Health Impact Assessment, Cumulative Effects, and Environmental Justice

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Drivers for *disproportionate* health effects analysis in law and policy

- The National Environmental Health Policy Act (NEPA) requires federal actions to consider potentially significant direct, indirect and cumulative effects on the *human environment*
- Environmental Justice mandates agencies to identify and address disproportionately adverse environmental and health effects on low income and minority populations

Criteria for environmental justice impacts

- Significant disproportionately adverse health or environmental effect on a vulnerable population
  - Relatively higher effect intensity on a vulnerable population,
  - Cumulative contribution to a pre-existing adverse condition or exposure,
  - Population vulnerability factors mediate or exacerbate an adverse health effects.
- Mitigations or alternatives exist to prevent or reduce disproportionate impacts

Cumulative Effects

- Combined and incremental effects of human activities on environmental resources, human communities, or ecosystems (40 CFR §1508.7.; USEPA 1999).
- Cumulative effects on human communities may be combined
  - Two or more sources of the same physical exposure
  - Incremental additions to exposure over time
  - Two or more hazards with common mechanisms
  - Two or more effects on the same biological endpoint
  - Multiple effects on human health of multiple exposures occurring over time
  - Effects on community well being

Gaps in knowledge for equitable decision-making

- Gaps in health effects analyses
  - Missing cumulative effects
  - Focus on discrete physical agents (vs neighborhoods or systems)
  - Dependence on risk assessment
- Credibility of analysis
- Intelligibility & utility of analysis
- Disconnect between analysis and decision-making

Health Impact Assessment: IAIA Definition

…a combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, program or project on the health of a population and the distribution of those effects within the population. HIA identifies appropriate actions to manage those effects.

--Adapted by the International Association of Impact Assessment from World Health Organization 1999

Steps in the HIA Process

Screening	Determine the the value and feasibility of a HIA
Scoping	Determine which health impacts to evaluate, the methods for analysis, population affected, temporal and geographic boundries
Assessment	Assess baseline conditions; judge the magnitude and direction of potential health impacts; evaluate management strategies
Reporting	Communicate HIA results to stakeholders and decision-makers
Monitoring	Track the effects of decision adoption and implementation on health determinants and health outcomes

HIA Key Characteristics

- Systematic and transparent process (vs analytic tool)
- Holistic definition of health–determinants, behaviors, diseases
- Multiple effects and outcomes
- Analysis of beneficial and harmful impacts
- Best available evidence and theory
- Engagement with stakeholders
- Evaluation of alternatives

Screening: When to conduct a HIA

- ***Regulatory Requirements*** Do policy or legal requirements mandate the conduct of a health analysis?

- ***Value of HIA*** Are there potentially significant health effects associated with the decision alternatives? Could these impacts create or exacerbate inequities? Are impacts already known? Are impacts uncertain or controversial?

- ***Feasibility and capacity to do HIA*** Are there data and methods available to assess potential impacts? Is there leadership, resources and technical capacity to conduct analyses?

- ***Receptiveness of the decision-making process*** Is the decision-making process open to new information?

"Environmental Effects" under NEPA

- The "human environment" is to be "interpreted comprehensively" under NEPA to include "the natural and physical environment and the relationship of people with that environment" (40 CFR 1508.14).
- "Effects" are those that are "…ecological, aesthetic, historic, cultural, economic, social, or ***health***, whether direct, indirect, or cumulative," (CEQ §1508.8).
- In determining whether an effect is "significant," an agency must evaluate the "…degree to which the proposed action affects public health or safety" (CEQ §1508.27).
- NEPA requires analysis of cumulative effects resulting "… from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions."

Setting the scope of the HIA means determining:

- Which specific decision alternatives will be considered?
- What are the potential impacts on health needing analysis?
- What are the geographical and temporal boundaries for impact analysis?
- Which populations and subpopulations will be considered? Are there sensitive or socially excluded subpopulations that are vulnerable to disproportionate impacts?
- Who will conduct the analysis (if not already determined)? Under what oversight?
- What data, methods, and tools will be employed to evaluate impacts? Which experts and key informants will be engaged?
- What is the plan for public review of the HIA?
- What is the timeframe for the assessment?

Assessment: Three products

- A **profile of baseline conditions** including baseline health status and factors known or suspected to influence health.

- A **judgment on potential health impacts** including an evaluation of their certainty and significance.

- Evaluation of **management strategies** for any identified adverse health impacts – in the form of decision alternatives, policy design changes, mitigation of specific impacts, or other related policy recommendations.

Types of Evidence for HIA

- **Existing Data**
  - Empirical literature
  - Community expertise
  - Available collected social, economic, environmental and health measures
  - Regulatory standards and benchmarks

- **New data**
  - Environmental measures
  - Modeling
  - Surveys
  - Quantitative risk assessments
  - Epidemiological studies

Health Impact Assessment of Eastern Neighborhoods Rezoning, San Francisco

- City proposed rezoning of historically industrial lands
- Potential impacts on residents from noise, air pollutants, traffic hazards, limited infrastructure, and demographic changes
- Stakeholder process to develop health objectives and standards for development
- Analysis and mitigations to EIR as “cooperating agency”
- EIA required new mitigations to protect respiratory health, reduce noise exposure and added “improvement measures” to reduce pedestrian injuries

Cities have the capability of providing something for everyone only because and only when they are created by everybody.

- Jane Jacobs

Eastern Neighborhoods Community Health Impact Assessment

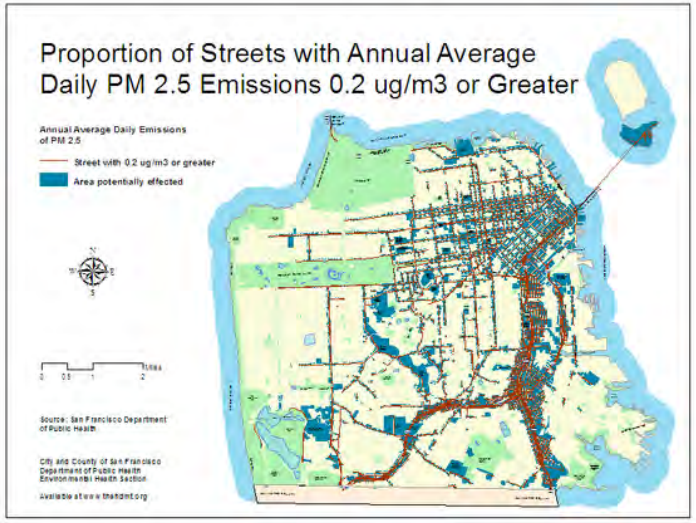
- Collaborative, consensus-based health impact assessment to analyze how development in three SF neighborhoods affected health

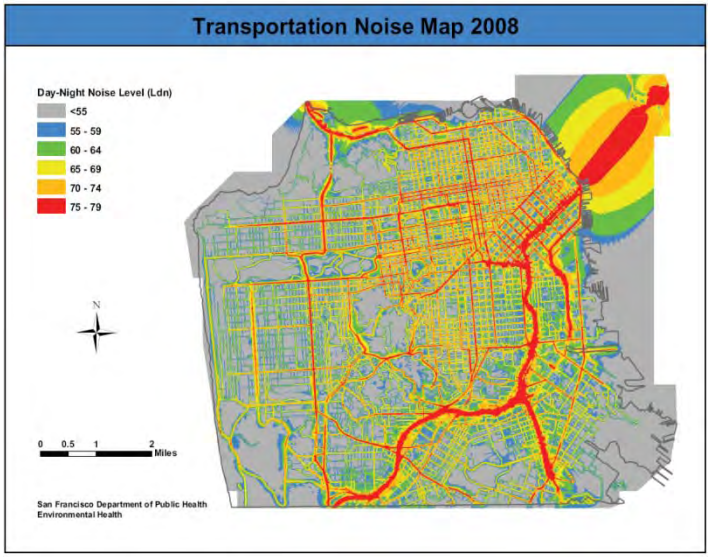
- Facilitated by SFDPH & Guided by a Community Council Comprised of >20 organizations and government stakeholders

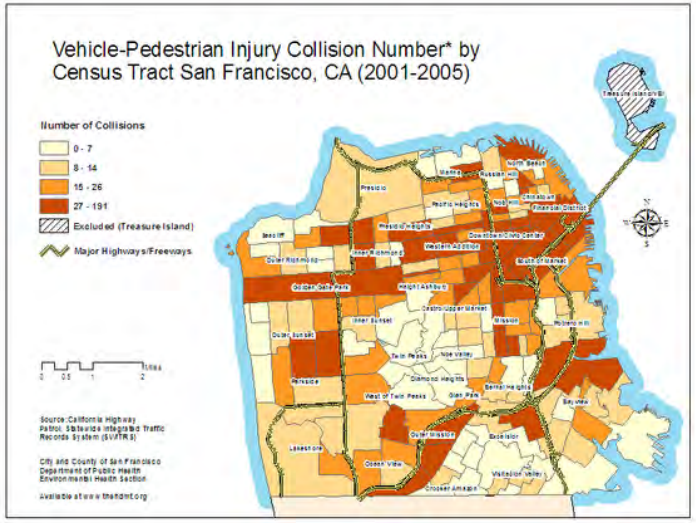
- 18-month process culminated in the development of the "Healthy Development Measurement Tool"

Cumulative impacts on roadway proximity from "smart growth" rezoning

Environmental health effects of roadway proximity include respiratory disease, lung development, sleep disturbance, stress, hypertension, and fatal traffic injuries.



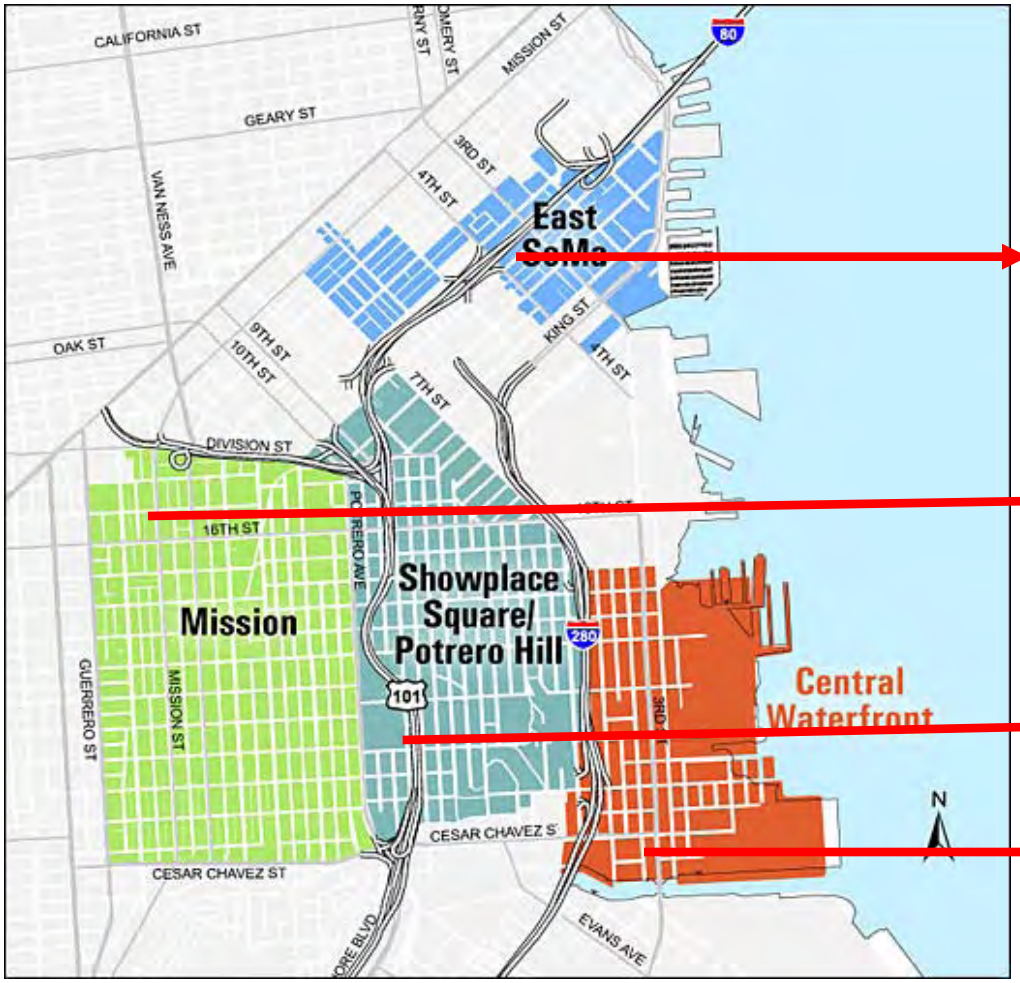




Area Level Regression Model of San Francisco Vehicle-Pedestrian Collision Injuries

- Traffic volume (+)
- Arterial streets (+)
  - w/o surface transit
- Neighborhood commercial zoning (+)
- Employees (+)
- Residents (+)
- Land area (-)
- Below poverty level (+)
- Age 65 and over (-)

Vehicle-Pedestrian Injury Collision Model: Eastern Neighborhoods Plans EIR Analysis



20%

21%

15%

24%

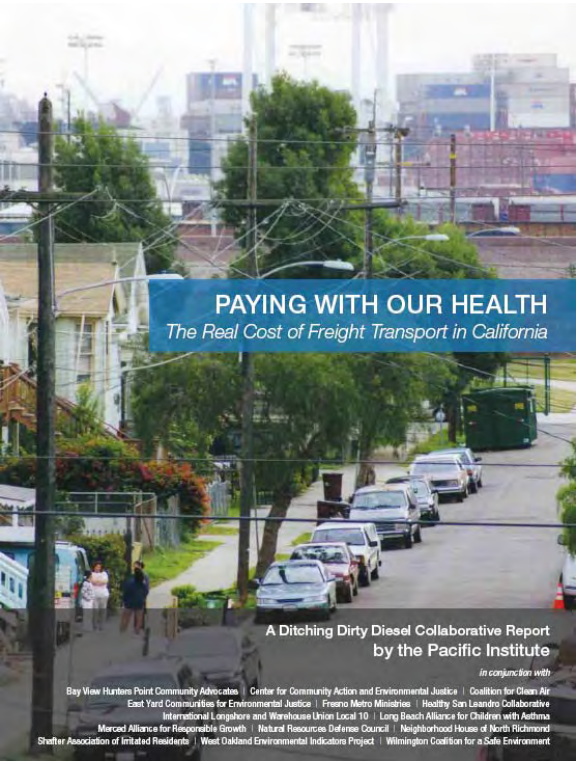
Predicted **% change in pedestrian injury collisions** based on estimated **changes** in **resident population** and **traffic volume**.

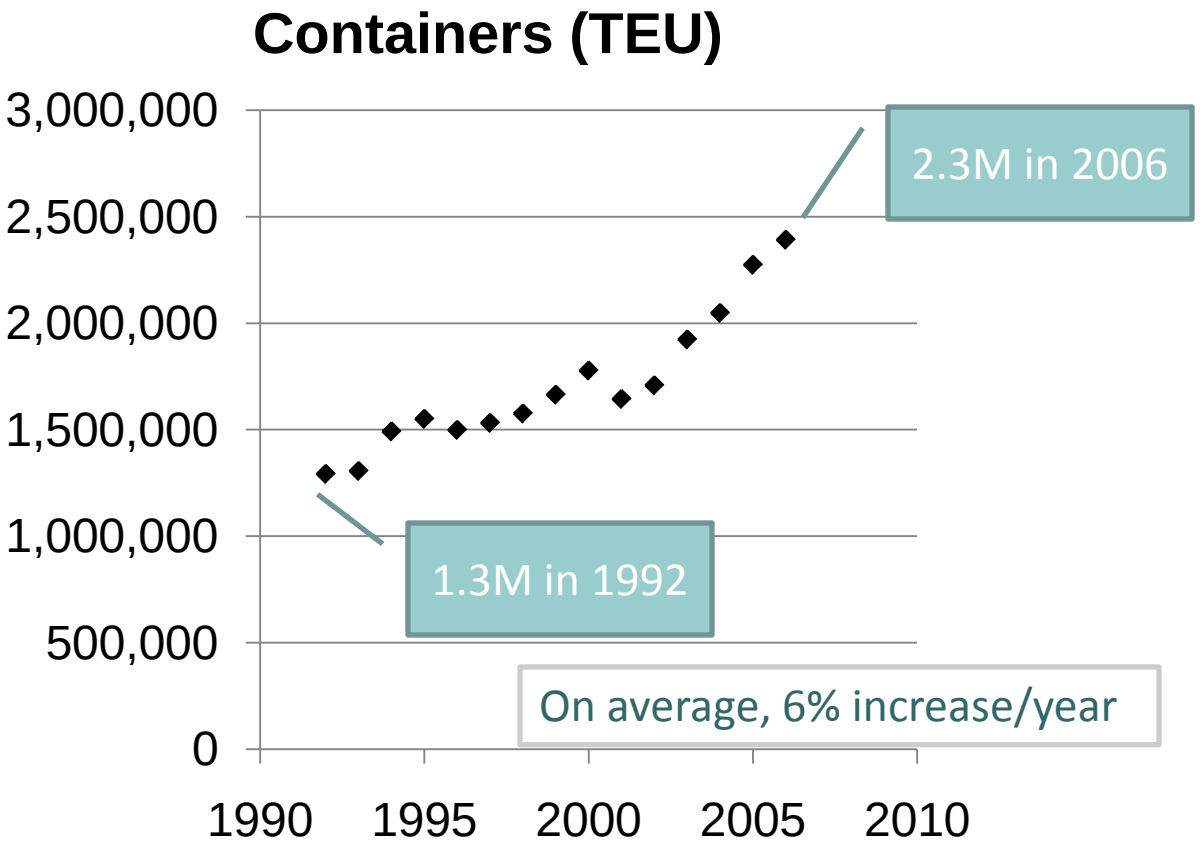
San Francisco Sensitive Use Protections for Traffic Pollution Hot Spots (HC Article 38)

- Identify Areas with Potential Conflicts through Roadway Exposure Zone Map
- Establish an PM 2.5 based Action Level for Mitigation
- Conduct Site Specific Air Quality Modeling
- Mitigation via Building Design or Engineered Ventilation to remove 80% of outdoor PM 2.5
- Maintenance Requirements

Port of Oakland HIA

Port of Oakland Shipping Trends

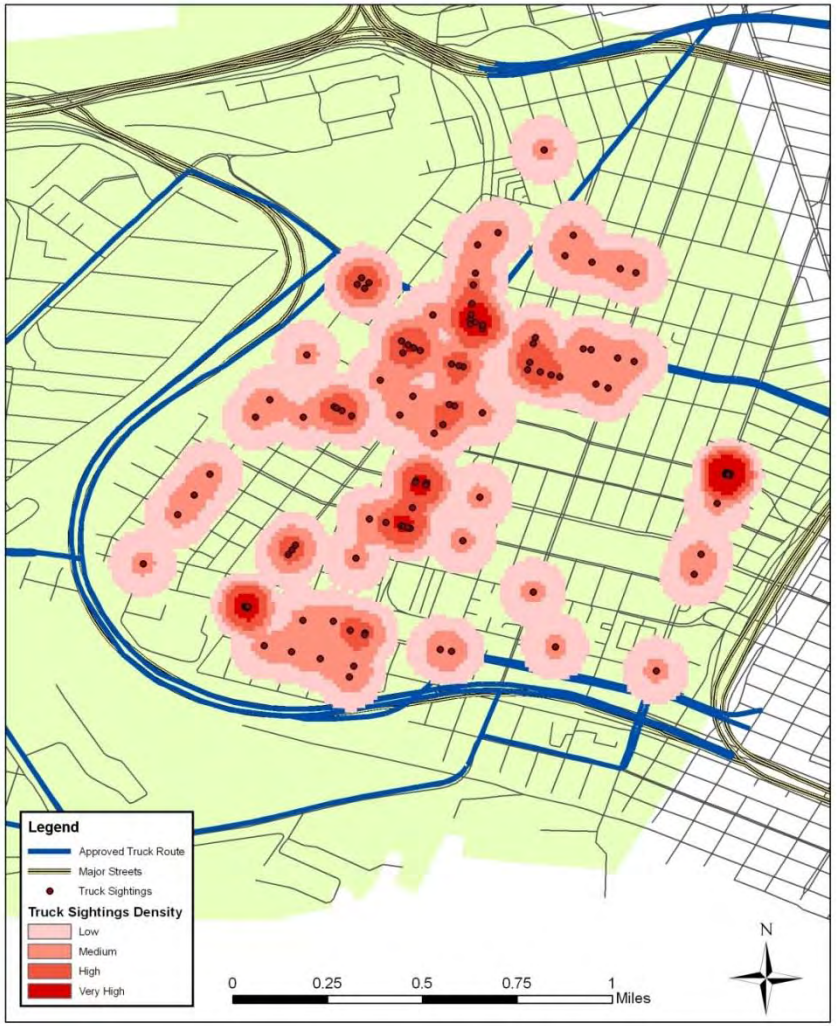




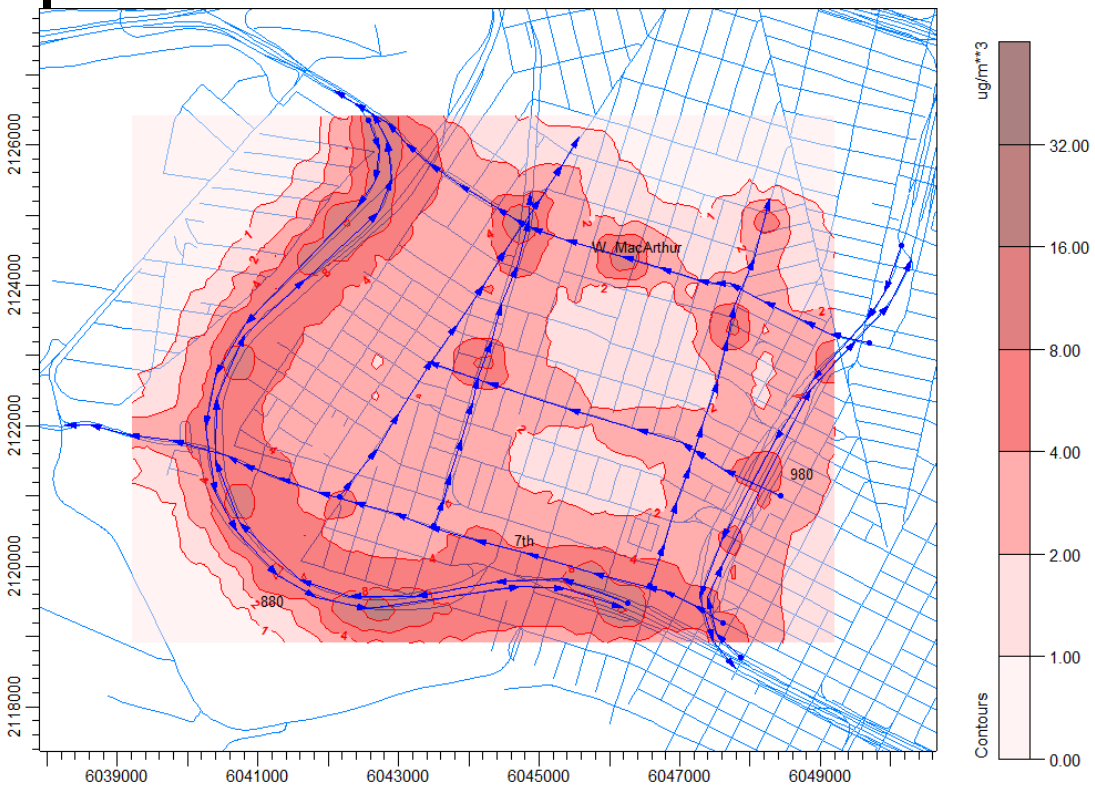
http://www.pacinst.org/reports/freight_transport/index.htm

/maritime/facts_cargo.asp

Truck sightings and truck routes in West Oakland



Estimated $PM_{2.5}$ Exposure and Health Impacts on West Oakland residents



Estimated deaths from PM 2.5 exposure

Including contributions from local traffic and surrounding freeways:

Approximately 4 deaths/year

$$\Delta y = y_0 (e^{\beta \Delta PM} - 1) \cdot pop$$

where:

Δy = changes in the incidence of a health endpoint corresponding to a particular change in PM

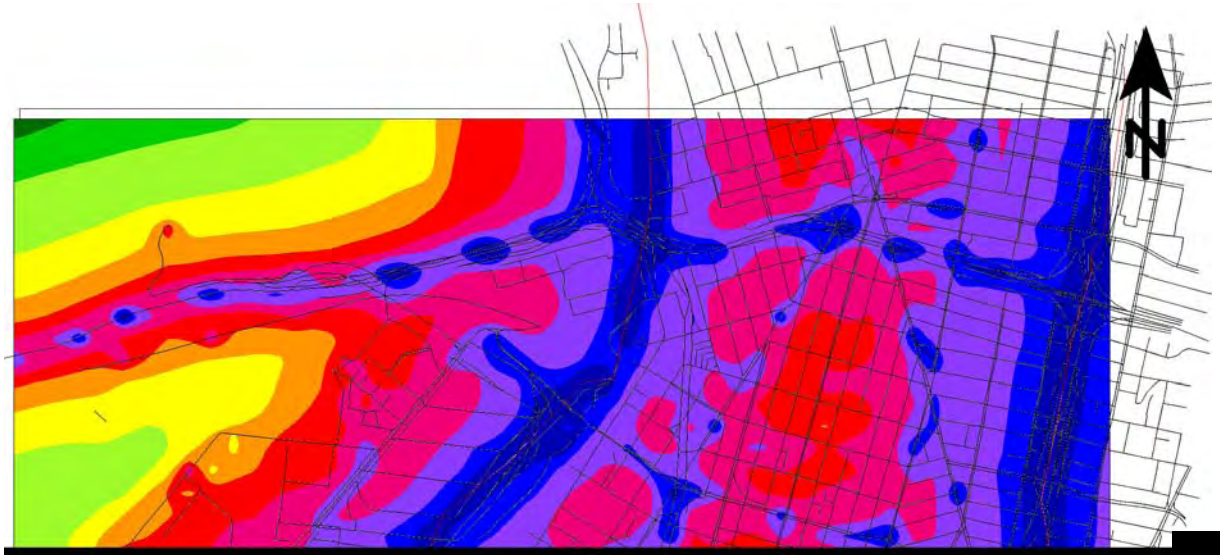
y_0 = baseline incidence rate per person

β = coefficient

ΔPM = change in PM concentration

pop = population of a particular group that a study considered

Estimated noise levels and health impacts from transportation sources



Sleep disturbed: 29%

High annoyance: 37%

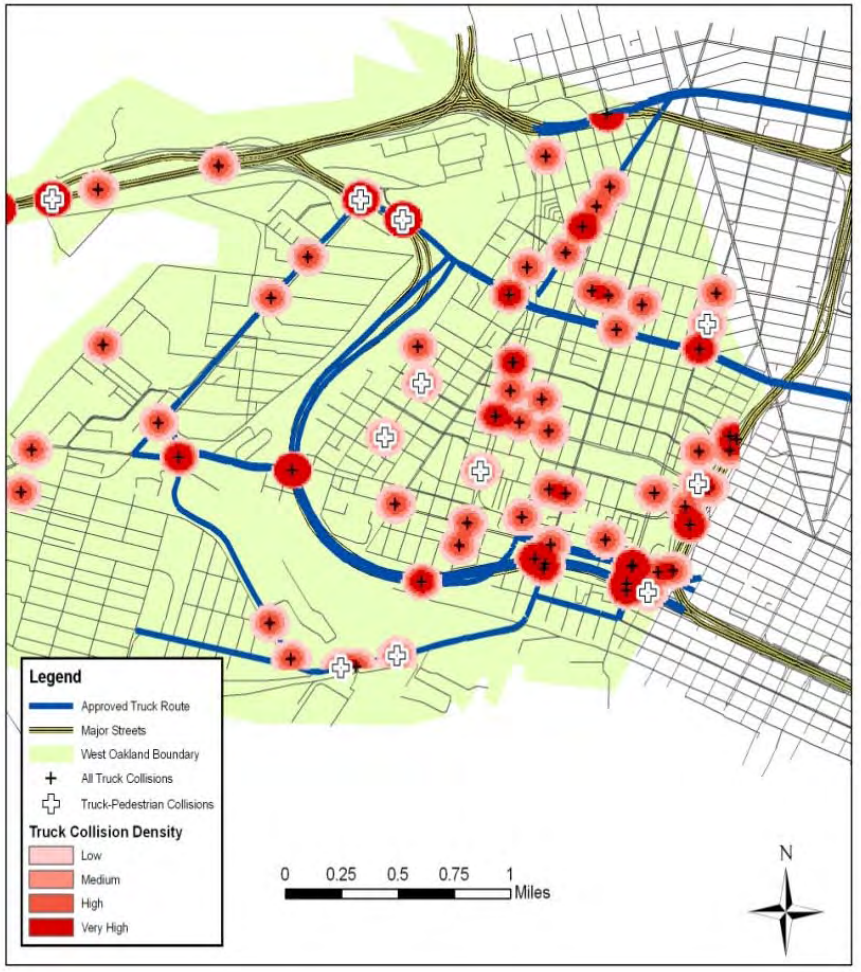
Cognitive impairment:
(reading + recall) 29%

Myocardial infarction:
8 deaths/year

Freight Routes and Truck-related Collisions in West Oakland

Truck-pedestrian/bicyclist
collision rates five-fold higher than City

Many truck collisions occur
not on the truck routes.



Impacts of HIA

- The value of HIA comes its capacity to integrate and translate, provide a place for public health engagement, and create new social networks
  - Changes public understanding of the causes of poor / good health
  - Development of policy agendas
  - Composition of policy coalitions
  - Changes to policy design
  - Integration of health in cross-sector activities
  - Accountability to EIA mandates for health analysis

California HIA Resources

Healthy Development Measurement Tool

- www.TheHDMT.org

Health Impact Assessment Collaborative

- www.HIAcollaborative.org

UC Los Angeles – HIA Clearinghouse

- www.ph.ucla.edu/hs/hiaclic