Public Health in Long Range Planning in the San Francisco Bay Area

Sean Co
Transportation planner
Metropolitan Transportation Commission

Targets

Targets adopted by MTC & ABAG

Smaller projects assessed by type

700 projects in total analyzed

Adopted Targets

1. CO_2 emissions reduction
2. Adequate housing
3 a. $PM_{2.5}$ emissions reduction
   b. PM_{10} emissions reduction
   c. PM emissions reduction in CARE communities
4. Injury and fatality collision reduction
5. Increase in minutes of active transportation (walking/biking)
6. Open space and agricultural preservation
7. Decrease in low-income expenditures on transportation
8. Economic vitality
9 a. Decrease in per-trip non-auto travel time or increase in non-auto mode share
   b. VMT reduction
10. State of good repair

SB 375-Sustainable Communities Strategy – Plan Bay Area

Designed to achieve a 15% CO_2 reduction per capita by 2035

Links land use and housing to transportation

Region must show how it can house all the population in the next 30 years

Preservation of open space and agricultural land

Show how development pattern and transportation network can reduce greenhouse gases

Benefit-Cost 100 projects with cost>$50 million

Benefits based on MTC regional travel model runs of each project

Benefits:

- Travel time
- Emissions (CO_2, $PM_{2.5}$, PM_{10}, ROG, NOx)
- Health costs due to level of physical activity
- Collisions causing injuries, fatalities, or property damage
- Direct user costs (vehicle operating/ownership)
- Noise

Costs include:

- Capital expenditures
- Net operating & maintenance expenditures

Active Transportation Target Development

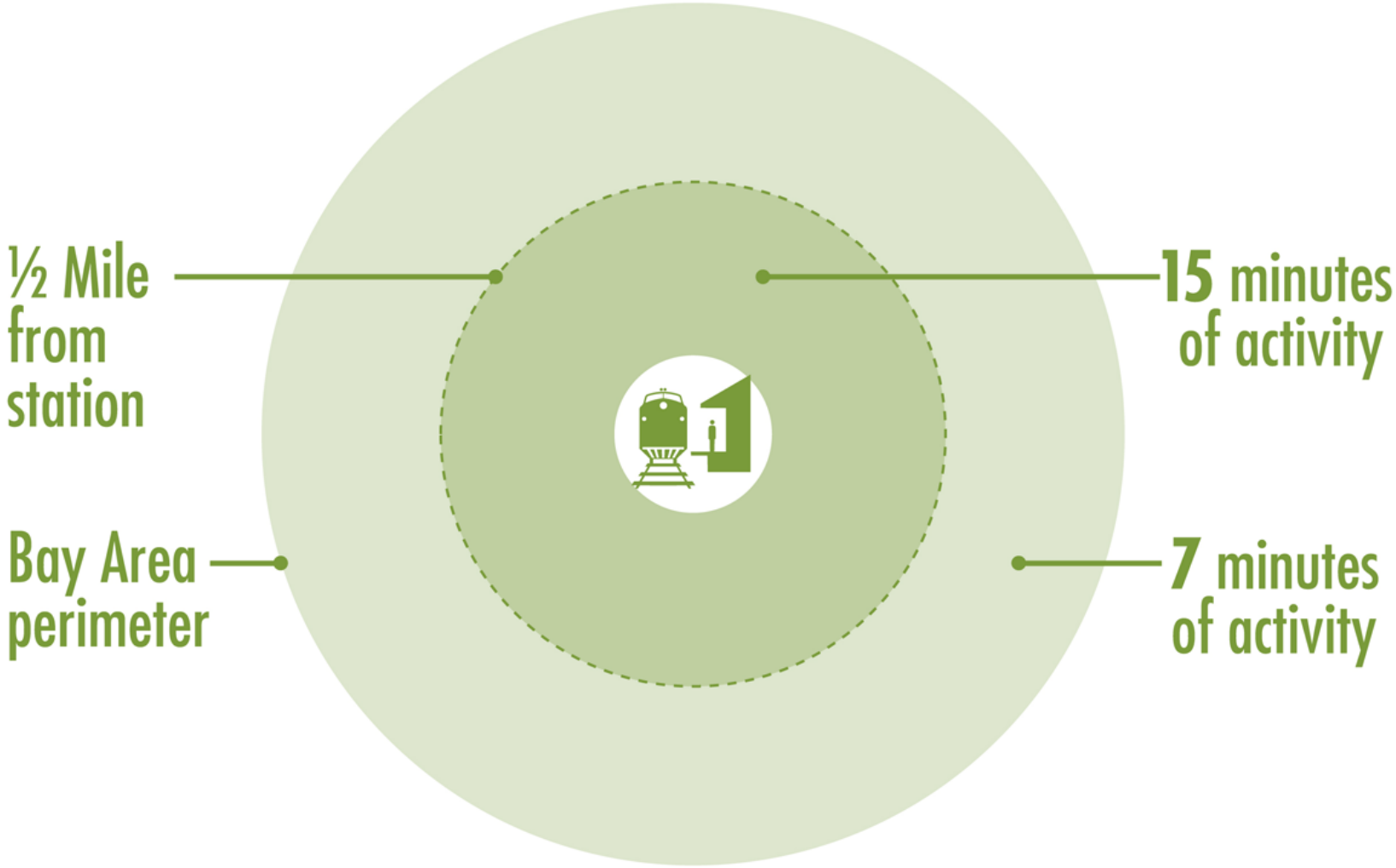
No metrics for active transportation

Where does walking and cycling fit within the 30 min/day of moderate to vigorous activity?

No performance standards from the CDC Community Guide – insufficient evidence that transportation policies increase physical activity

What is the expected increase in active transportation in 30 years?

How much physical activity should transportation take credit for?



Methodology of Evaluating Active Transportation

Travel Model calculates effects of investments on trips

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

% of Active Individuals

$$\frac{\text{(Change in minutes/person/day) * (inactive population 62\%)}}{\text{(Minutes to become active -30)}}$$

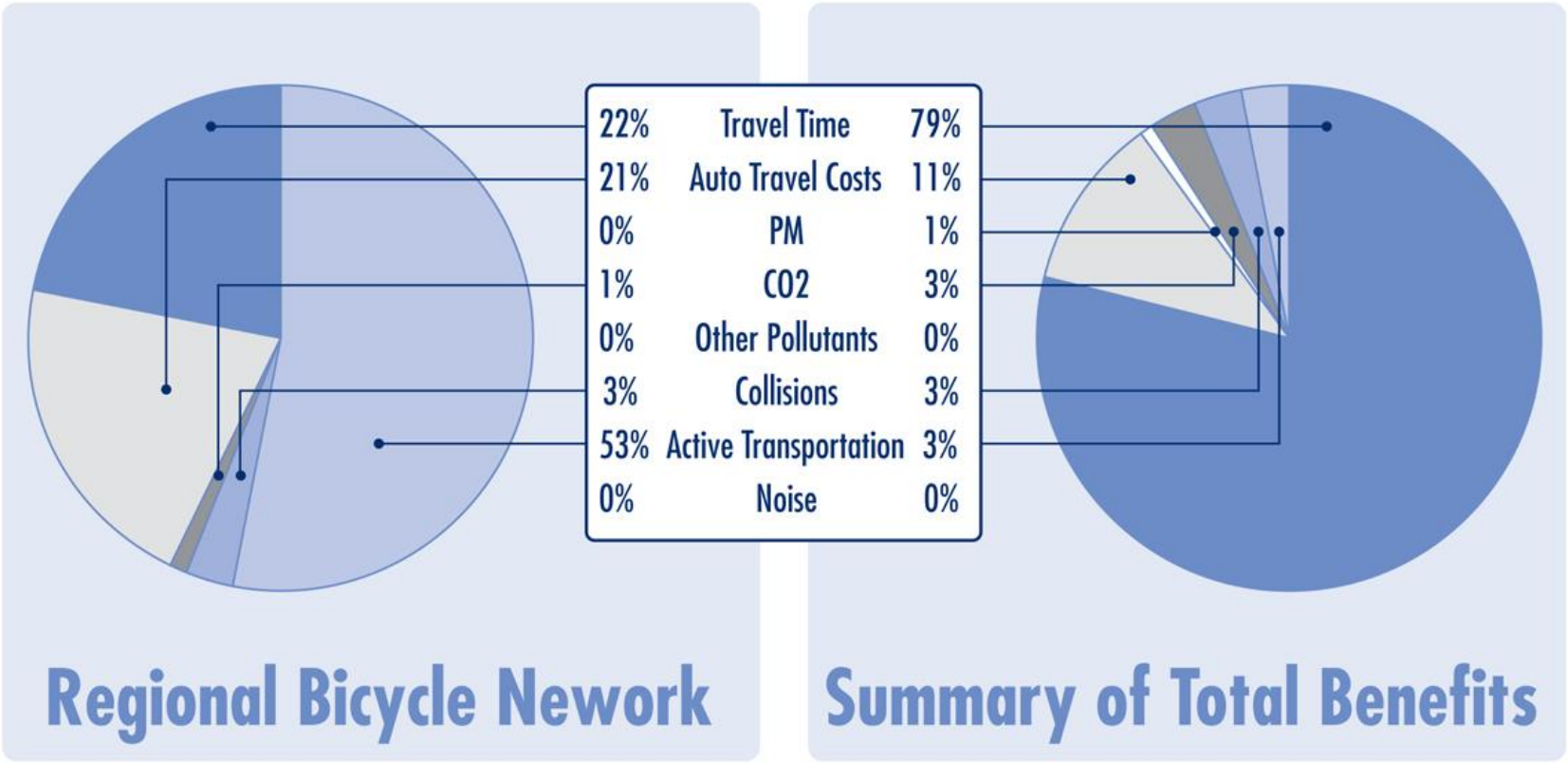
Active individuals from the project

Percent of active or inactive individuals
*
Projected Bay Area Population

62% **Bay Area Inactive** <30 minutes of activity
California Health Interview Survey

$717 **Savings From Lost Productivity**
Per person

$326 **Health Care Cost Savings** Per person
(Disease types attributable to physical inactivity)


22% Travel Time 79%
21% Auto Travel Costs 11%
0% PM 1%
1% CO2 3%
0% Other Pollutants 0%
3% Collisions 3%
53% Active Transportation 3%
0% Noise 0%
Regional Bicycle Nework
Summary of Total Benefits

What happens when everyone meets the 15 minutes per person per day target?

$1.1 Billion Lost productivity and health care cost savings

10.6% Become active

$3.2 Billion Saved based on theValue of Statistical Life (VSL)

650 LIVES SAVED

Implementation One Bay Area Grant

Transportation Infrastructure Investments in infill opportunity areas - Priority Development Areas (PDAs)

$795 million over 4 years STP/CMAQ

70% of the grant spent in PDAs in areas greater than 1M population

50% of the grant spent in PDAs in areas less than 1M population

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
- Shift from 10 to 30 minutes/day of walking and bicycling:

↓19% Cardiovascular Disease

↓15% Diabetes

↓13% Breast Cancer

↓ 8% Dementia

↓ 38% CO_2 Emissions

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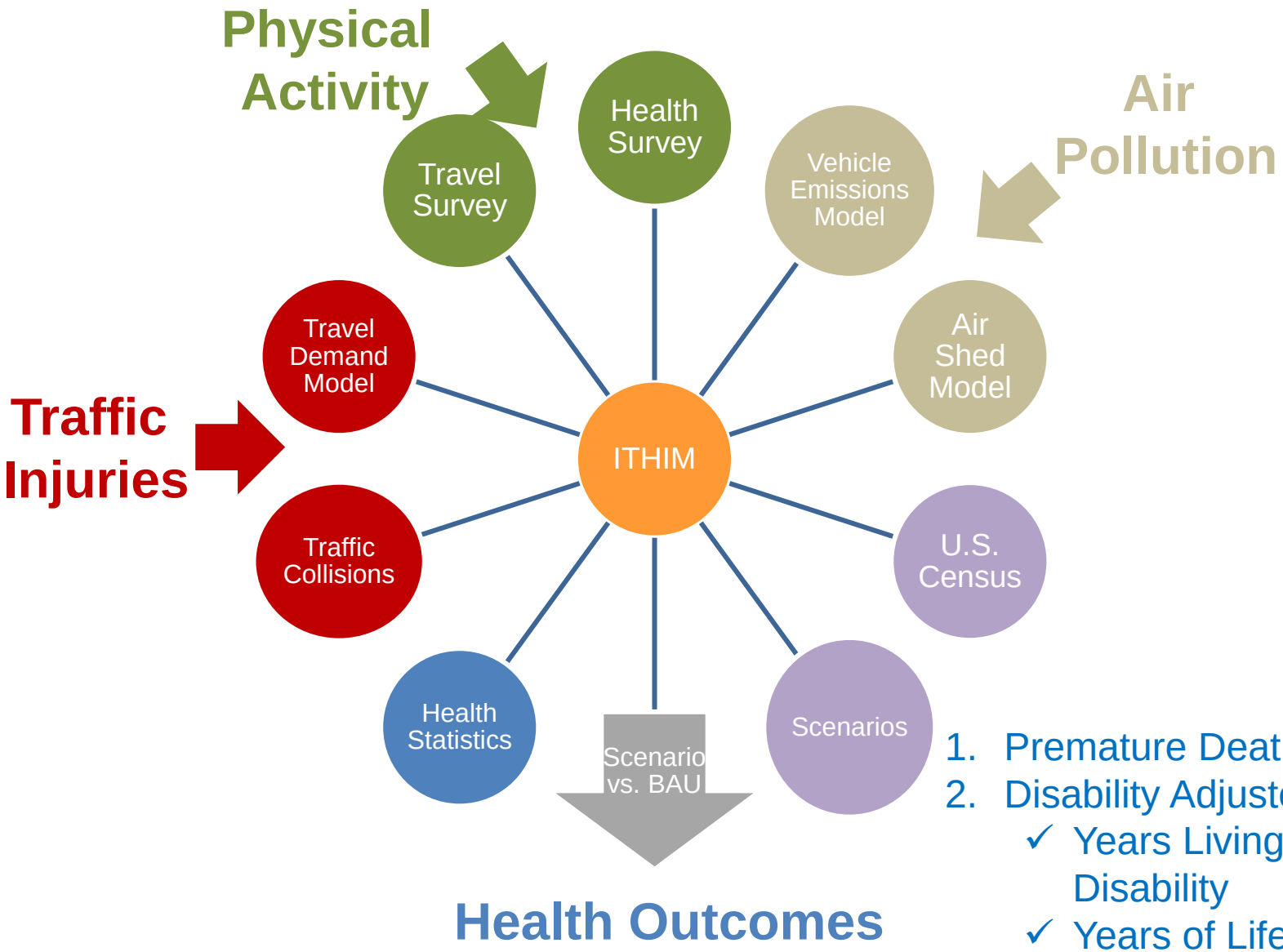
* Woodcock J, Edwards P, Tonne C, Armstrong BG, Ashiru O, Banister D, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: urban land transport. The Lancet 2009;374:1930-1943.

ITHIM Basics: What is ITHIM and What Does it Do?
The ITHIM Model Integrates Data on Health and Travel



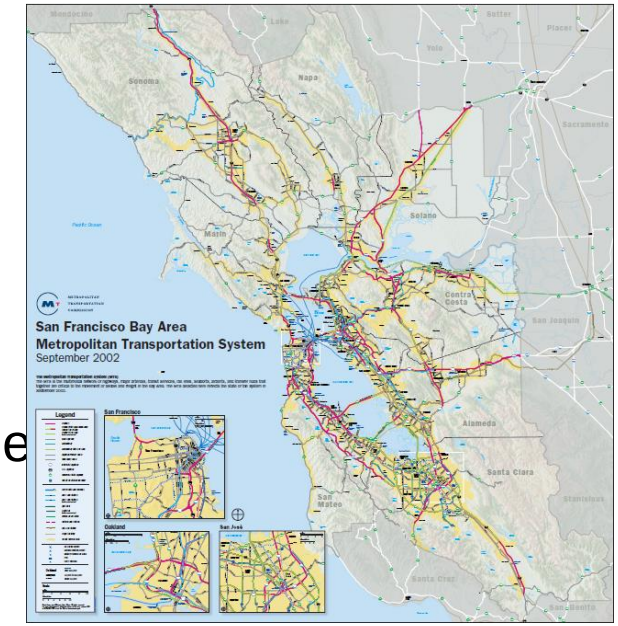
1. Premature Deaths
2. Disability Adjusted Life Years
   - ✓ Years Living with Disability
   - ✓ Years of Life Lost

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



Dr. James Woodcock

CDPH

METROPOLITAN TRANSPORTATION COMMISSION

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Dr. Bart Ostro

Active Transport and Low Carbon Driving Scenarios

1. <u>Bay Area Benchmarks</u>

- 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)

2. <u>Replace short car trips with active transport</u>

- Scenario: 1/2 of trips <1.5 miles walked and 1/2 of trips 1.5 to 5 miles bicycled

3. <u>Attaining Carbon and Physical Activity Goals</u>

- 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

4. <u>Low Carbon Driving</u>

- 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

Comparative Risk Assessment

- How much would the disease/injury burden, BD, change if exposure to the risk factor were eliminated?
  - ✓ $Population\ Attributable\ Fraction = \frac{D_{exposed}}{D_{total}}$
    where D is a disease or injury count or rate
  - ✓ △ BD = BD × PAF

- How much would the disease/injury burden, BD, change if exposure distribution were altered? Aka Comparative Risk Assessment (CRA)
  - ✓ Percent change formula: relative change in exposure(x)-weighted disease risks from baseline distribution, P, to alternative Q:

$$PAF = \frac{\int_{Xmin}^{Xmax} RR(x)P(x)dx - \int_{Xmin}^{Xmax} RR(x)Q(x)dx}{\int_{Xmin}^{Xmax} RR(x)P(x)dx}$$

RR is the relative risk of the health outcome at a given exposure level, x

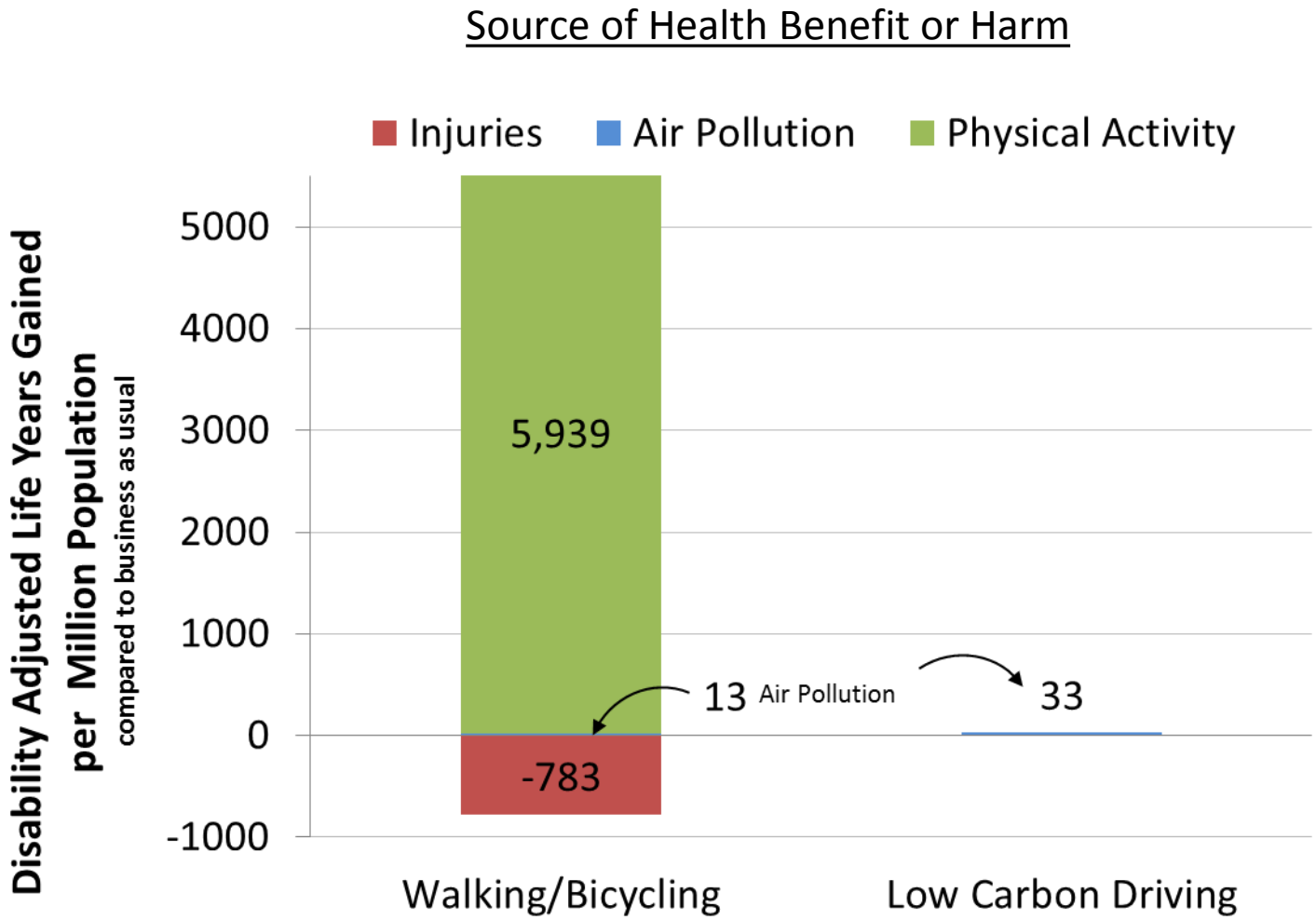
- In ITHIM, for physical activity, exposure, *x*, is the hours per week spent in walking, bicycling, and all other physical activity
- For air pollution, exposure is the concentration of fine particulate matter ($PM_{2.5}$)
- For road traffic injuries, exposure is the miles traveled by parties to a collision

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



(Scenario 3: Active transport 15% of miles traveled)

Scenario 4

Summary & Conclusion

A shift in active transport from 4.5 to 22 minutes/day:

•Major reductions in chronic disease

•Major public health impact

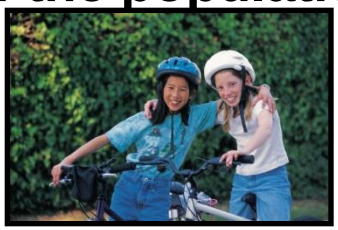
- $1.4-21.8 billion annual Bay Area health cost savings
- Adds about 9.5 months of life expectancy

- **Injuries to pedestrians and bicyclists significant concern**

15% reductions in CO_2 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**



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Acknowledgments

The Team

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- Sean Co, Metropolitan Transportation Commission, Oakland
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