Developing Indicators for Asthma or Other Respiratory Problems

Ying-Ying Meng[1], Beate Ritz[2],
Michelle Wilhelm[3], and Michael Jerrett [4]

1. UCLA Center for Health Policy Research;
2. UCLA Dept. of Epidemiology, Environmental Health Sciences, and Neurology;
3. UCLA Dept. of Epidemiology,
4. UC Berkeley Div. of Environmental Health Sciences

UCLA CENTER FOR
HEALTH POLICY RESEARCH

Objectives

○ To investigate the feasibility of combining existing environmental monitoring and health survey data (California Health Interview Survey (CHIS)) to develop health outcome indicators.
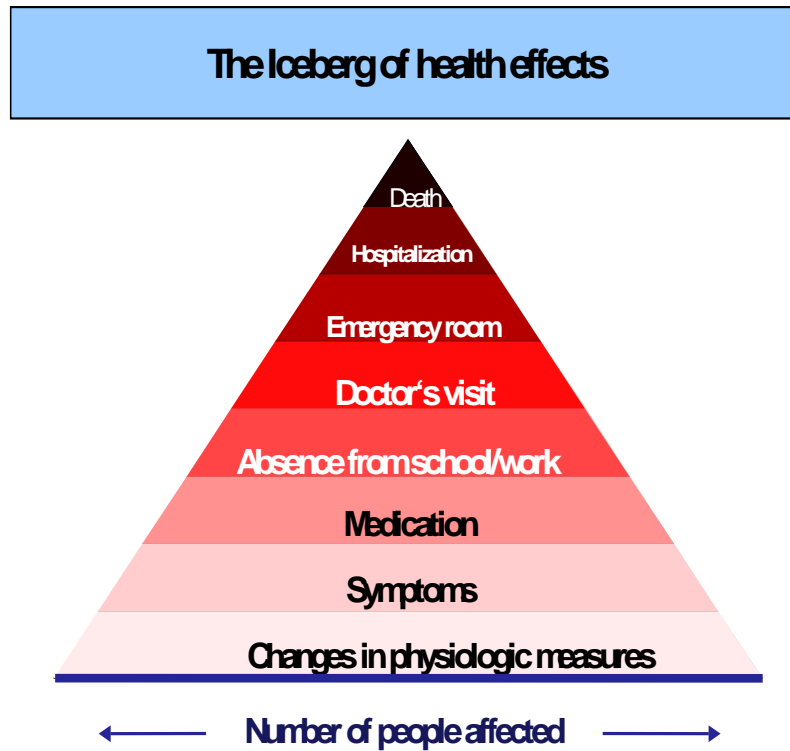
California Health Interview Survey

- A two-stage, geographically stratified random-digit-dial (RDD) telephone survey conducted biannually since 2001 in California;
- Interviews conducted in five different languages;
- Information collected on more than 54,500 non-institutionalized Californians in each survey;
- Many standard health questions, including asthma-related questions from the National Health Interview Survey;
- Geocodable residential address information, as well as duration of residence in the same neighborhood.

UCLA CENTER FOR
HEALTH POLICY RESEARCH

Health Outcome Indicators

The Iceberg of health effects

Death

Hospitalization

Emergency room

Doctor's visit

Absence from school/work

Medication

Symptoms

Changes in physiologic measures

← Number of people affected →

For those with asthma:

- Asthma-related ED visits,
- Doctor visits,
- Absences from school/work,
- Medication use, and
- Frequency of asthma symptoms

For those without asthma diagnoses:

- Asthma-like symptoms,
- Doctor visits and
- Absences from work/school due to breathing problems

UCLA CENTER FOR
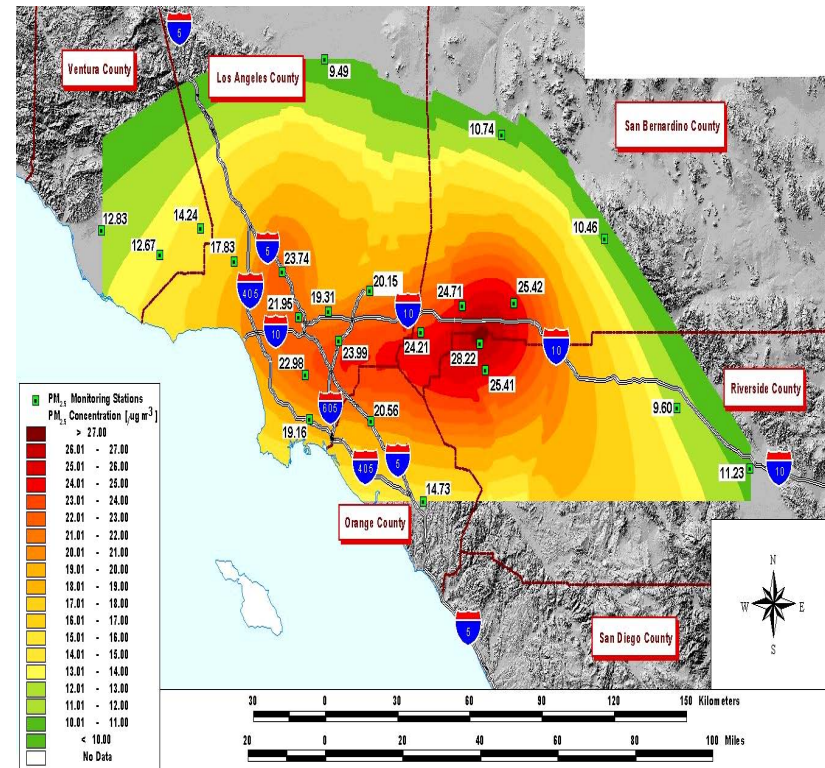HEALTH POLICY RESEARCH

Exposure indicators

For all CHIS 2003 respondents and CHIS 2005 asthmatic respondents:

- Long-term (12-, 24- and 36-month) **criteria air pollutant exposure indicators** using existing measurement data for O_3, NO_2, PM_{10}, and $PM_{2.5}$.

Geostatistical Exposure Modeling

For CHIS 2005
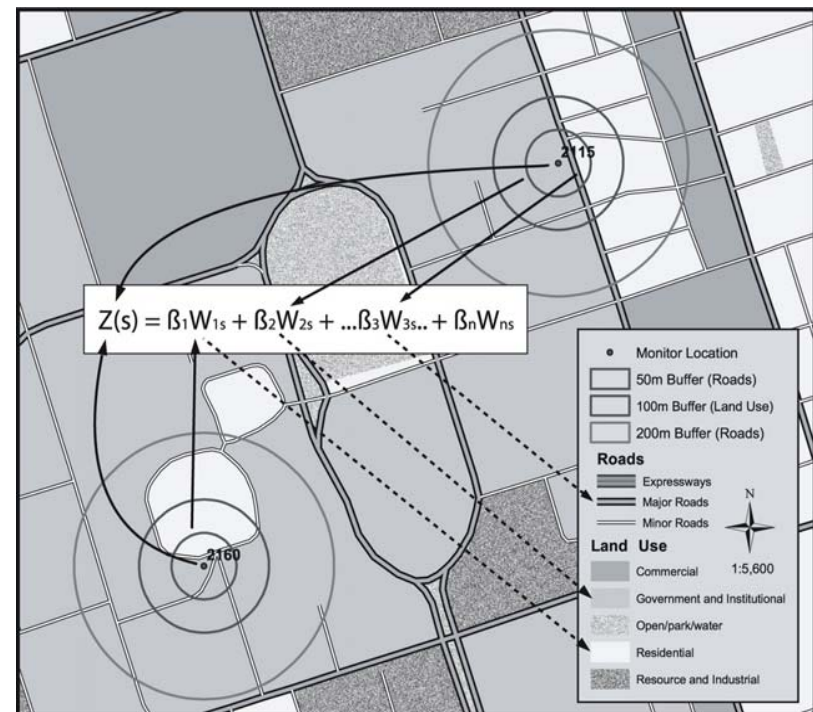respondents
with asthma in
Los Angeles:

- Kriging for O_3

Geostatistical Exposure Modeling

For CHIS 2005
respondents with
asthma in Los
Angeles:

- Land use
regression (LUR)
for PM_{10}, $PM_{2.5}$, NO_x,
NO and NO_2)

$$Z(s) = \beta_1 W_{1s} + \beta_2 W_{2s} + \dots \beta_3 W_{3s}.. + \beta_n W_{ns}$$

- Monitor Location
- 50m Buffer (Roads)
- 100m Buffer (Land Use)
- 200m Buffer (Roads)

Roads
- Expressways
- Major Roads
- Minor Roads

Land Use
- Commercial   1:5,600
- Government and Institutional
- Open/park/water
- Residential
- Resource and Industrial

Traffic-related Exposure Indicators

For all CHIS 2003 respondents and 2005 asthmatic respondents:

- Traffic Density;
- Proximity to roadways.

UCLA CENTER FOR
HEALTH POLICY RESEARCH
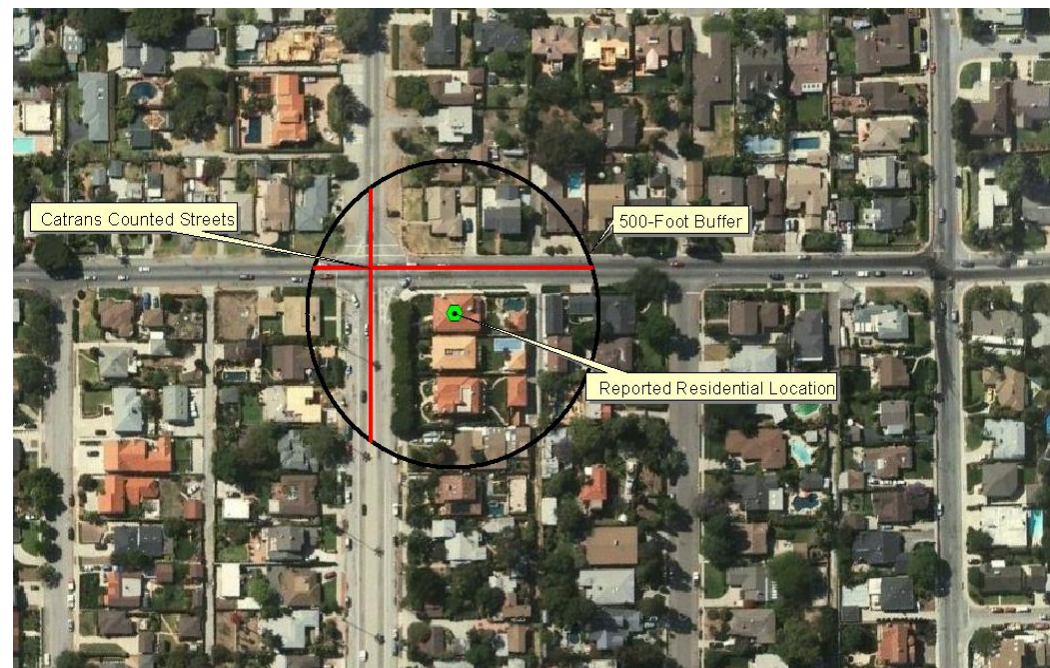
Data Analyses

- With this combined data, we will use statistical modeling to quantify spatial and temporal links between the exposure indicators and health outcome indicators after adjusting for other risk factors, such as smoking and secondhand smoking.

- We will also evaluate whether the estimated associations differ by geographic region (e.g., rural or urban) and for potentially susceptible sub-populations (e.g., children and the elderly).

UCLA CENTER FOR
HEALTH POLICY RESEARCH