

US EPA ARCHIVE DOCUMENT

# El Paso Children's Respiratory Health Study

**Start Date: 1999**

**Completion Date: 2001**

## **Project Purpose:**

To determine if exposures to particulate matter and gaseous co-pollutants from mobile sources are associated with increased prevalence of respiratory symptoms or illness or with lung function decrements in children. Previous epidemiologic studies of children in Europe and Southern California have suggested that proximity to major highways and gaseous indicators of mobile source emissions are associated with adverse respiratory health effects, including an increased prevalence of asthma.

## **Project Description:**

The El Paso Children's Health Study has been a major collaborative effort by NHEERL and NERL scientists to examine the role of mobile source emissions in the development of allergies and asthma among nearly 8,000 children enrolled in the 4<sup>th</sup> and 5<sup>th</sup> grades of the El Paso Independent School District. El Paso, TX, is the largest metropolitan area on the US-Mexico border with a major, urban border crossing and heavily traveled roads and interstate freeways. During the winter, neighborhood differences in air pollutant levels increase as weather conditions trap air pollutants close to ground level. This study involves the comparison of neighborhood differences in exposures to mobile source emissions as estimated from an area-wide, measurement-based geographic information system with neighborhood differences in the prevalence of asthma, allergies, other respiratory conditions, and decreased lung function.

The El Paso Children's Health Study consisted of two waves of exposure monitoring, respiratory health questionnaires, and lung function examinations. The cooperation of the El Paso Independent School District; its principals, teachers, and staff; local health and environmental agencies; and the parents and children were excellent throughout the study.

The school-based air quality monitoring component began with a pilot study using passive samplers for nitrogen dioxide in February, 1999 and was followed by an enhanced exposure assessment study conducted by scientists from EPA's National Exposure Research Laboratory in November-December, 1999. The concentrations of volatile organic compounds and nitrogen dioxide were measured at 22 schools with passive monitors. Concurrent with school monitoring, ultrafine particles, fine particles, carbon monoxide, nitrogen dioxide and volatile organic compounds were measured at two environmental monitoring stations operated by the state of Texas in central El Paso.

In January, 2001, respiratory health questionnaires in both English and Spanish were distributed to all fourth and fifth grade children to take home to their parents. The questionnaire asked about respiratory conditions, such as allergies and asthma, and the home environment. Within a week, 7,775 questionnaires were completed and returned for an 80% participation rate. From late-March through mid-May, 2001, breathing tests were performed with parental consent on 2,572 children at 20 elementary schools selected on the basis of enrollment, school location, and prior participation in monitoring studies. Quality assurance assessments of the health measures were conducted through May, 2003. The geographic information system and exposure assessment model were

completed in December, 2003. In September, 2002, an EPA report on the prevalences of selected health conditions and domestic environmental risk factors was presented to local officials and at a public meeting in El Paso.

#### **Accomplishments:**

From 2001 to 2004, environmental assessment results have been discussed at various international scientific conferences including:

- an association of distance from border and elevation with concentration gradients of nitrogen dioxide and motor vehicle-related volatile organic compounds, and
- an predictive ambient concentration model was developed based on these relationships to predict children's exposures in the school-based health study.

From 2001 to 2004, preliminary health results have been discussed at various international scientific conferences including:

- an association of increased prevalence of respiratory allergies in children associated with increased duration of residence in El Paso,
- findings of both adverse and protective health effects associated with the child's home environment, and
- an association between estimated exposures to indicators of mobile source emissions and lower levels of peak expiratory flow in children

#### **Expected Outcome(s):**

Noble, C.; Mukerjee, S.; Gonzales, M.; Rodes, C.E.; Lawless, P.A.; Natarajan, S.; Myers, E.A.; Norris, G.A.; Smith, L.; Ozkaynak, H.; Neas, L.M. Continuous measurement of fine and ultrafine particulate matter, criteria pollutants and meteorological conditions in El Paso, Texas. *Atmospheric Environment* 2003; 37:827-840.

Neas, L.; Svendsen, E; Ross, M; Gonzales, M.; Walsh, DF; Rhoney, S; Terrill, G. Adverse impact of home dampness and length of residence on atopy and lung function among children in El Paso, Texas, USA. *Epidemiology* 2003; 14:S109.

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Mukerjee, S.; Norris, G.A.; Smith, L.A.; Noble, C.A.; Neas, L.M.; Ozkaynak, H.A.; Gonzales, M. Receptor model comparisons and wind direction analyses of volatile organic compounds and submicrometer particles in an arid, binational, urban airshed. *Environmental Science and Technology* 2004; 38:2317-2327.

Gonzales M., Qualls C., Hudgens E., Neas L. Characterization of a spatial gradient of nitrogen dioxide across a United States–Mexico border city during winter. *Science of the Total Environment* 2004; in press.

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Neas, L.; Gonzales, M.; Mukerjee, S.; Smith, L.; Svendsen, E. GIS-modeled indicators of mobile source emissions and adverse health effects among children in El Paso,

Texas, USA. Epidemiology 2004; 15:S66.

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