



SFDPH Program on Health, Equity, and Sustainability

Urban Health and Place Team

Vehicle-Pedestrian Injury Collision Model – June 2010



Vehicle-Pedestrian Injury Collision Model

Description

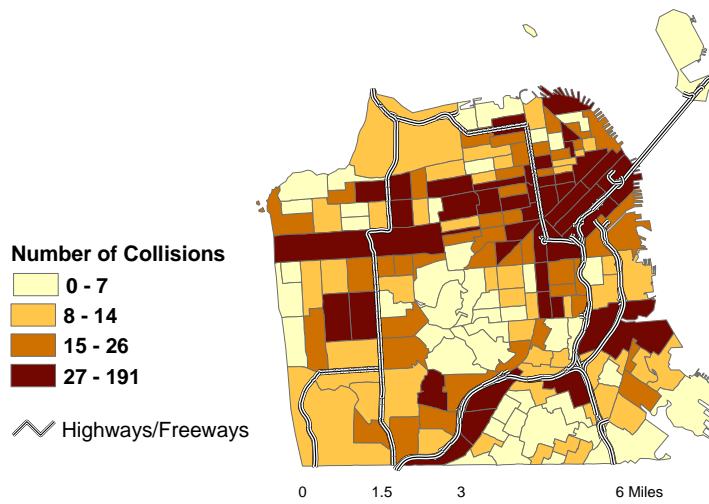
The Vehicle-Pedestrian Injury Collision Model predicts change in the number of collisions resulting in pedestrian injury or death associated with area-level changes in street, land use and population characteristics due to new development or transportation system changes. SFDPH uses this model to inform the need for pedestrian safety mitigations and improvements in the course of land use and transportation planning, to prevent people from being injured or killed by motor vehicles while walking on San Francisco streets. Significant predictors (census-tract level variables) in the current model are:

- Traffic volume
- Arterial streets (% , without MUNI transit)
- Neighborhood commercial areas (% , land area)
- Land area (square miles)
- Employee population
- Resident population
- Below poverty level (% , population)
- Age 65 and older (% , population)

Background and Development

Primary preventable predictors of vehicle-pedestrian injury collisions are environmental, including: traffic volume, higher vehicle speeds, pedestrian volume, and intersection and street design factors. To achieve safe, walkable communities, planning professionals need practical tools to assess and mitigate the impact of land use and development plans and projects on pedestrian safety, including vehicle-pedestrian collisions. The tools typically used to evaluate the impacts of land use planning on pedestrian safety conditions are limited to existing conditions assessments of collisions or qualitative analyses of the pedestrian environment.

Vehicle-pedestrian injury collisions: San Francisco, California census tracts (2001-2005)



Source: California Highway Patrol, Statewide Integrated Traffic Records System

SFDPH published the vehicle-pedestrian injury collision model findings in the professional scientific journal *Accident Analysis & Prevention* in 2009.¹ SFDPH developed this model to understand how changes in traffic and other environmental factors impacted by development and planning decisions in SF predict vehicle-pedestrian injury collisions.

¹ Wier M, Weintraub J, Humphreys EH, Seto E, Bhatia R, 2009. An area-level model of vehicle-pedestrian injury collisions with implications for land use and transportation planning. *Accident Analysis and Prevention* 41(1): 137-45.



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Collaborations/Constituencies Involved

SFDPH researchers developed the Vehicle-Pedestrian Injury Collision Model in collaboration with Edmund Seto, a UC Berkeley School of Public Health researcher and lecturer - drawing on traffic data generated from an ongoing collaboration regarding the health impacts of traffic and transportation planning decisions. SFDPH sought input from health, planning, and transportation professionals, and community advocates for pedestrian safety - both individually and through presentations at City staff and task force meetings, professional conferences, and academic settings - throughout the model development process. SFDPH continues to engage with these constituencies regarding both our findings and potential practical applications to predict vehicle-pedestrian injury collisions based on area-level changes impacted by City planning decisions and inform the need for pedestrian safety improvements.

Relevance to Health and Health Equity

Walking, particularly as an alternative to driving, can be beneficial for human health by reducing the risk of motor vehicle collisions, reducing traffic-related noise and air pollution, and increasing physical activity and social cohesion. In San Francisco, neighborhoods with some of the lowest proportions of households owning cars are disproportionately burdened by streets with high traffic volumes, posing serious hazards to pedestrians. Those neighborhoods also have some of the highest concentrations of poverty and people dependent on walking or public transportation as their primary mode of travel.

Walking and public transit, as opposed to driving, are sustainable travel modes - and can be supported by safe environments that promote those behaviors. Land use and transportation planning processes provide an opportunity to assess pedestrian safety conditions for current and future San Francisco residents and workers, and to intervene to improve the pedestrian environment and support safe, sustainable transportation modes - provided there are tools to conduct these assessments.

Applications and Policy Targets

The main aims of the application of the San Francisco Vehicle-Pedestrian Injury Collision Model is to inform the need for pedestrian safety mitigations and improvements in the course of land use and transportation planning and increase awareness of traffic volume and other environmental factors as primary predictors of pedestrian injury. Potential area-level interventions that improve pedestrian safety include planning and design decisions that reduce traffic volumes, speeds, and the need to drive, while promoting more walkable, safe environments including: transportation-land use planning coordination, transportation demand management measures, traffic calming, and street and intersection engineering countermeasures and amenities.²

SFDPH, with funding from the Robert Wood Johnson Active Living Research program, is currently using the model in conducting a health impact assessment of proposed Congestion Pricing policy being studied by the SF County Transportation Authority.³ SFDPH also used the model to analyze the impact of the Eastern Neighborhoods Area Plans based on estimated increases in resident population and traffic volume from the SF Planning Department.⁴ The model predicted that the plans' implementation will result in increases in five-year pedestrian injury collision totals - by approximately 17% overall, or over 30 additional pedestrian injury collisions on those streets each year. SFDPH's analyses were included in the Pedestrian Assessment of the Eastern Neighborhoods Environmental Impact Report.

² See the online TDM encyclopedia from the Victoria Transport Policy Institute for detailed information: <http://www.vtpi.org/tdm>.

³ More Information available at: http://www.sfphes.org/HIA_Road_Pricing.htm.

⁴ Bhatia R, Wier M, Weintraub J. 2007. *Impacts of Urban Land Use Development on Pedestrian-Motor Vehicle Collisions: An Application of the San Francisco Pedestrian Injury Model to Five Neighborhood Plans*. San Francisco, CA: San Francisco Department of Public Health. Available at: www.sfphes.org.

For more information, please visit:

www.sfphes.org