

In 1999 King County initiated a study to inform land development and transportation investment decisions county-wide. This study identifies how our travel patterns, health, and overall quality of life are impacted by specific land use and transportation decisions within our communities.

KING COUNTY

LAND USE

TRANSPORTATION

AIR QUALITY

HEALTH

STUDY

(L U T A O H)

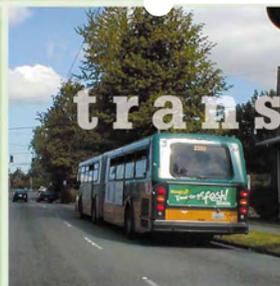


land use

achieving sustainability through healthy community design



public health



transportation

**Federal Transit
Administration**



King County

Contributing Agencies:

Puget Sound Regional Council

**Centers for Disease Control
and Prevention**

**Cities of Seattle, Kent
and Redmond**

The mission of this research is to establish and implement community design principles and transportation investment policies that improve accessibility, air quality and public health within King County and the central Puget Sound region.

why this study is needed



transportation

- Seattle ranks 4th in the nation in annual person hours of delay due to congestion and 3rd in the nation in the rate of increase in hours of delay (1982-2000) during which peak hours of delay increased from 20 to 82 per peak period roadway traveler (TTI, 2000).
- *Destination 2030* (PSRC's Plan) addresses congestion with extensive investments in all modes with significant funding for pedestrian and bike facilities, but financing is not yet secured (PSRC, 2003).



environment

- Puget Sound has amongst the highest levels of harmful air toxics in the nation. This is largely attributable to diesel exhaust from transportation (Puget Sound Clean Air Agency, 2003).
- Both lifetime and current rates of asthma prevalence are higher in Washington State than the national average. Lifetime: Washington-11.9%/U.S.-10.5%; Current: Washington-8.2%/U.S.-7.2% (U.S. Centers for Disease Control and Prevention, 2001).



public health

- Prevalence of obesity in King County more than doubled from 7% to 16% between 1987 and 2001 (Seattle and King County Public Health Data Watch).
- Obesity was responsible for roughly 15% of the 11,300 deaths in King County in 1998 for adults over 18 (Allison et al, 1999, JAMA).
- Deaths in King County from diabetes, a disease linked with obesity, increased by over 50% since the mid-1980s (Seattle-King County Public Health Data Watch).

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approach

This project examines the function and quality of the transportation investments that link our homes, places of employment, recreation, entertainment and other important destinations.

The distances between where we live, work, shop, eat and play, and the nature of the linkages between these activities (i.e. the quality of the walking environment, availability of transit service, and traffic congestion) impact our quality of life in a variety of ways. For example, the amount of time spent walking between these destinations translates into improved public health. Conversely, the amount and distance we drive exacerbates regional air pollution and greenhouse gas formation, and reduces the time we have available for our friends and families.

This research explores how different approaches to community design can improve our quality of life. We use three unique case studies—Kent East Hill, Redmond, and White Center—to apply the results of our research. The results of this work will support and inform the decisions that are made in these locations. Finally, the study will provide the needed tools to assess impacts to the quality of life resulting from other local and regional planning decisions.

activities & objectives

- **ASSESS** specific land use actions and transportation investment decisions to see how effective they are at reducing air pollution and greenhouse gas formation, and promoting physical activity and public health within King County.
- **APPLY** the findings from research to three case study areas within the County: Kent East Hill, Redmond, and White Center.
- **WORK** closely with stakeholders and community leaders to implement strategies within selected communities.
- **EVALUATE** the effectiveness of land use and transportation investment strategies at meeting the study's goals and objectives.
- **INFLUENCE** designs, plans, capital investments and services to create sustainable communities.

findings

transportation

- **82%** of trips in the region are for non-work purposes.
- **50%** of all trips are three miles or less and take less than fifteen minutes.

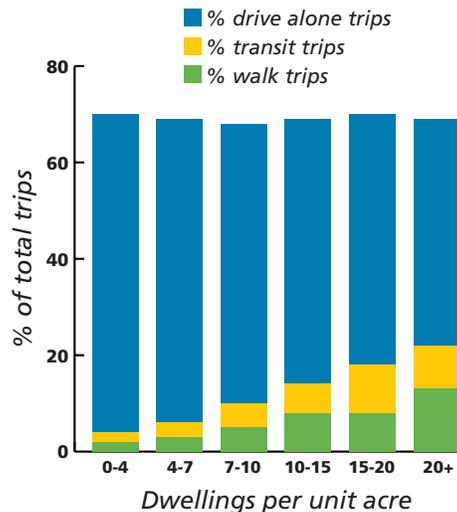
Potentially Walkable Trips

- **20%** of all trips are less than one mile in distance and five minutes in duration.
- **58%** of the trips less than one mile in distance are made in a car.

Vehicle Miles of Travel

- Vehicle miles of travel is highly related to the level of residential density. On a per capita basis, residents of the most compact areas of the region generate **28%** less miles of travel than their suburban counterparts.

Mixed Use



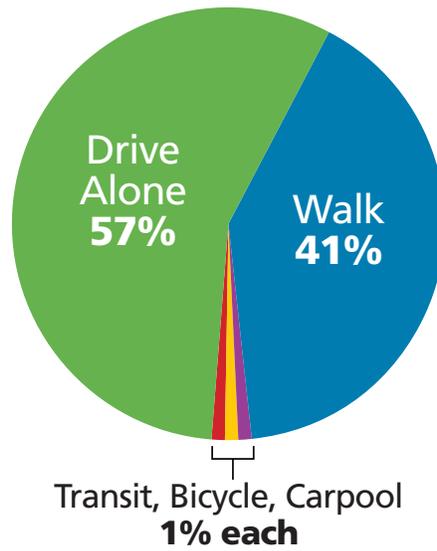
- Along with residential density, the number of neighborhood retail and entertainment establishments and the connectivity of the transportation network were significant predictors of household miles of travel when adjusted for income and household size.

Transit, Driving & Walking

- Vehicle trips decline while transit and pedestrian trips increase as density increases up to around 20 dwelling units per acre. Additional increases in density may yield little change in travel choice.

Travel data provided by Puget Sound Regional Council

Travel Modes For Short Trips (One Mile Or Less)

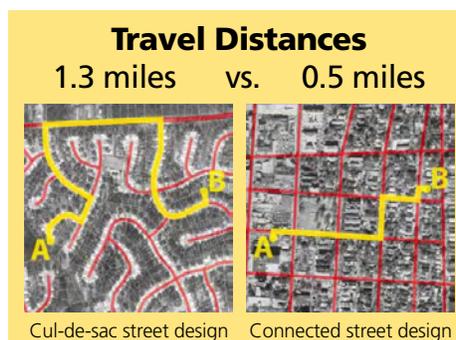


- **Transit usage** increases with the square footage of retail, civic, entertainment, office space and residential density.
- More than half of the transit riders surveyed earned more than 45K per year.
- Improvements in transit service will be most effective in corridors that have a combination of retail and entertainment uses, more than 40 intersections per square kilometer, and an average density above 10 dwellings per acre.
- **Walking** increases as the numbers of retail and entertainment uses increase at the *place of residence and employment*.

* Both of these are the results of analyses that adjusted for demographic factors (income, age, educational attainment, and household size).

Street Layout

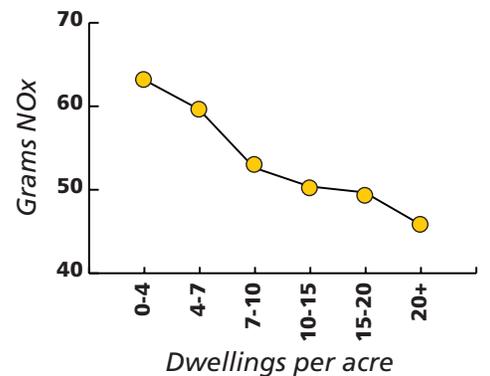
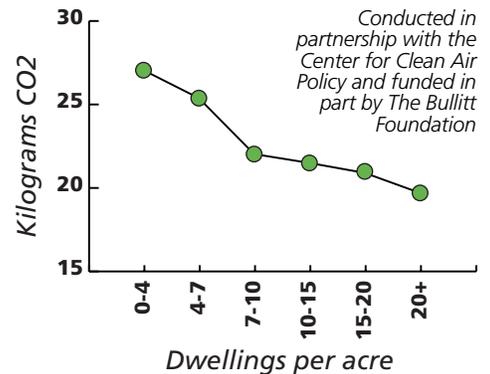
- Street layout is an important predictor of travel behavior. Travel distance can be far lower within a connected street network, enabling walking.



environment

- Residential density is also a good surrogate for understanding how the built environment relates with Greenhouse gas and regional air pollution. As shown below, CO₂ and NO_x (ozone precursor) decline steadily as density increases. (Assistance provided by GeoStats, LLP).

* Regression analysis adjusted for household size and income revealed that CO₂ and NO_x decline significantly as street connectivity, number of neighborhood retail establishments, and residential density increase.

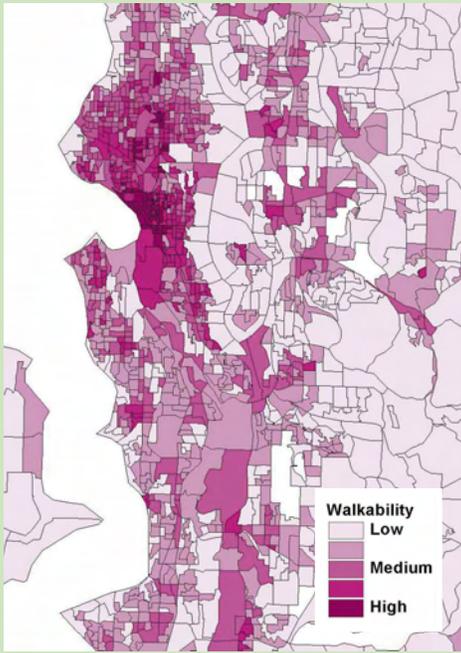


public health

- People are more likely to walk and be more physically active in areas with increased density, land use mix, and street connectivity (Frank et al, *Health and Community Design*, Island Press, 2003).
- Additional research was conducted on elderly residents who are members of Group Health Coop. Physical activity increased with residential density, street connectivity, increased open space, and increased retail and entertainment uses (Frank & Schmid, 2003).

This project is being conducted in partnership with the NIH funded (NQLS) Neighborhood Quality of Life Study (www.nqls.org) being led by Dr. Jim Sallis, San Diego State University.

applying the results



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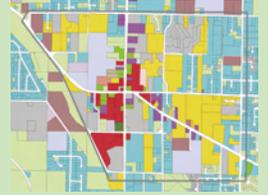


Regional Application

To support improved transportation and public health in the region, this project creates a system of measures to assess where land use is most supportive of transit service and pedestrian infrastructure. Guidance will be provided to state, regional and local agencies over the types of land use and transportation actions that reduce auto dependence and promote walking and transit. Recommendations for street network design, neighborhood commercial and compactness of development will be provided.

Case Study Application

Specific guidance is being developed as part of this study for three areas of the region. In Kent, White Center, and Redmond, place-specific strategies will be proposed based on current planning activities and research results. Statistical models developed in this effort will be applied to these areas to determine which types of actions would promote active mobility through walking and biking and reduce auto dependence and environmental degradation. A survey is being conducted in each community to determine the types of improvements most desired.



Kent Hill East



Redmond



White Center

King County
Land Use - Transportation -
Air Quality - Health Study

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sustainability
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