

# Childhood Asthma & Exposure to Traffic

February 23, 2006



**Air Resources Board**



---

**California Environmental Protection Agency**

# Background



## Deaths Associated with Traffic

- ◆ **Dutch** - living near roadways doubled the risk of death from heart or lung disease

## Prenatal Impacts

- ◆ **Los Angeles** - infants born to women living near high traffic areas increased risk of premature birth and low birth weight

## Cardiovascular Effects

- ◆ **North Carolina** - PM exposure in cars is associated with cardiovascular effects in young men

## Children & Respiratory Effects

- ◆ **Bay Area** - children in schools nearby freeways have more respiratory symptoms

# Introduction



- ◆ Previous studies many in Europe
- ◆ A growing body of literature from the US
- ◆ Different indicators used for traffic
- ◆ Compare and validate traffic indicators
  - same study subjects
- ◆ Today's Study:
  - Gauderman WJ, et al. "*Childhood Asthma and Exposure to Traffic and Nitrogen Dioxide*". *Epidemiology*, 16:737-743, 2005.

# Population



- ◆ 208 children - from 10 Southern California cities
  - 15 % of children had asthma
  - USC-led Children's Health Study



# Methods



## MEASURED

- ◆ Distance from nearest freeway to child's home
- ◆ Volume of vehicles 150 meters from home
- ◆ NO<sub>2</sub> samplers outside homes

## MODELED AT EACH CHILD'S HOME

- include weather conditions, vehicle counts
- ◆ Modeled freeway pollution
- ◆ Modeled non-freeway road pollution

## POTENTIAL CONFOUNDERS

- ◆ Included gas stove, maternal smoking, and ETS

# Results



<i>Outcome</i>	<i>Measured NO<sub>2</sub></i>	<i>Distance to Freeway</i>	<i>Modeled Freeway</i>
<b>Asthma Prevalence</b>	1.83 (1.04-3.22)	1.89 (1.19-3.02)	2.22 (1.36-3.63)

# Evaluation of Traffic Indicators



- ◆ Estimates of freeway indicators were strongly correlated with measured  $\text{NO}_2$  at home
- ◆  $\text{NO}_2$  a product of combustion engines

Correlation Between Traffic Indicators &  $\text{NO}_2$



\* Absolute value, as  $\text{NO}_2$  is negatively correlated with distance of home to the freeway.

# Summary of Results



- ◆ Higher asthma prevalence near freeways
- ◆ Proximity to freeways linked with increased wheezing & asthma medication use
- ◆ Freeway traffic has a strong influence on  $\text{NO}_2$  concentrations at homes
- ◆ A traffic indicator -  $\text{NO}_2$

# ARB Ongoing Traffic Studies



## Children

- ◆ Traffic-Related Air Pollution and Asthma in Economically Disadvantaged and High Traffic Density Neighborhoods in Los Angeles County, California
- ◆ Traffic Pollution and Children's Health: Refining Estimates of Exposure for the East Bay Children's Respiratory Health Study

## Elderly

- ◆ Cardiovascular Health Effects of Fine and Ultrafine Particles during Freeway Travel
- ◆ Air Pollution and Cardiovascular Disease in the California Teachers Study Cohort

# Concluding Remarks



- ◆ Traffic air pollution associated with asthma in children
- ◆ Freeway a major pollution source in a community
- ◆ Continued research on traffic effects