

Walking, Biking, Electric Driving:

What are the Health Benefits of Sustainable Transportation Alternatives?

Neil Maizlish, PhD, MPH, Epidemiologist California Department of Public Health Center for Chronic Disease Prevention and Health Promotion

Presented at the Healthy Communities Forum, San Mateo

April 4, 2012





Climate Change and Public Health

- Climate change no. 1 public health threat in 21st Century
- California 12th largest greenhouse gas emitter in world
- Transportation is the largest source of GHGs in California 38% of total (179 MMT CO₂E in 2003)
 - Personal passenger vehicles account for 30% (79% of 38%)
- How can we reduce GHG emissions in transportation?
 - Increase efficiency of vehicles and fuels
 - Reduce vehicle miles traveled (less trips, mode switching (SOV to mass transport), walking/bicycling (active transport)











Smart Strategies Solve Multiple Problems

- Strategies to reduce GHG emissions impact health
 - Do the strategies generate health co-benefits?





Chronic Disease/ Obesity Epidemic



- Do the strategies generate harms?
- What strategies yield significant health co-benefits?
- How do we measure this?



Groundbreaking Health Co-Benefits Research

- 2009 London Study: estimated the health impacts of alternative strategies for reducing carbon dioxide emissions from transport.
 - Lower carbon driving
 - Lower carbon emission motor vehicles/fuels
 - Increased active travel
 - Replacing urban car and motorcycle trips with walking or bicycling



```
Dr. James Woodcock
```

- Shift from 10 to 30 minutes/day of walking and bicycling:
 - 19% Cardiovascular Disease
 - ↓15% Diabetes
 - 13% Breast Cancer
 - ✤ 8% Dementia
 - ✤ 38% CO₂ Emissions



* Woodcock J, Edwards P, Tonne C, Armstrong BG, Ashiru O, Banister D, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: urban land transport. The Lancet 2009;374:1930-1943.

_

Can the London Active Transport Model Be Adapted for Regional Transportation Plans in California?

California Department of Public Health

- Partner with MTC (regional MPO) and BAAQMD to apply the London model (aka ITHIM) to the Bay Area
 - Test the feasibility
 - Develop a tool kit and technical resources to assist other MPOs apply the model to their geographic area







The Model Integrates Bay Area Data on Health and Travel



Active Transport and Low Carbon Driving Scenarios

1. Bay Area Benchmarks



Scenario: All Bay Area cities achieve by 2035 the walking and biking levels of the 2009 Bay Area leaders (SF, Oakland, Palo Alto, Berkeley, Mtn. View, Rohnert Park, Morgan Hill)





- 60% of car trips were < 5 mi
- Scenario: 1/2 of trips <1.5 miles walked and 1/2 of trips 1.5 to 5 miles bicycled

3. Attaining Carbon and Physical Activity Goals



 Back cast the amount of active transport time and distance to reduce car VMT and increase active transport to optimum levels (no more than average commute time to work ~25 minutes); land use and infrastructure exit to support changes

Low Carbon Driving



Fuel efficiency increases, low carbon fuels and low/no emissions cars and light trucks become more widespread, but there are no changes in physical activity or driving patterns



Daily Active Travel Times and Distances for a Typical Resident



BAU = Business-as-Usual



Summary of Bay Area Scenarios: Active Transport and Low Carbon Driving

Active Transport Scenarios



- 2-3 fold increase in walking (2.6%-4.3% of distance mode share)
- 4-16 fold increase in bicycling (2.9%-10.7% of distance mode share)
- Carbon reduction goal has 15% of distance mode share from active transport
- 4%-15% decrease in car VMT

Low Carbon Driving



- Penetration of gas-electric hybrid vehicles and light duty diesels, increased biofuels usage and the penetration of electric vehicles (Pavley I&II)
 - BAU/incremental changes 16.5% decrease
 - Electrification and biofuels (9%-33.5% decrease)



Health Impacts of Active Transport Scenarios

	Change in disease burden	Change in premature deaths
Cardiovascular Dis.	6-15%	724-1895*
Diabetes	6-15%	73-189
Depression	2-6%	<2
Dementia	3-10%	63-218
Breast cancer	2-5%	15-48
Colon Cancer	2-6%	17-53
Road traffic crashes	10-19%	60-113

* Range reflects range of physical activity in scenarios



Annual Health Benefits of Active Transport and Low Carbon Driving in the Bay Area: Predictions from the ITHIM Model



Annual Aggregate Reductions in Passenger Vehicle Greenhouse Gas Emissions from Different Transport Scenarios



- # Based on car VMT*BASSTEGG emission factor
- * Per capita reduction of 26%
- † Adjusted for double counting of mode choice

BAU, Business-as-Usual; LCD, Low Carbon Driving; TD, Top Decile of Cities; AT_{C.} Active Transport Carbon Goal



Summary of Findings

A shift in active transport from a median of 4.5 to 22 minutes/day (2% to 15% mode share):

- Disease reductions
 - $\mathbf{\Psi}$ 14% of heart disease, stroke, and diabetes
 - ♦ 6-7% of dementia and depression
 - ↓5% of breast and colon cancer
- Major public health impact
 - Adds about 9.5 months of life expectancy
 - >\$2 billion annual Bay Area health cost savings







Summary of Findings

- Injuries
 - ↑ 19% of injuries to pedestrian and bicyclists
- Physical activity accounts for almost all the health benefits; air pollution < 1%
- ~15% reductions in CO₂ emissions
- Low carbon driving is not as important as physical activity for generating health co-benefits
- ★ Together, low carbon driving and active transport can achieve California's carbon reduction goals and optimize the health of the population

+







Acknowledgments

- The Team
 - Linda Rudolph, CDPH (conceived the project), Sacramento
 - Neil Maizlish, CDPH, Richmond
 - James Woodcock, UKCRC Centre for Diet and Activity Research (CEDAR), UK
 - Sean Co, Metropolitan Transportation Commission, Oakland
 - Bart Ostro, Centre for Research in Environmental Epidemiology (CREAL), Spain
 - Amir Fanai and David Fairley, Bay Area Air Quality Management District, San Francisco
- Other Contributors
 - Caroline Rodier, Urban Land Use & Transportation Program, UC Davis
 - Dr. Phil Edwards and Dr. Zaid Chalabi, London School of Hygiene and Tropical Medicine
 - Colin Mathers, World Health Organization, Geneva
 - Other staff from MTC, UCD, CDPH, Mike Zdeb (University at Albany, NY)
- Partial funding and grant support
 - The California Endowment, Oakland
 - Kaiser Permanente Northern California Community Benefits Programs, Oakland
 - Public Health Law and Policy, Oakland, CA
 - Public Health Institute, Oakland



Neil Maizlish (<u>Neil.Maizlish@cdph.ca.gov</u>)

Report available at:

http://www.cdph.ca.gov/programs/CCDPHP/Documents/ITHIM_Technical_Report11-21-11.pdf



