Quantifying the Physical Activity Benefits of Transportation Investments

Sean Co
Transportation planner
Metropolitan Transportation Commission
Obesity Trends Among U.S. Adults
BRFSS, 1990, 2000, 2010

(*BMI ≥30, or about 30 lbs. overweight for 5’4” person)
Average Daily Vehicle Miles Traveled Per Person

1950

2000

(+224%)
Changing Portion Sizes in America

1950

Movie Popcorn
3 cups
174 calories

1900

Hershey Bar
2 ounces
297 calories

2004

Movie Popcorn
21 cups (buttered)
1,700 calories

2011

Hershey Bar
7 ounces
900 calories
Work in low physical activity occupation

1950

2000
(+116%)
Methodology of Evaluating Active Transportation

Activity Based Travel Model – changes in walk, bike and walk to transit trips from each project

Minutes of each trip were calculated on average trip distance and time

Average bike trip distance 2.27 miles
Average speed of bike trip 12 mph

Average walk trip distance 0.92 miles
Average speed of walk trip 3 mph
Methodology of Evaluating Active Transportation

\[
\text{% of Active Individuals} \times \left( \frac{\text{Change in minutes/person/day}}{\text{inactive population 62%}} \right) \times (\text{Minutes to become active} - 30)
\]

Percent of active or inactive individuals

Projected Bay Area Population
Health Care Cost Savings

California Health Interview Survey (CHIS) – 62% of Bay Area residents are inactive

$1220 Savings per Active Person

Health care costs from California Center for Public Health Advocacy, - based on disease types attributable to physical inactivity

Lost productivity to inactive lifestyle
### Attributable Fraction of Disease Burden Due to...

- What percentage of this disease burden is related to individual risk factors like smoking, alcohol, diet, physical inactivity, violence, etc.?

<table>
<thead>
<tr>
<th>Causes of Death, U.S., 2000</th>
<th>Number</th>
<th>PAF, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco</td>
<td>435,000</td>
<td>18.1</td>
</tr>
<tr>
<td>Poor diet and physical inactivity</td>
<td>400,000</td>
<td>16.6</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>85,000</td>
<td>3.5</td>
</tr>
<tr>
<td>Microbial agents</td>
<td>75,000</td>
<td>3.1</td>
</tr>
<tr>
<td>Toxic agents</td>
<td>55,000</td>
<td>2.3</td>
</tr>
<tr>
<td>Motor vehicle</td>
<td>43,000</td>
<td>1.8</td>
</tr>
<tr>
<td>Firearms</td>
<td>29,000</td>
<td>1.2</td>
</tr>
<tr>
<td>Sexual behavior</td>
<td>20,000</td>
<td>0.8</td>
</tr>
<tr>
<td>Illicit drug use</td>
<td>17,000</td>
<td>0.7</td>
</tr>
<tr>
<td>Other environmental causes</td>
<td>109,000</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Total of known risk factors</strong></td>
<td><strong>1,159,000</strong></td>
<td><strong>48.2</strong></td>
</tr>
</tbody>
</table>

## Health Impacts of Active Transport Scenarios

<table>
<thead>
<tr>
<th>Disease</th>
<th>Change in disease burden</th>
<th>Change in premature deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular Dis.</td>
<td>6-15%</td>
<td>724-1895*</td>
</tr>
<tr>
<td>Diabetes</td>
<td>6-15%</td>
<td>73-189</td>
</tr>
<tr>
<td>Depression</td>
<td>2-6%</td>
<td>&lt;2</td>
</tr>
<tr>
<td>Dementia</td>
<td>3-10%</td>
<td>63-218</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>2-5%</td>
<td>15-48</td>
</tr>
<tr>
<td>Colon Cancer</td>
<td>2-6%</td>
<td>17-53</td>
</tr>
<tr>
<td>Road traffic crashes</td>
<td>10-19%</td>
<td>60-113</td>
</tr>
</tbody>
</table>

* 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

Source of Health Benefit or Harm

Disability Adjusted Life Years Gained per Million Population compared to business as usual

- Scenario 3: Active transport (15% of miles traveled)
  - Walking/Bicycling: -783
  - Low Carbon Driving: 33

- Scenario 4
  - Air Pollution: 13
Distribution of Benefits
(Regional Bicycle Network)

- Active Transportation: 53%
- Travel Time: 22%
- Auto Travel Costs: 21%
- Collisions: 3%
- Noise: 0%
- CO2: 0%
- Other Pollutants: 0%
Total Distribution of Benefits

- Travel Time: 79%
- Auto Travel Costs: 11%
- PM: 1%
- CO2: 3%
- Collision: 3%
- Other Pollutants: 0%
- Active Transportation: 3%
- Noise: 0%
Total Benefit from Active Transportation

$1.1 Billion in benefits from health care cost and lost productivity reductions

- Achieve Target of 15 minutes/person/day
- Increase of 5 minutes over base case
- 10.6% of Bay Area residents becoming active
Public Private Partnership

Workplace competitiveness

Google, Facebook, Apple other tech investments in public bicycle infrastructure

Bay Area Council, Silicon Valley Leadership Group – wellness beyond the workplace

Bottom line health care costs
Next Steps

Implementation of Projects Based on Public Health Impacts

Common methodology for assessing health impacts in transportation projects

Award of projects based on health impact

What is the level of transportation investment necessary for a desired health outcome?