



# Potential Health Effects of Road Pricing in San Francisco, California

## Transportation, the environment and our health



Transportation choices affect the environment and the health of city residents.

In San Francisco, the ways people travel – by car, bus, foot, or bike – affect the city's environment and residents' health in ways that are both positive and negative. The transportation system affects physical activity, air pollution and asthma, injury collisions, and even stress and heart disease.

Analyzing the health impacts of proposed changes to transportation can help to make more informed decisions, save lives, and prevent disease.

## Studying the health impacts of road pricing

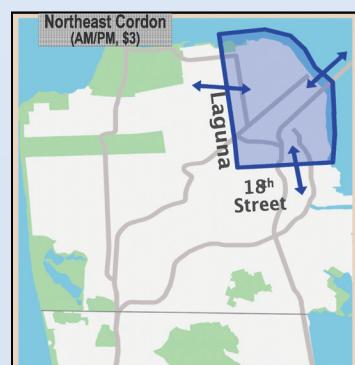
**Road pricing:** The San Francisco County Transportation Authority (SFCTA) is studying a potential program that would charge \$3 during AM/PM rush hours to travel into or out of the congested northeast quadrant of San Francisco (see map). This scenario was found to be the best performing among dozens analyzed in the SFCTA's Mobility, Access and Pricing feasibility study. This road-pricing fee would fund public transit, road maintenance, and bicycle and pedestrian street improvements. For more information on the SFCTA's Mobility, Access and Pricing Study (MAPS), visit [www.sfmobility.org](http://www.sfmobility.org).

**Health impacts:** The San Francisco Department of Public Health (SFDPH) analyzed potential health effects related to the SFCTA's potential road pricing scenario, including impacts on:

- Active transportation (walking and cycling)
- Air pollution
- Traffic noise
- Pedestrian and cyclist injury
- Associated economic value, and
- Implications for equity

**Two scenarios:** SFDPH compared 2005<sup>a</sup> conditions with two alternate futures:

1. **2015 "Business As Usual"** –This scenario is based on current city plans for growth, without new policies or funding to manage transportation as the population increases.
2. **2015 with Road Pricing** –This scenario is similar to Business As Usual but with a congestion charge and up-front public-transit enhancements.



"Northeast Cordon" boundaries of the road-pricing zone under study by the SFCTA in San Francisco, California

<sup>a</sup>2005 was the most recent data year available for this study.



## Study findings

Health Impacts (Annual Estimates)	2005: Existing Conditions	Change: 2005 - 2015 BAU	Change: 2005 - 2015 RP	Change: 2015 BAU - 2015 RP	Confidence in Quantitative Estimate
<b>Early Death From Air Pollution</b>					<b>High - Moderate</b>
<b>Citywide</b>	<b>65</b>	<b>2%</b>	<b>-3%</b>	<b>-5%</b>	
<b>Northeast Quadrant</b>	<b>24</b>	<b>8%</b>	<b>-4%</b>	<b>-12%</b>	
<b>Residents Stressed From Traffic Noise</b>					<b>High</b>
<b>Citywide</b>	<b>92,500</b>	<b>9%</b>	<b>8%</b>	<b>0%</b>	
<b>Northeast Quadrant</b>	<b>36,800</b>	<b>10%</b>	<b>10%</b>	<b>0%</b>	
<b>Heart Attacks From Traffic Noise</b>					<b>Moderate</b>
<b>Citywide</b>	<b>31</b>	<b>10%</b>	<b>10%</b>	<b>0%</b>	
<b>Northeast Quadrant</b>	<b>18</b>	<b>11%</b>	<b>11%</b>	<b>0%</b>	
<b>Pedestrians Injured by Motor Vehicles</b>					<b>High - Moderate</b>
<b>Citywide</b>	<b>810</b>	<b>6%</b>	<b>1%</b>	<b>-5%</b>	
<b>Northeast Quadrant</b>	<b>360</b>	<b>10%</b>	<b>0%</b>	<b>-9%</b>	
<b>Cyclists Injured by Motor Vehicles</b>					<b>Moderate - Low</b>
<b>Citywide</b>	<b>270</b>	<b>9%</b>	<b>7%</b>	<b>-2%</b>	
<b>Northeast Quadrant</b>	<b>135</b>	<b>15%</b>	<b>11%</b>	<b>-3%</b>	
<b>Cycling Benefits - Lives Saved</b>					<b>Moderate</b>
<b>Citywide</b>	<b>23</b>	<b>9%</b>	<b>13%</b>	<b>4%</b>	
<b>Northeast Quadrant</b>	<b>8</b>	<b>13%</b>	<b>13%</b>	<b>0%</b>	
<b>Walking Benefits - Lives Saved</b>					<b>Moderate</b>
<b>Citywide</b>	<b>130</b>	<b>6%</b>	<b>8%</b>	<b>2%</b>	
<b>Northeast Quadrant</b>	<b>69</b>	<b>10%</b>	<b>12%</b>	<b>1%</b>	

2015 BAU: 2015 under "Business As Usual" - no road pricing; 2015 RP: 2015 with road pricing  
 Red: Increases in Negative Health Impacts  
 Green: Increases in Health Benefits  
 Black: Neutral/Flat Impacts

## Today's transportation system puts a heavy burden on health

Emissions from air pollution and noise are estimated to contribute to approximately 65 annual deaths from air pollution and 30 heart attacks for residents of San Francisco. Residents living within the northeast quadrant of San Francisco suffer a greater burden of these health hazards; low-income households are also disproportionately burdened with environmental exposures related to higher traffic densities including air pollution, noise, and pedestrian hazards.

## "Business As Usual" is estimated to make health impacts worse

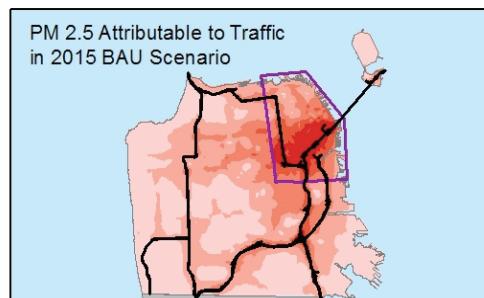
Under the "Business As Usual" 2015 scenario, traffic-related health impacts are estimated to worsen over 2005 levels, especially in the northeast quadrant of San Francisco:

- More premature death from air pollution
- More stress and heart attacks related to traffic noise
- More pedestrians and cyclists hit by vehicles

### One positive change from 2005 to the 2015

#### Business As Usual scenario:

More walking and biking (active transportation) will bring health benefits and save lives, even given negative changes.

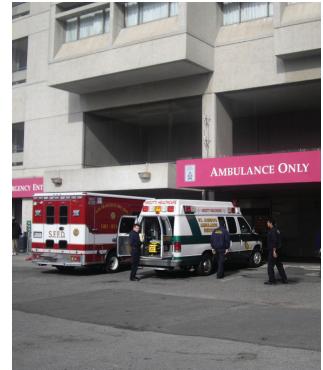


Air pollution in the 2015 "Business As Usual" scenario, based on traffic-attributable fine particulate matter (PM 2.5) in San Francisco, California

## Road pricing could reduce negative health impacts, increase benefits

Road pricing could offer significant improvements to health over Business As Usual and, in some cases, is estimated to potentially be an improvement over current (2005) conditions:

- Fewer deaths due to air pollution than in 2005
- More cycling and walking than in 2005
- Fewer pedestrians hit by vehicles than in 2015 Business As Usual, especially in the road-pricing zone
- Fewer cyclists hit by vehicles than in 2015 Business As Usual
- No inequitable health effects on low-income, elderly, or young populations



## The health-related economic costs of today's transportation system are very high

The economic value of transportation-related negative health effects could be as much as \$1.12 billion per year.<sup>b</sup> The most significant economic effects result from motor vehicle collisions with pedestrians and cyclists (50%) and premature death related to air pollution (45%). Road pricing could generate significant economic value by reducing transportation-related adverse health effects and increasing walking and biking.

Economic value of health effects	Estimated Value (\$, Millions)			
	Change: 2005 - 2015	Change: 2005 - BAU	Change: BAU - RP	Change: 2015 BAU - RP
	2005	BAU	RP	2015 RP
Illness, injury and death from environmental hazards	-\$1,124	-\$49	\$4	\$53
Lives saved with active transportation (walking and biking)	\$1,225	\$80	\$112	\$32

## Recommendations and policy considerations for more health benefits

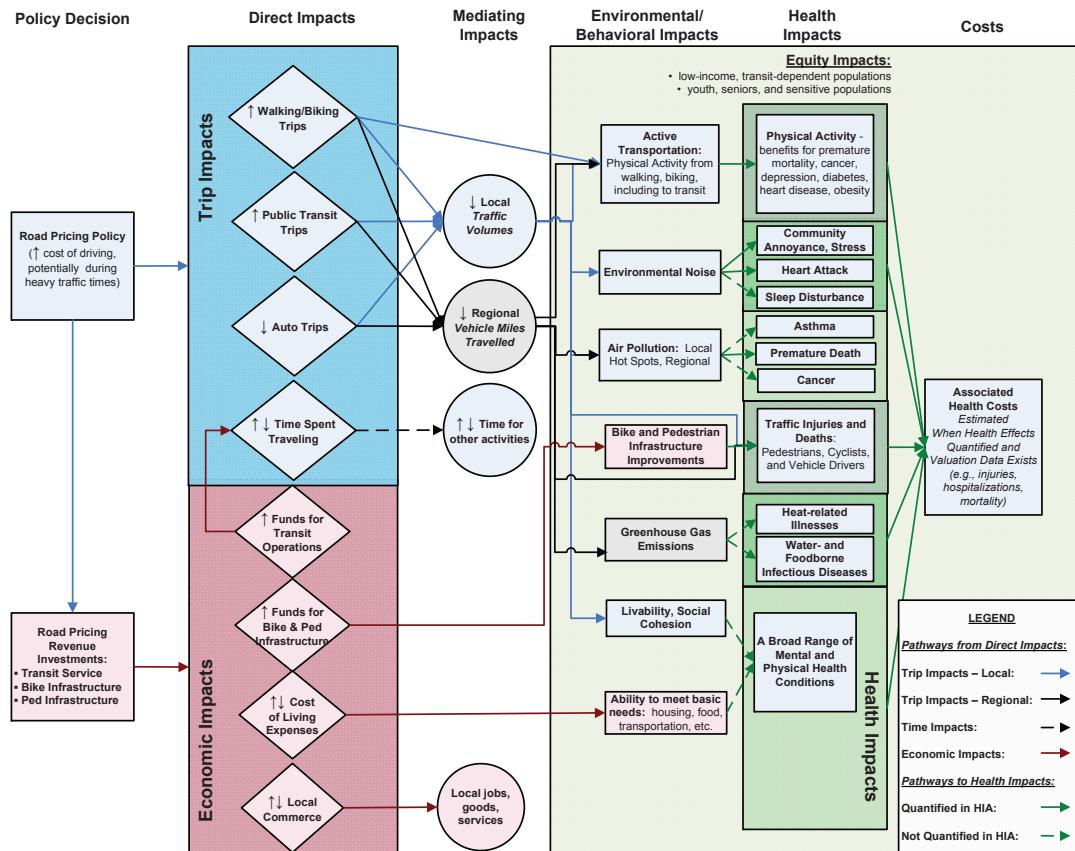
If road pricing is implemented, revenues will be invested in public-transit enhancements and bicycle and pedestrian projects that offer additional potential health benefits. Recommendations that specifically target health benefits include:

- **Increase the congestion pricing fees where they can reduce health risks**, for example, on “spare the air” days or on more polluting vehicles (see sparetheair.org)
- **Invest in walking and biking safety improvements where injuries are greatest**, for example with traffic calming along arterials in and near the road-pricing zone
- **Use quieter, low-emission hybrid buses in areas where noise and air pollution are worse**
- **Invest in walking and biking infrastructure** to encourage trips by foot and by bike into and out of the road-pricing zone
- **Monitor road-pricing implementation to address any unanticipated traffic increases and health impacts**
- **Encourage active transportation and discourage driving through more policies** such as demand-based parking fees, “unbundling” parking in new development, and transportation demand management programs



<sup>b</sup>This is not a full accounting of the costs and benefits of transport system operation under the three scenarios.

# Pathways through which Road Pricing Policies Potentially Effect Health



## About Health Impact Assessment (HIA)

The World Health Organization defines Health Impact Assessment as “a combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population.”

Increasingly, countries are using HIA to prevent disease and illness, improve the health of their populations, and reduce avoidable and significant economic costs of health care services.

For more info about HIA, please visit: [www.hiacollaborative.org](http://www.hiacollaborative.org)

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For a full report and references, please see:

[http://www.sfpches.org/HIA\\_Road\\_Pricing.htm](http://www.sfpches.org/HIA_Road_Pricing.htm)

For more information regarding the SFCTA's Mobility, Access and Pricing Study, please see: [www.sfmobility.com](http://www.sfmobility.com)

The San Francisco Department of Public Health conducted this Road Pricing HIA with generous financial support from the Robert Wood Johnson Foundation's Active Living Research Program.

## Research Methods

SFDPH conducted this assessment using the following data sources and research methods:

- SF-CHAMP IV travel forecasting model data provided by the SFCTA from the congestion pricing feasibility study;
- existing and future population data from U.S. Census estimates and the Association of Bay Area Governments; hospitalization, pedestrian and cyclist injury, and mortality data from County and State agencies; regional travel behavior data from the Bay Area Travel Survey; city lot and zoning data from SF Planning; pedestrian environment data collected by project staff; and
- quantitative forecasting of health impacts using ArcGIS 10, Stata 9, and Microsoft Access and Excel software.