

Asthma and Local Traffic in the Children's Health Study

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The USC Children's Health Study



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Features of the CHS

- Longitudinal study of 6,000 children
- 12 communities
 - Varied types and levels of regional pollution
- Main outcomes:
 - Lifetime asthma and related symptoms
 - Current wheeze last year
 - Severe wheeze
 - School absence monitoring
 - Lung function growth

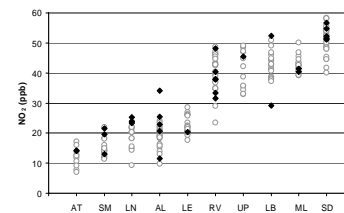
Traffic Metrics

- Average annual daily traffic density within 150 meters (distance weighted)
- Modeled NO₂ exposures
 - CALINE4 line source dispersion model
 - Freeway and non-freeway sources
- Distance to a freeway
- Measured NO₂ at a random sample of homes in each community

NO₂ Pilot Study

- How does NO₂ vary within community?
 - Correlated with health?
 - Correlated with traffic metrics?
- Random sample of children at 233 homes
 - 2 wk periods, August and December

Measured NO₂ at 208 homes By asthma status



Association of NO₂ and Traffic with Lifetime Asthma

Exposure metric	Odds Ratio per IQR	
	OR ^a	(95% C.I.)
Measured NO ₂	1.83	(1.04, 3.21)
Distance to Freeway	1.89	(1.19, 3.02)
CALINE4 model-based pollution from:		
Freeways	2.22	(1.36, 3.63)
Non-freeways	1.00	(0.75, 1.33)

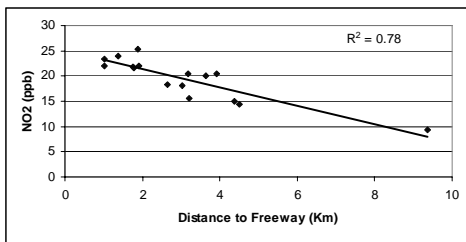
^a Includes adjustments for sex, race, hispanic ethnicity, cohort, and community; odds ratio per increase in 1 interquartile range (5.7 ppb for NO₂ and 1.2 km for freeway distance)

Gauderman et al., in press

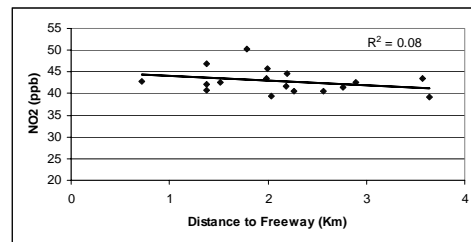
Issues

- How well do traffic metrics predict NO₂
- Quality of traffic data?
- Schools with traffic density of zero?
- What does NO₂ represent?
- Heterogeneity of effects by community?

Measured NO₂ vs. Distance to Freeway (Lancaster)



Measured NO₂ vs. Distance to Freeway (Mira Loma)



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Conclusions

- In southern California
 - NO₂ was a marker for exposures associated with asthma, but it was unlikely to be the (only) causal pollutant
 - Distance to a freeway may be an easily measured marker of exposure to pollutants from local secondary roadways
- It is prudent to calibrate the selection of traffic metrics to measurements of an appropriate indicator pollutant