NEAR-ROADWAY AIR POLLUTION AND CHILDHOOD ASTHMA
Challenges for Policy Makers

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Communities

Map showing various communities along the coastline and major roads in the Southern California region.
CHILDREN’S HEALTH STUDY

- Has looked at impacts of living or going to school close to near-roadway air pollution
“Common Wisdom”
About Air Pollution and Asthma

Regional air pollution exacerbates asthma, but does not cause asthma

Emerging evidence indicates that near-roadway air pollution that varies within communities causes asthma

In the Children’s Health Study (and in other studies) we found that lifetime and new onset asthma were related to residential and school NRAP.

Air Quality is Worse Near a Freeway

Other pollutants are also high near freeway (e.g. NO2, benzene,...)

(Zhu et al., 2002, 2006)
There is more asthma in children living within 150 meters of a major road.

Some children are more susceptible to near roadway pollution…

Genetically susceptible children had 900% increase in frequency (lifetime prevalence) of asthma

(Salam MT, et al. Thorax 62:1050-7(2007))
NRAP Causes Asthma!

- Pattern of genetic susceptibility seen in CHS hard to explain based on socioeconomic status, race, other disparities...
- Many studies in U.S. and in Europe show that living near busy roads and freeways has been linked to asthma

Anderson HR, Atmosphere & Health 2011, 1-10
ALSO USED NEW TECHNIQUES TO ESTIMATE ‘BURDEN OF DISEASE’ ATTRIBUTABLE TO NRAP
Found a Large “Burden of Disease” from NRAP

Number of childhood asthma cases attributable to traffic proximity
- Long Beach – 1600 (9%)
- Riverside – 690 (6%)

Cost of pollution-attributable asthma exacerbation $18 million yearly

Half of total cost attributable to NRAP

(Brandt, Eur Respiratory J 2012)
Burden of Disease (L.A. County)

Number of childhood asthma cases attributable to traffic proximity

- Entire County using more complete exposure information:
  - 20,000 – 30,000 cases

Cost $400 m yearly

Perez, et al. EHP 2012

Brandt, et al. JACI 2014
Planning for SB-375
Greenhouse Gas Reduction

- Compact urban growth scenario
  - Increasing use of public transit
  - Reducing vehicle miles traveled
- Cleaner or zero emission vehicles
- Clear health co-benefits from reduced regional pollution
- Other health benefits from more parks, bike lanes, development conducive to walking
Risk of Increased NRAP Exposure Associated With Compact Urban Development

Residential proximity to a major road in So Cal in 2008 and 2035

- 2008: 8.3%
- 2035 (Future Scenario): 10.9%

Percentage
Action is Warranted to Prevent Childhood Disease

There is strong health science justification for regulating exposures within 500 feet of roadways with heavy traffic

- Precedent exists:
  - For school construction in California
  - For low income housing construction in L.A. County

Will anything else work as well?
- Filters, trees?
- Skepticism and further study is in order
Health Risks as Cities are Re-developed

- Transit-oriented developments right near freeways
- School and parks continue to be sited near busy roads and freeways
- Industrial sites and facilities emitting pollution are still being located near homes, schools and parks
Near-roadway air pollution is likely an obstacle to reducing prevalence of asthma.

By ignoring near-roadway air pollution, a historic opportunity is at risk of being missed.
Near-Roadway Air Pollution (NRAP): Emerging Evidence

- Associated in studies in U.S. and Europe with:
  - Childhood asthma
  - Heart attacks
  - Decreased lung function
  - Lung cancer
  - Low birth weight and preterm birth
  - Impaired neurodevelopment, including reduced IQ and autism
  - Accelerated cognitive decline and neurodegenerative disease in the elderly
  - Childhood obesity and obesity-related metabolic consequences, including diabetes
Many Causes of Childhood Asthma and Asthma Exacerbation

- Allergens (e.g. mold, pets, pests, house dust mite)
- Household and industrial chemicals
- Prenatal exposures (e.g. maternal obesity, tobacco smoke)
- Genetics
- Air pollution
- Combined exposures (e.g. stress and air pollution)