Public Health Benefits of Public and Active Transportation

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Public Health Benefits of Public and Active Transportation

- Health pulse check
- Transportation related health indicators
- Selected examples of built environment and health research
- Selected health policies encouraging health promoting transportation infrastructure

10 Leading Causes of Deaths, Tennessee

2005 - 2010, All Races, Both Sexes
Ages: All Ages

Cause of Death	Number of Deaths	Percentage of All Deaths in Age Group
All Deaths	347,871	100.0%
Heart Disease	87,368	25.1%
Malignant Neoplasms	79,444	22.8%
Cerebrovascular	20,233	5.8%
Chronic Low. Respiratory Disease	19,931	5.7%
Unintentional Injury	**19,731**	5.7%
Alzheimer's Disease	13,490	3.9%
Diabetes Mellitus	10,438	3.0%
Influenza & Pneumonia	8,727	2.5%
Suicide	**5,437**	1.6%
Nephritis	5,158	1.5%
All Others	77,914	22.4%

WISQUARS
National Center for Health Statistics (NCHS), National Vital Statistics System

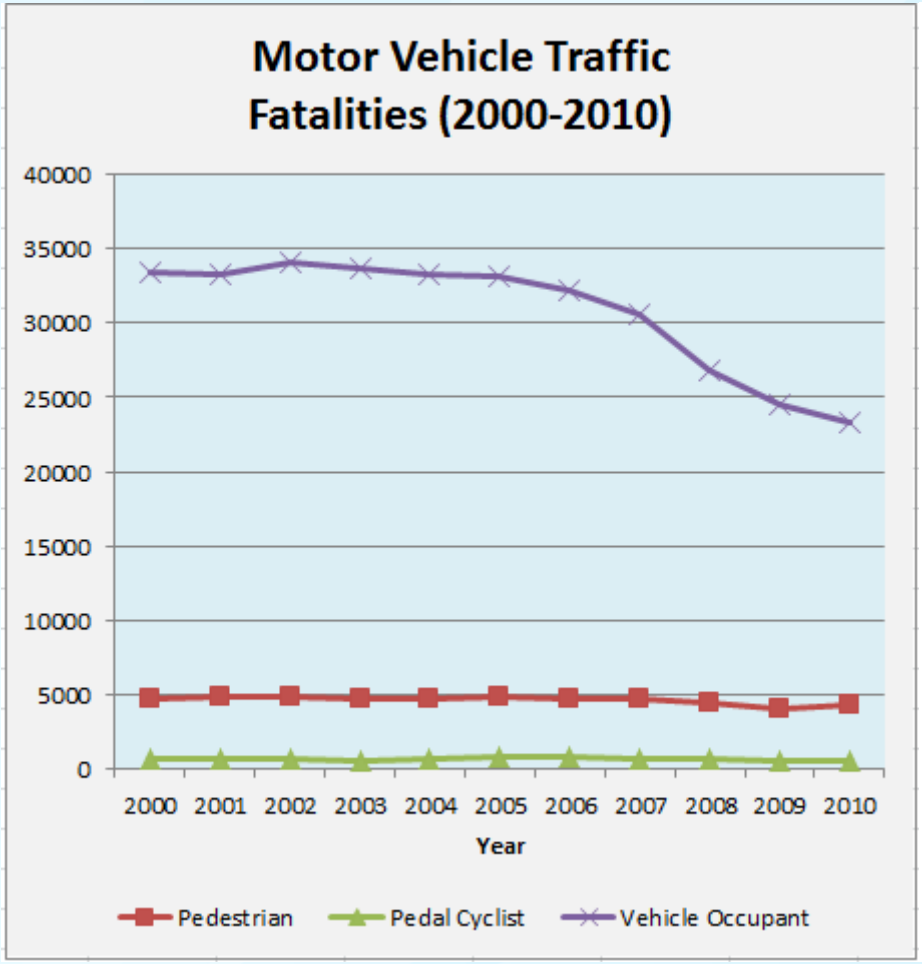
Injury / Fatality Burden

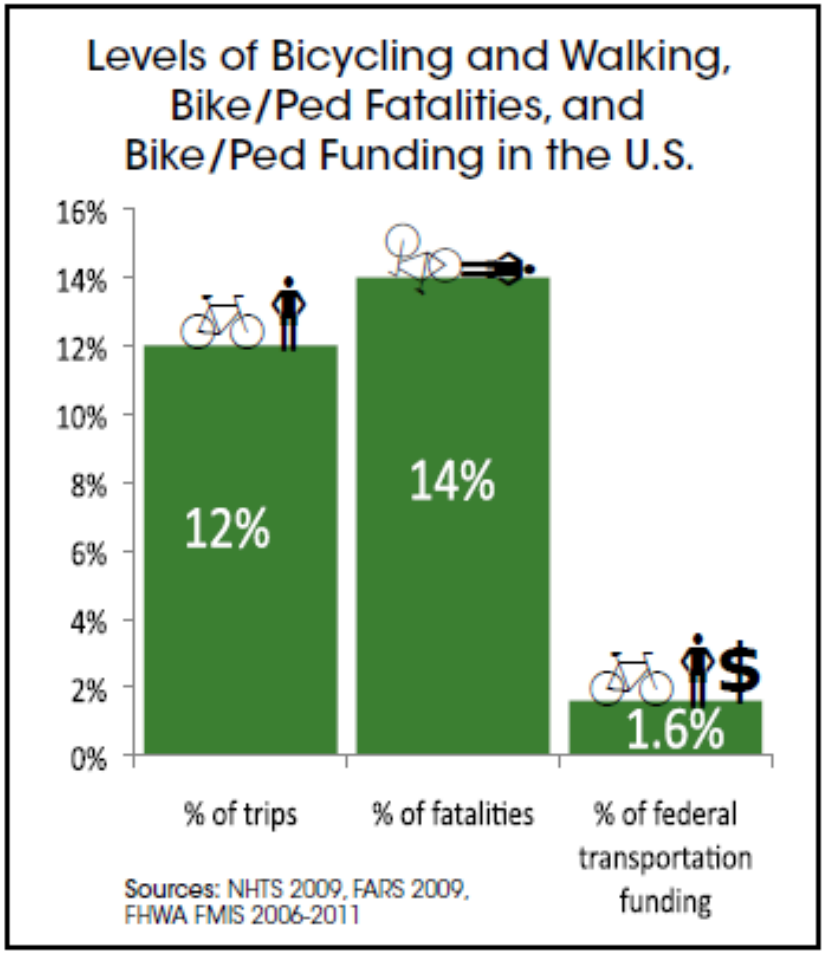
Photo Credit: http://www.texastownship.org/fire/Responses.aspx?ID=81

- **Motor Vehicle Injuries & Fatalities**
  - 32,885 deaths total (2010)[1]
    - 4,280 pedestrians
    - 618 pedal cyclists
  - 2.3 million non-fatal injuries (2008)[2]
  - $299.5 billion in 2009 – total costs in urban areas (2011)[3]
  - Leading cause of death for ages 5– 34 in the country[4]

1. National Highway Traffic Safety Administration. 2010. "National Statistics, FARS Data Tables – Summary, General" Fatality Analysis Resource System (FARS) Encyclopedia http://www-fars.nhtsa.dot.gov/Main/index.aspx
2. National Highway Traffic Safety Administration. 2008. "Traffic Safety Facts 2008" US Department of Transportation. http://www-nrd.nhtsa.dot.gov/Pubs/811170.pdf
3. AAA. 2008. "Crashes vs. Congestion? What's the Cost to Society?" Cambridge, MD: Cambridge Systematics, Inc. http://www.motran.org/2011_AAA_CrashvCongUpd.pdf
4. CDC, National Center for Injury Prevention and Control. 2012. "Injuries and Violence are Leading Causes of Death: Key Data & Statistics" http://www.cdc.gov/injury/overview/data.html

Fatality Burden





1. National Highway Traffic Safety Administration. 2010. "National Statistics, FARS Data Tables – Summary, General" Fatality Analysis Resource System (FARS) Encyclopedia http://www-fars.nhtsa.dot.gov/Main/index.aspx
2. Alliance for Walking. "2012 Benchmarking Report." www.PeoplePoweredMovement.org/Benchmarking

Chronic Disease Burden

- **Physical inactivity, a major risk factor of chronic diseases such as[1]**
  - Obesity, heart disease, diabetes & stroke
- **Chronic diseases are[2]**
  - among the most common, costly, and preventable of all health problems in the U.S.
  - the leading cause of death in the US
- **Relying on motor vehicles, and less on active transportation, has a significant impact on the chronic diseases**
  - Research shows that each hour spent in a **car** per day was associated with a 6% increase in obesity. [3]

Currently in the US…

- 1 in every 3 adults is obese and almost 1 in 5 youth between the ages of 6 and 19 is obese. [2]
- More than one-third of all adults do not meet recommendations for aerobic physical activity based on the 2008 Physical Activity Guidelines for Americans (2008) [2]
- Healthcare costs were $142 billion for the obese and overweight in 2008.[4]

1. CDC, National Center for Environmental Health. 2011. "Healthy Places - Transportation Health Impact Assessment Toolkit." http://www.cdc.gov/healthyplaces/transportation/promote_strategy.htm
2. CDC, National Center for Chronic Disease Prevention and Health Promotion. 2012. "Chronic Diseases and Health Promotion." http://www.cdc.gov/chronicdisease/overview/index.htm
3. CDC, National Center for Environmental Health, Environmental Health Tracking Branch. 2012. "Types of Transportation to Work" http://ephtracking.cdc.gov/showCommunityDesignAddLinkTypesOfTransportationToWork.action#exposure
4. CDC, Division of Nutrition, Physical Activity and Obesity, National Center for Chronic Disease Prevention and Health Promotion. 2012. "Causes and Consequences." http://www.cdc.gov/obesity/adult/causes/index.html

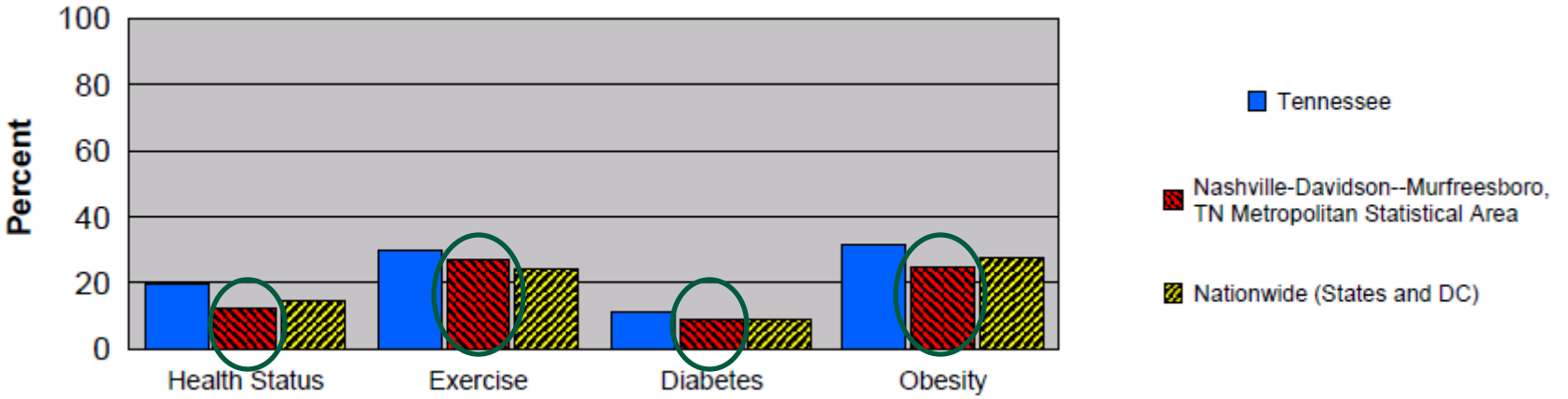
Comparing TN Metro Areas to TN and US, 2010

SMART BRFSS

(Selected Metropolitan/Micropolitan Area* Risk Trends from the Behavioral Risk Factor Surveillance System)

Nashville-Davidson--Murfreesboro, TN Metropolitan Statistical Area

Percentage of Adults Reporting Selected Health Risks - Nashville-Davidson--Murfreesboro, TN Metropolitan Statistical Area, BRFSS 2010.



Survey Definitions

Health Status - Percentage of adults reporting general health as fair or poor
Exercise - Percentage of adults reporting doing no leisure time exercise or physical activity in the past 30 days
Diabetes - Percentage of adults told by doctor they have diabetes
Obesity - Percentage of adults reporting Body Mass Index greater than or equal to 30.0

Obtained from SMART: BRFSS City and County Data http://apps.nccd.cdc.gov/brfss-smart/SelQuickViewChart.asp

Respiratory Health Burden

- **Motor vehicles contribute to more than 50% of air pollution in urban areas.[1]**
  - Elevated exposure to ground-level ozone, PM2.5, and aeroallergens is linked to decreased lung function, aggravation of asthma, rhinitis, exacerbations of chronic obstructive pulmonary disease, hospitalizations for respiratory and cardiovascular diseases, and premature mortality.[2]
- **Asthma**
  - Outdoor air pollution is a known trigger of asthma attacks.[3]
- **Cardiovascular Illness**
  - Coarse thoracic PM is associated with increased risk of ED visits and hospitalizations for cardiovascular outcomes, especially among adults over 65 years of age.[2]

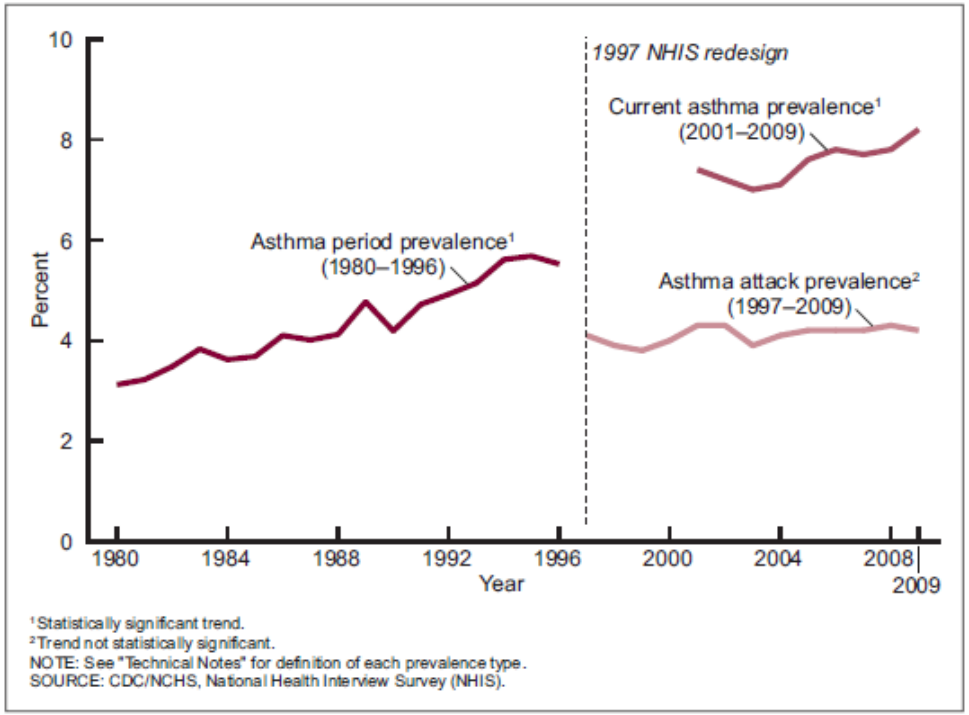


Figure 1. Asthma period prevalence, asthma attack prevalence, and current asthma prevalence for all ages: United States, 1980-2009[2]

- **Allergies**
  - PM2.5 and ozone may alter the allergenicity of aeroallergens like pollen, thereby promoting further airway sensitization.[2]

1. CDC, National Center for Environmental Health. 2009. "Respiratory Health and Air Pollution." http://www.cdc.gov/healthyplaces/healthtopics/airpollution.htm
2. CDC, National Center for Environmental Health. 2010. "Asthma, Respiratory Allergies, and Airway Diseases." http://www.cdc.gov/climateandhealth/effects/airway_diseases.htm
3. CDC, National Center for Environmental Health. 2012. "Common Asthma Triggers." http://www.cdc.gov/asthma/triggers.html

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✖ Sedentary Lifestyle
▲ Air pollution
Crashes

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CDC ATSDR

Selected Research on the Built Environment and Health

- Diabetes and walkable Environments in Canada
- Transit and Physical Activity in the U.S.
- Transit and body Fat in Charlotte, NC
- Cycling infrastructure preference and injuries
- Active living environments Portland OR
- Cycling to work in Australia
- Longitudinal data on crashes in NYC and Portland, OR
- Benefit/Cost Analyses of Transit and Active Living Infrastructure in Portland, OR

Unwalkable Neighborhoods, Poverty, and the Risk of Diabetes Among Recent Immigrants to Canada Compared With Long-Term Residents

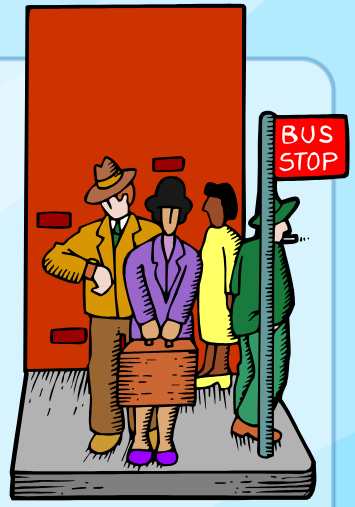
Booth et al. 2012

- **Are residents in less walkable neighborhoods more likely to develop diabetes?**
- **Are recent immigrants particularly susceptible, given genetic predisposition and diet?**
- Retrospective cohort study: **recent immigrants (n =214,882) vs. long-term residents (n = 1,024,380). Adults aged 30–64 years who were free of diabetes and living in Toronto, Canada, in 2005. Followed for the development of diabetes 2005-2010**
- Summary: http://care.diabetesjournals.org/content/early/2012/08/24/dc12-0777.abstract

- **RESULTS:**
  "Neighborhood walkability was a strong predictor of diabetes incidence *independent of age and area income,* particularly among recent immigrants."
  - **Coexisting poverty accentuated these effects; diabetes incidence varied threefold between recent immigrants living in low-income/low walkability areas (16.2 per 1,000) and those living in high-income/high walkability areas (5.1 per 1,000)."**

Gillian L Booth et al. 2012. "Unwalkable Neighborhoods, Poverty and the Risk of Diabetes Among Recent Immigrants to Canada Compared With Long-Term Residents." Diabetes Care. http://care.diabetesjournals.org/content/early/2012/08/24/dc12-0777.full.pdf+html

Walking to Public Transit
Steps to Help Meet Physical Activity Recommendations
Besser et al. 2005



What effect does using transit have on physical activity?

First study of transit-related physical activity.

- Data from 3312 transit users nationwide from the 2001 National Household Travel Survey, by DOT. Descriptive, bivariate and multivariate statistics

- **RESULTS:**
  - **Transit users walked 19 minutes daily**
  - **One third of transit users met Surgeon General's recommendation of thirty minutes of daily physical activity**
  - Rail users, minorities, people in lower income households, and those in high-density urban areas were more likely to spend 30 or more min. walking to and from transit daily.

Lilah M Besser et al. 2005. "Walking to Public Transit: Steps to help meet physical activity recommendations." American Journal of Preventive Medicine. http://www.sciencedirect.com/science?_ob=MImg&_imagekey=B6VHT-4HC72VR-4-3&_cdi=6075&_user=856389&_pii=S0749379705002552&_orig=search&_coverDate=11%2F30%2F2005&_sk=999709995&view=c&wchp=dGLzVlb-zSkzS&md5=c6f14c9041ddcf70020868481540ba71&ie=/sdarticle.pdf

The Effect of Light Rail Transit on Body Mass Index and Physical Activity

MacDonald et al. 2010

- **Examined effect of introducing new light rail transit on (LRT) on BMI, obesity, and weekly RPA levels**
- Cross-sectional association between objective and perceived measures of the built environment, BMI, obesity, and meeting weekly physical activity

Results

- **Use of LRT to commute to work associated with**
  - **LRT users lost an average of 6 pounds**
  - **81% reduced odds of becoming obese over time**
- Positive perception of one's neighborhood at baseline associated with
  - -.36 lower BMI
  - 15% lower odds of obesity,
  - 9% higher odds of meeting RPA levels of walking
  - 11% higher odds of meeting RPA levels of vigorous exercise.

MacDonald et al. 2010. The Effect of Light Rail Transit on Body Mass Index and Physical Activity. American Journal of Preventive Medicine. Vol 39, No. 2

Photo credit: Charlotte Area Transit System http://charmeck.org/city/charlotte/cats/planning/ble/Pages/default.aspx

Built environment, adiposity, and physical activity in adults aged 50-75: Portland OR

Li et al. 2008

- **Neighborhoods with high land use mix, street connectivity, density of public transit stations, and green spaces were associated with more walking** (e.g. meeting physical activity recommendations.)

Inverse associations between cycling to work, public transport, and overweight and obesity: Population based study in Australia

Wen and Rissel 2008

Males who cycled to work and those who used public transportation were significantly less likely to be overweight than those who drove

Fuzhong Li et al. 2008. American Journal of Preventive Medicine. Vol. 35. No. 1.
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2459142/

Li Ming Wen and Chris Rissel. 2008. Preventive Medicine. Vol. 46, No.1
http://www.sciencedirect.com/science/article/pii/S0091743507003714#

CDC ATSDR

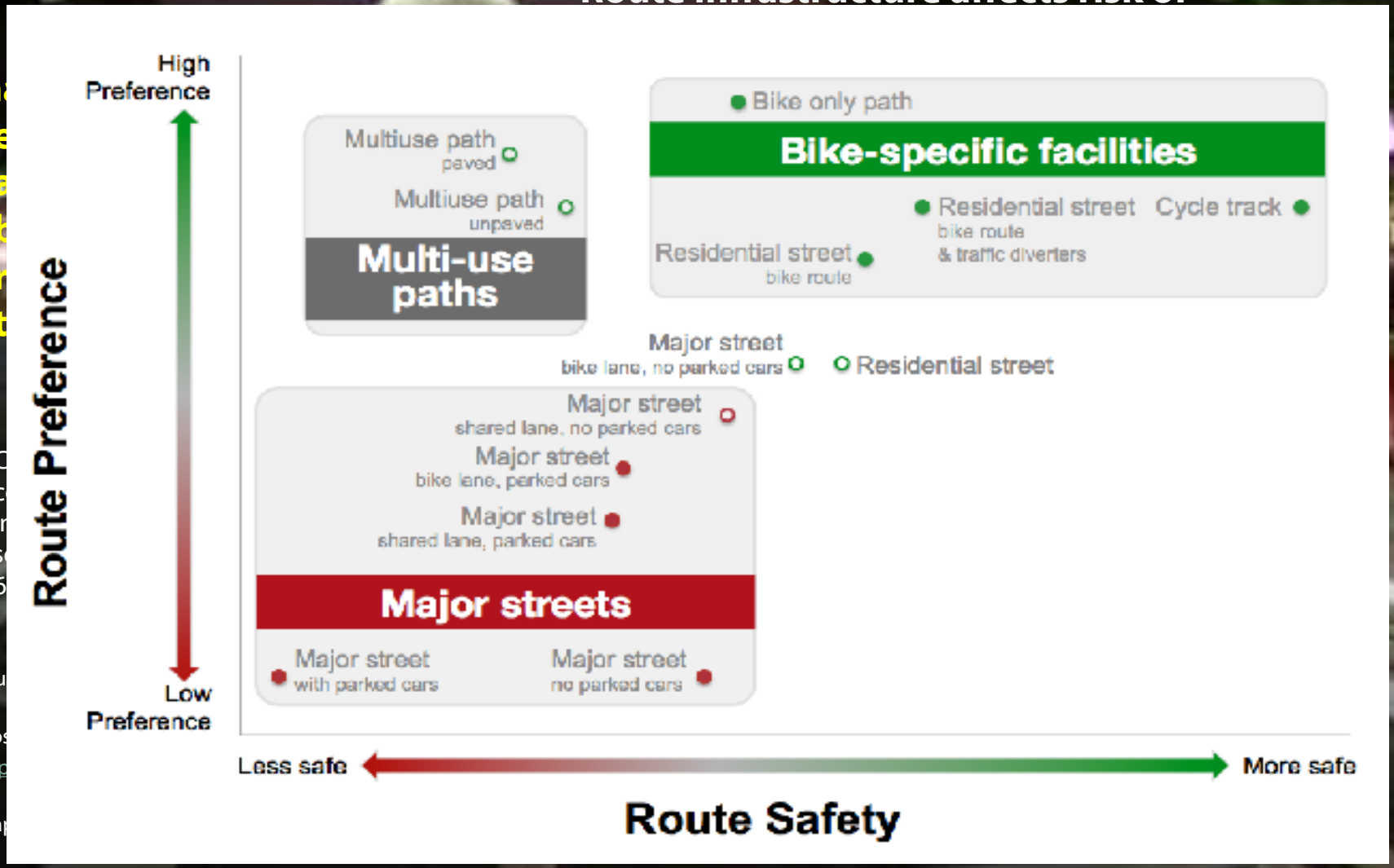
Route Infrastructure and the Risk of Injuries to Bicyclists: A Case-Crossover Study

Teschke et al. 2012

Route preference vs route safety of 13 route types: route safety data from the injury study in the cities of Vancouver and Toronto, Canada, 2008–2009.

Results

- Route infrastructure affects risk of



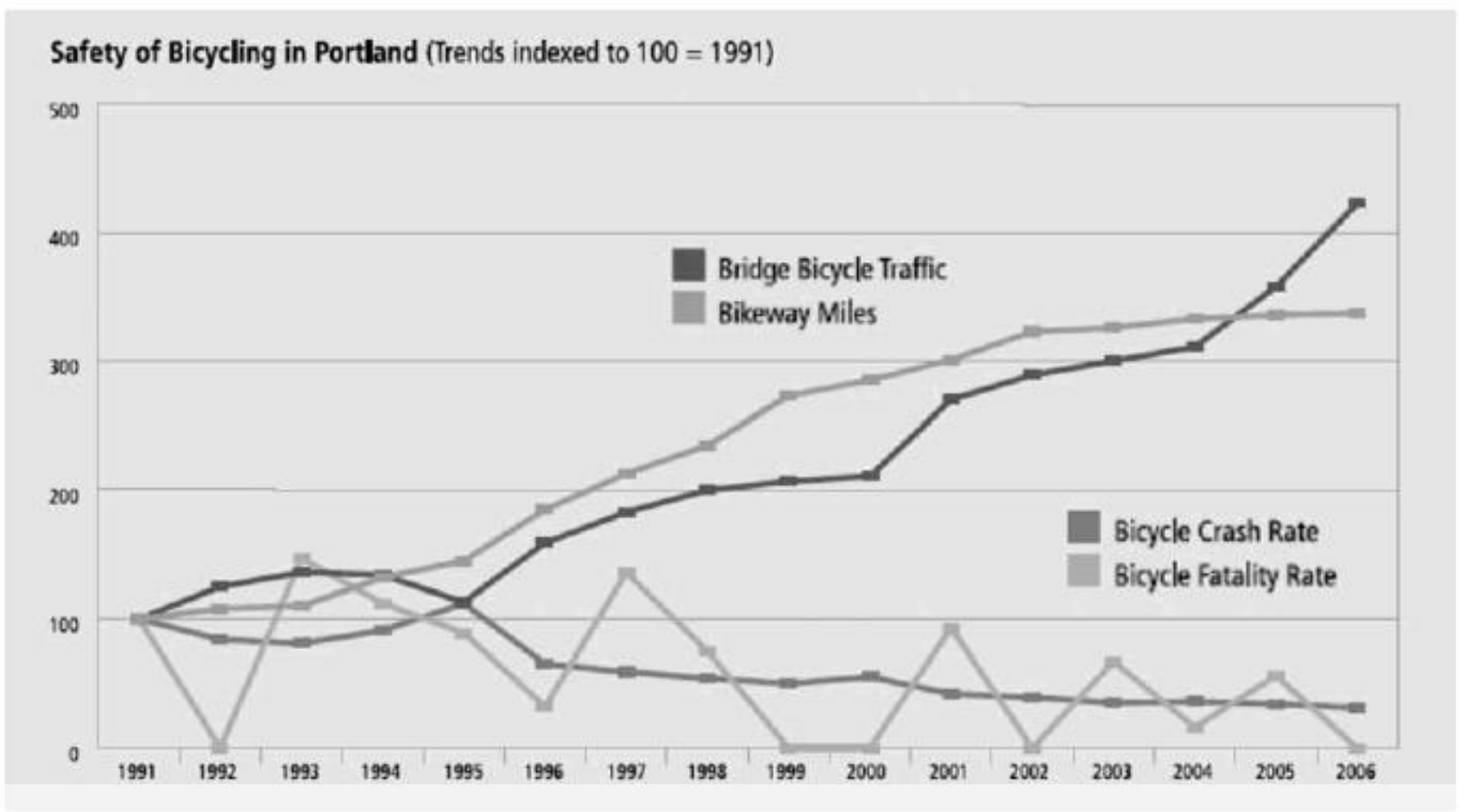
Increasing bike traffic, decreasing fatalities for all modes

- From 2005 to 2009, Pedestrians accounted for 52% of traffic fatalities
- Driver inattention was cited in nearly 36% of crashes that killed or severely injured pedestrians.
- Serious pedestrian crashes involving unsafe speeds are 2x as deadly as other crashes
- Between 2006-2009 NYC DOT added 200 miles of new bike lanes
- Pedestrian crashes on streets with bike lanes were approx. 40% less deadly than those crashes that occurred on streets without bike lanes.
  - Other effects included: traffic calming, lower speeds, increased driver attention
- **2009 – Safest year on record in NYC history**

New York City Department of Transportation. 2010. "The New York City Pedestrian Safety Study & Action Plan."
http://www.nyc.gov/html/dot/downloads/pdf/nyc_ped_safety_study_action_plan.pdf

Increasing bike traffic, decreasing bike crashes and fatalities

Relative changes in bicycle traffic, bikeway miles, reported crashes, and cyclist fatalities in Portland from 1991 to 2006.



Thomas Gotschi. 2011 "Costs and Benefits of Bicycling Investments in Portland, Oregon." *Journal of Physical Activity and Health,* 8:Suppl 1, S49-S58

If you build it they will…

Policy example	Incentive for active transportation
Block size limits increasing connectivity	Convenience – shorter distance to destinations
Key community destinations located close to population	Walking/bicycling for a purpose
Incentivize development of dense, highly mixed land use	Convenience due to increased connectivity
Investing in complete streets	Safety for all road users
Safe Routes to School program	Increased physical activity among children Safety for all road users
Provision of signs, maps, landscape cues for easy wayfinding	Increased ease and convenience of active transportation options
Bicycle boulevards parallel to streets	Reduced speeds Safety and security

Physical activity lowers risk of early death, heart disease, stroke, Type 2 diabetes, high blood pressure, adverse blood lipid profile, metabolic syndrome, and some cancers. Among older adults it prevent falls and reduces depression.

Partnership for Prevention, Safe Transportation Research Center, Booz Allen Hamilton, and CDC. 2011. "Transportation and Health: Policy Interventions for Safer, Healthier People and Communities." http://www.prevent.org/Additional-Pages/Transportation-and-Health.aspx

Cost/Benefit of Investing in Transit and Active Living in Portland OR

- By 2040, investments in the range of $138 to $605 million will result in
  - health care cost savings of $388 to $594 million
  - fuel savings of $143 to $218 million

- The benefit-cost ratios for health care and fuel savings are between 3.8 and 1.2 to 1, and an order of magnitude larger when value of statistical lives is used.

Thomas Gotschi. 2011 "Costs and Benefits of Bicycling Investments in Portland, Oregon." *Journal of Physical Activity and Health,* 8:Suppl 1, S49-S58

Policy Statements on Health and Transportation

- CDC Recommendations for Improving Health through Transportation Policy
- American Academy of Pediatrics
- American Public Health Association
- American Heart Association
- National Prevention Strategy
- Institute of Medicine

CDC Transportation and Health Policy Recommendations

1. Reduce injuries associated with motor vehicle crashes
2. Improve air quality
3. Expand public transportation
4. Promote active transportation
5. Encourage healthy community design
6. Design to minimize adverse health and safety consequences
7. Require research and surveillance
8. Support professional development and job creation

CDC, National Center for Environmental Health. 2012.. "CDC Transportation Recommendations." http://www.cdc.gov/transportation/

National Prevention Strategy

- One of four Strategic Directions: **Healthy and Safe Environments**

Recommendations:

1. Improve **quality of air**, land, and water.

4. **Integrate health criteria** into decision making, where appropriate, **across multiple sectors**.

5. Enhance **cross-sector collaboration in community planning and design to promote health and safety**.

Actions:

Coordinate investments in **transportation**, housing, environmental protection, and **community infrastructure to promote sustainable and healthy communities**. (NPS, 2011)

National Prevention Council. 2012. "National Prevention Council Action Plan."
http://www.healthcare.gov/prevention/nphpphc/2012-npc-action-plan.pdf

Institute of Medicine: Accelerating Progress in Obesity Prevention: Solving the Weight of the Nation (IOM, 2012)

- **Goal 1: Make physical activity an integral and routine part of life.**
- **Recommendation 1: Communities, transportation officials, community planners, health professionals, and governments should make promotion of physical activity a priority by substantially increasing access to places and opportunities for such activity.**
- **Strategy 1-1: Enhance the physical and built environment. Communities, organizations, community planners, and public health professionals should encourage physical activity by enhancing the physical and built environment, rethinking community design, and ensuring access to places for such activity.**

Dan Glickman, Lynn Parker, Leslie J. Sim, Heather Del Valle Cook, and Emily Ann Miller, ed. 2012. "Accelerating Progress in Obesity Prevention-Solving the Weight of the Nation." Institute of Medicine. http://www.nap.edu/openbook.php?record_id=13275&page=R1

Thank You

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