

# 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.*

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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.<sup>1</sup> 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.<sup>2</sup> This constituted the leading cause of death for individuals ages one to 34.<sup>3</sup> 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.<sup>4</sup> Of the 41,059 traffic fatalities, 4,654 were pedestrians, 5,154 motorcyclists, and 698 bicyclists.<sup>5</sup>

Crashes were more likely to occur at an unsignalized intersection than a signalized one.<sup>6</sup> 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.<sup>7</sup>

Vulnerable populations typically have a higher risk of unintentional injury.<sup>8</sup> 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.<sup>9</sup> Traffic-related crashes are the leading cause of death for children,<sup>10</sup> and poor children die at higher rates. The pedestrian victim of a car collision is statistically more likely to be a person of color.<sup>11</sup> 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.<sup>12</sup> There is a similar effect for pedestrians.<sup>13</sup> Although less than one-quarter of all driving takes place in a rural setting,<sup>14</sup> more than half of all fatal motor vehicle crashes occur there.<sup>15</sup> Rates of pedestrian fatalities are higher in urban areas.<sup>16</sup>

## 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.<sup>17</sup>

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.<sup>18</sup>
- Incorporate treatments to control conflict points, such as medians, alleys, traffic signals, and movement restrictions.<sup>19</sup>
- 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.<sup>20</sup>
- Include public transportation facilities and shift travel to this mode, reducing risk of injury.
- Provide sidewalks and frequent crosswalks to improve pedestrian safety.<sup>21</sup>
- Reduce corner radii where possible to minimize pedestrian exposure and reduce vehicle speed.<sup>22</sup>
- 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.<sup>23</sup>
- Create landscaped, tree-lined roads.<sup>24</sup>
- Reduce roadside distractions such as billboards.
- Improve street and roadside lighting, especially at conflict points.<sup>25</sup>
- 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.<sup>26</sup> 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<sub>2.5</sub> and PM<sub>10</sub>) 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.<sup>27</sup>

Children, older adults, pregnant women, and low-income households are especially vulnerable.<sup>28</sup> 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<sub>2.5</sub>) has an adverse effect on lung development in adolescents that can lead to lifelong lung deficiency,<sup>29</sup> and even small amounts of air pollutants are associated with small changes in cardiac function in older adults.<sup>30</sup> 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.<sup>31</sup>

## 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<sub>x</sub>), and volatile organic compounds (VOCs) are all major concerns, as well as ozone, which form from NO<sub>x</sub> 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.<sup>32</sup> 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.<sup>33</sup> 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.<sup>34</sup>

Social capital—the collective benefits conferred by social networks—decreases 10 percent for each additional 10 minutes spent commuting<sup>35</sup> and is lower for people who live on streets with high traffic volume.<sup>36</sup> 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.<sup>37</sup> 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.<sup>38</sup>

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.<sup>39</sup> 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.<sup>40</sup> 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.<sup>41</sup> 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.<sup>42</sup> 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 walking<sup>43</sup> and improves actual and perceived personal safety. Shorter distance to destinations has a strong correlation with increased walking and bicycling,<sup>44</sup> 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).<sup>45</sup> 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.<sup>46</sup>

*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.<sup>47</sup> 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.<sup>48</sup>

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.

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Appendix A. *Policies and Strategies for Healthy Transportation*

<b>Health Impact Assessment (HIA)</b>	
<b>Principles Addressed:</b>	<ul style="list-style-type: none"> <li>• Injury</li> <li>• Environmental Quality</li> <li>• Mode Share</li> </ul>
<b>Description:</b>	<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>
<b>References:</b>	<p><a href="http://www.cdc.gov/healthyplaces/hia.htm">http://www.cdc.gov/healthyplaces/hia.htm</a>  <a href="http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/handbook-guide/vol_4/table-tableau-3-eng.php#Table-3-1a">http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/handbook-guide/vol_4/table-tableau-3-eng.php#Table-3-1a</a></p>
<b>Scope:</b>	<ul style="list-style-type: none"> <li>• Local</li> <li>• State</li> <li>• Regional</li> <li>• Federal</li> </ul>

# Roadways and Health

## Context Sensitive Design

Principles Addressed: • Injury  
• Mode Share

Scope: • 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/](http://www.contextsensitivesolutions.org/content/topics/css_design/design-examples/)

## Complete Streets

Principles Addressed: • Injury  
• Environmental Quality  
• Mode Share

Scope: • 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: • Injury  
• Mode Share

Scope: • 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: • Environmental Quality  
• Mode Share

Scope: • 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/>





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- <sup>34</sup> Ibid.
- <sup>35</sup> Ibid.
- <sup>36</sup> Land use planning powers have not explicitly been taken by the federal government and so are left to states, according to the reserved powers doctrine of the U.S. Constitution; most states have chosen to delegate this power to local governments, with some variation in the degree to which states have chosen to exert influence over local planning.
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## Chapter 5: Roadways and Health: Making the Case for Collaboration

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