-modal level-of-service standards	All levels of government; transportation agencies and professions	Change transport funding and planning practices so they are based on multi-modal performance evaluation
Apply least-cost planning	All levels of government; transportation agencies and professions	Change transport funding and planning practices to allow alternative modes and mobility management strategies to be funded whenever they are most cost effective, considering all impacts and objectives
Implement mobility management strategies and programs	All levels of government; transportation agencies and professions	Change transport funding and planning practices to support mobility management whenever it is cost effective, considering all impacts and objectives; support pricing reforms such as increased fuel taxes, road pricing, and distance-based insurance and registration fees

Reforms and Actions	Leaders	Federal Legislative Role
Develop more comprehensive transportation planning tools	All levels of government; transportation agencies and professions	Support research for more comprehensive transport planning tools
Improve transit vehicles	Vehicle engineers, manufacturers, transit agencies, and governments	Support research; develop procurement guidelines
Improve transit stops and stations	All levels of government; transportation and land use planning agencies; private companies; and developers	Support innovative design and business models; support transit oriented development
Develop convenient, integrated fares	Regional governments and transit agencies	Support research, design, and implementation
Improve transit user information and marketing	Regional governments and transit agencies	Support research, design, and implementation
Apply more efficient parking management	All levels of government; transportation and land use planning agencies; private companies; and developers	Support transit oriented development and smart growth; provide incentives for local and regional governments to implement parking management
Build coalitions	Professional and advocacy organizations	N/A

This table indicates how various stakeholders can help implement transportation policy reforms to improve public fitness and health. Public transit improvements can play a key role in many of these strategies.

Implementing these reforms will require action by various stakeholders, including federal, state, regional, and local governments, as well as diverse interest groups and advocates. Federal legislation can help support many of these reforms and actions by providing guidance and incentives. Such leadership and guidance can significantly accelerate the implementation of these reforms and avoid conflicts between existing and desired transportation policies. Table 4 indicates the level of government,

organization, or interest group that can provide leadership for implementing these recommendations and outlining the role of federal legislation.

Convergence Opportunities

Many interest groups and organizations with a wide range of objectives and perspectives have reasons to support policies to create a more efficient and diverse transportation system.

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This diverse interest offers an opportunity to build broader support for transit investments and supportive transportation and land use policies. For example, this is an ideal time to create collaborations among existing public transportation and community advocacy groups (wanting to achieve equity objectives), transportation professionals (wanting to reduce problems such as traffic and parking congestion), environmental organizations (wanting to reduce energy consumption, pollution emissions, and land use damages), local public officials (wanting to support urban redevelopment), senior advocacy groups (wanting to improve mobility options for nondrivers, to increase affordability, and to provide practical ways for older Americans to safely exercise), and health professionals (wanting to improve public fitness and health).

To fully achieve the potential benefits of high-quality public transportation, these diverse interest groups will need to overcome cultural and practical barriers. For example, correcting existing policy and planning biases that favor mobility over accessibility and automobile transportation over other modes will probably require a combination of professional education, planning agency reforms, and political advocacy to change laws and funding practices. No single interest group can achieve all these changes, but a collaborative effort can succeed.

Public transportation improvements can play a much greater role in creating a more diversified and efficient transportation system than indicated by its relatively modest share of total travel. High-quality public transportation often provides a catalyst for creating a more diverse transportation system and accessible, multi-modal land use development. Public transportation travel both supports and is supported by walking and biking trips. As a result, public transportation improvements can leverage large reductions in automobile travel and increases in walking and cycling activity.



The involvement of health professionals can significantly improve the chances for success because they can contribute a new sense of urgency, expertise, and leadership into transportation and land use policy reform debates. Previous public health successes, such as reduced tobacco use and increased breastfeeding, can provide models.

Conclusion

Transportation planning decisions impact public health in various ways: by affecting traffic risk, pollution exposure, physical activity and fitness, community cohesion, mental health, basic mobility, and affordability. Communities where people drive less and rely more on alternative modes are healthier places to live and work, particularly for physically, economically, and socially disadvantaged people. Transportation policy and planning reform improvements can play a significant role in creating healthier communities. High-quality public transportation (convenient, comfortable, frequent, fast, reliable, and safe) provides significant direct benefits when people shift from automobile to transit for individual trips. It provides even larger indirect benefits by providing a catalyst for development of more accessible, multi-modal communities where people own fewer



automobiles; drive less; and rely more on walking, biking, and public transportation for utilitarian trips and recreation.

This is a timely issue. Current demographic, economic, and market trends are reducing the demand for automobile travel and increasing the demand for alternative modes. This is not to suggest that Americans will give up driving altogether; but at the margin, that is, relative to current travel patterns, many people would prefer to drive less and rely more on alternative modes, provided that these alternatives are convenient, comfortable, safe, and affordable. This means that many consumers will choose healthier transport habits if given appropriate options, including high-quality public transportation and accessible, multi-modal communities.

Current transportation and land use planning practices favor automobile transportation and undervalue alternative modes and smart growth development. Various transportation policy and planning reforms can help achieve public health and social equity objectives by helping to create more diverse and efficient transportation systems. More comprehensive analysis is needed that accounts for the additional indirect costs of policy and planning decisions that increase automobile travel and sprawl and the additional indirect benefits of more compact, walkable, and transit oriented communities. Current funding is inadequate, causing public transportation service quality to decline and fares to increase in many communities. Budgeting practices must be reformed to provide adequate, reliable funding to ensure high-quality and affordable public transportation services. Land use development policies should change to better support smart growth and reduce sprawl.

These reforms are justified for a number of reasons, due to the diverse economic, social, and environmental benefits provided by public transportation improvements. When all impacts are considered, improving public transportation may be among the most cost-effective ways to improve public health, and improving public health is one of the best reasons to improve public transportation.

Walking, Bicycling, and Health

ch. 4

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ABSTRACT >> *Walking and bicycling are efficient modes of travel and effective forms of exercise. Starting with the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991, the federal government has provided various forms of financial support for non-motorized transportation, but increasing walking and bicycling without increasing fatalities and injuries requires more than the limited federal resources to date. State, regional, and local policies determine the extent to which communities capitalize on the federal programs to expand walking and bicycling and help close the gap in health disparities between low-income communities and their more affluent neighbors. To increase non-motorized modes of travel—travel by walking and bicycling—safely, the authorization of the next federal transportation bill should:*

- *Assist: by providing state, regional, and local governments with the tools they need to plan for non-motorized travel*

- *Enable: by making it easier for state, regional, and local governments to spend federal funding on non-motorized modes*

- *Encourage: by providing incentives for state, regional, and local governments to pay more attention to non-motorized modes*

- *Require: by putting in place policies that compel state, regional, and local governments to improve conditions for non-motorized modes*

Increased walking and bicycling would yield many health benefits and reduce disparities in health for low-income communities and others. The federal transportation bill can establish policies that will help to achieve the goal of increasing walking and bicycling safely.

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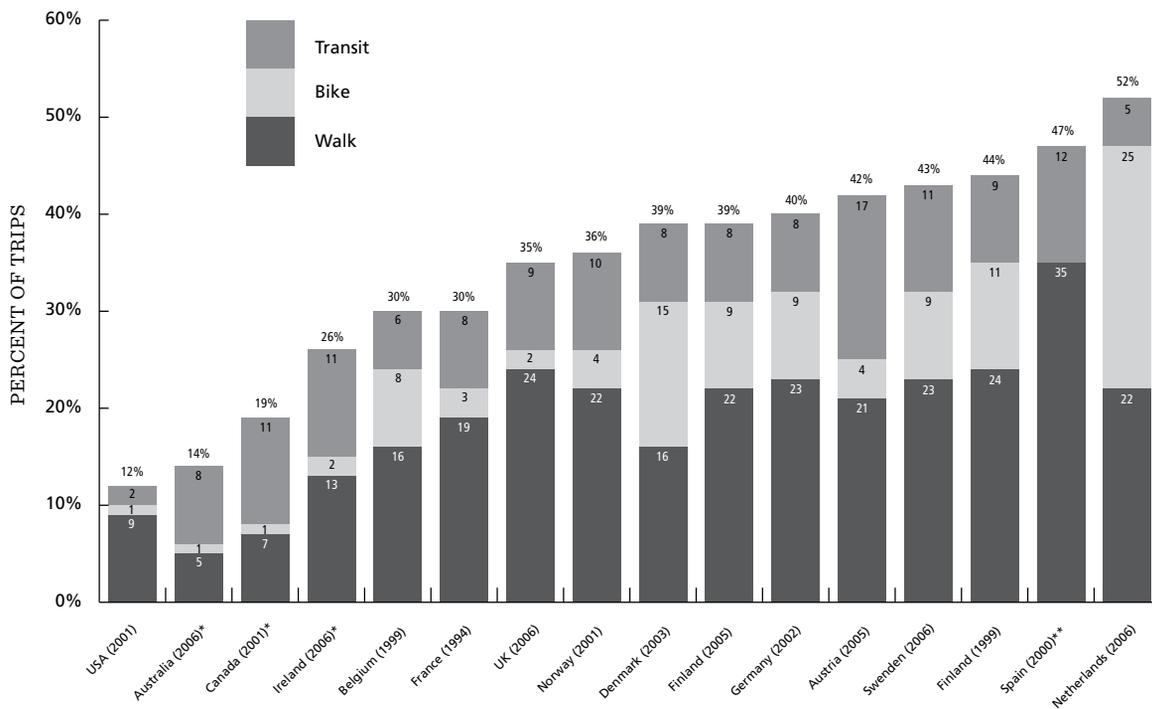
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Introduction

Walking and bicycling as modes of transportation—known as “non-motorized” or, more recently, “active” travel—are low-cost, low-polluting, calorie-burning, health-improving alternatives to driving. Despite these advantages, non-motorized modes represent a small share of all travel in the United States, or fewer than 10 percent of all daily trips in urban areas as of 2001.¹ Increasing this number, without a congruent increase in fatalities and injuries, would yield considerable benefits, especially among low-income communities and people of color, the young and older adults, by helping to close wide gaps in health in this country. But what policies would achieve this aim?

For guidance, we can look to other developed countries, where rates of walking and bicycling are significantly higher than in the United States, particularly in Denmark, Germany, and the Netherlands (figure 1). We can also look to communities in the United States, where bicycle commuting is significantly more common than the national average of less than one percent of workers (figure 2). Common to these places is a supportive environment combined with a population motivated to walk and bicycle. These conditions have not come about by chance; they are the outcome of aggressive policies that address both environment and motivation.³

Figure 1. *Share of Trips by Walking, Bicycling, and Transit, by Country* ²



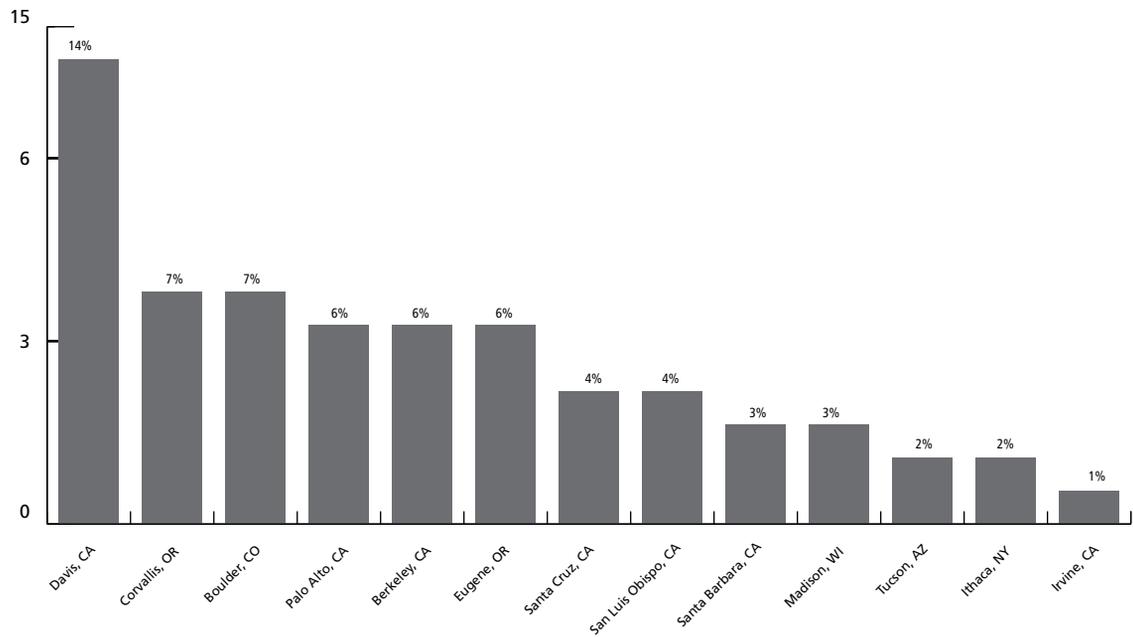
*work trips only

**walk and bike combined for Spain

Source: J. Pucher and L. Buehler, “Making Cycling Irresistible,” 2008.

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Figure 2. *Percent Usually Bicycling to Work in Selected U.S. Cities, 2000*



Source: 2000 U.S. Census, as compiled by the author.

A concerted and sustained effort is required to motivate people to walk and bike more and make their environment more conducive to doing so. The quality of the pedestrian and bicycle environment depends on several elements (see table 1), including land use patterns, network configuration, and facility design, all of which play an important role and are shaped by public investments and development policies over time. Natural features, particularly weather and topography, are also important, though obviously beyond the direct reach of policy. Motivation to

walk or bicycle also depends on personal characteristics—ability, comfort, confidence, habits, and perceptions—that can evolve over one’s lifespan but may also be modified by targeted intervention programs. Community norms also affect individual motivation but may be difficult to shift. Despite the challenges, a growing number of cities have demonstrated that it is possible to assemble a cost-effective package of policies, projects, and programs addressing both environment and motivation that significantly increases non-motorized travel.⁴

Table 1. *Factors Influencing Non-motorized Travel*

Category	Factor	Definition	Importance
Environmental	Land use patterns	The arrangement of land uses such as housing, shops, offices, etc., across the community	Determines the straight-line distance among different activities, such as housing, shopping, and offices
	Network structure	The layout of streets and trails throughout the community	Determines how direct the connections from one place to another are and thus influences the travel distance
	Facility quality	Characteristics of streets, including presence of sidewalks and bike lanes, widths, pavement conditions, crosswalks, signals, etc.	Influences how comfortable, safe, and attractive it is to walk or bicycle that route
	Natural features	Topography, weather, scenery	Influences the energy needed to walk or bicycle as well as comfort and enjoyment
Motivational	Individual factors	Ability, experience, comfort level, confidence, preferences, habits, etc.	Influences the willingness and desire of an individual to walk or bike
	Community norms	Social acceptability of bicycling, dominant attitude toward bicycling, bicycling culture	Influences the willingness and desire of an individual to walk or bike

Two converging forces make this the right time to elevate non-motorized modes of travel. First, with health, economic, and environmental concerns on the rise, there seems to be a renewed interest in bicycling as evidenced by increased attention in the popular media. Second, Congress is now considering the authorization of the federal transportation bill, the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users*, or *SAFETEA-LU*, which will set policy and dictate

funding levels for surface transportation well into the next decade. These forces together create an unprecedented opportunity to work toward the goal of increasing safe non-motorized travel.

Walking, Bicycling, and Health

Health And Non-Motorized Transportation

Whether for transportation or recreation, walking and bicycling are important forms of physical activity. Federal guidelines categorize brisk walking and bicycling on level ground as moderate physical activity, while bicycling at more than 10 miles per hour qualifies as rigorous physical activity. The U.S. Department of Health and Human Services (DHHS) recommends that children engage in 60 minutes of physical activity each day and that adults engage in two hours and 30 minutes of moderate physical activity per week,⁵ a standard that more than one-third of all adults nationwide fail to meet.⁶ A 15-minute non-motorized commute twice a day for five days a week is enough to meet the adult recommendations. The DHHS identifies walking and biking as effective measures for increasing overall physical activity and notes that non-motorized commuting has a low risk of injury compared to many other forms of physical activity. Walking, in particular, has been described by health researchers as “near perfect exercise”⁷ and “a popular, familiar, convenient, and free form of exercise that can be incorporated into everyday life and sustained into old age.”⁸ The health benefits of achieving the recommended levels of physical activity are numerous: prevention of weight gain; improved cardio respiratory and muscular fitness; and lower risk of type 2 diabetes, heart disease, stroke, and other unhealthy conditions.

From an equity standpoint, non-motorized transportation presents both challenges and opportunities. Non-motorized modes can improve access to jobs, healthcare, and shopping for households with limited access to cars. Additionally, walking and bicycling reduce health disparities between low-income and more affluent communities. Safety, however, remains a significant concern: in 2007, there were 4,654 pedestrian and 698 bicyclist fatalities in the United States, with combined

injuries of more than 100,000.⁹ Indeed, public officials often use safety concerns to beat back arguments to do more to encourage walking and bicycling. The challenge is to increase non-motorized modes safely, primarily because the population groups that could most benefit from increased walking and bicycling are also the most vulnerable to traffic dangers.

Low-income and minority populations fall into this category. Ample evidence indicates that physical activity levels are lower among low-income and minority populations,¹⁰ despite the fact that only 73.5 percent of low-income households own cars and are more dependent on walking and public transit. That number compares with 91.7 percent of all U.S. households. Forty percent of the lowest-income transit users meet the recommended levels of physical activity solely from walking to and from transit.¹¹ Without this, their total physical activity would be far less. However, the quality of non-motorized infrastructure is often lower in low-income and minority communities, contributing to higher pedestrian fatality rates.¹² The confluence of these circumstances underscores the importance of improving walking and bicycling conditions in these communities.

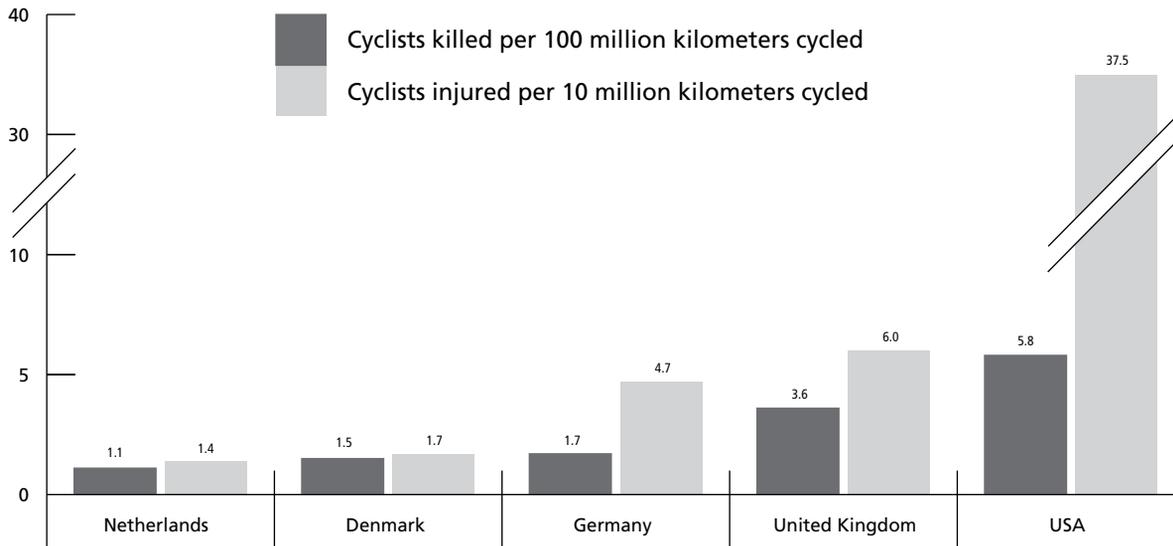
Youth are also vulnerable. Across the country, adolescents depend on parents and other adults to drive them to school and other activities.¹³ If children were able to walk or bike more, they would get more physical activity and their parents (predominantly mothers) would have less need to drive them. Again, however, safety is a concern: rates of pedestrian and bicyclist fatalities and injuries per capita are highest for those under the age of 15.¹⁴ Parental fears about traffic as well as fear of abductions help explain why children now walk and bike less than in the past. Consequently, increasing walking and bicycling for children means removing threats—actual and perceived—to their safety.

Older adults, too, could benefit from increased walking and bicycling, but safety, once again, is an issue. One in five adults ages 65 years and

older does not drive, and more than 50 percent of the nondrivers stay home on any given day because they lack transportation options.¹⁵ For nondrivers, walking, bicycling, and transit can provide an important means of getting to the doctor's office, the store, or a friend's house. However, the decline in physical and mental abilities that make driving no longer safe can also make walking and bicycling less safe. Uneven sidewalks, for instance, can pose a perilous hazard to frail older adults. The highest rate of pedestrian fatalities per capita is for those over age 70.¹⁶ Where safe conditions exist, increased walking and bicycling can improve physical and mental health.¹⁷

The good news is that safety is likely to improve for low-income households, children, older adults, and others as more people walk and bicycle. Countries with high levels of non-motorized travel also have fewer fatalities and injuries per mile than does the United States (figure 3). In part, this difference is explained by better infrastructure, particularly the separation of pedestrians and bicyclists from motor vehicles. But the higher number of pedestrians and bicyclists using thoroughfares itself improves safety by heightening driver awareness and attentiveness.¹⁹ Larger numbers of pedestrians and bicyclists also spur elected officials to invest more in better, safer infrastructure, which, in turn, helps to encourage more walking and bicycling.

Figure 3. **Cyclist Fatality and Injury Rates, by Country**¹⁸



Note: The symbol // in the graph represents a break in the consecutive numbering of the Y-axis.
 Source: Pucher and Buehler, "Making Cycling Irresistible," 2008.

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The potential economic benefits of increased walking and bicycling are numerous. Improved health as a result of increased physical activity can reduce healthcare costs. Cheaper modes of travel can reduce household spending on transportation: the typical household in this country spent an average of \$7,896 to own and drive their cars in 2005.²⁰ Making walking and bicycling more viable, particularly in conjunction with improvements to transit, could increase access to jobs. Improvements to walking and bicycling facilities can contribute to economic development efforts by, for example, encouraging stores to locate within walking distance of residential areas, particularly in low-income areas.

The potential environmental benefits of non-motorized modes are also abundant and include reductions in air pollution, water pollution, noise, and greenhouse gas emissions. However, these benefits accrue only if the increase in the use of non-motorized modes comes with a reduction in the use of motorized modes. A substantial share of walking and bicycling in the United States is for recreation rather than for transportation, and even some non-motorized trips to destinations are made in addition to, rather than instead of, driving trips.²¹ Walking and bicycling trips that do not replace driving trips do not have a direct environmental benefit, though they still have important health benefits.

Transportation Goals

The goal for non-motorized modes is straightforward: increase walking and bicycling without increasing fatalities and injuries, particularly for low-income households, communities of color, the young, and older adults. But what is a realistic increase to aim for? Although walking and bicycling have virtually boundless potential as forms of recreational physical activity, their potential as modes of transportation are limited by practical constraints. Given the low levels of use in this country, significant increases as a percentage of

all travel may be possible even if they remain a relatively small share of all trips. The potential for the two modes is likely different: walking is possible for more people because it requires no equipment and less confidence and skill, but it is considerably slower than bicycling; bicycling is at least theoretically possible for more trips because it is considerably faster than walking, but it requires equipment as well as skills and confidence that many lack. Given the low-density patterns of development in the United States, which put destinations beyond walking distance in most places, bicycling seems to offer greater potential for expansion.

Strategic Targets

In aiming to increase safe non-motorized modes of transit, particularly among those with the greatest needs but also the greatest vulnerabilities, it makes sense to take a strategic approach and target the following: types of travel most conducive to non-motorized modes, communities with greater potential for change, and communities with greater potential benefits from change.

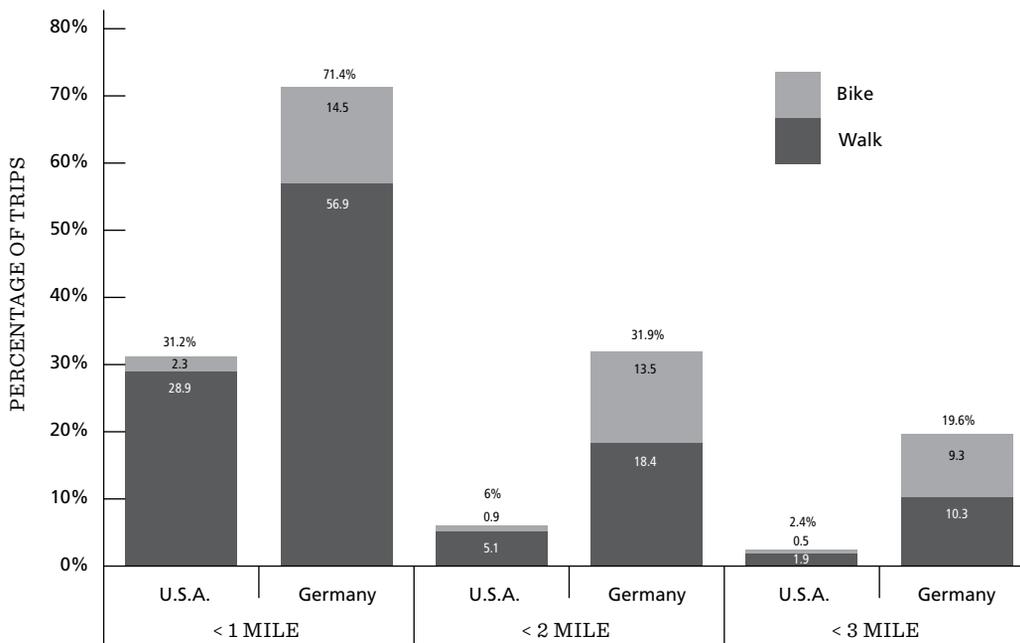
Short trips are an obvious target. According to the 2001 National Household Transportation Survey, 28 percent of all trips are less than one mile, a reasonable distance for walking, and 41 percent of trips are less than two miles, a distance that is reasonable for biking.²² The shares of these short-distance trips that are made by non-motorized modes are much lower in the United States than in European countries: 71.4 percent of trips shorter than one mile are by walking or bicycling in Germany versus 31.2 percent in America (figure 4). In other words, while trip distances are longer on average in the United States than in Europe, distance is not the only issue; environmental and motivational factors must explain differences in non-motorized rates at these short distances.

School trips are another obvious target and, indeed, the federal Centers for Disease Control and Prevention has set a goal of increasing

walking to school. This makes sense from a practical standpoint, given that these are frequent trips with regular routes and fixed destinations. Walking to school dropped from 40.7 percent of all school trips in 1969 to 12.9 percent in 2001, while bicycling remained roughly constant at around one percent (figure 5). Increasing walking and biking to school is generally a good starting point for increasing physical activity in children. For example, it could contribute to an increase in non-motorized travel to other destinations, as skills and habits change. Current efforts fall into two categories: changes in where schools are located to put more children within walking distances of school, and Safe Routes to School programs, which aim to improve safety around schools for walkers and bicyclists.

Some communities have greater potential for change than others. One target should be areas where walking and bicycling are already significant. For example, Davis, CA, has high levels of bicycling, but levels could clearly be even higher. The environment there supports bicycling, but not all residents take advantage of the opportunity: over three-fourths of children are driven to their Saturday morning soccer games.²⁵ Motivational rather than environmental barriers are often the issue—habit, perceptions, confidence, etc. A second target should be places where land use patterns put destinations within walkable or bikeable distances of homes, that is, areas with higher densities and mixed land uses. In these places, the quality of sidewalks and other facilities may be a problem

Figure 4. **Percent Walk and Bike Trips by Trip Length, Germany vs. United States**²³



Source: R. Buehler, "Transport Policies, Travel Behavior, and Sustainability," 2008.

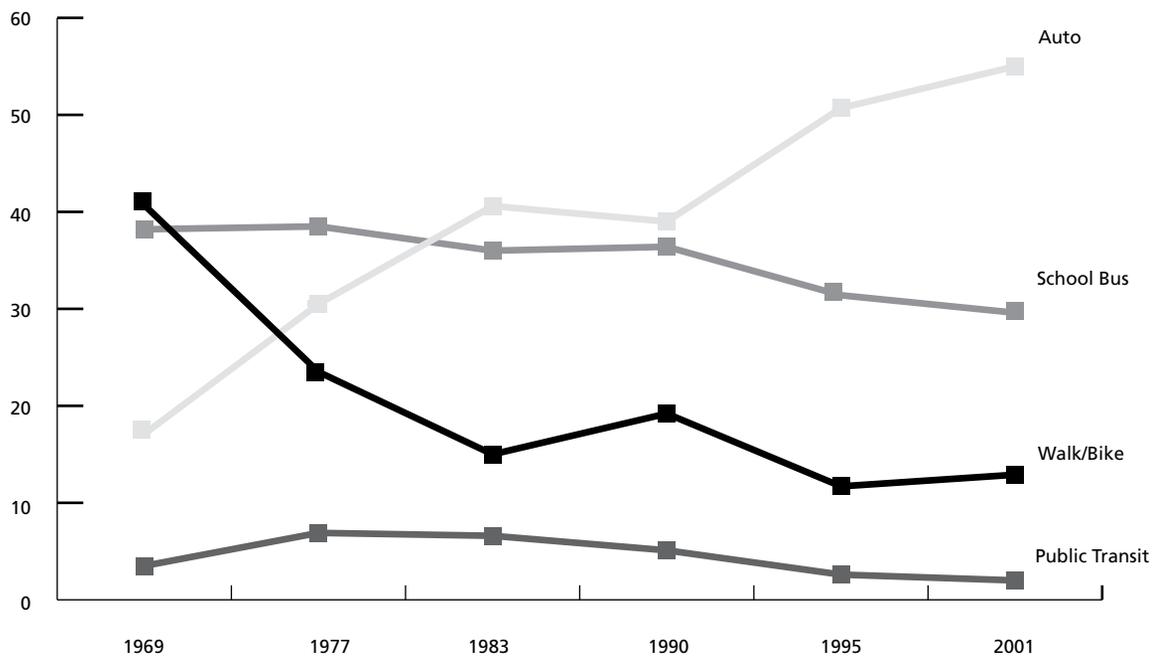
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in addition to motivational barriers.

Of lower priority, because they are harder to change, are low-density areas with limited walking and bicycling infrastructure, particularly rural areas. In these areas, however, it is still important to look for specific opportunities to reduce environmental barriers, e.g., by improving the shoulders of rural roads or through a trail project that connects rural residents to the town center. Finding such opportunities should be more of a priority in areas where residents have limited access to cars and where transit service is sparse or nonexistent.

Potential benefits from increases in non-motorized travel are greater in some areas than others. Increases are most important in low-income and minority communities, where efforts are needed to improve safety when residents of these communities do walk and bicycle and to make more places accessible by these modes. Bicycling, in particular, offers a way to fill the gap between places accessible by foot and those accessible by bus. Anecdotal evidence suggests that bicycles are an important mode for recent Hispanic immigrants in California, though bicycling often occurs in environments not designed for it.²⁶ Hispanics walk and bike to work in greater shares than

Figure 5. *Trends in Mode of Travel to School in United States, 1969–2001*²⁴



Source: N. C. McDonald, "Active Transportation to School," 2007.

other Americans; not surprisingly, their rates of pedestrian and bicycle fatalities are also higher.²⁷ Environmental improvements are essential in these communities.

Retirement communities, formal or informal, are another important target. It used to be that those who aged in place lived mostly in older communities that were designed for walking. Increasingly older adults now live in suburban environments that are not designed for walking. Improving the walking environment in these areas is not easy, though strategic projects coupled with programs to encourage walking or even bicycling could make a difference. In so-called active retirement communities, bicycling could be encouraged over golf carts as a way to get around within the community.

Measuring Progress

Achieving the goal of an increase in walking and biking safely requires development of new performance measures, both to assess current conditions and to monitor the effectiveness of new policies. Traditional transportation performance measures focus on vehicle traffic in support of the goal of maximizing vehicle flow and to the detriment of walking and bicycling. Without performance measures for non-motorized travel, policies are likely to continue to favor cars over pedestrians and bicyclists; transportation goals for which performance is not measured will get less attention in the planning process.²⁸

Admittedly, developing such measures is difficult. If the goal—the desired outcome—is to increase walking and bicycling without increasing fatalities and injuries, then these factors are what should be measured. But increases in non-motorized travel are hard to measure.²⁹ The best available data come from travel surveys, conducted at the regional or national level. Yet non-motorized trips have historically been undercounted in these surveys, which have primarily been concerned with driving trips. The surveys are also not frequent

enough to be useful for annual monitoring (the national survey occurs every five to seven years, while regional surveys are typically separated by 10 years or more). Although data on fatalities and injuries are arguably better than data on the amount of walking and bicycling, without the latter, it is impossible to adequately gauge the former. For example, the numbers of pedestrian and bicyclist fatalities and injuries have been going down on a per capita basis,³⁰ but this likely reflects a decline in the use of these modes rather than a decline in danger. Improved data collection is needed.

As an alternative to measuring increases in non-motorized travel, performance measurement might focus on what might be called *inputs* rather than *outcomes*. One input is funding for bicycle and pedestrian projects. Another is the adoption of policies to promote non-motorized transportation, such as changes in zoning designed to bring about mixed-use land use patterns that reduce walking distances, or complete street policies that ensure that bicycles and pedestrians are given consideration in the design of all thoroughfares. Unfortunately, these inputs do not guarantee favorable changes in the environment, let alone the desired outcome of an increase in safe walking and biking. The input option for performance measures is the easiest to implement but the least effective in showing progress toward the goal.

An option that is better than measuring inputs but more feasible than measuring outcomes is to focus on *outputs*, that is, on changes in the environment that are expected to lead to increases in non-motorized travel, rather than changes in non-motorized travel that are difficult to measure. Outputs could be measured as projects actually constructed. However, non-motorized projects are not well tracked; categorizing such projects can be difficult, and bicycle and pedestrian improvements are often incorporated into larger road projects.³¹ Another option is to measure changes in the “walkability” or “bikeability” of a community. Many tools for measuring walkability and

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bikeability have already been developed,³² with increasingly frequent implementation in the transportation planning process. However, collecting data to calculate walkability and bikeability at a community scale can be labor intensive.

Transportation Policy: Opportunities And Barriers

The next authorization of the federal transportation bill offers a tremendous opportunity for non-motorized transportation. For almost two decades, federal policy has contributed to an expansion of investments in walking and bicycling infrastructure. However, many barriers have hindered progress toward the goal of increased walking and bicycling, including federal policy itself. The new transportation bill could overcome many of these barriers by putting in place stronger federal policy toward non-motorized modes.

Starting with the passage of the *Intermodal Surface Transportation Efficiency Act (ISTEA)* in 1991, the federal government has provided support for non-motorized transportation through a number of policies. Most importantly, federal transportation funding can be used for bicycle and pedestrian projects through the Transportation Enhancements (TE) Program, the CMAQ (Congestion Management and Air Quality) Program, the Surface Transportation Program (STP), the Safe Routes to School (SRTS) Program, the Non-Motorized Transportation Pilot Program, and several others, including the Highway Safety Improvement Program (HSIP).³³

Other policies also support non-motorized modes. Federal policy specifies seven “planning factors” that must be considered in the development of long-range transportation plans at state and regional levels. These factors include increased safety and security for non-motorized users, increased mobility and

accessibility options, and increased integration of the transportation system across modes. States are also now required to have bicycle coordinators. Finally, the Federal Highway Administration has pushed the concept of context sensitive design, which has increased attention to bicycle and pedestrian needs.

Under current policies, however, the availability of federal funds is insufficient to ensure improvements to the walking and bicycling environment. State, regional, and local policy decisions determine the degree to which communities take advantage of the federal programs for bicycling and walking facilities. For example, through the regional transportation planning process, metropolitan planning organizations evaluate and prioritize regional needs and decide what share of federal funding in these categories will go to non-motorized projects. The availability of federal funds for bicycle and pedestrian facilities has created an important opportunity, but one that only some states and regions have taken advantage of. Indeed, spending on non-motorized projects has varied significantly across the major metropolitan regions, ranging from \$0.20 per capita in Los Angeles to \$2.32 per capita in Providence, RI, from 1992 through 2006.³⁴

At the same time, many federal programs and policies hinder rather than support efforts to increase non-motorized travel.³⁵ The TE program as administered by the states can present insurmountable bureaucratic hurdles, particularly for communities with limited resources. The CMAQ program requires proof of air quality benefits, yet the models used to forecast emissions are not usually sensitive to bicycle and pedestrian improvements. Most significantly, an overarching concern with congestion at the federal level as well as at state and local levels undervalues non-motorized projects relative to highway projects in the planning process. The current focus on job creation and economic stimulus also threatens to perpetuate the top priority given to highway projects.



One of the most intractable barriers to improving the walking and bicycling environment on a wide scale is local control of land use planning, a long-standing tradition throughout the country.³⁶ The viability of non-motorized modes depends on land use patterns that put potential destinations within walking and bicycling distances of home. Similarly, transit viability increases as population and employment densities increase. These environmental characteristics are shaped by local policies such as zoning and subdivision ordinances. Investments in non-motorized infrastructure will be of little benefit without concomitant changes in local land use policies. Although land use planning authority is likely to remain at the local level for the foreseeable future, federal policy can and does influence the decisions of local governments, and this influence can be channeled toward the support of non-motorized modes.

Thus, federal policy alone will not bring about the needed changes, but it can help to expand non-motorized transportation by assisting, enabling, encouraging, or requiring agencies at the state, regional, and local levels to both improve the environment and

motivate people. To safely increase walking and bicycling, the upcoming authorization of the federal transportation bill should include the following policies, focusing on types of travel most conducive to non-motorized modes, communities with greater potential for change, and communities with greater potential benefits from change (see also table 2).

Assist: provide state, regional, and local governments with the tools they need to plan for non-motorized modes. Funding for more frequent and standardized travel surveys and for development of survey methods that collect more accurate and more comprehensive information on non-motorized modes would provide for better monitoring of progress. Such data could also provide a means of calibrating improved travel forecasting models that incorporate non-motorized modes. Resources should especially be directed towards low-income communities that may have a greater need for planning assistance.

Enable: make it easier for state, regional, and local governments to spend federal funding on non-motorized modes. Reducing bureaucratic barriers in current programs, particularly in the TE program, would likely increase the use of these funds for non-motorized projects, such as sidewalks and bicycle paths, particularly in low-income communities with fewer resources available for overcoming these barriers. Further increasing flexibility in federal programs would enable communities to give greater priority to non-motorized modes. In addition to infrastructure projects, educational and promotional programs should be eligible for funding.

Encourage: provide incentives to state, regional, and local governments to pay more attention to non-motorized modes. Specialized funding programs, such as Safe Routes to School, encourage spending on non-motorized modes. Targeted incentives, such as supplemental grants, could encourage attention to pedestrian and bicyclist needs, with

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Table 2. *Recommendations for Federal Policy on Walking and Bicycling*

Assist	Help provide state, regional, and local governments with the tools they need to plan for non-motorized modes: fund travel surveys; support development of improved planning tools
Enable	Make it easier for state, regional, and local governments to spend federal funding on non-motorized modes: reduce bureaucratic barriers; increase funding flexibility; expand eligibility of promotional programs
Encourage	Provide incentives for state, regional, and local governments to pay more attention to non-motorized modes: continue and expand specialized funding programs; target incentives for prioritizing bicycle and pedestrian projects and for supportive land use policies
Require	Put in place policies that compel improvements in conditions for non-motorized modes on the part of state, regional, and local governments: adopt federal complete streets policy; tie funding to performance requirements; tie funding to supportive land use policies

priority given to low-income areas. Incentives that encourage coordination of land use and transportation planning could also enhance the viability of non-motorized modes; for example, jurisdictions that adopt land use policies promoting greater densities and mixed land uses might earn bonus funding for bicycle and pedestrian projects.

Require: put in place policies that compel state, regional, and local governments to improve conditions for non-motorized modes. A federal complete streets policy would require that the needs of bicyclists and pedestrians are considered in all federally-funded projects. Federal transportation funding could be allocated based on the degree to which jurisdictions meet performance requirements for non-motorized modes. These

requirements could use the performance measures described earlier, such as increases in safe walkability and bikeability, with extra weight given to performance in lower-income areas and for key segments of the population. Performance standards could also be set with respect to land use policies; for example, jurisdictions might be eligible for funding only if they have adopted land use policies that are supportive of non-motorized modes.

As outlined, these approaches progress from least to most forceful; some combination of all four would have the best chance at success. But they must be accompanied by a shift in the focus of the federal program away from congestion reduction to goals related to health, equity, economic, and environmental benefits. Tying federal funding to demonstration of

progress toward these goals would ensure that the shift in focus is not just rhetorical. Such an approach could provide a powerful mechanism for improving walking and bicycling conditions.

Convergence Opportunities

Credit for the existence of federal policies supporting non-motorized modes goes to a strong coalition of bicycle and pedestrian advocacy groups operating at the national level. This coalition is increasingly working in partnership with other interest groups, including those focused on public health, social equity, and environment issues, reflecting the broad benefits of non-motorized travel in all these realms, as described previously. This effective coalition is well positioned to influence the authorization of the upcoming federal transportation bill, though it must



continue to battle the traditional focus on congestion reduction and the new emphasis on highway investments as a way to stimulate the economy. Making the case that bicycle and pedestrian projects create jobs, too, while also helping to reduce our economically detrimental dependence on fossil fuels will be important for this coalition.

Because federal policy alone does not determine improvements to the bicycle and pedestrian environment, effective coalitions are also needed at the state, regional, and local levels. The local scale is especially important but also especially challenging, and the potential for building the needed partnerships varies from community to community. The Active Living by Design program, among others, has helped to foster such partnerships in communities throughout the country, including many low-income communities.³⁷ The evaluation of this program should yield important lessons for other communities in their efforts to build partnerships in support of improvements to the bicycle and pedestrian environment.

Conclusion

A “perfect storm” of higher gas prices, strained household budgets, and declining public resources, coupled with emerging mandates to reduce greenhouse gas emissions and deepening concerns about the growing obesity epidemic, could produce a surge in interest in non-motorized travel modes. Indeed, recent media reports suggest that a new bicycling culture has begun to take hold. Surveys also suggest a growing interest nationwide in walkable communities.³⁸ If federal, state, regional, and local lawmakers follow the public’s lead, walking and bicycling could move the United States toward a healthier, more equitable future.

Roadways and Health: Making the Case for Collaboration

ch. 5

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ABSTRACT >> *Our streets and highways are inextricably linked with the very fabric of America. Roadways are used for many different modes of transportation, and constitute a major portion of the public space in our towns and cities. The limited inclusion of health considerations in the operation and construction of our roadways results in negative health outcomes. Lack of safe, convenient walking and bicycling routes have led to sedentary lifestyles, feeding a massive epidemic of obesity and chronic diseases. Motor vehicle emissions contribute to many negative health outcomes including asthma, lung disease, and cardiovascular disease. Transportation is the fastest-growing source of green house gases in the U.S., adding to climate instability which can result in natural disasters, food scarcity, and premature deaths. In addition to environmental impacts traffic crashes result in nearly 42,000 deaths and three million injuries every year. The authorization of the federal transportation bill is an opportunity to increase resources and focus on improving the negative health consequences associated with roadway construction and use. Fundamental changes in the way we measure and rank mobility needs, distribute funding, design, construct, operate and evaluate our roadways are possible and necessary.*

Roadways and Health

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Introduction

A vast proportion of travel—and life—in the United States occurs on our roadways. This travel is made by car, foot, bicycle, wheelchair, bus, and streetcar. “Roadway” refers to the entire right-of-way—sidewalks, roadside, medians and verges, and in-street rails; it constitutes a major portion of the public space in our towns and cities. Roadways are used not only for transport, but also for socializing and support of public life. Our streets and highways are inextricably linked with the very fabric of America and impact our lives, cities, and environment in complex and pervasive ways. They have considerable impact on health and can be harmful if potential negative impacts are not mitigated.

Roadways, including highways, streets, and parkways, are linked to health outcomes in numerous ways. Foremost are physical inactivity, crashes, vehicle emissions, and equitable access to jobs and services. Lack of safe, convenient places and ways to walk and bicycle have led to sedentary lifestyles, feeding a massive epidemic of obesity and chronic diseases. Current levels of motor vehicle emissions contribute to many negative health outcomes, including increased incidence of asthma, lung disease, and cardiovascular disease. Increased levels of greenhouse gases, to which cars and trucks are a major contributor, are causing climate instability resulting in natural disasters, food scarcity, unhealthy ecological and weather patterns, and premature deaths. Traffic crashes result in nearly 42,000 deaths and three million injuries every year on American highways. Even the economic health of a community and its residents is affected by the cost, availability, and mode of transportation used for daily activities. Emotional well-being is challenged by traffic congestion, long and stressful commutes, and noise. Every community is affected, and often vulnerable populations face the greatest risk.

There is compelling evidence that poverty, race, ethnicity, disability, age, and urban or

rural setting are correlated with persistent and expanding health disparities among U.S. populations. The pursuit of good health requires safe and convenient access to a source of steady income, goods and services, and a wholesome environment. However, nearly one-third of Americans do not drive due to disability, age, financial constraint, or other personal circumstances. The majority is located in metropolitan areas, but even in rural areas about 14 percent of trips are made by those without access to a car.¹ These Americans live in an automobile-oriented society without access to an automobile and are therefore both socially and economically disadvantaged. Their access to goods and services and their inclusion in the larger society are dependent on greater accessibility in the transportation system. The impending increase in the proportion of older Americans, constituting 20 percent of the population, will only add to this dependency. Without roadway system design and funding priorities that accommodate their travel needs, these individuals and their families often have limited access to jobs, hospitals, supermarkets, and more. Their level of access is also affected by land use patterns that have been formed by decades of automobile-oriented road planning and engineering.

Major roads and highways have turned into barriers as they become more difficult to cross by foot or by vehicle. Homes and stores have tried to withdraw from heavy motor vehicle traffic through use of the cul-de-sac and large setbacks from the edge of the street, reducing overall connectivity. Limited street connectivity forces use of a few heavily used, congested roadways, exposing travelers to greater risk from air pollution and car crashes. Cities have given over large tracts of valuable—and taxable—land to pavement for roads and parking that have depleted “Main Street,” drained the tax base, and created sprawling regions where businesses are dwarfed by their parking lots and roadways are often barren and dangerous. Designing for automobile use on every trip, no matter how short, has evolved into a self-reinforcing

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spiral of decentralizing communities, expanding pavement, and increasing per capita vehicle miles traveled (VMT). This trend has created many of the issues contributing to poor health outcomes.

Health is influenced by roads, but roads are influenced by infrastructure construction programs, public policy, and funding practices. A large proportion of funding and policy for roads is determined at the federal level; much of it is contained in the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)*, which expires on September 30, 2009. The impending new authorization is an opportunity to make fundamental changes in the way we measure and rank mobility needs, the way we distribute funding, the way we conduct and design projects, and the way we evaluate our results. Ultimately, it is a chance to adopt powerful strategies that will help us achieve a healthy, equitable, and sustainable national infrastructure that supports robust economic development and the well-being of people and communities.

The upcoming authorization presents the opportunity to rethink transportation system design and operation in ways that are more supportive of positive health outcomes. Many of the policy changes that help achieve health objectives also address other planning objectives, including congestion reduction, road and parking facility cost savings, energy conservation, and economic development. For instance, designing our transportation system for shorter travel distances to enable walking and bicycling would increase physical activity, curb foreign oil dependence, and reduce the need for new or upgraded transportation facilities to accommodate vehicular travel. Given the importance of health to a viable, productive nation, and given the effect of transportation on health, we cannot reasonably design and fund our transportation system without addressing its health impacts.

Connecting Roadways, Health, And Equity

The impact of roadways on health is summarized by examining the level of injury (intentional and unintentional), environmental impact (climate change and air pollution), and mode share (including level of access, physical activity, and mental/social health). The mechanism, extent, and mitigation of roadway-related health impacts are detailed below, with additional attention to the distribution of these impacts across the population. The major principles for mitigating the health impacts of roadways are to reduce injury, improve air quality and the environment, diversify mode share, and reduce automobile dependency.

The following characteristics of roadways all have an impact on health:

- **Modal Level of Service**—refers to the proportion of roadway dedicated to each travel mode (automobile, bus and light rail, truck, bicycle, and pedestrian). While general



Highways built to past standards are unable to support safe multi-modal travel.

purpose lanes can be used by cars, trucks, buses, and bicycles, the inclusion of facilities intended exclusively for one of these modes can greatly modify the user behavior and utilization of the road. For instance, bicycle lanes or bus-only lanes may increase the safety and speed of travel in a corridor, and more people may choose these modes.

- **Roadway Design**—focuses on features that impact behavior and safety. It addresses speed limit and design speed for motor vehicles, number and width of general purpose lanes (in each direction), presence of medians, and intersection design, including turn lane and free-flow turn/merge lane usage, corner radii, signal phasing, robustness of bicycle and pedestrian facilities, and more. A roadway will typically carry pedestrian and bicycle traffic, even if no facilities are provided for them.
- **Access Management**—refers to the regulation of interchanges, intersections, driveways, and median openings on a

roadway. Prohibiting turns or prohibiting certain users from part of or the entire road can improve operations. For instance, a left turn may be restricted to buses only, one leg of an intersection may be closed to pedestrians, or the quantity and placement of driveways along the roadway may be restricted. In doing so, conflicts between road users are reduced sometimes at the expense of freedom of movement. The right balance of access management can improve safety and level of service (LOS) for all road users.

- **Streetscape**—measures the degree of treatment of the roadway with trees and other plantings; placement of amenities such as lights, benches, and garbage cans; and general roadside appearance, including placement of buildings, artwork, or plazas. These influence motorist behavior, transportation access, and pedestrian and bicycle LOS.
- **Density, Land Use, and Connectivity**—refers to the types and intensity of uses along the roadway and the connectedness of the streets that support it. Research indicates that mixed land uses, higher land use density, and short block lengths have a strong relationship with higher levels of physical activity and social capital, as well as with lower levels of air pollution, greenhouse gas emissions, and fatal crashes.

Injury

Impact

There were 41,059 traffic-related deaths reported in the United States in 2007.² This constituted the leading cause of death for individuals ages one to 34.³ After age 34, deaths from heart disease, stroke, and cancer—which are largely affected by physical activity levels, another outcome of transportation practices—exceed deaths due to traffic crashes. Additionally, crashes result in almost three million injuries per year. This creates an economic burden of about



Road policies have impacted land use.

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\$150 billion each year, including \$52 billion in property damage, \$42 billion in lost productivity, and \$17 billion in medical expenses.⁴ Of the 41,059 traffic fatalities, 4,654 were pedestrians, 5,154 motorcyclists, and 698 bicyclists.⁵

Crashes were more likely to occur at an unsignalized intersection than a signalized one.⁶ Rural crashes were more likely to occur away from an intersection and appear to be most attributable to speed or driver distraction. In 2002, more than one-third of pedestrian travel took place on a roadway or shoulder. Crashes in urban areas alone result in about \$160 billion in expenses (according to 2005 data) and may be responsible for half of the roadway congestion there.⁷

Vulnerable populations typically have a higher risk of unintentional injury.⁸ There are disparities by income, age, ethnicity, gender, and urban or rural residency. People of color and those earning less than \$25,000 per year are much more likely to walk or bicycle.⁹ Traffic-related crashes are the leading cause of death for children,¹⁰ and poor children die at higher rates. The pedestrian victim of a car collision is statistically more likely to be a person of color.¹¹ Higher pedestrian fatalities have also been noted around low-income neighborhoods. Schools with a high proportion of students of color are less likely to have continuous, well-maintained pedestrian facilities. Older adults and people with disabilities are at greater risk because of physical or mental limitations on their perception and movement. Pedestrians, bicyclists, and motorcyclists (including mopeds and scooters) are much more vulnerable than car or truck occupants in a crash. Recent studies have shown that per-cyclist risk of crash is reduced as the proportion of bicycle mode share increases.¹² There is a similar effect for pedestrians.¹³ Although less than one-quarter of all driving takes place in a rural setting,¹⁴ more than half of all fatal motor vehicle crashes occur there.¹⁵ Rates of pedestrian fatalities are higher in urban areas.¹⁶

Mechanism

Collisions or crashes involving road users often result in physical traumas, which can lead to disability or death. A crash may involve a single bicycle or motor vehicle, multiple vehicles, or any number of vehicles and pedestrians. Conventional wisdom has held that roads can be made safer for motor vehicles by moving fixed objects back from the roadside; widening travel lanes; and employing channelization, acceleration lanes, and grade separation at intersections. However, researchers are finding that this type of design may not provide the anticipated safety benefits. Health professionals now believe that such designs promote speeding and reduce driver awareness, leading to much higher rates of pedestrian and bicycle fatalities.¹⁷

Road design can increase crash risk by determining where and how traffic movements will occur. This can exacerbate conflicts between two or more road users; changes in speed or direction; safety of at-grade rail crossings; and road user speeds, visibility, and attentiveness. Designing a road to control traffic flow as well as to accommodate all of the movements that any user might want to make, safely and without excessive delay, is the key. In urban areas, access management plays a large role. In a rural setting, the challenge can be accommodating slow or non-motorized traffic without promoting higher speeds. It even appears that rural roads with many curves have fewer crashes than flat, straight roads, perhaps due to increased vehicle speeds on the latter. Areas on the metropolitan fringe may be particularly vulnerable as they begin to carry more traffic on roads intended for rural use. While each road is different, users of all types must be anticipated, and design should be context sensitive. The principles of injury mitigation are outlined below.

Mitigation: Reducing Injury

- Base road design decisions on state-of-the-art transportation and health research and ensure that such research is disseminated to both planning and engineering staff.
- Constrain vehicle speeds as appropriate to the road context.¹⁸
- Incorporate treatments to control conflict points, such as medians, alleys, traffic signals, and movement restrictions.¹⁹
- Design roads to reduce risky driving behavior, rather than to accommodate it.
- Increase the share of bicycle facilities to reduce per-cyclist risk.
- Increase the share and quality of pedestrian facilities to protect pedestrians from traffic, reduce individual risk, and minimize fear of crime.²⁰
- Include public transportation facilities and shift travel to this mode, reducing risk of injury.
- Provide sidewalks and frequent crosswalks to improve pedestrian safety.²¹
- Reduce corner radii where possible to minimize pedestrian exposure and reduce vehicle speed.²²
- Provide more transportation choices to reduce vehicle volume.
- Utilize a network of streets to disperse traffic volume and provide smaller, safer roads for pedestrians and bicyclists.²³
- Create landscaped, tree-lined roads.²⁴
- Reduce roadside distractions such as billboards.
- Improve street and roadside lighting, especially at conflict points.²⁵
- Review universal design standards and seek to implement road design that accommodates all users safely, regardless of their limitations.
- Institute and enforce maintenance schedules for all facilities.



Context sensitive roads designed for all users can enhance safety.

Environmental Quality

Impact

Motor vehicle traffic presents a unique public health risk because of the toxicity of its emissions and its extensive integration within communities. Recent research links diesel exhaust to lung cancer, cardiopulmonary disease, and other causes of death. More than 42 percent of Americans live in places that exceed national air quality standards for ozone or fine particulate matter. Asthma affects nine percent of U.S. children and seven percent of adults.²⁶ Climate change may already be responsible for more than 150,000 deaths per

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year and is expected to have a devastating effect on global climate patterns. Vehicle-related fine particulate matter becomes highly concentrated in areas immediately adjacent (200 meters) to major roadways. Outdoor particulate matter concentrations (PM_{2.5} and PM₁₀) are an estimated 15 to 20 percent higher at homes located on high-traffic intensity streets compared to homes located on low-traffic intensity streets and at intersections.²⁷

Children, older adults, pregnant women, and low-income households are especially vulnerable.²⁸ Vehicle-related pollutants have been associated with increased respiratory illness, impaired lung development and function, and increased infant mortality. Also, pregnant women living within 200 to 300 meters of high-volume roads face a 10 to 20 percent higher risk of early birth and of low-birthweight babies. Children living near busy roads are six to eight times more likely to have certain forms of cancer. Additionally, fine particulate matter (PM_{2.5}) has an adverse effect on lung development in adolescents that can lead to lifelong lung deficiency,²⁹ and even small amounts of air pollutants are associated with small changes in cardiac function in older adults.³⁰ In addition, low-income and minority communities are more at risk for higher levels of pollutant exposure, as their homes are more likely to be located near busy roadways.³¹

Mechanism

Road-based airborne emissions result from tailpipe exhaust, fuel delivery, road surface wear, deterioration of vehicle parts, and electricity production for electric-powered vehicles. Particulate matter (PM), carbon monoxide, nitrogen oxides (NO_x), and volatile organic compounds (VOCs) are all major concerns, as well as ozone, which form from NO_x and VOCs, and black carbon and sulfur dioxide, which are emitted by diesel-burning vehicles. Exposure to these pollutants significantly increases the incidence of asthma, respiratory diseases, lung cancer, and cardiovascular disease. Additionally,

carbon dioxide and other greenhouse gas (GHG) emissions cause climate instability and stimulate natural disasters, food scarcity, and unhealthy weather and ecological patterns such as heat waves and the spread of disease-carrying insects.

The actual level of pollution from all cars and trucks is a function of vehicle miles traveled, the number of trips, the condition of the vehicle, the weather, and the driving conditions. In particular, traffic congestion can increase emissions because it leads to extra accelerating, braking, and idling. The highest level of tailpipe emissions is generated when the vehicle is started, making even short motor vehicle trips a culprit in air pollution. Additionally, large expanses of pavement for highways and parking can exacerbate emissions by increasing air temperature, which facilitates ozone formation; trees, shrubs, and some plantings can reduce pollution by keeping the area cooler and by absorbing some carbon dioxide and VOCs from the air. Both passenger and freight movement are relevant to emissions levels, as freight transport accounts for a large percentage of air pollution.

Motorists experience high exposure to vehicle emissions while driving, especially in stopped



This congested roadway is exposing individuals on or near it to air pollutants, including children on a school bus. Alternative modes are often lacking, even for short trips.

traffic. People living in immediate proximities (200 meters) of major diesel thoroughfares are more likely to suffer from respiratory ailments, childhood cancer, brain cancer, leukemia, and higher mortality rates than those who live farther away. Adults with asthma who walk along these thoroughfares are more likely to suffer acute symptoms.³² Airborne outdoor pollutants can penetrate any building through small gaps, ventilation systems, and open doors or windows.

Mitigation: Improving Air Quality and the Environment

- Increase the level of service for non-motorized travel to reduce automobile trips.
- Use roadway design and transportation alternatives to reduce congestion and make motor vehicle travel more efficient.
- Avoid road projects that compete directly with existing or planned lower-emission freight and passenger rail transport.
- Seek alternatives to road projects that will increase motor vehicle traffic near populated areas.
- Manage access to control congestion and freight traffic.
- Permit trees and plants along roadways to provide cooling, shelter for pedestrians, and capture some emissions.
- Promote higher-density land use to reduce the distances traveled by motor vehicle.
- Promote a connected network of streets to allow bicyclists and pedestrians to avoid using major thoroughfares.

Mode Share

Impact

Physical inactivity and elevated body mass index (BMI) are among the most pressing health concerns today. Thirty-four percent of Americans are obese, and more than two-thirds are overweight or obese. Obesity, defined as a BMI over 30, leads to elevated risk for heart disease, type 2 diabetes, cancer (including breast cancer and colon cancer), high blood pressure, stroke, liver disease, sleep disorders, arthritis, and infertility. Obese individuals are twice as likely to die prematurely as their non-obese counterparts. Sixteen percent of American children are obese, many of them already at risk for heart disease and type 2 diabetes.³³ Physical inactivity is a primary factor in obesity, and it is thought to contribute to approximately 30 percent of all U.S. deaths. Physical inactivity is estimated to have cost the United States more than \$250 billion in 2006.³⁴

Social capital—the collective benefits conferred by social networks—decreases 10 percent for each additional 10 minutes spent commuting³⁵ and is lower for people who live on streets with high traffic volume.³⁶ Mental health is assailed as traffic congestion, traffic danger, and commuting add to daily stress and prevent people from spending enough time with their families or engaging in more productive and enjoyable activities.³⁷ Transportation expenditures are the second-largest expense for an American household, and some households spend more than 22 percent of their income on transportation. In 1998, this expense approached \$9,000 per household.³⁸

Low-income households are more affected by transportation expenses than others and can spend up to 40 percent of their income on transportation. These underserved populations tend to be minority or of lower economic status.³⁹ Affected by high unemployment rates

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and lack of services, these populations rely on walking, bicycling, and public transportation to achieve economic stability. In many low-income communities, transportation to a hospital or medical office is completely lacking, except by ambulance. Additionally, almost one-third of Americans do not drive.⁴⁰ This group includes children under age 16, older adults who can no longer drive safely, people who cannot afford to own and operate a car, and people with disabilities, among others. These individuals constitute a significant part of the economy, as both workers and consumers. Without transportation, they experience difficulty accessing jobs, healthcare, churches, stores, government services, and friends or family.

Mechanism

Over-reliance on private motor vehicle travel eliminates a major source of regular physical activity. Average BMI has increased as walking and bicycling trips have declined, but a greater share of pedestrian or bicycle travel leads to gains in physical activity. In many localities, it is unsafe, unpleasant, or simply impossible to walk, even across the street or to an adjacent property. Excessive travel times decrease social capital, which can lead to mental health issues, substance abuse, and degraded relationships between family members or neighbors. Increased pedestrian travel contributes to overall lower household transportation costs and gains in social capital. Additionally, a greater share of transportation facilities increases transportation ridership, which increases pedestrian travel and enhances physical activity levels. The more time an individual spends driving a car, the more likely that driver is to have an elevated BMI.⁴¹ Automobile transportation is vastly more expensive than walking or bicycling and generally much more expensive than mass transit. Therefore, families in automobile-dependent regions may have to spend more money on transportation.

Wide, continuous sidewalks increase the comfort and efficiency of walking, especially for groups or people employing wheelchairs or strollers, and lead to more people walking.⁴² Planting zones or furniture zones improve the comfort and efficiency of walking by buffering pedestrians from traffic, leaving room for pedestrians to pass behind turning vehicles, and removing obstacles from the main walkway. Good aesthetics, amenities, and sidewalk-oriented building frontage and design create a lively social environment and increase personal safety. Sidewalk-oriented building frontage and design improves access to homes, stores, and services for persons on foot. Street lighting increases walking⁴³ and improves actual and perceived personal safety. Shorter distance to destinations has a strong correlation with increased walking and bicycling,⁴⁴ and higher connectivity has a strong correlation with increased walking and bicycling. Trees provide shade, without which walking or bicycling may be unbearable on warmer days. Greater intensity of usage can also increase actual and perceived personal safety for non-motorized transport, while actual or perceived



Roads can accommodate the needs of all road users, regardless of travel mode and ability.

danger from high-speed or high-volume traffic discourages walking and bicycling. Shorter distance to destinations improves access for low-income families and people with disabilities, while higher-density retail and commercial development is linked to more pedestrian travel. ADA-compliant facilities allow persons with disabilities to travel along the sidewalks.

Mitigation: Diversifying Mode Share and Reducing Automobile/Roadway Use

- Control speed and conflict points to improve the pedestrian and bicycle environment.
- Design intersections to serve all types of users with an equal degree of priority and minimum delay.
- Develop more accurate ways to evaluate level of service for all travel modes and road users, and use them to increase and improve bicycle, pedestrian, and transit travel as appropriate to location (including lower-volume rural roads).
- Enhance access to transportation services and eliminate roadway barriers such as infrequent pedestrian crossings or turn lanes that affect bus access to a bus stop.
- Promote higher-density land use to increase the number of destinations in walking or bicycling distance.
- Ensure that the entire roadway, including sidewalks and bicycle lanes, is adequately cleaned and maintained.
- Enhance street networks to minimize wide or high-volume roadways.
- Keep block lengths short and well-connected.
- Create pedestrian-friendly environments: wide sidewalks, planting or furniture zones between the vehicle lanes and the sidewalk, benches, waste and recycling receptacles, shade trees, sidewalk-oriented building frontage and design, street and sidewalk lighting, and pleasant streetscape.

Federal Legislation: Equity, Health, And Highways

It is appropriate to argue for a redefinition of highways. Historically, the highway system has been designed to move large numbers of passenger and freight vehicles at fast speeds. It connects homes and jobs for motorists but is not sensitive to other needs of highway users. Highways define the travel experience of people with diverse backgrounds, socioeconomic status, and lifestyle preferences. They disrupt communities and begin to structure the social interaction of residents. **Highways must become entities that integrate physical activity, minimize negative health impacts, enhance social interaction, preserve environmental quality, promote community health, increase safety, and promote sustainability even as they**



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become more responsive to global demands providing equitable access and participation in daily life.

The current federal transportation bill—*SAFETEA-LU*—has an enormous influence on roads throughout this country. Approximately 40 percent of the transportation dollars spent nationally emanate from the U.S. Department of Transportation (DOT) and the Federal Highway Administration (FHWA).⁴⁵ It comes with extensive stipulations, but very little evaluation or enforcement. It both sustained and introduced a number of notable programs, including the Highway Safety Improvement Program, various highway safety grants, Congestion Mitigation and Air Quality (CMAQ) funds, Safe Routes to School, and Transportation Enhancement funds. It promoted the Environmental Review Process, routine consideration of non-motorized travel needs, funding for routine maintenance, endorsement of standards for roadway design, and endorsement of the Americans with Disabilities Act Accessibility Guidelines; it added flexibility to National Highway System and Surface Transportation Program funds. *SAFETEA-LU* reinforced coordination, public participation, and planning requirements for states and metropolitan planning organizations (MPOs). These have been notable because they introduce the possibility of integrating comprehensive health considerations into transportation planning.

Roadway funding in the next federal authorization will need to place transportation in a larger context, rather than focusing narrowly on the movement of people and goods (or even more narrowly on the movement of cars and trucks). The legislation must explicitly address ways to mitigate climate change. It must continue to address casualties on our highways through requirements to restrict alcohol-impaired driving and seat belt legislation. And it must expand this effort through evidence-based road design, increased funding flexibility, and increased monies for research. As stated

in the final report of the National Surface Transportation Policy and Revenue Study Commission, highway policies should not conflict with other national policy goals.⁴⁶

SAFETEA-LU implemented many initiatives aimed at making roads safer, less harmful to the environment, more equitable, and more efficient, yet such initiatives have only tinkered with the edges of highway policy and had little impact on the overall results. The current challenge is to strengthen these goals, integrate them into every decision, and provide a much wider set of mitigation options—all in a situation of shrinking fuel tax revenues and widespread economic decline.

Transportation Policy Barriers

Although *SAFETEA-LU* included a number of well-intentioned programs and policies addressing safety, environmental quality, and effects on vulnerable populations, it also contained fundamental operational practices that prevented these initiatives from being truly effective. An important first step in the new authorization will be to eliminate these barriers.

For example, transportation funding intake and allocation has been too heavily based on motor vehicle travel, motorized-vehicle lane miles, and trucking. Approximately 50 percent of the monies received by the states are based on VMT (vehicle miles traveled), arterial lane miles, diesel fuel usage, and the ratio of lane miles to population.⁴⁷ It may not be desirable to link funding to increased VMT. Compare two states or localities that have created different road systems. One has roadways that primarily serve motor vehicle traffic; the other has constructed a complete, quality travel environment for pedestrians, bicyclists, cars, trucks, and buses. In this example the second location may be able to move as many people and goods at a comparable or better level of service and may do so with greatly reduced

externalities (emissions, crashes, and inequities for nondrivers). While they may have similar amounts of total infrastructure to maintain, the second location may have lower lane miles and lower VMT, thus receiving less funding. In this example, the community with a roadway system more supportive of positive health outcomes would be penalized. Congestion Mitigation and Air Quality (CMAQ) funding share, which is based on air quality non-attainment, and Minimum Guarantee share, which is based on the states' tax contribution (which is a function of the amount of fuel consumed) do little to rectify the situation.

Currently, very limited resources are allocated to non-motorized transportation, while enormous sums are committed to motor vehicle movement. A particularly large share goes to limited-access highways such as the Interstate Highway System (IHS). While the IHS fills a necessary transportation role, it is not sufficient to meet current or future travel and mobility needs. *SAFETEA-LU* and its predecessors have not allowed the flexibility in funding, nor the guidance, to allow more context sensitive, equitable funding of transportation projects. Local fund match requirements have not been equitable across travel modes, and previous transportation bills have not provided good mechanisms for assessing the effects of proposed highways on the roadside environment, on overall connectivity, or on the level of service for bicycles, pedestrians, or public transportation.

Overall, the use of federal transportation allocations has not been closely monitored. Although Environmental Impact Statements (EIS) are required, they have not adequately assessed health impacts (they are not sufficiently explicit on health). The needs of low-income communities and nondrivers have been routinely overlooked without consequence. In general, the entire bill has failed to sufficiently evaluate the outcome of the projects it has funded, especially with regard to vulnerable populations.

Transportation Policy Opportunities

A handful of policies are in use today to create healthy roads that function well for all users. These policies can be found at the federal, state, and local levels. The most relevant policies are Health Impact Assessment (HIA), Context Sensitive Design, Complete Streets, Local Area Traffic Management (LATM)/Traffic Calming, Environmental Review Toolkit, Livable Centers Initiative (LCI), Road Diets, and Green Streets (see appendix A for more detail about these policies). These policy examples go far beyond vehicle level of service to consider a project for its comprehensive effect on the immediate area and the region, often creating extra opportunities to consider equity and health concerns and to implement more meaningful public participation.

A \$3.2 billion deficit is forecast for the highway trust fund in 2009, presenting both a challenge and an opportunity to revisit our transportation strategy. It is also likely that fuel purchases will decline or grow less quickly. The National Surface Transportation Policy and Revenue Study Commission final report, *Transportation for Tomorrow*, suggests increasing the highway trust fund revenue tax from 25 to 40 percent a gallon over the next five to eight years and indexing it to inflation. However, the report also champions environmental stewardship and the development of alternative and renewable fuels.⁴⁸

Many other strategies are being put forth to help finance the priorities to be set in the upcoming authorization. Prioritizing long-term investment, developing more accurate and comprehensive cost-benefit analyses, and reducing earmarks can all help to control transportation financing. Another option is increasing collaboration with local and national advocates, planning organizations, and others to take advantage of innovations and research and facilitate private-sector funding of some initiatives. Finally, the cost-reduction benefits

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associated with other modes, travelways, and strategies are potentially substantial. There are already some innovative proposals, including:

- *The Lieberman-Warner Climate Security Act*, which includes some transportation funding that might be appropriate for Health Impact Assessment.
- Senator Benjamin Cardin of Maryland and others have recommended a Transportation Sector Emissions Reduction (TSER) Fund that would permit the auctioning of emission allowances. Approximately five percent of TSER funds would be available to state and local authorities for transportation alternatives that reduce travel demand, including regional planning organizations.
- Senator Tom Carper of Delaware has proposed *CLEAN TEA (Clean Low-Emissions Affordable New Transportation Equity Act)*. This act reduces greenhouse gas emissions by promoting alternatives to driving. *CLEAN TEA* provides low-emissions transportation options by directing cities with more than 200,000 residents and state departments of transportation to review their transportation plans and determine how they could reduce greenhouse gas emissions. Federal funding for projects in those transportation plans would be distributed to states and localities based on the expected reductions in greenhouse gas emissions in each plan. States and cities with more ambitious plans would receive greater funding.
- Medicare and Medicaid programs spend almost 10 percent of their budget each year treating conditions related to obesity and physical inactivity.
- State and local police departments incur significant costs responding to crashes. Many have already funded their own road safety programs.
- State and local tax dollars are being used to bus students, even though many live within walking distance. Some are participating in the federal Safe Routes to School program to reconstruct the road infrastructure near school property and develop programs to encourage physical activity.
- High-cost roadway capacity projects are becoming less feasible for transportation department budgets and less popular among taxpayers and residents.
- Industry, freight, and automakers will bear the brunt of climate change legislation without more opportunities for change in personal travel behavior.
- Emergency services for crash victims are overwhelmed and strapped for cash.
- Health insurance providers spend billions each year treating conditions related to physical inactivity, air pollution, and roadway casualties.
- Labor departments are aware that transport and child care are the biggest barriers to employment and are seeking solutions.
- Federal and state agriculture and environmental protection divisions are devoting resources toward environmental quality.
- The federal Centers for Disease Control and Prevention (CDC) and countless public and nonprofit organizations are investing

Convergence Opportunities

The upcoming transportation authorization presents many opportunities to create partnerships and take advantage of mutual interests to create healthier road networks. A number of innovative policies have been identified above. A small cross-section of entities and programs representing convergence opportunities follow:

in physical activity programs, road emission mitigation programs, and more.

- Public health research is building evidence for design of safe and healthy road environments, but the work may not be translated to engineering and planning practices.

Many of these opportunities involve various branches of the federal government, if only as a funding source. They allow addressing multiple issues at once by including health, equity, and road programs in the same planning process. This would prevent duplication of activities, take advantage of existing expertise, and avoid having federal programs work at cross-purposes to one another.

Conclusion

Roadway systems are set in a context of towns and cities, commerce and agriculture, ecological systems, neighborhoods, regions, state and local governments. Our public spaces and our travel along them have a profound effect on all of these settings. They are extensive and

thoroughly integrated into all aspects of the American landscape. As a result, they play a large role in the health and quality of life of the general population.

While the purpose of the upcoming authorization is to address highway funding and the movement of people and goods, within the entire national context, it plays a much larger role in the health outcomes of citizens. The biggest impacts result from crash-related injuries, vehicle emissions that pollute the air and contribute to climate change, automobile dependency leading to sedentary behavior, and the lack of equitable access for all Americans. The implementation of the mitigation strategies, policies, programs, and design guidelines outlined earlier result in significant improvement in the positive effect of roadway systems on health. The recommended steps to improve safety, reduce emissions, and create high levels of service for all travel modes change the role of the roadway system, causing it to be more supportive of good health and increased prosperity. In this way, it expands its contribution to improving the health status of Americans.

Appendix A. *Policies and Strategies for Healthy Transportation*

Health Impact Assessment (HIA)	
Principles Addressed:	<ul style="list-style-type: none"> • Injury • Environmental Quality • Mode Share
Description:	<p>A combination of procedures, methods, and tools by which a policy, program, or project may be judged as to its potential effects on the health of a population and the distribution of those effects within the population. Public participation is an important part of health impact assessment.</p>
References:	<p>http://www.cdc.gov/healthyplaces/hia.htm http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/handbook-guide/vol_4/table-tableau-3-eng.php#Table-3-1a</p>

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Context Sensitive Design	
Principles Addressed:	<ul style="list-style-type: none">• Injury• Mode Share
	Scope: <ul style="list-style-type: none">• Local• State• Regional• Federal
Description:	A collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic, and environmental resources while maintaining safety and mobility. An approach that considers the total context within which a transportation improvement project will exist.
References:	http://www.cnu.org/streets http://www.fhwa.dot.gov/context/index.cfm http://www.contextsensitivesolutions.org/content/topics/css_design/design-examples/
Complete Streets	
Principles Addressed:	<ul style="list-style-type: none">• Injury• Environmental Quality• Mode Share
	Scope: <ul style="list-style-type: none">• Local• State• Regional
Description:	Complete Streets are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists, and bus riders of all ages and abilities are able to safely move along and across a complete street.
References:	http://www.completestreets.org/ http://www.completestreets.org/federal.html (S. 584/H.R. 1433)
Local Area Traffic Management (LATM)/Traffic Calming	
Principles Addressed:	<ul style="list-style-type: none">• Injury• Mode Share
	Scope: <ul style="list-style-type: none">• Local• Federal (non-U.S.)
Description:	Traffic calming is a system of design and management strategies that aim to balance traffic on streets with other uses. The tools of traffic calming provide an example of a different approach from treating the street only as a conduit for vehicles passing through at the greatest possible speed.
References:	http://www.cochrane.org/reviews/en/ab003110.html http://www.fhwa.dot.gov/environment/tcalm/part3.htm http://www.pps.org/info/placemakingtools/casesforplaces/livememtraffic
Environmental Review Toolkit	
Principles Addressed:	<ul style="list-style-type: none">• Environmental Quality• Mode Share
	Scope: <ul style="list-style-type: none">• Federal
Description:	Environmental stewardship and streamlining resources for FHWA offices, state departments of transportation, resource agencies, and consultants. The website includes a guide to practices by state, links between planning and the environment, and the National Environmental Policy Act (NEPA).
References:	http://www.environment.fhwa.dot.gov/

<p>Livable Centers Initiative (LCI)</p>	
Principles Addressed:	<ul style="list-style-type: none"> • Environmental Quality • Mode Share
	<p>Scope:</p> <ul style="list-style-type: none"> • Local • Federal
Description:	<p>The LCI is a program offered by the Atlanta Regional Commission. It is an example of promoting local strategies to plan and implement a link between transportation improvements and land use development policies to create sustainable, livable communities consistent with regional development plans.</p>
References:	<p>http://www.atlantaregional.com/html/308.aspx</p>
<p>Road Diets</p>	
Principles Addressed:	<ul style="list-style-type: none"> • Injury • Mode Share
	<p>Scope:</p> <ul style="list-style-type: none"> • Local • State • Regional
Description:	<p>"Road diets" are typically conversions of four-lane undivided roads into two through lanes and a center turn lane or two through lanes and a median. The fourth lane may then be converted into bicycle lanes, sidewalks, or on-street parking. "Road diets" are an example of service reevaluation for all users.</p>
References:	<p>http://www.walkable.org/assets/downloads/roaddiets.pdf http://www.tfhrc.gov/safety/hsis/pubs/04082/index.htm http://www.contextsensitivesolutions.org/content/reading/road-diets-2/</p>
<p>Green Streets</p>	
Principles Addressed:	<ul style="list-style-type: none"> • Injury • Environmental Quality • Mode Share
	<p>Scope:</p> <ul style="list-style-type: none"> • Local • State
Description:	<p>Sustainable practices associated with the design and construction of roadways, such as use of recycled or sustainable construction materials, ecologically-sensitive storm water management, and extensive use of vegetation.</p>
References:	<p>http://www.lowimpactdevelopment.org/greenstreets/</p>

Transportation is the lifeline of communities. It connects residents to jobs, stores, family, friends, doctors, schools, parks, clubs, religious institutions, volunteer commitments—everything that allows people to participate and prosper in society. Transportation policy bears on every critical issue facing neighborhoods, regions, and the country.

KEY ISSUES

The chapters in this section cover:

>> **Economic development**

>> **Access to healthy foods and healthy food systems**

>> **Traffic safety**

These are by no means the only issues that should be considered in crafting the new transportation bill. Healthy, equitable, forward-thinking transportation policy must address a number of urgent and interconnected issues, among them climate change, environmental justice, freight transport, and workforce development.

Breaking Down Silos: Transportation, Economic Development, and Health

ch. 6

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ABSTRACT >> *Transportation policy in the United States has historically emphasized automobile use and steered land use, development, and investments in infrastructure toward low-density suburbs. This approach has left low-income communities in aging city centers poorer, sicker, and increasingly immobile, unable—more and more—to get to work, their doctor, parks, gyms, or even grocery stores that sell fresh, healthy food. This paper explores an alternative transportation policy designed to create healthy, productive metro regions by closing the gap between affluent, mobile communities and their less mobile, disadvantaged neighbors.*

By reconfiguring how we use available land, we can create densely populated, mixed-use communities that expand access to transportation and improve health outcomes. With a focus on equity, these policies can also support economic development that reduces poverty and economic and racial segregation.

This paper considers two approaches: creating mixed-income, transit oriented villages and using transportation funds to promote local workforce development. While the goals of equity and environmental sustainability are not mutually exclusive, the paper concludes by cautioning activists against ignoring the short-term needs of low-income families who live in built environments dominated by the automobile.

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Introduction

The United States is in the midst of a shift in transportation policy—from *mobility* to individual and community *accessibility*. Traditionally, transportation choices in this country have been made inside policy “silos” that isolate decisions on how we commute and travel from decisions on how we live. By making these decisions in a vacuum, transportation policies have promoted sprawl, or low-density patterns of housing that favor automobile use over public transportation and that exact a huge toll on the health of our metro regions, particularly low-income communities.

The goal of making transportation more efficient is not to move people faster and farther but to give them wider access to all the things that are necessary for a good life: jobs, education, family, friends, recreation, culture, etc. Under this approach, for example, it might make sense to spend transportation funds on housing construction near major employment centers. This kind of planning can be especially beneficial for low-income families who don’t own a car. But for it to happen requires a more democratic decision-making process in which all community stakeholders have input. This broad-based effort can produce more environmentally sustainable regions.

The focus of this paper is on vertical equity, or policies that provide the most benefits to the most people, including those at the bottom of the socioeconomic ladder. Equity should not be understood simply in terms of income or wealth, but in terms of what Amartya Sen calls “functionings and capabilities.” According to Sen, “relevant functionings can vary from such elementary things as being adequately nourished, being in good health, avoiding escapable morbidity and premature mortality, etc., to more complex achievements such as being happy, having self-respect, taking part in the life of the community, and so forth.”¹ Capabilities refer to the ability to have choices. Other things being equal, people are better off

if they have choices in how they want to live their lives.² To achieve transportation equity, not all low-income people should be treated alike because, depending on where they live, some people have greater transportation needs than others.³ For example, using transportation funds to develop pedestrian-friendly, transit-rich villages will enable people to have acceptable “capabilities and functionings” without building expensive highways.

This essay will not examine the direct effects of transportation services on health. Providing more bus routes for low-income communities, for example, would help people to access medical care or healthy foods. Instead, the focus here is on how transportation influences economic development that in turn affects health. By facilitating market exchanges, transportation influences *what kind* of economic development occurs (single use or mixed use), *where* it occurs (on the suburban fringe or near the center), and *who benefits* (rich or poor, white or black). The type of economic development that occurs has direct effects on health. Compact, mixed-use developments that rely more on public transportation, walking, and biking support better health outcomes, other things being equal, than auto-dependent, low-density economic development that separates residential, retail, and office functions.⁴

Besides these *direct* effects, there are also many *indirect* effects of transportation systems on health. Transportation policies encourage economic development that either worsens or lessens poverty, inequality, and economic and racial segregation. All of these factors—poverty, inequity, and segregation—are associated with poor health outcomes (see endnotes five and six). The link between poverty and poor health outcomes is well documented, but less well known is that income inequalities across class and space are also associated with poor health.⁵ Moreover, residents of areas with concentrated poverty not only have little access to health services, but also experience other factors that undermine health,⁶ including:

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- 1. Less Exercise:** Because people are afraid to go outside in high-crime areas and because high-poverty areas often lack good walking infrastructure, such as parks and sidewalks, living in poverty-impacted neighborhoods discourages physical activity and therefore increases obesity and other negative health outcomes.
- 2. Poor Air Quality:** High-poverty neighborhoods are more likely to be the locations for toxic waste dumps, garbage transfer stations, bus depots, highways and ports, and truck facilities, and therefore suffer from inferior air quality due to toxic fumes as well as gasoline and diesel exhaust.
- 3. Inadequate Diet:** Residents of high-poverty neighborhoods often lack access to low-cost, high-volume grocery stores with fresh fruits and vegetables.
- 4. High Stress:** Finally, residents of poor neighborhoods suffer from the withering effects of stress. High crime, overcrowding, noise, unemployment, lack of retail outlets, and poor public services are all stressful. Chronic stress damages our organs and immune systems and is associated with cardiovascular disease, asthma attacks, and premature death.

The paper concludes with recommendations for transportation policies that can reduce economic inequalities and improve the access of disadvantaged populations to all those things that are necessary for a good life and good health. It cautions that we need both long-term policies—to reduce automobile dependency by changing land use patterns over time—and short-term policies—to meet the needs of low-income families who live in automobile-dependent environments.

Unhealthy Effects of the Highway Policy Silo

Until the 1990s transportation policy in the United States was dominated by what political scientists call a policy monopoly, or silo—an arena of government decision making controlled by industry insiders and insulated from demands by other stakeholders.⁷ A steady stream of funding for transportation was guaranteed by federal- and state-earmarked gasoline taxes, and decisions about spending that money were made largely by highway engineers within state departments of transportation (DOTs).

The transportation policy silo was influenced by market principles intended to maximize mobility. Building more and more roads was the market's response to meet demand of customers who had the most money to spend. Highway engineers in state DOTs based their decisions to extend roadways on mathematical projections for increasing automobile travel, and the central tenet was increased mobility—moving more people over greater distances at higher speeds. Highway engineers were not trained to think about how land use patterns influenced travel demand but to focus on how to move people in the most efficient manner given the infrastructure that was in place.

Rather than simply respond to demand, however, highway building created demand for more roads and cars. This is called traffic generation or induced demand: expanding road capacity on the urban fringe promoted low-density suburban sprawl that in turn generated demand for more highways.⁸ Reinforced by suburban zoning codes, auto-centered transportation policy promoted economic development that separated residential, retail, office, and wholesale functions into distinct geographic zones. Instead of a market equilibrium or balance between different transportation modes and land use patterns, silo-driven transportation policy generated a positive feedback mechanism that encouraged



one mode (automobiles) and one land use pattern (suburban sprawl) to expand unchecked.

The white middle-class families that moved out to the suburbs to live in single-family homes on large lots generally inhabited environments with plenty of green space, sunshine, low crime, and low stress.⁹ Most of the negative effects of highway-oriented economic development fell on those left behind by suburban sprawl. Highway construction encouraged the movement of jobs away from the urban core.¹⁰ Largely because of suburban zoning codes, lack of access to federally guaranteed mortgages, and racism in housing markets, inner-city working class and minority households were unable to follow jobs out to the suburbs. Unusually long distances between home and jobs for low-income and minority workers are well documented by researchers and are a cause of poverty.¹¹

Auto-driven urban sprawl has also been a mighty engine of economic segregation. Since the 1950s, new home construction on the suburban fringe has shifted from the middle to the top of the income distribution.¹² The correlation between new housing and economic segregation is strong: the newer the housing in a neighborhood, the higher the average income in that neighborhood.¹³ By subsidizing the flight of the middle class out of central cities

and inner-ring suburbs, the auto-dominated transportation system left behind pockets of concentrated poverty, with the negative effects on health cited earlier.

Using the power of eminent domain, state DOTs displaced millions of households to build new highways.¹⁴ Highway engineers typically located highways connecting suburbs with central business districts through low-income, usually minority, neighborhoods to save money on land acquisition. Involuntary displacement from highway building severed social connections, which have been shown to be crucial for good health.¹⁵ Forced moves can be life threatening for older adults. At the same time that urban neighborhoods were disrupted by highway building, the highway construction jobs went overwhelmingly to white, often suburban, construction workers.¹⁶

The highway-dominated transportation system also puts pressure on family budgets, especially among low-income families. The general standard is that no family should spend more than 20 percent of income on transportation; after that, transportation expenditures will begin to eat into other necessities, such as housing and healthcare.¹⁷ The average American household devotes about 18 percent of its after-tax income to transportation, but this varies by income and by place of residence. Overall, transportation expenditures are regressive with regard to income.¹⁸ Low-income households, and especially those who live in areas without good public transportation, spend a much higher percentage of their incomes on transportation. For example, households earning between \$20,000 and \$35,000 and living far from employment centers spend 37 percent of their income on transportation.¹⁹ To have access to jobs, they must own a car. The necessity of car ownership exacerbates poverty. In 2007 the annual cost of owning an automobile averaged \$9,498 (for insurance, gas, maintenance, and the average annual cost of purchasing or leasing an automobile).²⁰

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New Transportation Policies for Healthier Economic Development

The 1991 *Intermodal Surface Transportation Efficiency Act (ISTEA)* was designed to break open the policy silo that had dominated transportation policy for so long.²¹ As the name suggests, *ISTEA* aimed to create intermodal systems that balance highways with transit, walking, and bicycling. *ISTEA* made it easier to “flex” funds from highways to transit. By encouraging the coordination of land use and transportation, *ISTEA* began the shift from a mobility policy paradigm to an accessibility policy paradigm. It changed the way decisions were made, removing some decision-making power from highway-dominated state DOTs and giving metropolitan planning organizations (MPOs) veto power over projects in their area. *ISTEA* began to open the transportation policy silo. For example, decisions for spending Congestion Mitigation and Air Quality (CMAQ) funds had to be approved by the air quality district, thus ensuring that environmental interests would be at the table when some transportation decisions were made. *ISTEA* also required MPOs to publish an overall plan for citizen participation. The intent was to have a broad array of stakeholders at the table when transportation decisions were made.

Although *ISTEA* and its successor acts (the *Transportation Equity Act for the 21st Century*, or *TEA-21* (1998), and the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users*, or *SAFETEA-LU* (2005) have activated new networks around transportation policy, the results on the ground have been disappointing. With the exception of California, relatively few dollars have been flexed from highways to other transportation modes.²² Even though transit ridership is up, the proportion of all trips made by public transportation declined steadily from 1990 to 2001.²³ In 2007 10.3 billion trips were taken on public transportation, the highest level in 50 years; the third quarter

of 2008 reported the largest annual increase in transit ridership in 25 years.²⁴ In 2009, just as public transportation is serving record numbers of people, many transit agencies are facing deep cuts. Efforts to coordinate transportation investments and land use continue to be halting and fragmented, and in most metropolitan areas, federal dollars are still going to highways, subsidizing energy-intensive, low-density sprawling patterns of land use that shift jobs away from needy urban communities.²⁵ State DOTs still dominate decision making; only about six percent of federal funds are actually controlled by MPOs.²⁶ Even within MPOs, citizen participation is often ritualistic.²⁷ Citizen groups are put in the position of responding to decisions rather than being at the table when the agenda is set.

The upcoming authorization of federal transportation policy needs to take bold steps to correct these problems, completing the transition from a mobility policy paradigm to a focus on accessibility. All major stakeholders—drivers, transit users, local residents, environmental groups, civil rights organizations, pedestrians, and bicyclists—should have a say in how federal transportation dollars are spent in their areas. Above all, federal transportation policy needs to be more equitable. The next two sections examine areas where transportation policy can improve the health and well-being of disadvantaged groups at the same time that it builds a more efficient and environmentally sustainable transportation system. This requires transportation policymakers to step out of their policy silos and talk to those who formulate housing policy and workforce development policy.

Mixed-Income Transit Oriented Development

Transportation policy and housing policy tend to be developed in separate policy silos; DOTs don't talk to HUDs. This is a mistake. Transportation investments shape housing demand and housing shapes transportation demand. Low-density suburban development would have



been impossible without massive investments in suburban road capacity. Similarly, investments in new light-rail systems open up possibilities for higher-density development around transit stations. Well-planned development around such stations can produce broad benefits for society as well as targeted benefits for low-income persons, but only if equity is made a priority in the transportation-housing nexus. The result will be healthier communities, especially for low-income persons.

Starting with San Diego in the early 1980s, a new generation of fixed-rail transit systems has emerged in the United States. The new light-rail systems are faster than trolleys but stop more frequently than the heavy-rail suburban commuter trains. Bus rapid transit (BRT) lines, in which buses are given dedicated lanes and priority at traffic lights, are being developed in many cities and, if properly constructed, can provide many of the same benefits as light rail. Substantial new investments are being made in new light-rail systems. The federal New Starts program, which provides capital funds for light-rail systems, is funded at only about two billion dollars out of the approximately

\$50 billion spent by the federal government on transportation each year. Only a handful of metropolitan areas get assistance in any year.

Many metropolitan areas have taken matters into their own hands, passing local taxes to pay for expansion. In 2004 Denver voters passed a half-cent sales tax to fund a \$4.7 billion expansion of their light-rail system; Charlotte voters also approved a half-cent sales tax to finance a nine billion dollar light-rail system planned to be completed by 2030. Light-rail systems are sold to the voters for a wide range of benefits, including cutting traffic congestion, reducing gasoline consumption, improving air quality, and attracting new investment to the region.

All of these benefits are enhanced by transit oriented development (TOD), defined as development within a half-mile of a transit station (about a ten-minute walk) that is high density, pedestrian friendly, has mixed use, and includes station-focused public spaces. The development of new light-rail systems opens up possibilities for more efficient, more environmentally sustainable, and more equitable development. The land around light-rail stations increases in value because it is more accessible to housing, jobs, and shopping.²⁸ Higher land values justify denser development. Drawing on these increased land values, public policies can leverage funding for affordable workforce housing with little or no cost to taxpayers. Developers can be offered density bonuses in exchange for building affordable housing. The profits they make by building more units on each plot of land will be used to fund the affordable housing, typically with money left over as additional profits. In weaker markets, mixed-income TOD may need to be subsidized by housing policies.

The demand for housing near light-rail station lines soared until the recent housing crisis, and it will rise again when the economy recovers and gas prices escalate. Today, about six million households live within a half-mile of a transit station. The demand for housing adjacent to

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transit is projected to reach 16 million by 2030.²⁹ To meet this demand, 10 million housing units will need to be built within a 10-minute walk of transit stations. This movement toward denser, mixed-use forms of development presents a golden opportunity to create mixed-income transit villages, providing healthier environments, especially for low-income families. Enabling low-income households to live in TODs will give them access to pedestrian-/bicycle-friendly environments that encourage an active, healthy lifestyle and that are closer to amenities, such as full-service grocery stores offering fresh fruits and vegetables.

TOD is built primarily by private developers, but it has extensive public benefits that justify government support: TOD increases property values around stations and therefore enhances tax revenues; well-designed TOD reduces crime by creating “eyes on the street” and 24-hour activity; TOD increases transit ridership and reduces traffic congestion by giving residents access to more destinations by transit and on foot; TOD reduces air pollution by cutting down on the need for automobile use; TOD saves infrastructure costs by reducing the need for parking; and TOD promotes active lifestyles that reduce obesity and improve health.

By including affordable housing, TOD can also improve equity and health. As we noted earlier, transportation costs are an onerous burden to low-income families, especially those that must own a car to get to work. TOD can reduce that burden. Higher levels of accessibility enable families to substitute more affordable and healthier forms of transportation—public transit, walking, and bicycling—for more expensive automobiles. A new tool, the Affordability Index, shows how much a household can save by living in a transit-rich environment. In Minneapolis-St. Paul, monthly costs of transportation varied from \$446 to \$941. Moving from a transit-poor to a transit-rich neighborhood would save the average household \$5,940 a year.³⁰ For a low-income

family, this savings would be huge. Locating jobs within TODs can help overcome the job-housing mismatch discussed earlier.

Planners may be tempted to include only higher-income housing in TODs on the ground that it will maximize property values. But this is not necessarily true. Smaller, more affordable rental housing and condos can be quite profitable. Moreover, low-income households are good to have in TODs because they tend to use transportation more than high-income households. In 2001 those earning less than \$20,000 a year accounted for 38 percent of all transit riders, far more than their 14 percent share of the urban population.³¹ Low-income households are less likely to own a car; therefore, the zoning code can reduce the parking requirement by up to 75 percent (from one parking space per middle-income unit to one-quarter of a space per low-income unit).³² At \$10,000–\$30,000 per parking space, this can be a powerful incentive for developers to include affordable housing.

One of the barriers to realizing the savings of living in transit-rich environments is that it is very rarely possible for households to entirely give up access to a car. Automobile use has high fixed costs, and those costs are more burdensome to low-income households that drive fewer annual miles. Low-income drivers often pay high insurance rates, even though they drive less.³³ Even if low-income households can use public transportation to get to work, in most American metropolitan areas, they will still need a car to transport major purchases or to visit friends or relatives in other parts of the region.

The root of the problem is that there is no easy way to own “part” of a car. The invention of car-sharing solves this problem by enabling access to an automobile on a pay-as-you-drive basis. A nonprofit in the Bay Area, City CarShare, opened for business in 2001, and subsequently private companies—such as ZipCar—have entered the business. Flex cars are parked on

city streets and, after undergoing a background check, people can join the system and use the cars on a per-hour basis, usually for less than \$10 an hour. A study of CarShare members found that nearly 30 percent of them had gotten rid of one or more cars and nearly two-thirds said they had decided not to purchase another car.³⁴ This system could be adapted for low-income persons; used cars could be employed instead of new cars. Imagine what it would mean to a family of three earning the federal poverty cutoff (\$17,600 in 2008) if they could dispense with the cost of owning a car (average cost \$9,498) and instead use public transportation and car-sharing at one-half that amount or less.

To realize the full benefits of mixed-income TOD, new policies are needed to break down the silos that have encased transportation and housing policies and prevented the synergies that would result from coordinating them.³⁵ The upcoming authorization of federal transportation policy presents an opportunity to connect transportation to economic development and health. When energy prices rise, as they will when the economy recovers, the motivation to coordinate housing and transportation policies to reduce energy consumption will also rise. The Obama administration and the new congressional leadership have expressed a desire to overcome policy silos and to begin planning transportation and housing policies together.³⁶

Policy Recommendations

Transportation

- Authorization of the upcoming federal transportation bill should enable MPOs to flex funds from transportation funding to subsidizing mixed-income TODs.³⁷
- Funding for the New Starts program should be increased and the Federal Transportation Administration (FTA) should give priority to applications that incorporate plans for mixed-income TODs.
- Funds should be set aside in the next bill to provide technical assistance to local governments and community-based organizations (CBOs) to plan mixed-income TODs.
- U.S. DOT should develop a model overlay zoning code that encourages mixed-use, denser, more pedestrian-friendly development around transportation stations and disseminate best practices for TOD from around the country.
- DOT should require that MPOs' Transportation Improvement Plans (TIPs) report on how transportation investments will address the need for affordable workforce housing near transit.
- DOT should develop a competitive grant program to subsidize car-sharing for low-income households living within half-a-mile of transit stations.
- DOT (or HUD) should develop an affordability index for housing that includes transportation costs to monitor the progress of metropolitan areas, especially for low-income households.

Housing

- The Low-Income Housing Tax Credit (LIHTC) and New Markets Tax Credit programs should be amended to incentivize projects that are located within half-a-mile of a transit stop; the U.S. Treasury should increase the LIHTC bonding cap for states to undertake mixed-income TOD projects.
- HUD should write regulations for the Community Development Block Grant (CDBG), and other grant programs, to give high priority to mixed-income TODs.
- The federal government should enact a homeownership tax credit targeted to low- and moderate-income homes located within half-a-mile of a transit station.

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- HUD should create a program to preserve affordable housing within half-a-mile of a transit station and that is threatened by expiring use restrictions.
- State and local governments should allocate a portion of tax-increment financing (TIF) and other local incentives to mixed-income TODs; economic development incentives should be targeted on jobs that are accessible by transit (“location efficient job incentives”).³⁸
- In strong market regions, local governments should enact TOD overlay zoning districts that reward developers with density bonuses if they include workforce housing.³⁹

Transportation and Local Workforce Development

Just as transportation policy needs to be coordinated with housing policy, it also needs to be coordinated with workforce development policy. Transportation expenditures generate hundreds of thousands of jobs each year in the construction industry. When these jobs are targeted to the neediest communities, transportation policy helps to lift up poor communities and, in the process, improve health outcomes. In effect, connecting transportation to workforce development enables the taxpayers to get “more bang for their bucks.”

The loss of well-paying manufacturing jobs has been devastating to many inner urban, heavily minority communities, creating pockets of concentrated poverty with all of the negative effects on health discussed earlier.⁴⁰ One of the causes of entrenched poverty is the lack of decent-paying jobs for workers without a college education. The jobs they can get usually pay low wages, have few benefits (including no health insurance), and lack job ladders for advancement. Dead-end jobs offer little hope.

Construction is one industry where a worker

without a college education can get a job with good pay, decent benefits, and the prospects of advancing up a clear job ladder. Even though fewer than 10 percent of construction workers have college degrees, the average wage in construction in 2006 was \$18.29 an hour, well above the minimum wage.⁴¹ Wages and benefits vary significantly in the industry.⁴² Unionized construction workers who have access to joint union-contractor apprenticeship systems can advance from apprentice to journey-level status, earning at least \$30–\$40 an hour. The apprenticeship system is paid for by a modest surcharge on all wages that are part of the collective bargaining agreement. Workers do not need thousands of dollars to access excellent job training services; in construction apprentice programs they can “earn while they learn” on the job.

Unfortunately, blacks and women have historically been blocked from skilled, unionized jobs in the construction trades. According to a recent study of the core counties in the 25 largest metropolitan areas, if blacks were employed in construction in 2006 at the same rate they were employed in the general workforce, an additional 137,044 blacks would be working in construction. In 2005 women represented only 2.6 percent of production workers in construction.⁴³

Successful programs have been set up around the country involving collaboration among unions, community groups, and end users of construction to bring minorities, women, and low-income persons into skilled construction trades. With the exception of the recent downturn in the homebuilding industry, construction jobs are growing, offering the opportunity to bring new workers into skilled construction trades without displacing present workers. Based on retirements, transfers, and job growth, the federal government estimates that the industry will need to recruit 245,900 skilled construction workers each year between 2004 and 2014.⁴⁴ With guaranteed funding

of \$244 billion over five years, *SAFETEA-LU* should have created more than 1.9 million person years of on-site construction jobs by its 2009 expiration.⁴⁵

The 1931 *Davis-Bacon Act*, as amended, requires that all workers on federally funded construction projects be paid the “prevailing wage” in each region, which is usually close to the union wage in construction.⁴⁶ The potential of targeting jobs from transportation projects to disadvantaged communities is illustrated by the Alameda Corridor project. In 1998, a coalition of community groups won a local hiring agreement on a \$2.4 billion transportation project serving the ports of Los Angeles and Long Beach, called the Alameda Corridor.⁴⁷ The project used a combination of federal and state monies. A coalition of 40 community-based organizations negotiated a community benefits agreement (CBA), requiring that at least 30 percent of all the hours on the project be performed by disadvantaged persons from the surrounding low-income zip codes. During the CBA negotiations, the federal government maintained that targeted hiring was prohibited on both statutory and constitutional grounds. The project was able to get around this prohibition by using only state funds for the targeted hiring program. CBOs were funded to run pre-apprenticeship programs to prepare applicants for the rigors of construction. Of the 880 graduates of the pre-apprenticeship programs, 373 were ex-offenders. Eventually, 710 local residents were placed in construction jobs.

The Transportation Equity Network (TEN)—a coalition of 300 grass-roots community groups working to make transportation policies more responsive to low-income persons, minorities, and disadvantaged communities—wanted to spread the Alameda model around the nation. In 2005 it was able to get a “Sense of Congress” inserted into *SAFETEA-LU*, which specifically upholds the Alameda Corridor project as a model and states that “federal transportation projects should facilitate and encourage” collaboration between state

departments of transportation and other interested parties “to help leverage scarce training and community resources to help ensure local participation in the building of transportation projects” (Public Law 109-59, Stat. 114. Section 1920: Transportation and Local Workforce Investment).

Using this provision, TEN and its allies have negotiated local workforce agreements in states and metropolitan areas around the nation.⁴⁸ In one successful example community groups in St. Louis used a little-known provision in federal transportation law (23 USC 140) that allows state DOTs to use up to one-half of one percent of surface transportation funds for workforce development. The groups negotiated an agreement with the Missouri Department of Transportation that devoted \$2.5 million from the \$535 million I-64 project to local workforce development and reserved 30 percent of the work hours on the project for women, minorities, and low-income persons. A similar agreement was negotiated in 2008 for the Kansas City Paseo Bridge Project. In May 2008 Governor Tim Pawlenty of Minnesota signed a law that directs Minnesota’s DOT to spend the maximum amount feasible on job training and supports. Also in 2008 Michigan passed a law that directed \$15 million of highway funds into job training over four years.

Successful state and local experiments show that transportation projects can successfully target jobs to needy communities. Federal prohibitions against race- or place-based targeting have been overcome by recruiting participants through “first-source” job training centers. Under first-source hiring provisions, apprenticeships are required to be filled by job training centers that are located within, and have close ties to, low-income and minority neighborhoods. These job training centers provide pre-apprenticeship training that prepares workers for the rigors of the construction trades. Many applicants lack the basic math skills, work habits, and knowledge of the construction industry to succeed

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in an apprentice program. Successful pre-apprenticeship programs impart these skills and weed out those who are unprepared, including those with drug or alcohol problems. The best pre-apprenticeship programs have high success rates placing their graduates in the construction trades, but they cost between \$6,000 and 8,000 per participant.⁴⁹

Successful experiments in local workforce development in the construction trades are encouraging, but they do not come close to meeting the need. This is where transportation policy can make a difference. Current federal transportation law permits states to use federal highway funds for local workforce development; it does not *require* them to do it. Local workforce development should be mandatory on all large federal transportation projects. The federal departments of transportation and labor should collaborate to develop joint programs on workforce development. Transportation expenditures will generate a steady demand for skilled construction labor, which could be met by targeted job training programs.

Policy Recommendations

Transportation

- Section 1920 should be changed from a “Sense of Congress” to a mandate requiring that 30 percent of all hours on all large federal transportation projects (over \$10 million) be performed by women, minorities, ex-offenders, and low-income persons from the local communities where the project is located.⁵⁰
- One percent of all funding on large federal transportation projects, transit as well as highways, should be set aside to fund pre-apprenticeship programs and to subsidize the wages of apprentices.⁵¹



- State DOTs should be directed to facilitate negotiations among unions, contractors, community groups, local job training agencies, and other interested parties to negotiate agreements to implement mandated local hiring.

Labor

- The U.S. Department of Labor (DOL) should establish a program under the *Workforce Investment Act* to provide grants in metropolitan areas with demonstrated shortages of skilled construction workers for pre-apprenticeship programs run by unions, community-based organizations, high schools, or community colleges.
- DOL should fund a program to evaluate pre-apprenticeship programs around the country and spread best practices, including offering technical assistance to providers of such programs.
- DOL should gather data on the supply and demand for skilled construction labor

in each metropolitan area for each major construction trade to guide local workforce development planning.

In short, health, environmental, and equity concerns can and must be addressed at the same time. Win-win policies can help to cement the so-called blue-green alliance between workers and environmentalists. For example, a recent Public Interest Research Group (PIRG) report showed that investment in public transportation produces 19 percent more jobs than equivalent investments in roads and bridges.⁵² We have shown that mixed-income development around transit stations can address poverty and improve health outcomes at the same time. Equity and health advocates have a natural convergence of interests here.

To realize these policy objectives, we do not need government agencies to just break out of their policy silos; we need citizens to break out of their advocacy silos. Transportation equity advocates need to understand the health implications of the policies they recommend, and health advocates need to be mindful of the impacts of their policies on equity—on the ability of people everywhere to access opportunities. Health advocates need to understand the key role played by land use reform in creating healthier environments and giving low-income persons access to jobs. There is a convergence of interests here that could build powerful coalitions for reform—only if advocates in each area set aside narrow definitions of self-interest and open themselves to new perspectives.

Conclusion

It is exciting to develop policies that can shape a new built environment that is healthier and more equitable than today's norm. This will require working across the silos that have too often constrained effective public policies. For example, Secretary of HUD, Shaun Donovan, and Secretary of Transportation, Ray LaHood, have begun to collaborate on how to coordinate housing and transportation policies (see endnote 36). Using transportation policies to promote affordable housing and housing subsidies to support public transportation will reduce our over-reliance on automobiles and create healthier environments.

Unfortunately, most people today live in a built environment that requires extensive use of cars or buses. To devote the vast bulk of our resources to public transportation in order to shape the built environment in a more progressive direction would be shortsighted.⁵³ We must continue to invest resources in maintaining and improving bus service for low-income persons and people with disabilities (including making buses less polluting), even though buses, unlike light-rail systems, do not create powerful incentives for higher-density TOD. Indeed, we may need to subsidize vans and even car ownership for some people who live in areas not serviced by mass transit.⁵⁴

Ultimately, we need short-term policies to accommodate the transportation needs of people where they presently live at the same time that we advocate for long-term policies that will shape living patterns to reduce automobile dependence and create healthier environments for everyone.

Sustainable Food Systems: Perspectives on Transportation Policy

ch. 7

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ABSTRACT >> *Global agri-food and transportation systems have dramatically expanded food production and distribution worldwide. This integration, however, also adversely affects human health. The negative effects arise from unequal access to healthy food, unequal access to transportation for agri-food workers, increasing geospatial and economic concentration in the agri-food industry, and an emerging competition between food and fuel. Because the health of individuals is inextricably tied to the health of communities, regions, and ecological systems, health and transportation professionals need to act to both mitigate current disparities and enhance the future viability and sustainability of these systems. This paper offers numerous, specific recommendations for improving health through transportation policy and programs as they relate to agri-food systems.*

Sustainable Food Systems

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Agri-Food Systems, Health, and Transportation: An Overview

Agri-food systems include the production, processing, distribution, and consumption of food; the disposal of wastes; and the resources, actors, rules, and processes involved in the design, implementation, promotion, and regulation of these activities. These systems interact with communities to affect human health, both directly and indirectly. This paper explores these interactions to inform transportation policies that improve health, strengthen communities, and protect the environment.

As a result of linkages between the agri-foods industry and growing transportation networks, most U.S. households have ready access to large quantities of foods from all over the country and abroad; communities in crisis can quickly receive food aid transported from faraway countries; and exporters can efficiently reach grocery store shelves and markets around the world, positioning U.S. corporations at the helm of an international retail food enterprise pegged at four trillion dollars annually.¹

But the integrated system for food production and distribution has left behind millions of Americans in low-income communities in the inner cities and sprawling rural areas. Women, people of color, and immigrants have been left particularly vulnerable. To reduce disparities and attendant costs; to distribute benefits more equitably; and to build more sustainable transportation, food, and community systems, transportation policy must focus on health concerns resulting from:

- Lack of access to grocery stores offering affordable, healthy foods. This imbalance is associated with higher rates of obesity, disease, food insecurity,² and related stress;
- Lack of efficient, affordable transportation access for agri-food workers, such as farm workers and food service staff, whose wages are among the lowest in a region;
- A global agri-food industry that is fueled by cheap energy and transportation subsidies but, paradoxically, poses serious health risks to the community and exacerbates climate change; and
- Competitive market pressures to use crops for fuel, raising the price of food.

Transportation policy has not traditionally considered these issues, but it should, given the increasing rates of obesity and related health costs; climate change; threats to global food security; and inefficient, unsustainable food systems that rely on cheap energy to distribute food to faraway places.

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Disparities in Urban and Rural Communities' Access to Healthy Foods

Communities do not enjoy the same access to healthy foods, with inner-city neighborhoods and remote, rural areas faring the worst.³ This disparity occurs for several reasons, including a lack of grocery stores in low-income neighborhoods, a lack of affordable mass transportation, and lower rates of automobile ownership in low-income areas.

Lack of Grocery Stores In and Near Low-income Neighborhoods

Over the past five decades, the food retail industry has transformed itself in many ways, resulting in fewer corporate chains capturing a larger share of the retail market,⁴ more big-box stores opened in suburban locations and

fewer in urban and rural ones,⁵ and supermarket chains with consolidated food supply and distribution systems.⁶ These shifts, and increasing suburbanization, mean that fewer people now live within walking distance—or a short bus or subway ride—to the grocery store.⁷ This spatial dislocation has been made possible, in large part, by federal transportation policy that financed highway development, supported increased truck transportation of goods, and encouraged personal automobile use through subsidies that expanded roadways and parking. For example, one study puts the total “tax subsidy” to motor vehicle users in the range of \$19–\$64 billion per year.⁸

Today, inner-city⁹ and rural¹⁰ neighborhoods have fewer and smaller grocery supermarkets, with poorer selections of healthy foods and higher prices than their suburban counterparts. Urban neighborhoods, conversely, have an abundance of smaller convenience stores and fast-food outlets, which offer disproportionately higher amounts of foods of poor nutritional quality.¹¹ A decline in wholesale and retail farmers' markets¹² also paralleled the decline of grocery supermarkets in urban and rural locations, although farmers' markets have recently seen a dramatic rise.¹³ Nonetheless, farmland in metropolitan areas, where a majority of fruits and vegetables are grown, continues to be consumed by urban sprawl.¹⁴

For low-income and urban residents, for people of color, and for immigrants—all of whom tend to own fewer cars than affluent and middle-class whites,¹⁵ the paucity of nearby supermarkets leads to higher rates of diet-related morbidity and mortality,¹⁶ and even greater stress related to grocery shopping. Conversely, relatively easy access to supermarkets is associated with higher household consumption of fruits and other positive dietary behaviors.¹⁷ Disparities in the number and size of supermarkets have been documented by race even after controlling for income, with African American neighborhoods most adversely affected.¹⁸ Higher costs,



poorer selections, and lower quality of foods in low-income neighborhoods mean that taxpayer-funded nutrition programs such as the food stamp program (more recently known as SNAP, or the Supplemental Nutrition Assistance Program) don't go as far as in better-off neighborhoods. Lack of affordable, neighborhood-based food outlets also forces low-income households to rely more on emergency food programs such as food pantries that—dependent on private donations and government surpluses—stock little in the way of healthy foods. What's more, poor diets conspire with poor air quality, fewer parks and fitness facilities, poor quality housing, high levels of crime, noise, and other social and environmental stressors in low-income neighborhoods.

Increased Dependence on Use of an Automobile for Grocery Shopping

Grocery shoppers tend to prefer to travel to supermarkets by car, in part because of the one-stop design of supermarkets and their proximity to large-scale shopping districts with abundant, available parking, all of which discourage walking or biking. Vehicles save time and can help shoppers reach more stores, combine trips, and transport heavy packages easily, including in inclement weather.¹⁹ One Austin, TX, study found that few people substitute walking for driving to the grocery store, even if pedestrian or cycling access is good.²⁰ Even the poor who do not own cars often borrow them, ask for rides from friends, or take taxis to do grocery shopping²¹; however, transportation and walking remain critical in providing the mobility needed to access grocery outlets for these families.²²

Public bus routes and schedules, even in well-served communities, are typically planned in ways that disadvantage food-shopping trips needed during weekends and evenings. A typical bus system is also planned around a central hub, a design that often lengthens travel time to more peripherally located supermarkets. And high levels of required parking for supermarkets may make them less of a priority

in transportation system planning. Perversely, such land use policies may exacerbate the peripheral location of supermarkets. Research from the United Kingdom suggests that when land use policies discourage new supermarket development on the urban fringe, stores invest more in expanding and refurbishing the older stores based closer to the urban core.²³

People who live in low-income households are underserved by both the food²⁴ and transportation²⁵ systems. In 2007, food insecurity rates in the United States rose even before the sharp economic declines of 2007–08. Overall, 36.2 million persons—or 12.2 percent of Americans, mostly women, minorities, and children—struggled with hunger. In May 2008, more than 28 million persons participated in the food stamp program, a 32 percent increase in five years; yet the program reaches only two out of three eligible households.²⁶ Access to food stamp offices for these populations often is undermined by the distances needed to travel, lack of evening hours of operation, and limited public transportation within communities.²⁷ Food stamp recipients are also vulnerable to losing benefits due to lack of transportation to recertification appointments.²⁸ For a variety of reasons, farm worker households face a higher risk of food insecurity.²⁹ At the same time, the poorest Americans who have cars spend disproportionately more of their household budget than the national average on the purchase, operation, and maintenance of automobiles³⁰; are subject to higher interest rates when attempting to purchase a car; spend disproportionately more on commuting to work³¹; and are more likely to miss work due to car problems.³²

Low-income populations are comprised disproportionately of women, who also tend to make more trips related to childcare and household servicing—including 75 percent more grocery shopping than men do.³³ Shoppers tend to mix and match stores for food shopping based on criteria related to product mix, price, quality, and quantities desired and also the

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relative proximity of suitable outlets to their homes and workplaces.³⁴ Rural residents shop for groceries at more stores than do urban residents and travel farther to reach the stores.³⁵ Nonetheless, the scarcity of large supermarkets in poor neighborhoods and the economic pressures that force low-income residents to shop in smaller stores in their neighborhoods remain significant factors in why poor people pay more for food.³⁶ Federal nutrition programs such as food stamps and WIC (Women, Infants, and Children) do not pay for transportation costs incurred by households to procure food.³⁷ The Summer Food Service Program, which is under-enrolled in large part because of transportation barriers, provides small multiyear, competitive grants for innovative approaches to overcome such barriers.³⁸

Although transportation costs represent only a modest share of the cost of food consumed at home—an estimated six to 12 percent³⁹—energy disruptions can cause significant hikes in the price of food, as was experienced in the first half of 2008.⁴⁰ This is because both the food and transportation systems are highly energy intensive. Also, declining diesel oil prices through the 1990s tended to restrain food transportation cost increases; this trend is unlikely to continue for long. Rising energy costs hit low-income households especially hard as they struggle with maintaining an automobile, higher utility costs, and buying enough food for their families.

Disparities in Affordable Transportation Alternatives for Agri-food System Workers

Low-income rural households also experience problems with access to affordable transportation.⁴¹ Agri-food workers' burdens in this regard are especially heavy, and the least paid among them also tend to be predominantly members of groups that

are also vulnerable within communities: disproportionately younger (or older), female, immigrant (including those without legal residency status), and people of color. Most farm laborers and food service workers earn close to the minimum wage and get few additional benefits or perks. According to the U.S. Department of Labor, the national median wage in 2007 for waiters and waitresses was \$7.62 per hour, and that for farm workers and laborers was \$9.78 per hour. By comparison, the median for all occupations was \$15.10 per hour. Dependence on public transportation reduces employment access far more than any other factor⁴²; when people who work at or near the minimum wage must make longer journeys to work, their income does not rise.⁴³

Agri-food workers also experience greater transportation challenges because of the dispersal of jobs across the metropolitan and rural landscape. As a subset, farm workers have special difficulties accessing transportation.⁴⁴ In one study of farm workers in Mendocino County, CA, two out of five workers depended on rides from family members and other acquaintances; those who incurred transportation costs (i.e., were not living on farms) reported a mean cost of \$40 per week—or roughly 16 percent of the average weekly wage—with a median of \$30 per week.⁴⁵ As other papers in this collection show, strong evidence exists of a correlation between lack of access to adequate mobility and lack of access to opportunities, social networks, and health-supporting services such as clinics and pharmacies. At the same time, anecdotal evidence suggests that farm workers with transportation issues are at higher risk for injury as a result of their greater reliance on older “junkier” cars, traveling in the early hours of the morning, lower safety requirements (such as seatbelts) for farm-worker transport vehicles, and lax enforcement of safety regulations for such vehicles.⁴⁶

Table 1. *Energy Consumption and Emissions by Different Freight Modes*⁵⁴

	Rail	Water	Truck	Air
Fuel (kilojoules per ton-kilometer)	677	423	2,890	15,839
Emissions (grams per ton-kilometer)				
Carbon Dioxide	41	30	207	1,260
Hydrocarbons	0.06	0.04	0.3	2.0
Volatile Organic Compounds	0.08	0.1	1.1	3.0
Nitrogen Oxide	0.2	0.4	3.6	5.5
Carbon Monoxide	0.05	0.12	2.4	1.4

Table 2. *Average Distance by Truck to Chicago Terminal Market, 1998*⁵⁵

Average distance by truck to Chicago Terminal Market (continental U.S. only)*	# States supplying this item	% Total from Mexico	
Grapes	2,143 miles	1	7
Broccoli	2,095 miles	3	3
Asparagus	1,671 miles	5	37
Apples	1,555 miles	8	0
Sweet Corn	813 miles	16	7
Squash	781 miles	12	43
Pumpkins	233 miles	5	0

* Information for this chart is based on the weighted average source distance—a single distance figure that combines information on distances from production source to consumption or purchase endpoint. For more information on method, refer to Pirog and Van Pelt, 2002 (endnote 55).

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Table 3. *Estimated Fuel Consumption, CO₂ Emissions, and Distance Traveled for Conventional, Iowa-based Regional and Iowa-based Local Food Systems for Produce*⁵⁶

Food system type/type of truck	Fuel consumption (gal/year)	\$ value of fuel (2001 prices)	CO ₂ emissions (lb/year)	Distance traveled (miles)
Conventional/semitrailer	368,102	581,601	8,392,727	2,245,423
Iowa regional/semitrailer	22,005	35,208	501,714	134,230
Iowa regional/midsize truck	43,564	69,702	993,243	370,289
Iowa local—CSA farmers' market/ small truck (gas)	49,359	78,974	967,436	848,981
Iowa local—institutional/ small truck (gas)	88,265	141,224	1,729,994	1,518,155

Transportation, Agri-food System Sustainability, and Disparate Community and Regional Impacts

In global commerce, the agri-food sector presents special opportunities and challenges when it comes to transportation. Food, especially produce, is different from other commodities in that it is perishable and requires timely delivery and careful handling—including temperature control and cooling—to prevent spoilage. Globalized transportation of food enables surpluses from one region to efficiently make up for shortfalls in other regions, and one hemisphere to continue to supply familiar foods to the other following the latter's growing season; it also makes available new markets for local agriculture.

Because both modern agriculture and transportation today are more energy intensive than in the past, when energy costs go up, food costs rise dramatically, making the global food system especially susceptible to inflationary pressures and communities vulnerable to rising

energy prices.⁴⁷ Additionally, the greater reliance on faraway sources for food has resulted in a loss of access to markets for many local and smaller-scale farmers, which, when combined with the loss of metropolitan farmland to urban sprawl, only exacerbates the vulnerability of food systems in many parts of the country.⁴⁸ Increased truck-miles and air-miles in food transportation worsen air pollution and climate change; increased roadway congestion causes more accidents; the loss of nearby slaughter and packing facilities increases travel times and stress for animals. Together, these factors accumulate social, economic, and environmental costs that are greater than what food source communities get in return for their products.

Increased Road- and Air-miles in Food Transportation

Environmentalists are increasingly concerned about the distance food travels from field to plate—typically 1,500 road-miles—which creates unsustainable demands on transportation, air quality, climate, and energy systems. One study revealed that the average distance for fruits transported to the Jessup, MD, terminal market was 2,146 miles, while

the average for vegetables was 1,596 miles.⁴⁹ Transportation accounts for about 11 percent of the energy use in the food system.⁵⁰ About 93 percent of fresh produce transported between cities in this country was carried by trucks, according to a 1996 USDA study.⁵¹ In addition to general emissions that affect our climate, truck emissions create disparate air quality-related health impacts on low-income and minority neighborhoods because of their greater proximity to highways and truck terminals.⁵² Causing even more concern is the rapidly growing air transport of food, which creates the highest CO₂ emissions per ton.⁵³

Table 1 shows the energy consumption and tailpipe emissions for different modes of transportation. Of course, the actual mode of transportation and the distance traveled varies by specific food product and its origin. Distances traveled by different products shipped from within the continental United States are given in table 2 (which also shows how much averages derived from travel within the continental United States may understate actual distances if a larger share of a product comes from Mexico). Energy consumption and emissions for different kinds of truck transportation participating in distinct local, regional, and the conventional national food system considered by Pirog et al. (2001) are given in table 3. This last table underscores the point that the sustainability of local food systems is mediated by the specific mode and fuel used in transporting foods.

Finally, the transportation sector is responsible for more than one-quarter of all emissions causing climate change.⁵⁷ Many agri-food advocates are increasingly concerned about the implications of climate change for future agricultural productivity and food security in poorer regions of the world, given the greater likelihood of drought, soil erosion, extreme weather events, and higher pest prevalence.⁵⁸ More sustainable transportation, together with an agri-food system that reduces energy and transportation demand, would help reduce burdens on future agriculture globally.

Increased Consolidation of the Food Industry and Disparate Social and Spatial Impacts

Industrial agri-food's specialization in certain crops has concentrated food production in regions and uses large quantities of fossil fuels to ship food around the country and the world. For example, 95 percent of the nation's processed tomatoes and just under one-third of the fresh tomato crops come from California.⁵⁹ In 2007, nearly \$152 billion of agricultural products crossed U.S. borders as imports and exports, representing more than half the value of agricultural products sold by U.S. farms that year.⁶⁰ This specialization, however, has reduced many "receiving" regions' previous diversity of production and made them more vulnerable to shocks in the system. For example, agricultural modernization has favored large farm size, crop monocultures, mechanization, and increased chemical inputs. Moreover, research points to rising food insecurity among low-income farmers in some countries as subsistence production has been replaced by export-oriented mono-cropping.⁶¹ These challenges, of course, affect rural communities and predominantly smaller-scale and low-income farmers whose market reach is hurt by the loss of localized infrastructure and support for logistics (management of the movement of goods). Cheap energy and transportation subsidies have therefore enabled the consolidation and globalization of the agri-food sector.

The case of retail supermarkets and resulting disparities in healthy food access was presented in the first section of this paper.⁶² The increase in food miles traveled results from: (a) restructuring of logistical systems due to stricter requirements from retailers' management of inventories; (b) realignment of supply chains so that more of the product from farm to supermarket is owned by a single firm or a strategic partnership of firms (which has happened to reduce costs and risks and also increase responsiveness to consumers); (c) shifts in production and distribution scheduling

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decisions, with negotiated coordination replacing market coordination; and (d) changes in management of transport resources such as increasing the use of air instead of road transport for food.⁶³

The consolidation of processing, wholesaling, and distribution operations results in fewer, larger, and more efficient facilities and the closure of more local and regional processing plants, warehouses, and related facilities. As a result, the plant closures cause greater economic insecurity and health risks for nearby communities.

The transportation sector also has experienced consolidation, with somewhat similar results. Railroad consolidations, for example, have increased the number of captive customers and, while the monopolization helps railroads financially, it also tends to distort the location of economic activity, creating or exacerbating regional disparities⁶⁴—and therefore vulnerabilities—in the food system.

Food Versus Fuel and Related Health Impacts

The production of the most popular forms of biofuels—corn ethanol and palm oil—threatens to cause a major increase in greenhouse gas emissions.⁶⁵ In the United States, corn ethanol poses special concern because of its net negative energy balance (that is, more energy is required to produce a gallon of corn ethanol than can be gained from it) and because its production and use contribute to air, water, and soil pollution.⁶⁶ Some food security advocates worry that the continued expansion of biofuels is raising food prices in this country⁶⁷ and elsewhere and causing malnutrition in many developing countries.⁶⁸ Still others suggest that corn ethanol has a worse impact on the environment and human health than do conventional fuels such as gasoline and diesel.⁶⁹ There are direct transportation impacts as well: as corn use shifts from exports and animal-feed use to ethanol production, grain transportation

is affected because of changes in quantities transported to diverse destinations and modes of freight used for raw and finished products.⁷⁰

To summarize the paper's analysis, transportation policies and subsidies—when combined with cheap energy over the past six decades—have thus created patterns of spatial dispersion of people and food outlets over the metropolitan landscape in ways that pose special hardships for low-income food shoppers as well as agri-food workers in urban and rural communities. Transportation has also enabled structural change in the agri-food sector so that decisions made in the name of economic efficiency have generated many negative environmental, social, health, economic, and spatial consequences, along with increased costs and risks to society as a whole. These consequences call for a review of the basic goals and purposes of transportation policy so that environmental, social, and health needs and goals take priority over private gain.



Elements of a Sustainable Agri-food System

A primary contribution of the agri-food system is to deliver adequate nutrition to support the health of human communities now and into the future. However, contemporary industrial agri-food practices also create direct health problems (such as through the effects of pesticides on farm workers or widespread obesity among youth and adults) and indirect health problems (through diminished quality of air and ground water and the pervasive use of antibiotics in meat production, for example). These practices also endanger the very base upon which the food system depends, thereby threatening future food security and health. That is, they are unsustainable.

A sustainable food system promotes the health of individuals, communities, *and* the ecosystem. As this paper shows, transportation is implicated in many of the pathways linking the agri-food system and health. Sustainable food systems are typically organized around the following principles, on which consensus more or less exists:

- produce and distribute food so that all persons have adequate access to nutritious foods within neighborhoods;
- respect and operate within the biological limits of natural resources such as soil, water, and species;
- minimize energy inputs, recycle resources, and use renewable energy and other resources;
- support vital and diverse urban and rural economies;
- enable viable livelihoods and fair trade among producers, processors, distributors, retailers, and consumers;

- provide safe, fair, and satisfying working conditions for workers;
- treat animals humanely;
- sustain the amount and quality of land needed for food production; and
- promote democratic processes in decision making related to food and nutrition.⁷¹

Transportation Goals

The following goals are proposed for transportation policy and programs to help build sustainable food systems that promote human, community, and environmental health in the United States and globally.

1. Healthy food access for all, with special focus on the needs of low-income communities and communities of color, through appropriate land use policies and affordable transportation alternatives.
2. Affordable and reliable transportation alternatives for low-income agri-food workers so that they may have access to employment, food sources, and other basic needs.
3. Transportation policies and programs that prioritize regional linkages over national and global ones as they relate to food systems so that local producers are connected with local eaters; regional economic development is promoted through localized networks and infrastructure; small-scale farms are supported; air pollution and climate change impacts are reduced; and risks associated with agri-food concentration, dependence on distant sources, and energy price hikes are mitigated.

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Table 4. *Desired Policies and Programs to Address Transportation-Related Agri-food Problems: Opportunities for Success*

Goals	Desired Policies and Programs
<p>Reduce disparities in access to healthy foods</p>	<p>Support local and metropolitan land use policies and planning for increasing neighborhood-based access to food retail sites such as stores, farm stands, and urban agriculture sites⁷²:</p> <ul style="list-style-type: none"> • Promote smart growth development that supports multiple transport modes and contains grocery stores, urban agriculture sites, and farm stands. • Encourage transit oriented neighborhood design to include grocery outlets. • Retrofit older neighborhoods for pedestrian, bike, and transportation access to food outlets and urban agriculture sites. • Reduce required parking for grocery stores in exchange for public bus connectivity during peak grocery shopping times (weekends, especially). <p>Support policies and programs that promote transportation access for low-income residents to grocery outlets and other healthy food sites:</p> <ul style="list-style-type: none"> • Promote paratransit or public-private partnerships for shuttle programs sponsored by supermarkets,⁷³ congregate (subsidized) housing facilities and community-based nonprofits to provide affordable rides for grocery shopping. • Develop and promote “grocery bus” routes⁷⁴ with weekend service to connect low-income neighborhoods to full-service supermarkets, food pantries, and urban agriculture sites. • Support community-based programs to create mobile markets or grocery van-delivery in urban and rural communities.⁷⁵ <p>Require transportation support in federal nutrition programs:</p> <ul style="list-style-type: none"> • Include transportation support for WIC, food stamp (SNAP), Summer Food Service, and farmers’ market-related nutrition programs to access healthy foods.⁷⁶ • Provide transportation support for small-scale farmers to sell at farmers’ markets in or near low-income urban or rural areas.

Goals	Desired Policies and Programs
Promote safe and affordable transit for agri-food workers	<ul style="list-style-type: none"> • Increase funding for job access and reverse commutes for low-income employees, including agri-food workers. • Encourage metropolitan transportation system design to increase access for low-income agri-food workers in processing, wholesale, and retail jobs in metropolitan areas. • Encourage paratransit options (vanpools) for farm workers.⁷⁷ • Review rules related to vehicle conversion for farm-worker transportation and safety equipment/use to increase transportation safety and minimize accidents.
Promote agri-food sustainability	<ul style="list-style-type: none"> • Support within transportation law small-scale farmers' and processors' transportation of product to farmers' markets and other local outlets. • Encourage and support cleaner and more efficient vehicles, especially smaller trucks used for local food transportation. • Review and adjust tax structure as it relates to overall transportation subsidy so that social and environmental costs associated with emissions in agri-food transportation are reflected in prices, especially in the case of air transportation of foods. • Promote use of more sustainable modes of freight for long-distance food transportation, such as rail and water. • Increase competitive access to rail for food transport (via separation of ownership of rail infrastructure from that of rolling stock, e.g. rail cars), increase subsidy for rail relative to road and air, and break up geographic concentration of control over railway infrastructure (e.g. tracks) to increase competition. • Prioritize local and regional food transportation networks and infrastructure over long-distance ones. • Support the development of mobile kitchens and processing facilities in urban and rural communities. • Promote metropolitan planning to prevent sprawl, preserve farmland, and promote urban agriculture in transportation-related rights of way.⁷⁸
Prioritize agriculture for food and promote sustainable biofuels	<ul style="list-style-type: none"> • Minimize competition in agricultural production between food and fuel (since most biofuel is used for transportation) by giving food a clear priority. • Support the development and promotion of genuinely sustainable biofuels. • Support the widespread conversion of waste cooking oil into biodiesel. • Internalize social and environmental costs of corn-ethanol production and end subsidies for biofuels that are sourced from food grains.

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Goals	Desired Policies and Programs
General recommendations	<ul style="list-style-type: none"> • Promote greater coordination between transportation and agri-food policies and programs. • Provide greater support for intra-regional (versus inter-regional) transportation. • Encourage tighter links among transportation planning, policy, and programs and anti-sprawl and pro-urban planning. • Facilitate improved regional coordination to support multiple transportation modes and programs and diverse trip purposes and needs. • Develop transportation systems at the regional level to create positive economic impact, including through regional food systems. • Consider USDA's Community Food Projects Competitive Grants Program as a model to promote community- and region-based collaborative approaches to improve food access, market access to small-scale farmers, and affordable agri-food system transportation.⁷⁹

4. The agri-food system reconfigured as a resource to reduce energy and transportation demands and related problems through the development of more local food systems and truly renewable fuels.

approach to improve health, build localized food systems, reduce the energy intensity of the agri-food system, and help the agri-food system contribute to the creation of sustainable transportation systems.

Transportation Policies: Opportunities and Barriers

Many of the problems outlined in the first part of this paper are rapidly turning into emergencies—if they are not already emergencies. Their simultaneous occurrence presents something of a perfect storm for health and sustainability concerns. The upcoming authorization of the federal transportation bill offers a significant opportunity to make headway in addressing—and correcting—these problems. The crises related to rising incidence of obesity and diet-related diseases, climate change, and national energy and food security provide impetus to increase access to healthy foods as part of a preventive

Specific recommendations that link policies and programs to emerging problems are presented in table 4.

Notwithstanding the policy and programmatic opportunities outlined in table 4, those seeking to meet health goals within transportation legislation face many barriers to success. These are outlined below.

The most obvious barrier lies in the structure of transportation funding, legislation, and governance—especially at the federal level. The majority of transportation funds are allocated by formulas tied to modes and trip purposes; this makes it hard to achieve the goals outlined here within the existing structure of transportation policy and policymaking. The

problem is that, at the national level, we fund and manage transportation programs primarily by mode, rather than by urgent societal needs or compelling national goals. We also allocate funding by state, making achievement of national goals even more difficult. This is further complicated by competition between donor and donee states (that is, states that send more gas taxes to the federal transportation budget than they receive in transportation funding, or vice versa), a situation made worse in the current recession because many of the donee states are in the hard-hit, former manufacturing belt of the Midwest. Moreover, we fund transportation through a myriad of other (non-Department of Transportation) agencies, including the departments of Agriculture (USDA) and Health and Human Services (HHS), leading to further fragmentation by sector. Such fragmentation of the program is the cause of many transportation-related problems experienced by communities and within metropolitan regions.

The problems posed by programmatic fragmentation suggest that addressing food- and health-related transportation problems, as recommended in this paper, could increase overall transportation inefficiency, if they are not coordinated well, that is, more silos are not the solution. Instead, the programs and policies recommended here must be tied to land use policies that reduce transportation demand, improve access and regional connectivity (regardless of trip mode or purpose), and improve coordination between transportation providers and the system as a whole. In addition, policy must prioritize regional food system transportation connectivity over national or international ones, support more energy-efficient and less polluting modes and vehicles, and more effectively use spare capacity in existing programs to support food access for low-income consumers and regional market access for small-scale farmers. This will require coordination across federal agencies such as Department of Transportation (DOT), USDA, and the Environmental Protection Agency (EPA).

Lack of precedence within transportation

legislation for key asks: To date, there is little precedence for transportation legislation incorporating many of the policies recommended in this paper. Some policymakers may view the recommendation to increase transportation assistance to low-income households participating in federal nutrition programs as more appropriately falling within the agriculture law. USDA already funds transportation for rural providers of the Summer Food Service Program, which feeds low-income children.⁸⁰ Similarly, the recommendation to prioritize agriculture for food over fuel may be viewed as falling under agriculture or energy, rather than transportation, even if most of the corn ethanol is destined for transportation-related uses.

Highways and roads (rather than access) as the primary orientation of transportation policy:

Despite the progressive changes ushered in by *ISTEA* and its successors, transportation policy continues to be driven by a dominant orientation toward roads and highways, rather than toward multi-modality that provides access to goods, services, employment, healthy food, etc., thereby meeting community and regional needs and goals. Local land use decisions often follow, rather than drive, regional transportation planning by metropolitan planning organizations. Because land use decisions are local, more support is also needed than is available within the transportation legislation for *transportation planning* that effectively integrates land use and transportation to promote smart growth, that is, increase mixed-use, transit oriented development and neighborhood-based access to basic needs. Similarly, many advocates believe that transportation programs and funding tend to be designed to serve the interests of powerful groups—highway builders, auto manufacturers, and petroleum corporations—and that relationships of power and patronage, rather than systematically derived community needs, drive transportation policy.

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Impending revenue shortfalls from gas

taxes: The expected shortfalls in the Highway Trust Fund present a challenge to funding new programs in the transportation legislation. Policymakers will need to find additional sources of funding that are adequate, sustainable, and fair. To this end, policies that improve health can result in savings in other areas, such as healthcare cost savings⁸¹ and can present new funding alternatives to fuel taxes. Such solutions go beyond the oft-suggested road and congestion pricing, both of which may further disadvantage the communities already at risk from current policies. More research is needed related to the net benefits and costs of transportation programs, including those suggested in this paper.

Convergence Opportunities

Efforts to build sustainable food systems are inherently boundary spanning and require work across disciplines, sectors, professions, and geographic scales. The federal transportation law authorization process provides unique opportunities to build partnerships among interests in sustainable agri-food systems, smart growth, public health, community economic development, anti-poverty and social justice, labor, energy security, and climate change mitigation.

Coalitions that have emerged to advocate for transportation policy reform, such as the Transportation Equity Network, Transportation for America, Surface Transportation Policy Project, Complete Street Coalition, and Smart Growth America, are calling for proposals with broadly similar goals as those suggested herein, even if they are largely silent on agri-food issues addressed in this paper.⁸² Among the coalitions advocating for more sustainable agri-food systems or elements thereof are the Community Food Security Coalition, National Sustainable Agriculture Coalition, Food Research and Action Center, National Family Farm Coalition, and American Farmland Trust.⁸³ Past efforts by these

groups to bring attention to sustainable agri-food issues within the transportation law have borne little, if any, fruit. We hope that the broad health rubric under which these papers are assembled will help coalesce the many groups mentioned above and attract new groups into the fold to add power to related transportation advocacy.

Additionally, the specific proposals made by this paper call for greater collaboration and coordination among various departments at the federal and state levels. For example, the proposals in this paper could benefit from partnerships among:

- DOT and USDA (and Department of Health and Human Services or the Department of Education when applicable) to provide transportation assistance to nutrition program participants in order to procure food, to improve neighborhood-based access to healthy foods through the use of transportation resources, and to support small-scale farmers' efforts to bring products to local markets in underserved areas. This would increase participation in nutrition programs such as SNAP, WIC, Summer Food Service, and Farmers' Market Nutrition; it would also increase the benefits of participation, improve health, and reduce healthcare costs.



- DOT, USDA, and the Department of Labor to provide affordable transportation for urban and rural agri-food workers to access jobs, food, healthcare, and other vital services.
- DOT, USDA, the Department of Energy, and the EPA to support the development of more truly renewable energy sources in environmentally sensitive ways, including through the use of switchgrass and waste cooking oil; to support the development of fuel-efficient vehicle and transportation systems; and to discourage the use of food grains for producing fuel. Such cooperation is sorely needed to eliminate the competition between food and fuel.
- USDA, DOT, and the EPA to mitigate the problems caused by long-distance transportation of food in international trade.
- Does the regional transportation infrastructure support local food producers and processors to efficiently market to local consumers, in addition to national distribution channels?
- Do transportation policies support modes of freight, fuel choices, and vehicle designs such that air and water pollution, greenhouse gas emissions, and energy use are minimized?
- Are the currently externalized social, health, and environmental costs and increased risks posed by the global, industrial food system internalized in the price of food and transportation? Are associated costs and benefits fairly distributed across diverse income and racial groups in urban and rural areas?
- Does the agri-food system support transportation policies with renewable and efficient options for energy that reduce environmental impacts on air, water, and climate; minimize competition with food production; and reduce dependence on foreign sources for energy?

Conclusion

This paper presents four clear problems impacting the interaction between agri-food and transportation systems and suggests possible actions that could solve them. Some solutions can be addressed through transportation legislation, but clearly efforts need to extend to legislation that addresses energy, agriculture, child nutrition, labor, and health and human services.

Whatever the final mix of policies, successful efforts will result in affirmative responses to the following questions:

- Do neighborhoods provide convenient access for all residents to healthy foods and other basic goods and services? Do they allow food shopping without the need for a car?
- Beyond basic accessibility, do transportation policies and programs enhance local and regional quality of life through improved multi-modal access for all residents to the region's resources and destinations and through reduced congestion?

The transportation authorization process presents opportunities to break bad habits, extend positive developments from the past, and launch bold new initiatives that set us on a better course. Promising directions that build on positive aspects of *SAFETEA-LU* include, for example, correcting inequities in funding across states; providing dedicated funding to states to meet air quality requirements; and creating pilot programs to test alternative transportation funding schemes (which should be extended beyond tolling and road pricing schemes that may hurt the transportation-disadvantaged).

Clearly, other strategies are needed to eliminate disparities and problems caused by the current agri-food–transportation system linkage: extending transportation programs to increase access to healthy food and agri-food employment, reducing railroad concentration, ending competition between food and fuel, and more.

Traffic Injury Prevention: A 21st-Century Approach

ch. 8

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ABSTRACT >> *Traffic injuries and deaths exact a huge toll on our finances, our families, and our future. There are opportunities in the upcoming authorization of a new federal transportation bill to promote safety for all travelers. More broadly, safety for all travelers must become a national health and transportation priority. Advocates for injury prevention should collaborate with public health experts (specialists in chronic disease prevention, for example) and partners in other sectors (such as economic development) to promote a broad vision for health and equity in transportation policy.*

The overarching policy goals that support traffic injury prevention are to: (1) promote the safe transportation of all travelers by improving infrastructure in communities; (2) reduce the number of vehicle miles traveled by promoting alternative modes of transportation, including public transportation, walking, and bicycling; and (3) protect drivers and passengers through continued improvements in vehicle safety, occupant protection, and road safety. This paper describes specific strategies to achieve these goals.

Traffic Injury Prevention

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Introduction

While getting off a streetcar in New York City on September 9, 1899, Henry Hale Bliss was struck by an electric-powered taxicab and suffered injuries so severe—his skull and chest were crushed—that he died the next day. Bliss thus became the first person killed by a motor vehicle in the United States. The taxicab driver was arrested and charged with manslaughter but was later acquitted on the grounds that the death was unintentional. While the legal proceedings considered where responsibility for Bliss's death lay, there was no discussion of what could have been done to prevent the crash.¹

What was unprecedented in 1899 is unremarkable today. Traffic crashes are the leading cause of death in the United States for people ages one to 34,² and by 2020, traffic-related deaths will be the third-leading cause of death worldwide.³

Traffic injuries and deaths exact an unnecessary economic toll. In 2000, motor vehicle crashes in the United States cost \$230.6 billion in emergency services, medical treatment, legal procedures, insurance administration, property damage, lost workers' productivity, and travel delays.⁴ That figure represents 2.3 percent of the nation's gross domestic product.⁵

In 1900, motor vehicle travel was considered a novelty, and the risks to health and safety were largely overlooked. Subsequent improvements in manufacturing made cars more affordable and available, benefiting commerce, communications, and personal mobility. In 1900, an estimated 8,000 automobiles were registered in the United States. By 1950 there were 50 million, and by 2001, more than 230 million vehicles and 193 million licensed drivers were on the road.⁶ The current number of cars and drivers, along with the extensive networks of roads and highways around the nation, would have been inconceivable in 1899 but are accepted as norms of transportation today. Traffic injuries and deaths are frequently

considered uncontrollable aspects of America's love affair with the car. This may account for the fact that traffic crashes are too often ignored as a major contributor of premature death and disability, the consequence of which is a missed opportunity to improve health and reduce costs.

In light of ever-shrinking federal, state, and local budgets, the authorization of a new federal surface transportation bill is an opportunity to structure transportation programs to reduce the burden on the healthcare system, the economy, and society at large. National and international experts on traffic injury prevention, including the U.S. National Highway Traffic Safety Administration (NHTSA), the U.S. Centers for Disease Control and Prevention (CDC), and the World Health Organization, increasingly reject the notion that traffic injuries are the inevitable price we pay for modern travel.⁷

Many transportation policies and practices that lead to traffic injuries also contribute to chronic diseases that result from physical inactivity, poor air quality, and other environmental factors that are the consequences of our car culture. Linkages between injury prevention and other health fields should be developed to foster a national transportation strategy that forges solutions to these intersecting problems. Such strategic partnerships can help catalyze a revamped national transportation strategy that is central to policymakers' efforts to address a range of critical challenges: the economy, climate change, the limited supply of fossil fuels, and soaring healthcare costs. A transportation agenda that emphasizes health, equity, environmental protection, jobs, and an improved quality of life requires collaboration from all sectors.

The overarching policy goals that support traffic injury prevention are to: (1) promote the safe transportation of *all* travelers by improving the physical infrastructure in communities; (2) reduce vehicle miles traveled by promoting alternative modes of transportation, including public transportation, walking, and bicycling;

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and (3) protect drivers and passengers through continued improvements in vehicle safety, occupant protection, and road safety.

Achievements in Traffic Injury Prevention

While it is impossible to forecast the exact circumstances of traffic crashes, these incidents are not isolated events but are both predictable and preventable. The news and entertainment media often speak of traffic “accidents,” but the word implies—erroneously—that the event is happenstance and arbitrary.

Dr. William Haddon, Jr., the first director of the National Highway Safety Bureau, which in 1970 became the National Highway Traffic Safety Administration, brought an emphasis on injury prevention to the government’s transportation policies and practices. Dr. Haddon is also recognized for developing the Haddon Matrix (see table 2).

By deconstructing the sequence of events contributing to traffic-related injuries, Dr. Haddon developed effective strategies to prevent crashes and limit injuries. By integrating education, legislation, and enforcement, health and safety advocates as well as government officials have bolstered Dr. Haddon’s research by requiring the

Table 1. *Traffic Injury Prevention Highlights*

<p>1923: Garrett Augustus Morgan, an African American traffic safety innovator, invents the modern traffic signal to reduce the high risk of collisions he observed on roadways shared by horse-drawn buggies, pedestrians, and automobiles.</p> <p>1924: President Herbert Hoover convenes the National Conference on Street and Highway Safety, marking the first presidential initiative to bring attention to traffic safety.</p> <p>1964: Ralph Nader’s book <i>Unsafe at Any Speed: The Designed-In Dangers of the American Automobile</i> is published—another milestone that attributes injuries not just to driver error but also to vehicle design flaws and describes auto executives’ resistance to vehicle safety features, most notably General Motors’ Chevrolet Corvair. Following the book’s release, public pressure mounts, forcing President Lyndon Johnson to call for tighter regulation.</p> <p>1966: President Johnson signs <i>The Traffic and Motor Vehicle Safety Act</i> and <i>The Highway Safety Act</i> into law, authorizing the National Highway Safety Bureau (now the National Highway Traffic Safety Administration (NHTSA)) to set vehicle and road safety standards and to fund research and programs on traffic safety.</p> <p>1967: The U.S. Department of Transportation (DOT) is created to oversee transportation issues, including traffic safety (NHTSA is housed within the DOT).</p> <p>1979: <i>Healthy People – The Surgeon General’s Report on Health Promotion and Disease Prevention</i> is released and is the first call to attention that traffic injury prevention should be part of the country’s public health agenda.</p> <p>1985: Under the direction of Congress, the National Academy of Sciences releases the report <i>Injury in America</i> which recommends a major national program of research to address injury as a health problem.</p> <p>1986: Congress creates a center for injury research, surveillance, and education within the Centers for Disease Control and Prevention (CDC), now called the National Center for Injury Prevention and Control.</p>
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Table 2. *The Haddon Matrix (with examples)*

	Host	Agent/Equipment	Physical Environment	Social Environment
Pre-Event	Drinking	Alcohol ignition lock	Alcohol outlets	Drinking norms
Event	Seat belts and Car seats	Airbags	Safety rails	Speeding
Post-Event			Emergency phones	Healthcare access

The Haddon Matrix delineates factors along the timeline of a traffic incident (pre-event through post-event) with four other elements involved in the occurrence of injury (host [e.g., driver], agent [e.g., vehicle], physical environment, and social environment). Prevention activities can be developed within any of these elements. For example, bicycle lanes separate bicyclists from motorized travelers and can thus prevent a crash in the first place. When a crash does occur, if the bicyclist is wearing a helmet, severe head trauma can be prevented. When trauma occurs, a fast and efficient emergency medical system and healthcare must be in place to treat the injuries and prevent death.

use of seat belts, infant car seats, and motorcycle helmets; implementing safe driving laws; and toughening drunk driving laws. The Spectrum of Prevention (table 3) provides a framework for developing comprehensive approaches to preventing injuries.⁸

Prioritizing Traffic Injury Prevention for All Modes of Travel

Diversifying transportation options is emerging as a top priority for policymakers. Preventing injuries, improving air quality, encouraging physical activity, and promoting healthier lifestyles can be addressed by reducing miles traveled via automobile and increasing the use of public transportation, bicycling, and walking. This is no easy feat in a country where the car is king and where driving is central to our identity. Advertising campaigns that associate cars with the desire for affluence and independence reinforce the societal link between mobility and upward mobility. The car has historically been promoted as an instrument of sexuality and

power; it's the guy with the "sexy car" who gets the girl. Driving is a rite of passage that marks our lives nearly from cradle to grave. It is an exuberant transition for a teen when he or she gets a driver's license and a moment of loss or fear for the adult who must surrender the car keys. Cars will remain the major source of transportation and continue to pose increasing risks unless other safe and convenient forms of transportation are made generally available to the public.

Building transportation systems for all modes of travel promotes equity. Robert Moses, New York City's storied planner known as the builder of the modern metropolis, reportedly constructed the overpasses on his Long Island parkways too low to accommodate buses as a means of preventing low-income residents of the city—especially blacks and Latinos—from visiting the beaches and parks.⁹ Thus, parkways like these served as tools for segregation and economic discrimination by putting suburban communities off limits as places of employment and recreation for someone from the inner city who had no car. Decades later, these thoroughfares

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Table 3. ***The Spectrum of Prevention***

The Spectrum of Prevention* is a tool to guide development of comprehensive strategies that encourage movement beyond the educational or “individual skill-building” approach to address broader environmental and systems-level issues. The Spectrum builds on the Haddon Matrix by providing a method for developing strategies to address traffic safety that are beyond the incident itself and approaches that focus on the individual. The tool has been used across injury fields to integrate individual-oriented efforts with systems change to have the greatest overall effect.

Levels of the Spectrum	Description
Influencing policy and legislation	Developing strategies to change laws and policies to influence outcomes in health, education, and justice
Changing organizational practices	Adopting regulations and norms to improve health and safety; creating new models
Fostering coalitions and networks	Bringing together groups and individuals for broader goals and greater impact
Educating providers	Informing providers who will transmit skills and knowledge to others
Promoting community education	Reaching groups of people with information and resources to promote health and safety
Strengthening individual knowledge and skills	Enhancing an individual’s ability to prevent injury or illness

Successful injury prevention strategies have been multifaceted and engaged efforts at multiple levels of the Spectrum of Prevention. In fact, traffic injury prevention has emerged as a model example of prevention.

*The Spectrum of Prevention was originally developed by Larry Cohen in 1983 while working as director of prevention programs at the Contra Costa County Health Department. For application of the Spectrum of Prevention to injury prevention: T. Christoffel and S.S. Gallagher, *Injury Prevention and Public Health* (Sudbury, MA: Jones and Bartlett Publishers, Inc., 2006).

stand as monuments to transportation policies that divided the country rather than healed its divisions.

Generally, the safety of public transportation and non-motorized travel (i.e., bicycling and walking) has received relatively little federal support, yet communities with diverse transportation options have been shown to have fewer traffic injuries and deaths.¹⁰ Contrary to the widespread belief that increased bicycle

and foot traffic will lead to more cyclist and pedestrian injuries and deaths, increasing the numbers of non-motorized travelers may actually make walking and bicycling *safer*.¹¹

There is also evidence that residents of transit oriented communities have lower per capita traffic fatality rates.¹²

Germany and the Netherlands illustrate the benefits of government support for safety improvements for pedestrians and bicyclists.

Per mile and per trip walked, Americans are roughly three times more likely to get killed than German pedestrians and more than six times as likely as Dutch pedestrians. Per mile and per trip cycled, Americans are twice as likely to be killed as German cyclists and more than three times as likely as Dutch cyclists.¹³ Furthermore, pedestrian and bicyclist deaths have declined far more in both countries than in the United States. The Netherlands and Germany have invested heavily in high-quality streetscapes for safe walking and bicycling, making non-motorized travel a norm compared to passenger vehicle travel. The United States has seen virtually the opposite—an interplay of land use, housing, and transportation patterns that have promoted low-density sprawl, high-speed roadways, narrow or no sidewalks, unsafe or no crosswalks, the absence of bicycle lanes, and inaccessible or no public transportation at all. All this makes alternatives to cars and driving not only impractical but also less safe.

With its promise of convenience and freedom, the car still has a strong allure. But a growing number of Americans say they want to drive less and walk, bicycle, and use public transportation more. Advocates can use this desire as momentum to raise public awareness about the benefits of these travel options that are good for better health, for the environment, and for the family budget.

The Continuing Burden of Traffic Injuries and Deaths

While there have been reductions in death rates per vehicle mile traveled (VMT) over the past four decades, the declines are far less when deaths are measured per capita because Americans drive more than ever (see graph 1).¹⁴

In 2007, traffic crashes accounted for 41,059 deaths,¹⁵ 1,755,247 years of lost life,¹⁶ and 2.5 million nonfatal injuries.¹⁷ Bicyclists and pedestrians have a disproportionately higher risk

of death in a traffic crash compared to vehicle occupants.¹⁸ This greater vulnerability stems from the fact that bicyclists and pedestrians do not have the buffers and protective measures that vehicles offer drivers and passengers. An analysis of 1995 National Household Travel Survey data indicates that the rate of pedestrian fatalities is 36 times higher than car-occupant fatalities per mile traveled, and bicycling fatalities are 11 times higher.¹⁹

In 2007, there were 5,504 non-motorized fatalities.²⁰ While walking and bicycling accounted for only 9.5 percent of all trips in 2001, non-motorized fatalities accounted for more than 13 percent of traffic fatalities nationwide.²¹ Pedestrian fatalities accounted for 84.5 percent of all non-motorized fatalities, bicyclist fatalities accounted for 12.7 percent, and the remaining 2.8 percent were skateboard riders, roller skaters, etc.²²

Contrary to the belief that these statistics make a favorable case for continuing to travel exclusively by car, they highlight the lack of infrastructure to support safe non-motorized travel alongside motorized travel. By implementing strategies that reduce the amount of exposure non-motorized travelers have to moving vehicles and reducing the number of cars on the road, it is possible to dually promote alternative modes of transportation *and* mechanisms to improve the safety of these alternative modes.

Disparities in Traffic Injuries and Deaths

Traffic injuries and deaths are major health concerns for everyone but more so among society's most vulnerable populations. National data from the Centers for Disease Control and Prevention (CDC) indicate that Native Americans are 1.5 times more likely to die from traffic crashes than other Americans.²³ Data collection methods inhibit clarity about the disparate impact of traffic crashes on other racial/ethnic groups, and there is a dearth of data that looks at disparities by income. This is due to the fact

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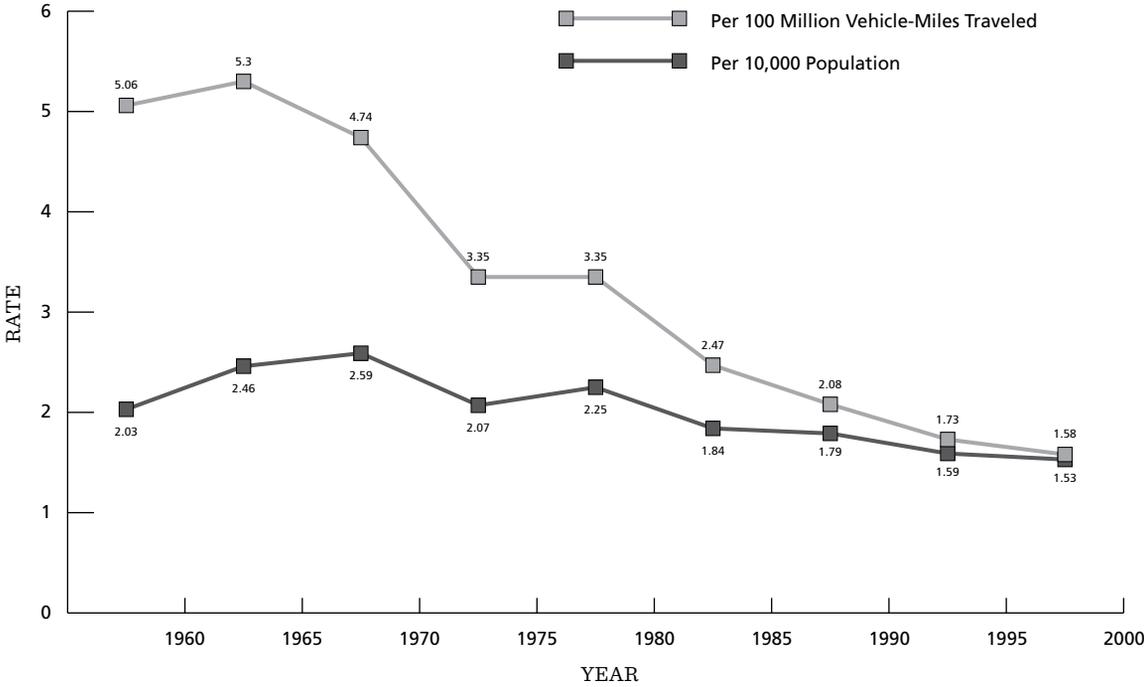
that the primary source of data comes from police reports, which do not collect race and ethnicity data. However, some studies seem to indicate the existence of such disparities across race/ethnicity. Between 1990 and 1998, death rates from motor vehicle crashes declined least for African Americans and Native Americans, who also continued to have higher age-adjusted death rates for motor vehicle crashes than any other racial or ethnic group.²⁴ An analysis of North Carolina's licensed drivers, ages 16 to 24, puts the fatality rate for Latinos at nearly 1.5 times greater than that for whites.²⁵

Pedestrian safety is particularly important for populations that have less access to cars

and rely more on walking for transportation. For example, African Americans make up approximately 12 percent of the U.S. population, but they account for 20 percent of pedestrian deaths.²⁶ Another CDC analysis suggests that the pedestrian fatality rate for Latino men in the Atlanta metropolitan statistical area was six times greater than that for whites between 1994 and 1998.²⁷ While Latinos made up 28 percent of the population in Orange County, CA, they accounted for 40 percent of all pedestrian injuries and 43 percent of pedestrian deaths in 1999, according to a study done by the *Los Angeles Times*.²⁸

While data comparing traffic injury rates by

Graph 1. *U.S. Traffic Fatalities by VMT and Per 10,000 Population*



Primary data collected by the Bureau of Transportation Statistics (2000), available at <http://www.bts.gov/publications/nts/index.html>. This graph was originally compiled by Todd Litman, Victoria Transport Policy Institute.

income level are not readily available, people with low incomes may be more vulnerable to traffic injuries and deaths. Low-income often means less access to products that enhance safety, such as newer, safer vehicles or child safety seats; moreover, low-income communities have fewer resources for safe roads and sidewalks, crosswalks, lighting, and traffic enforcement.

Other Populations with Greater Risk

Across all ethnic groups, more males than females die from motor vehicle crashes.²⁹ Compared to females, males have lower rates of seat belt use; and are more likely to be involved in alcohol-related crashes and be alcohol-impaired (whether as drivers, passengers, pedestrians, or cyclists) at the time of the incident.³⁰ Drivers under the age of 25 are also more likely to be involved in fatal traffic crashes than any other age group.³¹

Additionally, driving skills decline with age; with older adults representing the fastest-growing segment of the U.S. population, protecting them from injuries caused by collision should be a top priority on any health and safety agenda. Although older motorists drive fewer miles, they are more likely to be killed or injured in a crash of the same severity compared to other age groups.³² Not only are older drivers typically frailer than others, they also tend to drive older cars, which typically have fewer safety features.³³ Even if older drivers in the future drive at the same modest rates as the current elder population, their growing numbers mean that total miles driven by people ages 65 and older would increase 50 percent by 2020 and more than double by 2040.³⁴ While strategies can focus on mitigating risks for older drivers, the best safety approach is to provide safe pedestrian facilities and accessible, affordable public transportation.

Transportation Injury Prevention Strategies

Transportation safety practices and policies should be integrated into all relevant agency agendas and across all levels of government. The pending authorization of the federal transportation bill, the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)*, is an opportunity to expand programs that have led to improvements in health and safety. Federal policy has historically succeeded in establishing national standards through a carrot-and-stick approach, encouraging state and local governments to comply with federal targets such as those on seat belt use or car seats by dangling federal funds as the carrot. The federal government thus effectively leverages its resources and expands safety targets.

Land Use

Deciding the best uses for our land has not traditionally been included among injury prevention strategies. However, land use issues strongly influence how we travel, which is a key component in determining our risk for getting hurt in a crash. Zoning laws and general plans influence population density within a community, how streets connect, and the distance between homes and key institutions such as schools and workplaces. These factors affect the feasibility, appeal, and safety of walking, bicycling, or using public transportation to get where we need to go. Smart growth strategies—which encourage compact development combining housing, shops, businesses, and parks—reduce our reliance on car travel, creating communities that are safer, more convenient, and more inclusive of low-income residents, older adults, and people with disabilities. One approach that utilizes smart growth elements is transit oriented development (TOD), which develops compact major activity centers around public transportation hubs.

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By limiting the number of alcohol outlets, zoning laws can also help tackle the problem of impaired driving.

Road Design

Road design influences driving behavior and is an important determinant of bicyclists' and pedestrians' exposure to traffic, and thus, risk of injury and death.

Road design strategies should emphasize the safety of both motorized and non-motorized travelers. Many road and street improvements can accomplish this: clear road markings and signage to designate crosswalks, bicycle lanes, demarcations between vehicle lanes, and adequate lighting alongside the road to ensure good visibility.³⁵ Additionally, sidewalks, bulb-outs at street corners (which shorten crossing distances and slow the speed of traffic), curb cuts, and separate pathways for pedestrians and bicyclists can limit motor vehicle crashes. Road design strategies should also pay particular attention to improving safe access and mobility for older adults and people with disabilities, beyond *Americans with Disabilities Act (ADA)* street design requirements.³⁶

Because the risk of death and severe injury in traffic crashes has a direct correlation to speed³⁷ and because speeding is a factor in one-third of all crashes, environmental changes to encourage slower speeds on our roads are vital. Traffic calming, design approaches that acknowledge the relationship between environmental design and behavioral norms, is one of the most important injury prevention strategies in recent decades. Reducing lane widths, curving streets, and adding trees enhance the roadway experience and lead to slower, safer driving. The construction of raised islands, medians, and roundabouts in the roadway also reduces traffic speeds.

These design improvements must reach *all* neighborhoods. Funds should especially be targeted to low-income communities, where

residents are more likely to walk or bicycle for transportation.

Public Transportation

Safe, efficient, and easily accessible public transportation systems will reduce the frequency of injury and death caused by passenger vehicles and truck traffic. Public transportation systems can solve a number of transportation issues simultaneously, e.g., provide equitable access for vulnerable populations such as older adults, people with disabilities, and low-income populations as well as improve air quality by having fewer vehicles on the road.

Funding should be increased for public transportation improvements and expansions. Public transportation must be fast and affordable; it must link people with the places they need to go. Americans will not give up their cars in significant numbers without realistic public transportation alternatives, including safe routes for walking or bicycling to transit stops. Transit operators can help by providing bicycle lockers and racks, elevators, adequate lighting, and security guards or other safety monitors. Road design features such as crosswalks, sidewalks, and conveniently located transit stops (bus stops and transit lines positioned for easy pedestrian access) are also beneficial. Public transportation accessibility and safety will become increasingly important for older Americans as the U.S. population ages.



Speed Limits

As noted earlier, speeding is an important factor in traffic injury and death. The 55-mile-per-hour highway speed limit, established by Congress in 1974 and later adopted by all states, was repealed in 1995. When speed limits are increased on major highways, motorists tend to drive faster on secondary roadways, a process known as “speed adaptation.”³⁸ Reducing speed saves not only lives but also energy because speeding reduces fuel efficiency.

Automobile advertising tends to glorify high-speed driving and risky driving behaviors.³⁹ Getting drivers to slow down may also require changes in automobile marketing practices.

Impaired Driving Laws

Alcohol-related motor vehicle crashes kill someone in the United States every 39 minutes.⁴⁰ Several studies reveal that when alcohol plays a role, crashes tend to be much more severe.⁴¹ Strategies that are effective at preventing impaired driving include:

- Maintain strict enforcement of 0.08 percent blood alcohol content (BAC) laws.⁴²
- Consistently enforce the national minimum legal drinking age law and adopt zero tolerance laws (i.e., revoking a driver’s license if impaired) for drivers younger than 21 in all states.⁴³
- Establish sobriety checkpoints,⁴⁴ coupled with extensive media campaigns to increase public awareness.
- Install alcohol ignition interlocks in vehicles.⁴⁵

A number of impaired driving prevention strategies focus on organizational interventions such as alcohol licensing, alcohol availability, alcohol bans, reducing alcohol outlet density and server interventions.⁴⁶ Other effective

strategies include economic interventions such as raising state and federal alcohol excise taxes and reducing the number of alcohol retailers.⁴⁷

It must be noted that there are higher densities of alcohol retail in low-income communities and communities of color; consequently, strategies should address the saturation of liquor stores in these communities rather than relying exclusively on modifying consumers’ behavior.⁴⁸

Driver or pedestrian alcohol use was reported in 47 percent of the traffic crashes that resulted in pedestrian fatalities, with pedestrians more likely to be intoxicated than drivers.⁴⁹ As rates of driving continue to decline and other modes become more prevalent, specific solutions must be explored for preventing alcohol-related traffic crashes among bicyclists and pedestrians.

Bicycle Helmet Laws

More than a half-million people are treated annually in hospital emergency rooms in the United States for bicycle-related injuries.⁵⁰ Approximately 60 percent of bicycle deaths involve a head injury; research indicates that a helmet can reduce the risk of head injury by up to 85 percent.⁵¹ In 1999, the U.S. Consumer Product Safety Commission issued a mandatory safety standard for bicycle helmets.⁵² Twenty-one states and the District of Columbia have helmet laws but require use only among young riders (often under the age of 16).⁵³ Little political will exists at the federal and state levels to legislate helmets—despite their lifesaving value—for a greater percentage of bicyclists. Municipal ordinances remain the most promising policy approach.

Schools, businesses, and government agencies can also mandate that children and employees wear bicycle helmets when riding to and from school or work. Schools and offices can disseminate information about their importance and value. Stores that sell bicycles and helmets can also be productive partners in this effort, offering reduced-price or free helmets and

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distributing information about their proper use and importance in preventing injuries or deaths.

Vehicle Design Standards

Vehicle design standards play a key role in increasing safety for drivers and their passengers and for bicyclists and pedestrians. Examples include improved braking systems, bumpers and external frame requirements, airbags, shatter-resistant windshields, shock-absorbing steering wheels, and automatic seat belts.

Seat Belt Laws

It's been proven that seat belts save lives. Yet the United States ranks among the lowest nations in the developed world for seat belt usage—an 83 percent daytime use rate.⁵⁴ Every state except New Hampshire has seat belt use laws, but only 25 states and the District of Columbia allow primary enforcement,⁵⁵ which permits officers to ticket a driver for not wearing a seat belt without necessitating another traffic violation. Primary enforcement has been associated with lower fatality rates⁵⁶; in states with such laws, seat belt use is typically 10 percent to 15 percent higher.⁵⁷ *SAFETEA-LU* provided more than \$500 million in incentive grant money to encourage states to pass primary enforcement seat belt laws, but only a few states have done so. In addition to incentives, federal transportation dollars should be withheld from states that do not adopt such laws. There should also be safeguards for uniform enforcement of primary seat belt laws to address the concern from many opponents that traffic laws have a history of discriminatory enforcement, with targeting of certain racial and ethnic groups.⁵⁸ The National Organization of Black Law Enforcement Executives, the nation's leading group of minority law enforcement executives, has recognized that large numbers of African Americans die because they don't use seat belts or child safety seats (discussed below); it supports primary enforcement laws covering both strategies.

Motorcycle Helmet Laws

Motorcycles make up more than three percent of registered vehicles and only 0.4 percent of vehicle miles traveled but 11 percent of traffic fatalities.⁵⁹ Helmet use is the most effective measure to protect motorcyclists. Although helmets do not prevent crashes, they offer significant protection against head and brain injuries. States with all-rider helmet laws have a use rate of nearly 100 percent. Twenty-six states have laws that cover only some riders (e.g., up to age 18), which are nearly impossible to enforce; the trend now is toward repealing such laws rather than enacting them. All states should be required to enact an all-rider motorcycle helmet law, and grant funding should provide incentives for promoting motorcyclists' safety.

Child Safety Seat Laws

Child safety seats reduce the risk of death in vehicles by 71 percent for infants and by 54 percent for children ages one to four years.⁶⁰ For the past 20 years, child safety seats have been tremendously successful with nearly 100 percent compliance. The CDC Guide to Community Preventive Services presents strong evidence that child safety seat laws, the distribution of safety seats, and education and enforcement



campaigns are effective in increasing child safety seat use.⁶¹

But more work needs to be done to protect child occupants who remain at heightened risk. The next priority: enacting booster seat laws for children up to age eight, as recommended by the NHTSA. At present, 42 states and the District of Columbia have such laws.⁶²

Lack of access to affordable child safety seats makes their use lower in rural and low-income communities.⁶³ Research reveals, however, that 95 percent of low-income families who own a child safety seat use it.⁶⁴ The federal surface transportation bill should help low-income families to purchase booster seats.

Graduated Driver Licensing

Graduated driver licensing (GDL) laws, which require newly licensed youth to “graduate” to full licensing, allow young people to practice before assuming the full rights and responsibilities of driving. Research suggests that comprehensive GDL programs can reduce fatal crashes among 16-year-old drivers by up to 38 percent.⁶⁵

Truck Regulations

Although this paper emphasizes safety for passenger vehicles, truck safety is another important area for injury prevention. Strategies include improving built-in truck safety features, regular inspections, restrictions on hours operators can drive without a break, and regulations limiting load size. Federal transportation policy can make roads safer for everyone by supporting expanded rail transport and reducing reliance on trucks.

Challenges to and Opportunities in Traffic Injury Prevention Policy

The current federal transportation bill, *SAFETEA-LU*, includes programs that advance both health and safety. These programs can benefit greatly from additional funding in the pending authorization of a new bill and an emphasis on expanding best practices and promoting equity. Funding should be prioritized to ensure that injury prevention efforts are designed to benefit the most vulnerable communities. Notably, the Highway Safety Improvement Program (HSIP) was an unprecedented attempt to consolidate safety efforts. Other successes that should be expanded: the Safe Routes to School (SRTS) program, the Transportation Enhancements (TE) program, and The Non-Motorized Transportation Pilot program (see table 4 for details about these programs).

A well-thought-out federal health and safety framework for transportation policy and practice must be reflected at the local level as well. States and locales are the crucibles of change; they do most of the transportation planning and implementation. Yet the quality of safety efforts remains uneven. Without a sufficient federal mandate, some states ignore the imperative for traffic safety, and others have not implemented measures to their greatest potential. Federal mandates should be flexible so locales can choose strategies that best respond to community conditions. HSIP’s mandatory strategic highway safety plan process, which requires states to develop safety priorities and targets in order to receive safety funds from the program, is an opportunity for this type of coordinated traffic safety approach.

The federal government should also require states to include in their transportation planning a wide range of voices, including groups concerned with health and community well-being. An important model for this type of multi-sector collaboration is the Safe

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Table 4. *SAFETEA-LU Programs That Support Injury Prevention**

Program	Amount	Description
Highway Safety Improvement Program (HSIP)	\$5 billion over 5 years	Achieves a significant reduction in traffic fatalities and serious injuries on all public roads by implementing infrastructure-related highway safety improvements. A portion of these funds can be used for safe behavior enhancement programs.
Safe Routes to School (SRTS)	\$612 million over 5 years	Funds infrastructure and programming projects to encourage children and their accompanying guardians to walk or bicycle safely to school every day. This program is one of a few existing models that jointly focuses on increasing rates of walking and bicycling and improving safety conditions for non-motorized travelers. It should be authorized with greater investment.
The Non-Motorized Transportation Pilot Program	\$125 million over 5 years	Funds infrastructure and programming in four communities to increase bicycling and walking. Expanding it to fund more communities and conduct further evaluation is the next step. Its authorization should require funded communities to include safety goals in their transportation plans so that every new project focuses on reducing traffic injuries and deaths among bicyclists and pedestrians as well as infrastructure improvements that improve safety for all.
Transportation Enhancements (TE)	\$3.5 billion	Funds bicycle and pedestrian trails and rail-trail conversions, which include safety improvements to these environments; these conversions take up about 55% of TE funding. It is a 10% set-aside from another major program in SAFETEA-LU, the Surface Transportation Program. This is the largest source of federal funds for non-motorized projects and should be increased to reflect growing demand.
* Funds for agencies under the U.S. Department of Transportation that address traffic safety and for the State and Community Highway Safety Grant Program, described in table 5, were also authorized under SAFETEA-LU.		

Communities Program, funded through Section 402 transportation funds (described in table 5).

Moreover, the authorization should provide states with data, training, and technical assistance to ensure that plans are well tailored to community needs, that they effectively reach low-income communities and communities of color, and that they include a diverse and comprehensive set of strategies. HSIP currently focuses almost exclusively on the safety of

motorized travelers. To equitably distribute transportation safety funds, several advocates are calling for a “Fair Share for Safety” provision, requiring states to spend a portion of their funds, proportional to the percentage of non-motorized travelers’ deaths, on walking and bicycling safety projects.

A complete streets policy—which emphasizes safe, easy, and efficient mobility for *all* travelers through connected networks of roads, paths,

Table 5. *Federal and State Government Support for Traffic Injury Prevention*

- **Federal:** The U.S. Department of Transportation (DOT) is the agency responsible for the federal transportation system. One of its primary charges is to ensure the safety and security of the traveling public; safety is among its top three priorities. The National Highway Traffic Safety Administration (NHTSA), the Federal Highway Administration (FHWA), and the Federal Motor Carrier Safety Administration (FMCSA) are the three major agencies under the DOT umbrella that provide national leadership and support on transportation safety issues. The Federal Transit Administration (FTA) addresses safety related to public transportation. Congress has also created the National Center for Injury Prevention and Control (NCIP) within the Centers for Disease Control and Prevention (CDC); it funds injury research, provides grants to state and local health agencies, and works to increase awareness about injury prevention.
- **State:** In addition to the federal agencies and programs dedicated to traffic safety, states also have dedicated funding sources to improve traffic safety. This support comes primarily through Section 402 State and Community Highway Safety Grant Program, first authorized by the Highway Safety Act of 1966 and reauthorized in succeeding federal surface transportation bills. Most state public health departments also support ongoing injury prevention and control programs.

and trails—is not included in *SAFETEA-LU*, but should be incorporated into the new federal transportation bill.⁶⁶

Another policy issue that requires attention is deciding the appropriate mechanisms to distribute funds in order to encourage projects that promote safety and convenience by modes other than passenger vehicle travel. The new federal transportation bill should provide alternatives to the current funding formula, which bases allocations on a state's total number of vehicle miles traveled. One option is to link transportation funds to land use patterns that encourage smart growth development and discourage development patterns that require passenger vehicles for the majority of local travel.

Conclusion

Twenty-first century transportation policy must reflect a new vision of mobility and accessibility. Safe travel for all road users and broader considerations of health and equity must be at the center of policy and practice, which would be a difficult task even without the entrenched interests invested in maintaining the status quo. It requires a strong, committed partnership that spans multiple sectors and disciplines.

Building this partnership requires moving beyond past differences and historical positions. Diverse groups must recognize their common interest in opposing policies centered on building more roads, highways, and sprawling developments at the expense of air quality, bicycle and pedestrian access, smart growth, and safety for everyone.

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Key Issues

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- ⁴ The literature on the health effects of urban sprawl is voluminous. For a short overview, see Robert Burchell et al, *Sprawl Costs: Economic Impacts of Unchecked Development* (Washington, DC: Island Press, 2005). See also Howard Frumkin, Lawrence Frank, and Richard Jackson, *Urban Sprawl and Public Health: Designing, Planning, and Building for Healthier Communities* (Washington, DC: Island Press, 2004).
- ⁵ For evidence of the negative impact of inequality in general and geographical inequalities in particular on health, see Ichiro Kawachi, Bruce P. Kennedy, and Richard G. Wilkinson, eds., *The Society and Population Health Reader: Income Inequality and Health* (New York: New Press, 1999).
- ⁶ The following account of the health effects of concentrated poverty is based on Peter Dreier, John Mollenkopf, and Todd Swanstrom, *Place Matters: Metropolitcs for the Twenty-First Century*, rev. ed. (Lawrence, KS: University Press of Kansas, 2004), 76–82.
- ⁷ For an insightful discussion of policy monopolies (also called subgovernments, iron triangles, or policy silos), see Frank R. Baumgartner and Bryan D. Jones, *Agendas and Instability in American Politics* (Chicago: University of Chicago Press, 1993), 6–9. For analysis of the highway policy silo in its heyday, see Alan Altschuler, *The City Planning Process: A Political Analysis* (Ithaca, NY: Cornell University Press, 1965) and John Mollenkopf, *The Contested City* (Princeton, NJ: Princeton University Press, 1983).
- ⁸ According to a survey of urban scholars, the 41,000-mile federal interstate highway program was the most important influence

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shaping America's metropolitan areas in the past half-century. Reported in Robert Fishman, "The American Metropolis at Century's End: Past and Future Influences," *Housing Policy Debate* 11, no. 1 (2000): 199–213.

- ⁹ Over time, however, the urbanization of the suburbs and the almost complete reliance on the automobile has generated serious health costs, including higher levels of air pollution and low activity levels related to obesity. The increased stress from long commutes and traffic congestion negatively affect health. According to a study of eight metropolitan areas, even though rates of homicide by strangers are higher in inner urban areas than in outlying suburbs, the higher traffic fatality rates in outlying areas swamp this effect, making outlying areas less safe than central cities and inner suburbs. See William H. Lucy, "Mortality Risk Associated with Leaving Home: Recognize the Significance of the Built Environment," *American Journal of Public Health* 93, no. 9 (September 2003): 1564–69.
- ¹⁰ Elizabeth Kneebone, "Job Sprawl Revisited: The Changing Geography of Metropolitan Employment," The Brookings Institution, Center on Urban and Metropolitan Policy, May 2009.
- ¹¹ According to Ingrid Gould Ellen and Margery Austin Turner, of six literature reviews on the spatial mismatch, three find substantial support for it, two find moderate support, and one finds the evidence too mixed to reach a conclusion. See "Do Neighborhoods Matter and Why?," in *Choosing a Better Life: Evaluating the Moving to Opportunity Social Experiment*, eds. John Goering and Judith D. Feins (Washington, DC: Urban Institute Press, 2003), 328.
- ¹² Between 1950 and 2000 the average size of a new home increased by more than 50 percent (from 1,470 square feet to 2,265 square feet). In 2000 the average new house was almost two-thirds more expensive than in 1960 (in constant dollars), and the share of new housing purchased by the top 20 percent of the income range increased dramatically. Rachel Dwyer, "Expanding Homes and Increasing Inequalities: U.S. Housing Development and the Residential Segregation of the Affluent," *Social Problems* 54, no. 1 (2007): 23–46.
- ¹³ Paul Jargowsky, "Sprawl, Concentration of Poverty, and Urban Inequality," in *Urban Sprawl: Causes, Consequences, and Policy Responses*, ed. Gregory D. Squires (Washington, DC: Urban Institute Press, 2002), 57.
- ¹⁴ Between 1956 and 1972, highway building and urban renewal displaced an estimated 3.8 million persons, overwhelmingly poor and minorities, from their homes. Susan Fainstein and Norman Fainstein, eds., *Restructuring the City: The Political Economy of Urban Development* (New York: Longman, 1986), 49.
- ¹⁵ In *Bowling Alone* Robert Putnam reports that joining your first group will "cut your risk of dying over the first year in half." *Bowling Alone: The Collapse and Revival of American Community* (New York: Simon and Schuster, 2000), 331. For a comprehensive analysis of the costs of displacement on African American communities by urban renewal (and highway building), see Mindy Thompson Fullilove, *Root Shock: How Tearing Up City Neighborhoods Hurts America* (New York: Ballantine, One World, 2004).
- ¹⁶ To this day, African Americans are underrepresented in the construction workforce relative to their participation in the overall workforce. See Todd Swanstrom, *The Road to Good Jobs: Patterns of Employment in the Construction Industry in the Top Twenty-five Metropolitan Areas* (St. Louis, MO: Transportation Equity Network, Public Policy Research Center, University of Missouri – St. Louis, 2008).

- ¹⁷ "Transportation Affordability: Strategies to Increase Transportation Affordability," *TDM Encyclopedia*, updated July 2008, Victoria Transport Policy Institute, <http://www.vtppi.org/tdm/tdm106/htm>.
- ¹⁸ Transportation expenditures are not regressive with respect to family expenditures because many low-income households, such as older adults, live on savings and therefore spend more than they earn. However, for all vehicle-owning households, transportation expenditures are regressive as a proportion of household expenditures. See Todd Litman, "Transportation Affordability: Evaluation and Improvement Strategies," Victoria Transport Policy Institute, November 10, 2008, <http://www.vtppi.org/affordability.pdf>.
- ¹⁹ Barbara Lipman, *A Heavy Load: The Combined Housing and Transportation Burdens of Working Families* (Washington, DC: Center for Housing Policy, October 2006), http://www.nhc.org/pdf/pub_heavy_load_10_06.pdf.
- ²⁰ American Automobile Association, *Your Driving Costs* (Heathrow, FL: AAA, 2007). The estimate is based on gasoline costing \$2.256 a gallon. Low-income persons can own a car for less by purchasing a cheap used car, but then they are subject to repairs, and unreliable transportation can cost them their job. Also, insurance costs tend to be higher in poor communities.
- ²¹ Reauthorizations of *ISTEA* in 1998 and 2005 strengthened the law, for example, creating incentives to link transportation and land use (Transportation and Community and System Preservation [TCSP] Pilot Program) and funding reverse commuting programs to transport inner-city workers to suburban jobs (Job Access and Reverse Commute Program [JARC]).
- ²² For a comprehensive and largely critical review of federal transportation policy, see Bruce Katz, Robert Puentes, and Scott Bernstein, "Getting Transportation Right for Metropolitan America," in *Taking the High Road: A Metropolitan Agenda for Transportation Reform*, eds. Bruce Katz and Robert Puentes (Washington, DC: Brookings Institution Press, 2005), 15–42.
- ²³ John Pucher, "Public Transportation," in *The Geography of Urban Transportation*, 3rd ed., eds. Susan Hanson and Genevieve Giuliano (New York: Guilford Press, 2004), 207.
- ²⁴ http://www.apta.com/media/releases/081208_ridership_surges.cfm.
- ²⁵ Margaret Weir, Jane Rongerude, and Christopher K. Ansell, "Collaboration is Not Enough: Virtuous Cycles of Reform in Transportation Policy," *Urban Affairs Review* 44, no. 4 (March 2009): 455–89.
- ²⁶ Katz, Puentes, and Bernstein (see endnote 22).
- ²⁷ For example, to demonstrate that the public had been consulted, the Chicago MPO (CATS) produced a 15-pound compilation of public comments that had never been analyzed. Weir, Rongerude, and Ansell, "Collaboration is Not Enough," 476 (see endnote 25).
- ²⁸ See Robert Cervero, "Effects of Light Rail and Commuter Rail Transit on Land Prices: Experiences in San Diego County," *Journal of the Transportation Research Forum* 43, no. 1 (2004): 121–38.
- ²⁹ Shelley Poticha, "Building Housing Near Transit: A Long-Lasting Affordability Strategy," Congressional Testimony before the Appropriations Subcommittee on Transportation, Housing and Urban Development, and Related Agencies, U.S. House of Representatives, March 8, 2007. Poticha is President and CEO of Reconnecting America, Oakland, CA.
- ³⁰ Center for Transit-Oriented Development and Center for Neighborhood Technology, *The Affordability Index: A New Tool for Measuring the True Affordability of Housing*

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Choice, Brookings Institution Urban Markets Initiative, Innovation Brief (January 2006), 10. Recognizing this saving, Fannie Mae created a Location Efficient Mortgage that enables borrowers to qualify for a larger loan if they are buying in areas that have lower average transportation costs.

- ³¹ John Pucher, "Public Transportation," 212 (see endnote 23).
- ³² Dena Belzer et al., *The Case for Mixed-Income, Transit-Oriented Development in the Denver Region* (Oakland, CA: Center for Transit-Oriented Development, February 2007), 42.
- ³³ One way to address this problem would be Pay-As-You-Drive car insurance. See "Transportation Affordability" (endnote 17).
- ³⁴ Robert Cervero and Yu-Hsin Tsai, "San Francisco City CarShare: Travel-Demand Trends and Second-Year Impacts," Institute of Urban & Regional Development, *IURD Working Paper Series*, Paper WP-2003-05 (August 1, 2003), <http://repositories.cdlib.org/iurd/wps/WP-2003-05>.
- ³⁵ Directed by Congress, U.S. DOT and HUD have begun to collaborate on policies to promote affordable housing near transit. See *Better Coordination of Transportation and Housing Programs to Promote Affordable Housing Near Transit*, a Report to Congress from the U.S. Department of Transportation, Federal Transit Administration, and the U.S. Department of Housing and Urban Development, 2008. The HUD-FTA Interagency Working Group should continue to operate to identify legislation and administrative actions to better coordinate housing and transportation policies.
- ³⁶ For example, the House Appropriations Subcommittee on Housing, Transportation and Urban Development, chaired by Rep. John Olver (D-MA), held a hearing with a joint appearance by DOT Secretary Ray LaHood and HUD Secretary Shaun Donovan. In a joint press release, LaHood and Donovan announced a new partnership to coordinate housing and transportation to cut costs for working families, <http://www.hud.gov/news/release.cfm?content=pr09-023.cfm>.
- ³⁷ Present federal regulations do permit limited funds to be used for this purpose. The Metro system in Portland, OR, has used Congestion Mitigation and Air Quality (CMAQ) funds to acquire and sell land around transit stations for TOD, usually with an affordable housing component. PolicyLink, *Equitable Development Toolkit: Transit Oriented Development*, available at <http://www.policylink.org>.
- ³⁸ Sarah Grady with Greg Leroy, *Making the Connection: Transit-Oriented Development and Jobs* (Washington, DC: Good Jobs First, March 2006).
- ³⁹ Workforce housing is usually defined as housing that costs no more than 35 percent of the median wage in the area.
- ⁴⁰ For a penetrating account of what happens "when work disappears" from communities, see William Julius Wilson, *When Work Disappears: The World of the New Urban Poor* (New York: Alfred A. Knopf, 1996).
- ⁴¹ Center to Protect Workers' Rights, *The Construction Chart Book: The U.S. Construction Industry and Its Workers*, 4th ed. (Silver Spring, MD: Center to Protect Workers' Rights, Center for Construction Research and Training, December 2007).
- ⁴² A recent study of 25 metropolitan areas found that hourly wages in construction (2004–2007) varied from \$15.65 in the Dallas metropolitan area to \$27.70 in the Chicago region. Todd Swanstrom, *The Road to Good Jobs: Patterns of Employment in the Construction Industry* (St. Louis, MO:

Transportation Equity Network and Public Policy Research Center, U. of Missouri – St. Louis, 2008).

⁴³ Center to Protect Workers' Rights, *The Construction Chart Book* (see endnote 41).

⁴⁴ Daniel Hecker, "Occupational Employment Projections to 2014," *Monthly Labor Review* (November 2005): 70–101.

⁴⁵ Calculation of the number of jobs produced is based on Thomas P. Keane, "The Economic Importance of the National Highway System," *Public Roads* 59, no. 4 (1996): 16–21.

⁴⁶ The act is named after its Republican sponsors, James J. Davis, a Senator from Pennsylvania who was Secretary of Labor under three presidents, and Representative Robert L. Bacon of Long Island, NY. For Davis-Bacon wage rates state by state: see <http://www.gpo.gov/davisbacon/allstates.html>.

⁴⁷ Lisa Raghelli, *Replicating Success: The Alameda Corridor Job Training & Employment Program* (Washington, DC: Center for Community Change, 2002).

⁴⁸ For more examples of TEN's successes: see <http://www.transportationequity.org>.

⁴⁹ For best practices in pre-apprenticeship programs, see Kathleen Mulligan-Hansel, *Making Development Work for Local Residents: Local Hire Programs and Implementation Strategies That Serve Low-Income Communities* (Milwaukee, WI: Partnership for Working Families, 2008), <http://www.communitybenefits.org/downloads/Making%20Development%20Work%20for%20Local%20Residents.pdf>.

⁵⁰ The 30 percent standard has been shown to be achievable in a number of projects around the country, such as in the St. Louis I-64 partnering agreement. A copy of that agreement is available on the Transportation Equity Network website, <http://www.transportationequity.org>.

[transportationequity.org](http://www.transportationequity.org).

⁵¹ Presently, the federal law permits one-half of one percent of surface transportation funds to be used for local workforce development. One percent would do a better job of meeting the need while still representing a small cost to the overall project.

⁵² See <http://www.uspirg.org/home/reports/report-archives/transportation/transportation2/a-better-way-to-go>. Similarly, research has shown smart growth transportation policies, such as "fix-it-first" highway projects or public transportation, create more jobs than new highways that fuel more sprawl. Phillip Mattera with Greg Leroy, *The Jobs are Back in Town: Urban Smart Growth and Construction Employment* (Washington, DC: Good Jobs First, 2003).

⁵³ An example of the political problems this can cause is the lawsuit filed by the Los Angeles Bus Riders' Union against massive expenditures on a light-rail system at the same time that bus service was being cut. In March 1999, the Bus Riders' Union won a court ruling for 532 new buses and 1,500 new union jobs for drivers and mechanics. For a discussion of the tensions between environmentalists and advocates of the poor in the transportation arena, see Joel Rast, "Environmental Justice and the New Regionalism," *Journal of Planning Education and Research* 25 (2006): 249–63.

⁵⁴ Research has demonstrated that car ownership increases employment and wages for low-income persons. See Steven Raphael and Michael Stoll, "Can Boosting Minority Car-Ownership Rates Narrow Inter-Racial Employment Gaps?," Working Paper W00-002, Program on Housing and Urban Policy, University of California – Berkeley, <http://urbanpolicy.berkeley.edu>, and Paul Ong, "Car Ownership and Welfare-to-Work," School of Public Policy and Social Research, University of California – Los Angeles, February 26, 2001, <http://www.uctc.net/papers/540.pdf>.

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Chapter 7: Sustainable Food Systems: Perspectives on Transportation Policy

- ¹ U.S. Department of Agriculture, Economic Research Service, "Global Food Markets: Global Industry Structure," 2008, <http://www.ers.usda.gov/Briefing/GlobalFoodMarkets/Industry.htm> (accessed January 31, 2009).
- ² Food insecurity is said to exist whenever "the availability of nutritionally adequate and safe food, or the ability to acquire acceptable foods in socially acceptable ways, is limited or uncertain." S. A. Anderson, ed., "Core Indicators of Nutritional Status for Difficult-to-sample Populations," *Journal of Nutrition* 120 (1990): 1559–1600, 1560. Food insecurity ranges from a painful sensation of hunger, at its most severe, to families being relegated to a few inexpensive staple foods—such as macaroni and cheese—that do not alone make up a nutritious and varied diet. Inconsistent availability of food, lack of transportation to grocery stores, and skipping meals to keep food costs down all are indicators of food insecurity. Conversely, food security refers to access by all people at all times to a sufficient quantity of safe, nutritious, affordable, and culturally appropriate food for an active, healthy life, obtained through conventional sources.
- ³ In this paper, "access" is used to signify spatial proximity or convenient and affordable transportation to destinations. Proximity is central because low-income urban households display lower rates of automobile ownership and may need to rely for grocery shopping on walking, taking the bus, or rides from acquaintances. Social, cultural, and economic categories of access of food are also key to this paper; they are defined, however, by the term "food security" (see endnote 2).
- ⁴ For example, the top five grocery retail chains captured 48 percent of the market in 2007, double that in 1997, <http://www.nfu.org/wp-content/2007-heffernanreport.pdf> (accessed January 19, 2009).
- ⁵ Brookings Institution, *From Poverty, Opportunity: Putting the Market to Work for Lower-income Families* (Washington, DC: Brookings Institution, 2006), http://www.brookings.edu/reports/2006/07poverty_fellowes.aspx (accessed January 19, 2009); K. Pothukuchi, "Attracting Supermarkets to Inner-city Neighborhoods: Economic Development Outside the Box," *Economic Development Quarterly* 19 (2005): 232–44; E. Eisenhauer, "In Poor Health: Supermarket Redlining and Urban Nutrition," *GeoJournal* 53 (2004): 125; and R. W. Cotterill and A. W. Franklin, "The Urban Grocery Store Gap," Food Marketing Policy Issue Paper 8 (Storrs, CT: Food Marketing Policy Center, University of Connecticut, April 1995).
- ⁶ Today, the top food retailers control their own supply chains and manage their own fleets of trucks, warehouses, and buying offices. For example, Kroger has roughly 30 distribution centers to serve its 2,500 supermarkets, and other leading chains do the same to fully integrate their supply chains as a key strategy for remaining profitable. See Oakland Institute Report, "Food Chain Consolidation in U.S., 2007," <http://www.foodpolicy.in/html/archive/2007/rep/oakland1.htm> (accessed January 19, 2009). See also M. Hendrickson et al., "The Global Food System and Nodes of Power," Report prepared for Oxfam America, August 2008 (accessed March 24, 2009), paper can be downloaded by clicking on SSRN at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1337273; and Competition Commission, Groceries Market Roundtable Meeting (Amended Notes) (London, UK: October 9, 2006).
- ⁷ See, for example, a Canadian study: K. Larsen and J. Gilliland, "Mapping the

Evolution of Food Deserts in a Canadian City: Supermarket Accessibility in London, Ontario, 1961–2005,” *International Journal of Health Geographics* 7 (2008), <http://www.ij-healthgeographics.com/content/pdf/1476-072X-7-16.pdf> (accessed January 31, 2009). The study showed that in 1961, more than 75 percent of London’s downtown population lived within convenient access to grocery stores (i.e., a 10-minute bus ride combined with a 500-meter walk at the beginning or end of a bus trip). Because Canadian cities saw similar patterns of urban sprawl but at a lower intensity or scale than did most U.S. cities, it is safe to apply this study to U.S. cities as a general pattern.

- ⁸ M. A. Delucchi and J. Murphy, “How Large Are Tax Subsidies to Motor-vehicle Users in the U.S.?,” *Journal of Transport Policy* 15 (2008): 196–208.
- ⁹ For elaborations on this theme, see Brookings Institution, *From Poverty, Opportunity: Putting the Market to Work for Lower-income Families* (see endnote 5); D. Hendrickson, C. Smith, and N. Eikenberry, “Fruit and Vegetable Access in 4 Low-income Food Desert Communities in Minnesota,” *Agriculture and Human Values* 23 (2006): 371–83; M. Gallagher, *Examining the Impact of Food Deserts on Public Health in Detroit* (Chicago: Mari Gallagher Research and Consulting Group, 2007); M. Gallagher, *Examining the Impact of Food Deserts on Public Health in Chicago* (Chicago: Mari Gallagher Research and Consulting Group, 2006); S. N. Zenk et al., “Neighborhood Racial Composition, Neighborhood Poverty, and Spatial Accessibility of Supermarkets in Metropolitan Detroit,” *American Journal of Public Health* 95 (2005): 660–67; E. Bolen and K. Hecht, *Neighborhood Groceries: New Access to Healthy Food in Low-income Communities* (San Francisco: California Food Policy Advocates, January 2003); and many others. The Brookings Institution study found, for example, that the average grocery

store in its sample of 2,384 low-income neighborhoods is 2.5 times smaller than the average grocery store in a high-income neighborhood. Also, there is about one mid- or large-sized grocer for every 69,055 residents in low-income neighborhoods, half the availability found in other neighborhoods. Access to only small grocery stores results in higher food prices for low-income shoppers. In particular, more than 67 percent of the same food products in its sample of 132 different products are more expensive in small grocery stores than in larger grocery stores.

- ¹⁰ T. C. Blanchard and T. A. Lyson, “Retail Concentration, Food Deserts, and Food Disadvantaged Communities in Rural America,” in *Remaking the North American Food System*, eds. C. C. Hinrichs and T. A. Lyson (Lincoln, NE: University of Nebraska Press, 2007); C. Wirth, R. Strohlic, and C. Getz, *Hunger in the Fields: Food Insecurity among Farmworkers in Fresno County* (CA: California Institute for Rural Studies, 2007); A. D. Liese et al., “Food Store Types, Availability, and Cost of Foods in a Rural Environment,” *Journal of the American Dietetic Association* 107 (November 2007): 1916–23; T. Blanchard and T. Lyson, “Food Availability & Food Deserts in the Nonmetropolitan South,” Southern Rural Development Center, 2006, http://srdc.msstate.edu/focusareas/health/fa/fa_12_blanchard.pdf (accessed January 19, 2009); L. W. Morton et al., “Solving the Problems of Iowa Food Deserts: Food Insecurity and Civic Structure,” *Rural Sociology* 70 (2005): 94–112; L. W. Morton and T. C. Blanchard, “Starved for Access: Life in Rural America’s Food Deserts,” *Rural Realities* 1 (2007): 10; E. A. Bitto et al., “Grocery Store Access Patterns in Rural Food Deserts,” *Journal for the Study of Food and Society* 6 (2003): 35–48; C. Getz, “Perceived High Cost Deters Farmworkers from Eating Produce, According to UC Study,” University of California, News and Information Outreach, 2006, <http://news.ucanr.org/>

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- ¹¹ K. Morland and S. Filomena, "Disparities in the Availability of Fruits and Vegetables between Racially Segregated Urban Neighbourhoods," *Cambridge Journals Online* 10 (2007): 1481–89; L. V. Moore, A. V. Diez-Roux, "Associations of Neighborhood Characteristics with the Location and Type of Food Stores," *American Journal of Public Health* 96 (2006): 325–31; D. Block and J. Kouba, "A Comparison of the Availability and Affordability of a Market Basket in Two Communities in the Chicago Area," *Public Health Nutrition* 9 (2007): 837–45; M. Gallagher, 2007 and 2006 (see endnote 9); J. Block, R. A. Scribner, and K. B. De Salvo, "Fast Food, Race/Ethnicity, and Income: A Geographic Analysis," *American Journal of Preventive Medicine* 27 (2004): 211–17; K. Morland et al., "Neighborhood Characteristics Associated with the Location of Food Stores and Food Service Places," *American Journal of Preventive Medicine* 22 (2002): 23–29, and many others.

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- ¹³ Since 1994, when the USDA started to track growth in farmers' markets, more than 3,000 farmers' markets have opened nationally, reaching a total of 4,685 markets in August 2008. USDA, Economic Research Service, "Global Food Markets: Global Industry Structure," 2008, <http://www.ers.usda.gov/Briefing/GlobalFoodMarkets/Industry.htm>

(accessed January 31, 2009).

- ¹⁴ American Farmland Trust, "Farming on the Edge Report," <http://www.farmland.org/resources/fote/default.asp> (accessed January 19, 2009).
- ¹⁵ Surface Transportation Policy Project, "Surface Transportation and Poverty Alleviation," n.d., <http://www.transact.org/library/factsheets/poverty.asp> (accessed January 19, 2009); R. D. Bullard and G. S. Johnson, eds., *Just Transportation: Dismantling Race and Class Barriers to Mobility* (Gabriola Island, BC: New Society Publishers, 1997); and A. D. Gardenshire, "Economic and Sociodemographic Influences on Autolessness: Are Missing Variables Skewing Results?," *Transportation Research Record* 1670 (1999): 13–16.
- ¹⁶ S. H. Babey et al., *Designed for Disease: The Link Between Local Food Environments and Obesity and Diabetes* (Los Angeles: California Center for Public Health Advocacy, PolicyLink, and UCLA Center for Health Policy Research, 2008), <http://www.healthpolicy.ucla.edu/pubs/publication.asp?pubID=250> (accessed January 19, 2009); L. Mikkelsen, S. Chehimi, and L. Cohen, *Healthy Eating & Physical Activity: Addressing Inequities in Urban Environments* (Oakland, CA: Prevention Institute, 2007); M. Gallagher, 2007 and 2006 (see endnote 9); M. C. Wang et al., "Changes in Neighbourhood Food Store Environment, Food Behaviour and Body Mass Index, 1981–1990," *Cambridge Journals Online* 11 (2007): 963–70; K. Morland, S. Wing, and A. V. Diez-Roux, "The Contextual Effect of the Local Environment on Residents' Diets: The Atherosclerosis Risk in Communities Study," *American Journal of Public Health* 11 (2002): 1761–67; and The Food Trust, "Food Geography: How Food Access Affects Diet and Health," http://www.thefoodtrust.org/catalog/download.php?product_id=120 (accessed January 19, 2009).

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- ¹⁸ See, for example, Zenk et al., "Neighborhood Racial Composition" (endnote 9).
- ¹⁹ S. L. Handy, "Understanding the Link between Urban Form and Nontravel Behavior," *Journal of Planning Education and Research* 15 (1996): 183–98; and J. Boivin and P. Matharu, "Bus Transit and Grocery Shopping in Detroit, Wayne State University Department of Geography and Urban Planning, unpublished paper, 2008.
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- ²¹ See, for example, K. Clifton, "Mobility Strategies and Food Shopping for Low-Income Families: A Case Study," *Journal of Planning Education and Research* 23 (2004): 402–13.
- ²² This is an especially significant problem for the rural elderly. *Food Security, Insecurity, and Hunger: Rural Food Access Patterns: Elderly Open-Country and In-Town Residents* (Ames, IA: Iowa State University Extension, 2004); and K. Clifton, "Mobility Strategies" (see endnote 21).
- ²³ N. Wrigley, "Understanding Store Development Programmes in Post-property-crisis UK Food Retailing," *Environment and Planning A* 30 (1998): 15–35.
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- ²⁵ R. D. Bullard, G. S. Johnson, and A. O. Torres, eds., *Sprawl City* (Washington, DC: Island Press, 2000); R. D. Bullard and G. S. Johnson, eds., *Just Transportation: Dismantling Race and Class Barriers to Mobility* (Gabriola Island, BC: New Society Publishers, 1997); and Surface Transportation Policy Project, "Surface Transportation and Poverty Alleviation," <http://www.transact.org/library/factsheets/poverty.asp> (accessed January 19, 2009).
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- ²⁹ A Fresno County, CA, study found that nearly half of all farm worker households were food insecure compared to 36 percent of all county households. The same study also found that just over half and only about 36 percent of those eligible used food stamps in the winter and summer, respectively. C. Getz, "Perceived High Cost Deters Farmworkers from Eating Produce, According to UC Study," University of California, News and Information Outreach, 2006, <http://news.ucanr.org/newsstorymain.cfm?story=899> (accessed January 19, 2009).

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current dominance of Wal-mart underscore the preeminent contribution of logistics and transportation to their retail dominance.

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waste or plants grown on marginal land that is not used to grow foods. These have less than half the combined health and environmental costs of standard gasoline and one-third of current biofuels.

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Transit Cooperative Research Program, Transportation Research Board, January 2006). Such a preventive health approach should be adopted in integrating transportation into federal nutrition programs.

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⁸³ For more information about these coalitions and organizations see: <http://www.foodsecurity.org/>; <http://sustainableagriculture.net/>; <http://www.frac.org/>; <http://www.nffc.net/>; and <http://www.farmland.org/>.

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Chapter 8: Traffic Injury Prevention: A 21st-Century Approach

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