

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

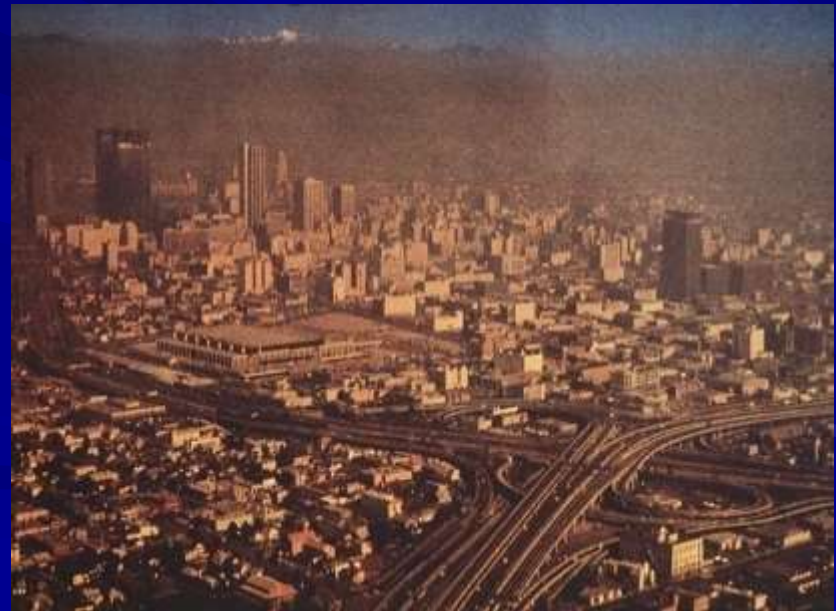
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Children's Health Study Communities



CHILDREN'S HEALTH STUDY

- Has looked at impacts of living or going to school close to near-roadway air pollution



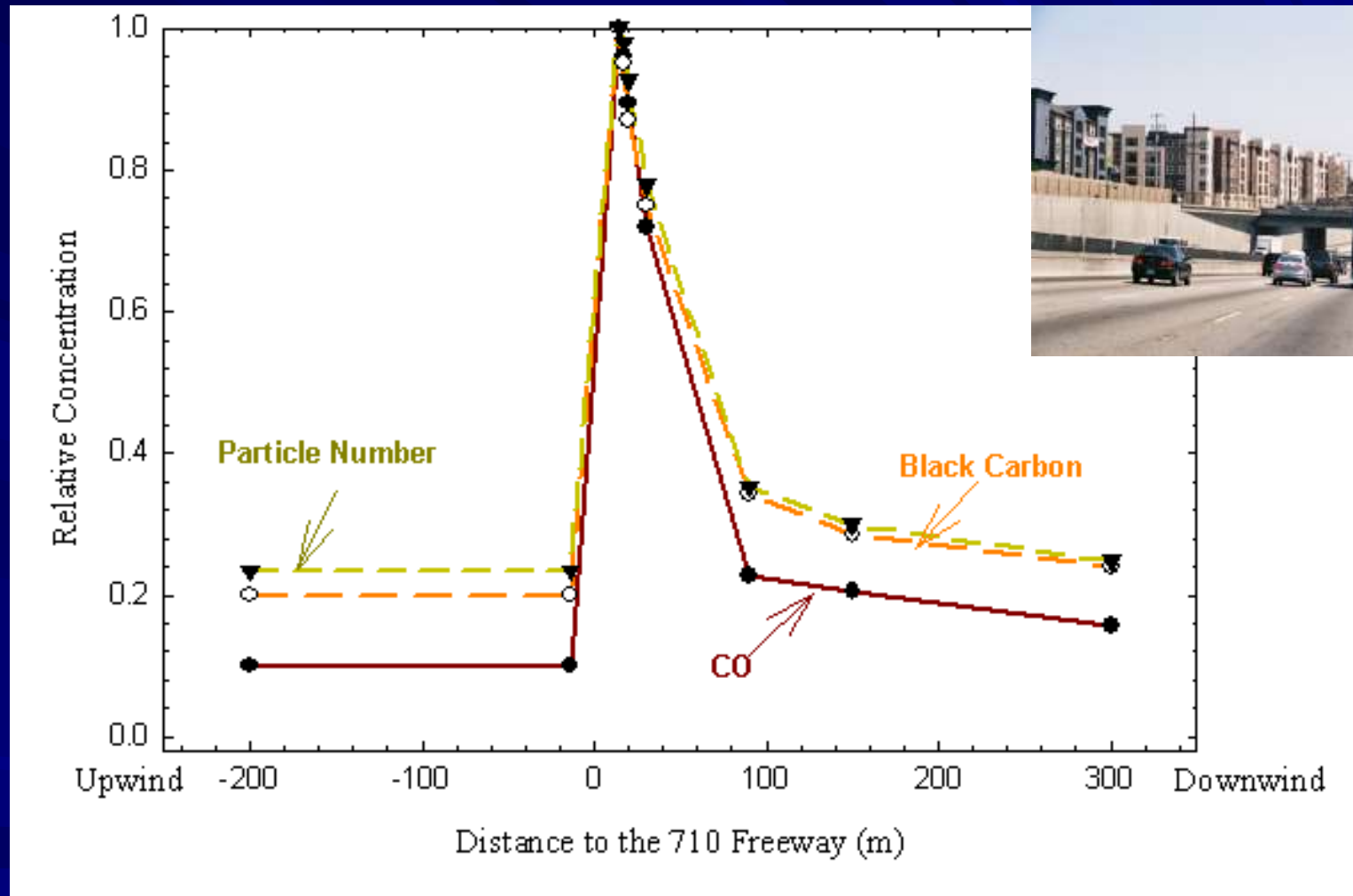
“Common Wisdom” About Air Pollution and Asthma

- Regional air pollution exacerbates asthma, but does not cause asthma

(Eder W, et al: The asthma epidemic, NEJM 2006;355:2226)

- 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.

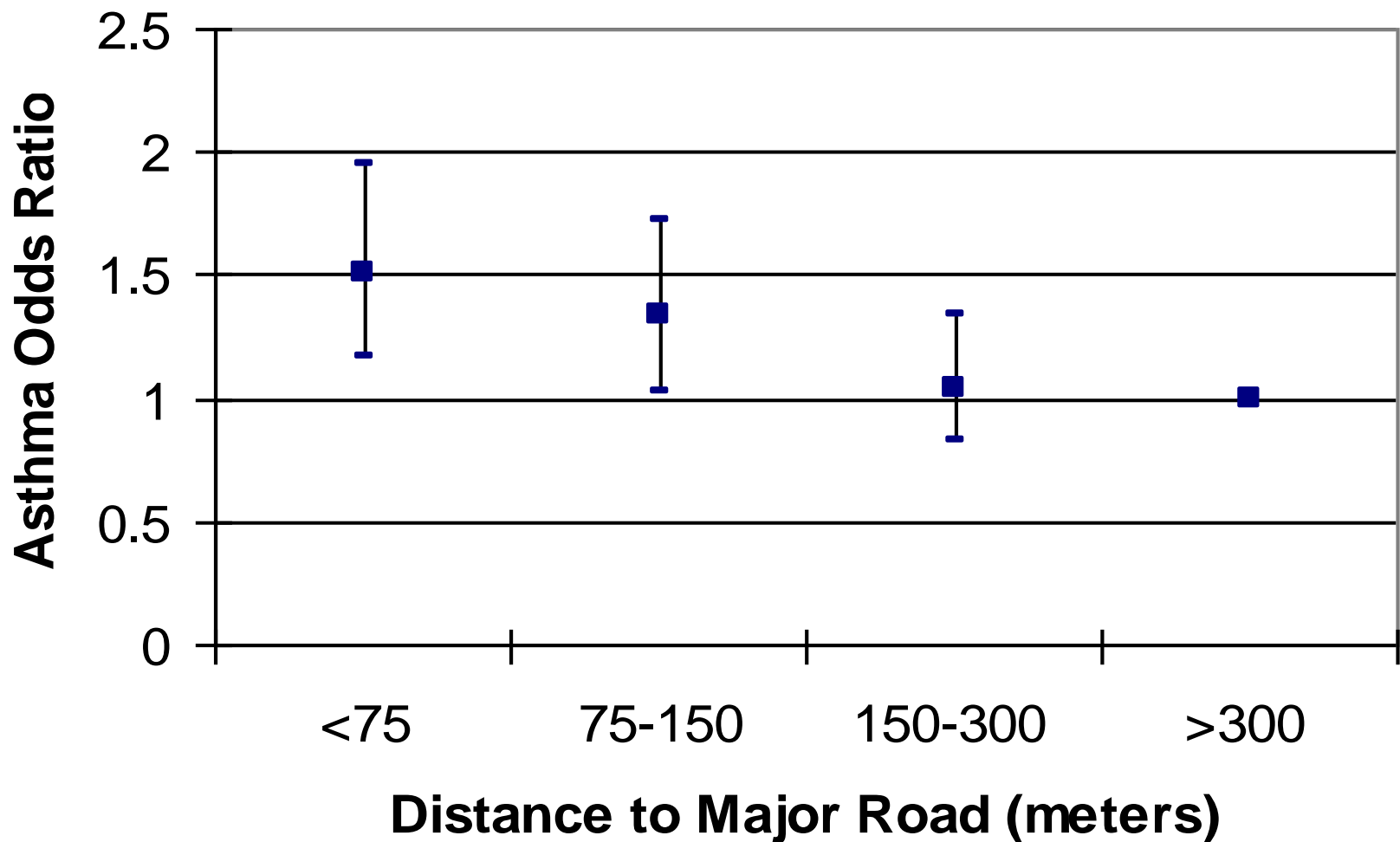
Air Quality is Worse Near a Freeway



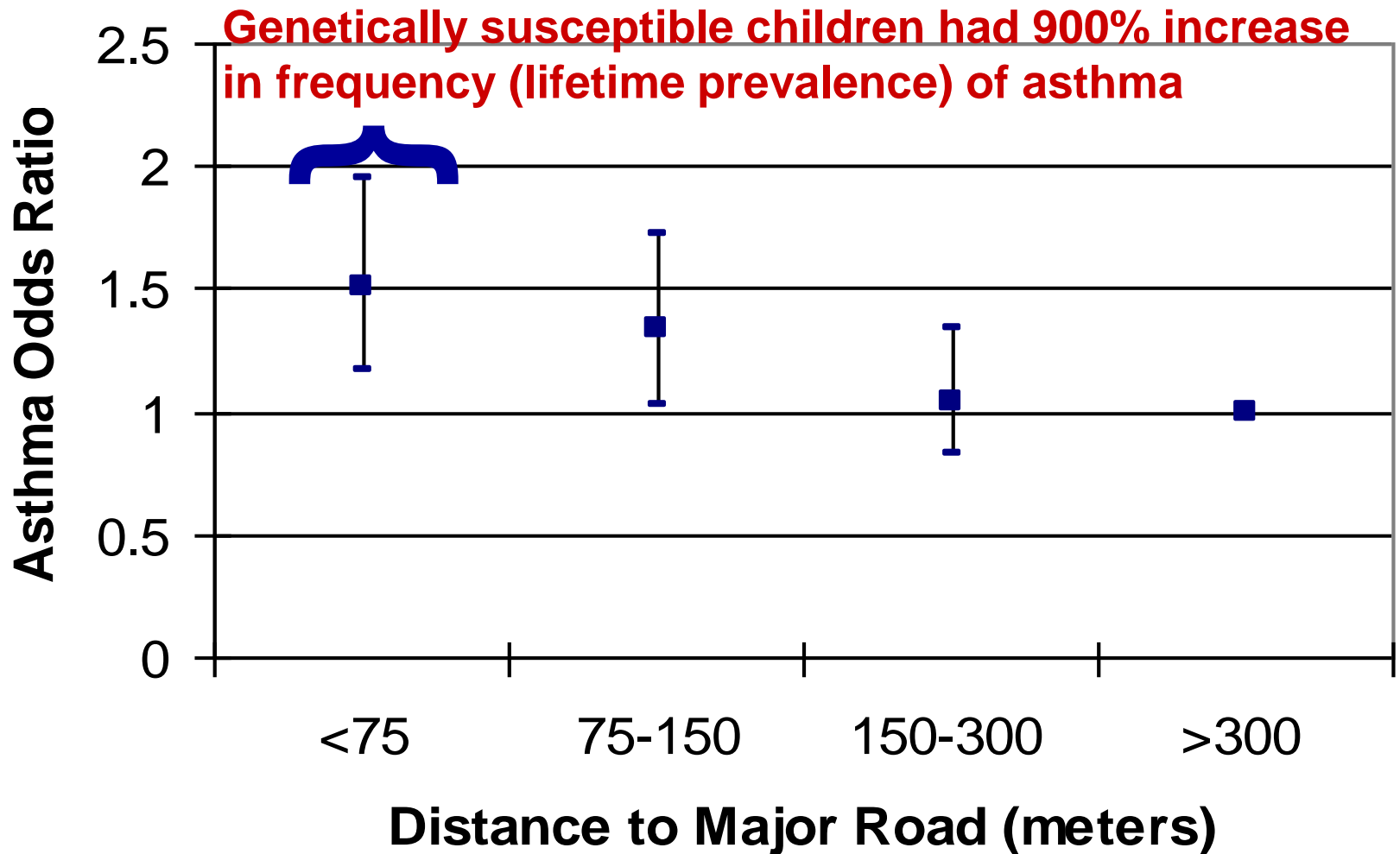
Other pollutants are also high near freeway (e.g. NO₂, benzene,...)

(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...



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%)

Kunzli, N. *Epidemiology*, 2008;19:179-85;
Perez, *Am J Public Health* 2009

- 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

Perez, et al. EHP 2012

- Cost \$400 m yearly

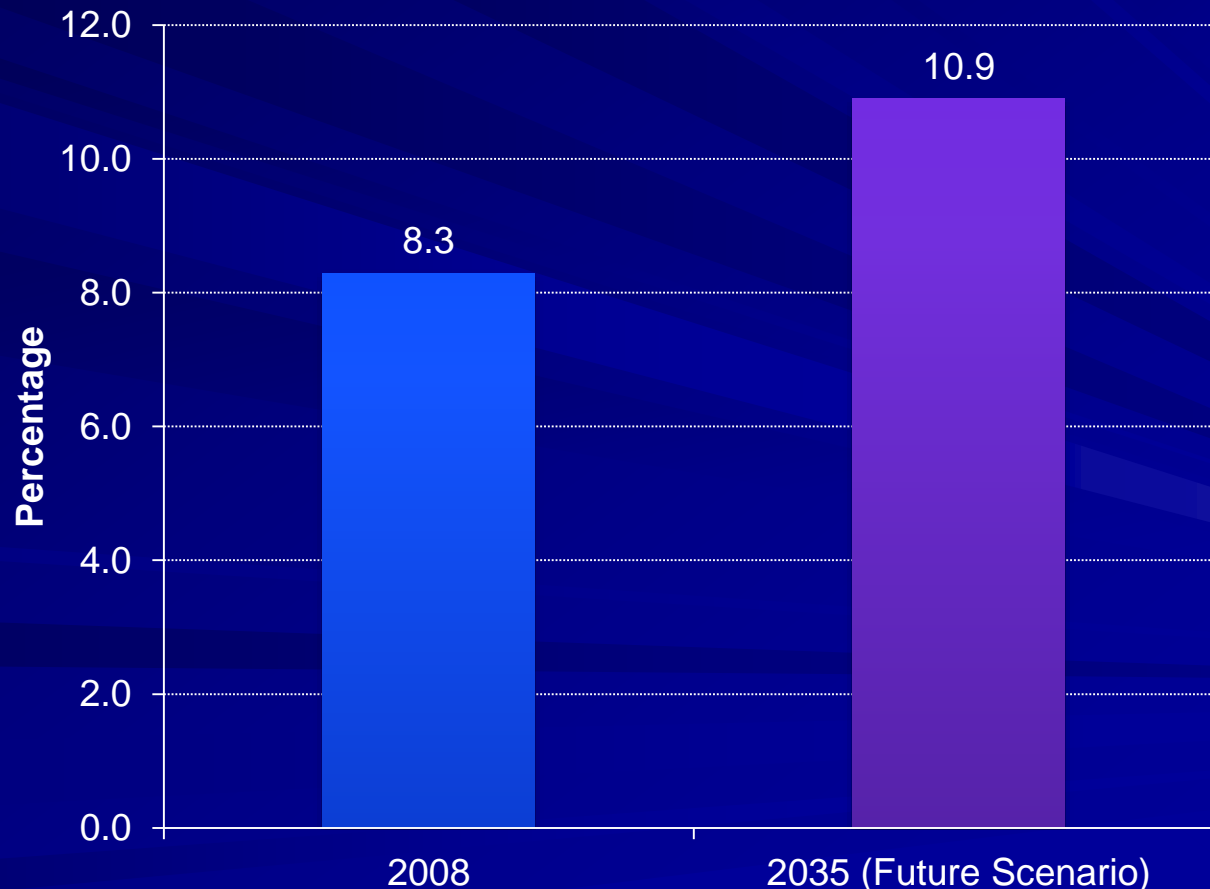
Brandt, et al. JACI 2014

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



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

BOTTOM LINE

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