

TECHNICAL MEMORANDUM

Clackamas County TSP

White Paper #5.4 - DRAFT

Transportation and Public Health

Date: October 5, 2011 **Project #:** 11732.5

To: Karen Buehrig, Clackamas County

From: Steve White, Oregon Public Health Institute

cc: Larry Conrad, Clackamas County

The following summarizes the primary ways in which transportation systems impact public health. A companion white paper will provide an overview of recommended strategies for addressing these primary issues and maximizing a transportation system's ability to improve community health.

Overview

Existing transportation systems in the US have been shaped by multiple policy inputs and decisions provided by planners, funding agencies and others at local, state, and national levels that have focused largely on building a system designed to move people and goods efficiently. An increasingly large body of research now shows that transportation decisions also directly and indirectly impact human health in multiple ways by influencing a wide range of physical, social, and environmental factors. According to the American Public Health Association, “[f]ifty percent of the leading causes of death and illness in the United States—traffic injuries, heart disease, cancer, diabetes, and respiratory illness—are preventable” because “[t]hese diseases have several risk factors that can be mitigated by transportation policies.”ⁱ

Much of this research has also highlighted the fact that the benefits and burdens of transportation decisions has fallen unequally on different sub-groups within a community. In particular, the negative health impacts stemming from transportation systems (discussed in greater detail below)

have disproportionately fallen on low income and minority groups, as well as others who lack access to cars or the resources to choose where they live. As a result, many transportation decisions to date have often inadvertently supported or exacerbated health inequities. Health inequities are unfair and avoidable differences between socio-economic groups in the presence of disease, injury, or other health outcomes. For the public health sector, addressing equity means prioritizing the elimination of health inequities by addressing the root causes of inequity and related health outcomes.

As a result of the increasing awareness of the connections between transportation systems, health, and equity, more and more planners and policy-makers recognize transportation system plans as providing an opportunity not just to improve mobility, but also to improve the health and well-being of all the members of the communities they are designed to serve. An increasing number of state, regional, and local transportation plans are acknowledging these connections by including goals that mention both health and equity. Locally, this trend is evident in the inclusion of health and equity goals in Metro's Regional Transportation Plan and in the Draft Transportation Goals for Clackamas County. Other local jurisdictions, including the cities of Portland and Gresham, are working on including similar goals into their comprehensive plan and transportation system plan updates.

In order to help policy makers and planners develop a transportation system plan that matches these goals, this white paper provides a summary of the primary ways that researchers have identified transportation systems as impacting health and equity. A companion white paper will then provide an overview of possible strategies for addressing these issues in a transportation system plan.

Transportation Systems and Health

There are five primary ways in which transportation system plans can directly and indirectly improve health and equity. They can:

- Reduce crash-related injuries and fatalities for bicyclists and pedestrians, as well as for motor vehicles
- Increase opportunities physical activity
- Decrease exposure to air pollutants
- Improve access to a wide variety of health supportive resources such as healthy food retail, employment, affordable housing, and parks and recreation facilities
- Reduce health inequities

The remainder of this paper will look at each of these issues in turn, identifying the related health issues and summarizing why they are priority issues for the public health sector.

BICYCLE AND PEDESTRIAN INJURIES AND FATALITIES

Traffic injuries and fatalities, including those involving bicyclists and pedestrians as well as motor vehicles, are the leading cause of death for Americans ages 5-34, and are among the top ten causes of death for Americans of all ages. When measured in terms of years of life lost, crashes rank third, trailing only cancer and heart disease, and cost Americans \$99 billion annually in lost work and medical costs.ⁱⁱ

While crashes involving only motor vehicles remain a central concern, however, the public health profession, both locally and nationally, has recently been placing particular emphasis on addressing bicycle and pedestrian safety issues, and has been awarding grant funds to state and local health departments to work with transportation planners on strategies for making these modes safer and more attractive.

There are three main reasons that public health professionals are now particularly interested in addressing bicycle and pedestrian safety. First, recent research indicates that bicycling and walking have become less safe than driving. While the rate of motor vehicle crash fatalities not involving bicycles and pedestrians has dropped considerably over the past few decades—due to advances in right-of-way design, improved motor vehicle and transportation system technology, and changes in driver behavior—the rate of pedestrian and bicyclist fatalities has declined only about half as fast. Between 2000 and 2009, pedestrian fatalities decreased 14 percent compared to a 27 percent decrease for motor vehicle occupants.ⁱⁱⁱ Over a similar period, 1998-2009, bicyclist fatalities declined 17 percent. As a result of these lower reduction rates, bicyclists and pedestrians now account for a disproportionate share of traffic fatalities when measured on a per trip basis. Whereas pedestrians accounted for 10 percent of trips taken in 2009, they accounted for 12 percent of fatalities, and bicyclists accounted for about 1 percent of trips taken, but about 2 percent of traffic fatalities.^{iv} While there are many reasons for these differences, two reasons are that relatively few resources have been devoted to improving safety for bicycling and walking, and that transportation policies have not typically prioritized addressing safety issues for these two modes. The public health sector is interested in addressing this imbalance by calling attention to the public health benefits of safe walking and biking conditions.

Second, data on pedestrian crashes indicate that youth, seniors, low income and minority individuals suffer higher rates of injuries and deaths while walking, largely because these groups are less likely to

own cars and more likely to rely on walking to meet their daily transportation needs.^v As a result, pedestrian safety is an equity issue because the health of certain vulnerable populations is being adversely affected by the relative danger of walking.

Third, as will be discussed in more detail below, bicycling and walking are forms of physical activity, and most Americans currently get only a fraction of their recommended daily levels of physical activity, thus putting themselves at increased risk of numerous chronic diseases such as heart disease, diabetes, and stroke. Research has clearly demonstrated that communities with higher walking and biking rates are generally healthier than others. In order to encourage more people to walk and bike, public health professionals and their funders are focusing on removing barriers to walking and biking such as safety concerns.

OPPORTUNITIES FOR PHYSICAL ACTIVITY

In a recent study that ranked the leading preventable causes of death in the United States^{vi}, physical inactivity ranked 5th on the list, and was estimated to have been responsible for 191,000 premature deaths in 2005. A primary reason that physical inactivity has such a large impact is that fact it is a significant risk factor for numerous chronic diseases and other negative health outcomes. Our understanding of the relationships between physical activity and health has steadily improved since the early 1990s when researchers began expanding the focus of their work from assessing the impacts of intensive vigorous exercise to include a wider range of low or moderate intensity physical activities. In 1996, the US Surgeon General released its first report on physical activity and health which concluded that moderate physical activity—defined as activities that use large muscle groups and include walking and biking for transport—can substantially reduce the risk of developing or dying from coronary heart disease, colon cancer, high blood pressure, and diabetes.

Since the Surgeon General's report was issued, research has built on its conclusions and has also more conclusively demonstrated that for people who are inactive, even small increases in physical activity can yield numerous measurable health benefits. In addition, physical activity has been demonstrated to improve mental health, educational attainment, and, for people with joint or bone problems, improve muscle function, cardiovascular function, and physical performance. Finally, types of physical activity that bring people into contact with each other, including walking about one's neighborhood, have also been demonstrated to improve mental health and social cohesion. High levels of social cohesion can contribute to improved health outcomes by enabling the dissemination of health-related information such as care options, establishing, maintaining, and promoting social norms and practices associated with healthful behaviors.

EXPOSURE TO AIR TOXICS

Combustion engines produce many different types of outdoor air pollutants that are either known or strongly suspected to negatively impact human health in a wide variety of ways. In general, the adverse health effects of long-term exposure can include:

- Accelerated aging of the lungs and loss of lung capacity
- Decreased lung function
- Development of diseases such as asthma, bronchitis, emphysema and possibly cancer
- Shortened life span

These health issues have been known for quite a while. They served as the basis for the Federal Clean Air Act in 1970, and have helped spur advancements in fuel and engine technology that have effectively reduced the number and amount of toxics produced by combustion engines. However, the issue remains a primary area of concern for three main reasons. First, America's overall levels of vehicle use continue to increase, and are anticipated to eventually cancel out gains in pollution reduction achieved by current technological solutions. Second, increasingly sophisticated monitoring and modeling efforts are more clearly demonstrating the highly localized geographic dimensions of motor vehicle-related pollutant dispersion within cities and regions. While average ambient concentration levels of many pollutants have gone down in many such areas, neighborhoods close to high-traffic roadways often still greatly exceed health-based benchmarks. This increased awareness has helped shift the public health focus on transportation pollutants from lowering ambient concentrations of pollutants to lowering exposure levels to pollutants, an issue that has received relatively little attention within the context of transportation planning.

Finally, respiratory health data raises equity concerns because low income and minority groups are more susceptible to severe health problems from transportation-related air pollutants in part because they are more likely to suffer from pre-existing cardiac or respiratory problems such as heart disease, asthma, or emphysema, but also because these groups are often more likely to live near high-traffic roadways. These equity concerns, along with the challenge of addressing highly variable localized exposure levels, have kept exposure to traffic-related air pollutants a primary concern for the public health sector.

ACCESS TO HEALTH SUPPORTIVE RESOURCES

Good health requires access to resources such as healthy food retail, healthcare, employment, education, parks and recreation facilities, publicly accessible gathering spaces, and social services.

Research has shown that a person's ability to conveniently access each of these resources can influence their health:

- Access to **healthy food** has been linked with rates of obesity and type-2 diabetes.
- **Clinical healthcare** access has been linked with a wide variety of health outcomes, and has been identified as a primary driver of health disparities between different socio-economic groups in America.
- **Employment** is the primary source of income for most people, and income levels are correlated with a wide variety of health outcomes, in large part because it determines a person's ability to access health-supportive resources. In addition, lower income levels contribute to higher levels of psychological stress that undermines physical health. Frequent or continuous exposure to stress can result in adverse effects on cardiovascular and immune systems leading to heart disease, diabetes, high blood pressure, strokes, depression, infections, and premature death. The stress and lack of opportunity associated with lower income levels also lead to the increased likelihood of engaging in unhealthful behaviors such as smoking, crime, substance abuse, and physical abuse.
- **Education** impacts health primarily through its influence on a person's income levels. In addition, education can impact health by providing access to information and by allowing a person the opportunity to develop cognitive skills useful for identifying, avoiding and/or changing unhealthful or risky behaviors. Schools also offer opportunities for social engagement. Social engagement influences social cohesion which can contribute to improved health outcomes by enabling the dissemination of health-related information about healthcare options and healthful behaviors, and by reinforcing social norms and practices associated with healthful behaviors
- **Parks, trails, and recreation facilities** offer opportunities for physical activity and social engagement with attendant health benefits. Access to greenspace has also been correlated with mental health benefits.
- Publicly accessible **gathering spaces**, including public spaces such as libraries, parks, plazas, schools, and community centers, as well as private spaces such as restaurants and neighborhood retail establishments that facilitate chance encounters with other community members, can increase social engagement and social cohesion.
- **Social services** encompass a broad set of services which directly and indirectly address numerous physical and mental health issues. Such services include helping people cope

with issues stemming from aging, disability, substance abuse, domestic violence, social isolation, poverty, and mental illness. These services can be provided by both public and private sector organizations.

A person's ability to access such resources is influenced by a variety of factors including a resource's location and cost, as well as the transportation infrastructure and travel options that a person has access to. Numerous studies have demonstrated that, because of the auto-oriented nature of most transportation systems, people without access to cars often have more difficulty accessing health-supportive resources and suffer poorer health as a result. Where additional options such as transit, walking, and biking are present, safe, and convenient, people are more able and likely to access such resources and less likely to be in poor health. As with the other health issues discussed in this paper, the fact that low-income and minority households are less likely to own cars and less likely to live in areas with good transportation options, access to health-supportive resources raises equity concerns that have helped make it a public health priority.

REDUCE HEALTH INEQUITIES

As noted in the Overview, health inequities are unfair and avoidable differences between socio-economic groups in the presence of disease, injury, or other health outcomes. In Oregon, research shows that economically disadvantaged individuals have higher rates of most chronic diseases with risk factors related to transportation including, heart disease, diabetes, obesity, and high blood pressure. In addition, American Indians have elevated rates of asthma, heart disease, diabetes, obesity, and high blood pressure; African Americans have higher rates of diabetes, obesity, and high blood pressure; and Latinos have higher rates of obesity and diabetes. Also, members of all of these groups, except Latinos, are more likely than the general population to suffer heart attacks or strokes.^{vii,viii}

All of these health outcomes have multiple causes, many of which have been traced to components of the social and natural environments in which people live, work, and play. Different environments contain different health risks and produce different health outcomes. In general, groups that have traditionally lacked economic and political resources, particularly low-income and minority groups have ended up living and working in environments that increase their risk for poor health outcomes and help explain the disparities in the rates of chronic diseases among different socio-economic groups. As discussed above, transportation systems impact multiple risk factors for multiple health outcomes, and have, like other components of the social environment, tended to adversely impact the

health of disadvantaged populations. As a result, transportation systems have helped exacerbate health inequities, but also offer the promise of reducing these inequities.

Because of the enduring and unjust nature of these inequities and because transportation system plans can address many of the risk factors associated with these health outcomes, including those discussed above, the public health sector has placed increasing focus on eliminating the causes of these inequities, including working with transportation planners to develop systems that improve transportation options for disadvantaged populations and reduce these groups' exposure to transportation-related health hazards.

ⁱ American Public Health Association. (2009). *At The Intersection Of Public Health And Transportation*. Washington, DC: American Public Health Association.

ⁱⁱ US Centers for Disease Control and Prevention. (2011) "Ten great public health achievements—United States, 2001-2010", *Morbidity and Mortality Weekly Report*, 60(19); 619-623.

ⁱⁱⁱ Transportation for America. (2011). *Dangerous by Design, 2011: Solving the Epidemic of Preventable Pedestrian Deaths*. Washington, DC: Transportation for America

^{iv} Pedestrian and Bicycle Information Center. (2011) Bicycle and Pedestrian Crash and Safety Fact Sheets available at: <http://www.walkinginfo.org/facts/facts.cfm> and <http://www.bicyclinginfo.org/facts/crash-facts.cfm>. Accessed 9/2/11.

^v *Ibid.*

^{vi} Danaei, G. et al. (2009) "The preventable causes of death in the United States: comparative risk assessment of dietary, lifestyle, and metabolic risk factors," *PLoS Medicine*, 6(4).

^{vii} Ngo, D. and R. Lehman (2007). *Oregon Overweight, Obesity, Physical Activity, and Nutrition Facts*, Department of Human Services: Portland, OR.

^{viii} Ngo, D. and R. Lehman (2007). *Keeping Oregonians Healthy: Preventing Chronic Disease by Reducing Tobacco Use, Improving diet, and Promoting Physical Activity and Preventive Screenings*, Department of Human Services: Portland, OR.