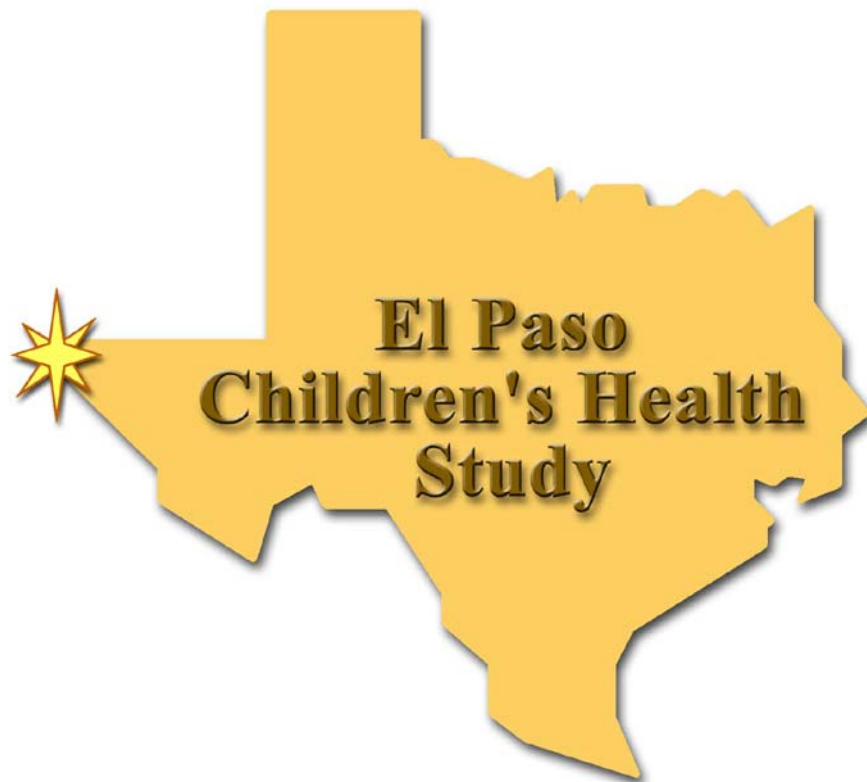




**Preliminary Research Findings**  
**of the El Paso Children's Health Study**



**Research and Development**

### **Disclaimer**

The information in this document complies with U. S. Environmental Protection Agency regulations and policies pertaining to the protection of human subjects in research and was reviewed and approved by the University of North Carolina's Committee for the Protection of the Rights of Human Subjects and by the EPA Human Subjects Research Review Official. The collection of data was also reviewed and approved by the White House Office of Management and Budget to ensure our compliance with the Paperwork Reduction Act. The information included herein presents preliminary findings of the initial phase of the study and is approved for publication. Approval does not signify that the contents reflect the view of the Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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**Preliminary Research Findings**  
**of the El Paso Children's Health Study**

**Prepared for the**  
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# **Preliminary Research Findings of the El Paso Children's Health Study**

## **Executive Summary**

The El Paso Children's Health Study was designed to evaluate the possible association between childhood respiratory illness and ambient air quality in the El Paso metropolitan area. The study was conducted by researchers of the U.S. Environmental Protection Agency (EPA), in cooperation with the El Paso Independent School District (EPISD), as part of EPA's Border XXI Program.

In the spring of 2001, 9,797 respiratory health questionnaires were distributed to all 4<sup>th</sup> and 5<sup>th</sup> grade students enrolled in the 54 EPISD elementary schools, and completed questionnaires were successfully returned for 7,772 children (80%). After the exclusion of children with severe chest illnesses, injuries or operations and children with missing information on key risk factors, questionnaires for 6,825 children were suitable for further analysis.

This document is an attempt to provide immediate information back to the EPISD as a return on their investment in the El Paso Children's Health Study. These preliminary research findings provide a summary of the information collected during the questionnaire survey

phase of the study across the 54 elementary schools, including the prevalence of respiratory symptoms and illness and the prevalence of key risk factors for respiratory illness. The information may be useful to EPISD school health nurses and health educators in designing local public health programs.

The El Paso Children's Health Study was not designed to provide a direct comparison between El Paso with the rest of the United States. Nevertheless, as a whole, the children in our study do not appear to have a higher prevalence of a physician's diagnosis of asthma, either lifetime or in the last year, than observed in similar studies of schoolchildren in other U.S. communities.

The analytic work on the El Paso Children's Health Study will continue beyond this document. Analyses of the role of traffic-related air pollutants in children's respiratory health will be conducted over the next two years, with presentations of preliminary findings at a major international scientific conference in 2003 and publication of scientific papers in peer-reviewed journals in 2003 and 2004.

# Preliminary Research Findings of the El Paso Children's Health Study

## Introduction

The El Paso-Ciudad Juarez area is one of the largest metropolitan areas on the U.S.-Mexico border. Sources of air pollutants include the more than 18 million vehicles, which annually cross between the two cities, heavily traveled roads and interstate freeways, and local industries. During the winter, weather conditions trap air pollutants close to ground level where they concentrate. The main air pollutants that we are studying (particulate matter or soot, and gases such as nitrogen dioxide and volatile compounds) are produced by car and truck emissions. The Texas Natural Resources Conservation Commission routinely monitors these air pollutants in El Paso. As part of the El Paso Children's Health Study, these air pollutants have been measured in the vicinity of El Paso Independent School District (EPISD) schools over two consecutive winters. Preliminary analyses suggest that the levels of many of these air pollutants appear to depend on the school's distance from major roadways. Highway and border traffic congestion, combined with winter weather conditions and different levels of air pollutants in different areas of the city provided the opportunity to study the health effects of motor vehicle exhaust in children.

The El Paso Children's Health Study evaluated the prevalence of respiratory illnesses and symptoms among those 4<sup>th</sup> and 5<sup>th</sup> grade students enrolled in the EPISD during the spring 2001. The study was conducted by researchers of the U.S. Environmental Protection Agency (EPA), in cooperation with EPISD. Fifty-four

elementary schools participated in the questionnaire portion of the health survey.

Immediately following the survey, children at 20 schools who had written parental permission had their height, weight and pulmonary function measured. These 20 schools were locations where air pollution measurements had been collected over the previous two winter seasons. Additional air pollution measurements were also collected at these schools at the same time pulmonary function was measured on the children. The full study will fill important information gaps in our scientific knowledge and understanding by looking at the possible links between outdoor air pollution and asthma, bronchitis, other chest illnesses and symptoms in children.

These preliminary research findings provide a summary of the information collected during the questionnaire survey phase of the study. It describes how prevalent respiratory symptoms and illness are among this segment of the student population. Demographic characteristics of the students and their families as well as the prevalence of specific risk factors, or covariates, known to be associated with respiratory health status are also described. The information for each school that participated in the study is presented in tables aggregated by EPISD region.

The information contained in this public health report provides the EPISD an in-depth view of the respiratory status of their students and may be a useful tool for health professionals, district-wide and at individual schools, to better understand respiratory health trends and target

resources for training and intervention programs. The cooperation extended by the EPISD principals, teachers, staff, parents and children was excellent throughout the study. Without such

cooperation, a study of this magnitude could not have been accomplished to the high degree of participation and quality achieved.

## Study Overview

This document is divided into three main sections. The first section outlines the questionnaire study and provides a descriptive summary of the characteristics of the study population in terms of their respiratory health and risk factors. The second section provides a review of the prevalence of covariate risk factors and demographic information for each of the 54 participating schools. The last section provides both the crude prevalence rates of respiratory health outcomes (illness and symptoms) and the adjusted prevalence rates, which account for the risk factors and demographics of each school. The definitions of the respiratory health outcomes, risk factors and demographic

variables used in these analyses are provided in Appendix A. The results are explained and interpreted at the end of the report.

The El Paso Children's Health Study complied with EPA regulations and policies pertaining to the protection of human subjects in research and was reviewed and approved by the University of North Carolina's Committee for the Protection of the Rights of Human Subjects and by the EPA Human Subjects Research Review Official. The collection of data was also reviewed and approved by the White House Office of Management and Budget to ensure our compliance with the Paperwork Reduction Act.

## Methods

All 4<sup>th</sup> and 5<sup>th</sup> grade students enrolled in EPISD schools received a questionnaire packet from their teacher to take home to their parents between February and March 2001. All questionnaire packets contained an English-language questionnaire, a Spanish-language questionnaire and a No. 2 pencil. The parents were instructed to complete the questionnaire in the language they preferred, seal it inside the provided envelope, and returned by the child to the school. The provision of duplicate questionnaires in both English and Spanish to all parents was intended to ensure that all respondents could reply in the language of their own choice and to permit an evaluation of any language-related differences in reporting these health conditions.

The questionnaire asked parents whether the child had experienced asthma, bronchitis and/or allergies or breathing problems ever in their lifetime and/or

within the past year. Information on risk factors known to be related to respiratory health effects and demographic information was also collected.

Upon receipt of the returned questionnaire packet, all personal identifying information was detached from the remainder of the questionnaire. All personal identifying information has been maintained in a secure file separate from the statistical information in strict accordance with the Federal Privacy Act.

The statistical portion of each questionnaire was scanned into a statistical database. Over the past year, this statistical information has undergone quality assurance review to identify any reporting problems and to ensure the overall quality of the database. A more detailed discussion of the analytic methods employed in the production of these findings is provided in Appendix C.

## Study Population

During January and February 2001, 9,797 questionnaire packets were distributed to 4<sup>th</sup> and 5<sup>th</sup> grade school children attending 54 elementary schools in the EPISD (Figure 1). By the end of May, questionnaires were not returned for 1,564 children (16%). No clear pattern was observed of non-returns by school region. Questionnaires were returned for a further 461 children (5%), but their parents declined to participate in the study. Completed questionnaires were returned to the schools by parents for 7,772 children (80%).

A small proportion (4%) of the school children reported severe conditions including cystic fibrosis, chest injury, chest operation, heart disease, or the need for supplemental oxygen for more than two

weeks after birth. Since these conditions are often associated with severe respiratory illness and are causally unrelated to environmental factors, these 274 children were excluded from the study.

Any comparison of disease prevalence across schools requires an adjustment for selected risk factors that may also differ across schools. Therefore, a final 673 children (9%) were excluded because of missing information on one or more of these risk factors. Appendix B lists the number of questionnaires excluded by school, region and district-wide because the child had a severe illness or because critical information was not reported. After these exclusions, 6,825 questionnaires were suitable for further analysis.

## Respondent and Demographic Factors

In every school region, the child's biological mother most commonly completed the questionnaires (Table 2). Grandparents or other adults completed less than 10% of the questionnaires district-wide. Sixty to 70% of the children lived in households with two adults, but the percentage of two-parent households was somewhat lower in EPISD Region 3.

The study population consisted of 6,825 4<sup>th</sup> and 5<sup>th</sup> grade schoolchildren with approximately equal proportions of girls (51%) and boys (49%) and half of whom were 10 years of age or older (table 4). The students in this study population were predominantly of Hispanic ethnicity (83%). The questionnaire was completed predominantly in English by both Hispanics and non-Hispanics respondents (Figure 2) with the exception of EPISD Region 3, where significantly more Spanish-language questionnaires were returned (62%). This trend corresponds to the higher percentage of Hispanics in this

region (98%) as compared to the EPISD as a whole.

The median level of parental education varied considerably across the school district (Figure 3). Approximately half of the households in Regions 1, 2 and 3 had a maximum parental education of a high school degree and/or additional post-high-school education. College education was most common in Region 4 (56%, Range 25-78%) and less common in Region 3 (17%, Range 5-57%). Differences in overall parental education level between Region 3 and the other Regions is also exemplified by the number of schools where parents did not have a high school degree. There were five schools in Region 3 where 40-50% of the parents had less than a high school education. In contrast, only one school in the other regions had a 30% rate of less than high school education. However, it should be noted that 57% of the parents from Mesita Elementary School had a college education.

## Prevalence of Risk Factors

The prevalence rates of risk factors associated with respiratory health problems varied considerably by EPISD region and elementary school (Table 4). The distributions of these risk factors are important since we would expect schools with a higher prevalence of these risk factors to have a higher prevalence of respiratory conditions.

Genetic factors may predispose children to respiratory ailments such as asthma. Therefore, it is important to obtain information on the **health history of the child's biological parents**. The average prevalence of a parental history of respiratory illness was 31% for allergy, 12% for asthma, and 7% for other lung diseases.

Similarly, environmental factors may also be associated with respiratory ailments. Approximately one-third of the households in the district had at **least one**

**person who smoked cigarettes indoors**. Prevalence of smoking in more than 40% of the children's homes was reported for two elementary schools: Burnet (47%) and Clardy (41%). A low prevalence of smoking in the home was found for three elementary schools: Milam (16%), Kohlberg (16%), and Polk (17%).

Across the entire district, 18% of the parents reported a **problem with mold inside of their home**. The prevalence rates of indoor mold were less than 10% at three schools: Rusk (9%), Kohlberg (9%) and Roberts (9%). At four schools, 25% or more of the parents reported a home mold problem: Milam (27%), Logan (27%), Schuster (25%), and Putnam (25%).

A majority of the households (80%) had **gas stoves**, and slightly more than half had a **furry pet** (52%) such as a cat, dog, hamster, mouse or guinea pig.

## Unadjusted Prevalence of Respiratory Health Outcomes

The crude or unadjusted prevalence of the children's respiratory conditions provides a snapshot of the burden of illness at each school. The unadjusted prevalence may be most useful to School Health Nurses in the allocation of educational materials and health surveillance to those elementary schools with the highest prevalence regardless of the reasons for this higher prevalence. For these preliminary findings, we focused our attention on seven important respiratory conditions:

- a physician's diagnosis of allergy ever in lifetime,
- a physician's diagnosis of asthma ever in lifetime,
- a physician's diagnosis of asthma in the last year,
- a physician's diagnosis of bronchitis in the last year,
- a parental report of chronic cough in the last year,
- a parental report of persistent wheeze in the last year,
- a parental report of chronic phlegm in the last year.

Among the 4<sup>th</sup> and 5<sup>th</sup> grade school children in the EPISD, the crude or unadjusted prevalence of a **physician's diagnosis of asthma at some time in their life** was 11% (table 5).

Recent national surveys have estimated the lifetime prevalence of asthma as between 11% and 12% for the entire U.S. The five EPISD elementary schools with the

highest lifetime prevalence of physician-diagnosed asthma were Nixon (18%), Clendenin (16%), MacArthur (17%), Dr. Green (16%), and Western Hills (16%).

Among the 4<sup>th</sup> and 5<sup>th</sup> grade school children in the EPISD, the unadjusted prevalence of a **physician's diagnosis of asthma within the past year** was 8%. For the entire U.S., surveys have estimated the prevalence of asthma in the last year at between 6% and 8%. The five EPISD elementary schools with the highest prevalence of a physician's diagnosis of asthma in the last year were Whitaker (12%), Clendenin (12%); Mesita (12%); Rivera (13%) and Western Hills (13%).

Only Western Hills and Clendenin elementary schools were in the top five EPISD elementary schools for both a higher prevalence of lifetime physician's diagnosis of asthma and a higher prevalence of asthma within the past year.

The unadjusted prevalence of asthma at these EPISD elementary schools should be interpreted with considerable caution. The El Paso Children's Health Study was designed to detect patterns of illness across the entire EPISD that might be related to air pollution. The El Paso Children's Health Study was not designed to reliably detect elevation of illness at individual elementary schools. The higher unadjusted prevalence of asthma at these schools may be due to the prevalence of risk factors, reporting bias of the respondents, or chance.

## Adjusted Prevalence of Respiratory Health Outcomes

As previously mentioned, a family history of respiratory ailments and household environmental risk factors may influence whether a child has respiratory health problems. The crude or unadjusted prevalence of respiratory illness is often greatly influenced by the proportion of each risk factor present at each school. In order to correct for this, we adjusted the prevalence of each respiratory condition at each school to a standard population with the following characteristics:

- an equal proportion of boys and girls,
- 10 years of age,
- who considered themselves to be white Hispanics,
- life-long residents of El Paso, Texas,
- from English-speaking, non-smoking, two-parent households,
- the parent with the highest education was a high school graduate,
- no furry pets (dogs, cats, mice, hamsters or guinea pigs) in the home,
- the household had no indoor mold or moisture problems,
- the household did not have a gas stove, and
- whose biological parents had no history of asthma, allergy or lung disease.

The model produces adjusted prevalence rates that more accurately reflect the differences in the prevalence rates in the study population that are unrelated to these risk factors (table 6). In selecting the composition of a standard population for the EPISD, we generally selected the most common characteristics of the district as a whole, except for potential risk factors such as smoking in the home, furry pets, and gas stoves.

The adjusted prevalence of these selected respiratory conditions among all 4<sup>th</sup>

and 5<sup>th</sup> grade schoolchildren varied considerably across the EPISD (table 6):

- The adjusted prevalence of a **physician's diagnosis of asthma ever in lifetime** was 6% for the EPISD, with three schools at or above a 10% prevalence: Nixon (10%), Alamo (15%) and Dr. Green (12%).

- The adjusted prevalence of a **physician's diagnosis of asthma in the past year** was 4.1% for the EPISD, with two schools above 7% prevalence: Houston (9%) and Hart (8.7%).

- The adjusted prevalence of **chronic cough in the past year** was 1.3% for the EPISD, with two schools above 3% prevalence: Clendenin (3.8%) and Roberts (3.1%).

- The adjusted prevalence of **persistent wheeze in the past year** was 1.4% for the EPISD, with one school above 3% prevalence: Coldwell (3.3%).

- The adjusted prevalence of **chronic phlegm in the past year** was 1.2% for the EPISD, with two schools above 3% prevalence: Coldwell (3.7%) and Clendenin (3.4%).

- The adjusted prevalence of **bronchitis in the past year** was 2.7% for the EPISD, with three schools at or above a 5% prevalence: Houston (5.0%), Zavala (7.6%), and Putnam (5.0%).

Although the prevalence of these respiratory conditions at each school has been adjusted for school-to-school differences in the most important risk factors, these results must still be interpreted with considerable caution. The higher adjusted prevalence of respiratory illness at any school may be still due to unintentional reporting bias on the part of the respondents or simply chance variations.

## Discussion

The El Paso Children's Health Study was not designed to provide an overall comparison between the El Paso Independent School District and the U.S. as a whole. Comparison of our findings with those of other national surveys may be problematic due to differences in sampling and questionnaire wording. Nevertheless, the children in our study as a whole do not appear to have a higher prevalence of either a lifetime history of a physician's diagnosis of asthma or a physician's diagnosis of asthma symptoms in the last year than the U.S. as a whole.

Even though the overall prevalence of asthma was comparable to that of the entire U.S., public health authorities have become concerned about the rising prevalence of asthma among all communities. We hope that these preliminary research findings may be useful in targeting public health education and surveillance programs to those elementary schools with a higher prevalence of asthma and related respiratory conditions. The Indoor Environments Division of EPA's Office of Radiation and Indoor Air has developed educational materials discussing environmental factors related to asthma exacerbation. EPA's Office of Research and Development has developed a comprehensive Research Strategy for

Asthma. The El Paso Children's Health Study is an important component of this EPA research strategy.

The prevalence of several known risk factors for asthma and other respiratory conditions are elevated in the El Paso Independent School District, particularly cigarette smoking in the child's home. The high prevalence of tobacco smoking among the children's parents could hinder the success of smoking prevention programs among the children. Educators may wish to take this high prevalence of parental smoking into account in designing their smoking prevention programs.

The analytic work on the El Paso Children's Health Study will continue over the next several years. A complete analysis of the role of traffic-related air pollutants in children's respiratory health will be conducted during 2002 with a report of preliminary findings at a major international scientific conference in Spring 2003 and several scientific papers in peer-reviewed journals in 2003 and 2004.

In conclusion, we are extremely grateful for the outstanding cooperation of the children, parents, teachers, and administrative staff of the El Paso Independent School District. Without your assistance, this study could not have been conducted.

## Pending Publications

Noble, C.A.; 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. *Environmental Science & Technology* (submitted).

## Abstracts for Scientific Meetings

Gonzales, M.; Neas, L.; Mukerjee, S.; Ozkaynak, H. Children's respiratory health and exposure to particulate matter and co-pollutants in El Paso, TX. Presented at the 12th Conference of the International Society for Environmental Epidemiology, Buffalo, NY, August 19-23, 2000.

Norris, G.A.; Mukerjee, S.; Ozkaynak, H.; Smith, L.A.; Noble, C.; Rodes, C.E.; Gonzales, M.; Neas, L.M. Relationship between fine and ultrafine particle number and VOC concentrations in El Paso, Texas (14E2). Presented at 20th Annual Conference of the American Association for Aerosol Research, Portland, OR, October 15-19, 2001.

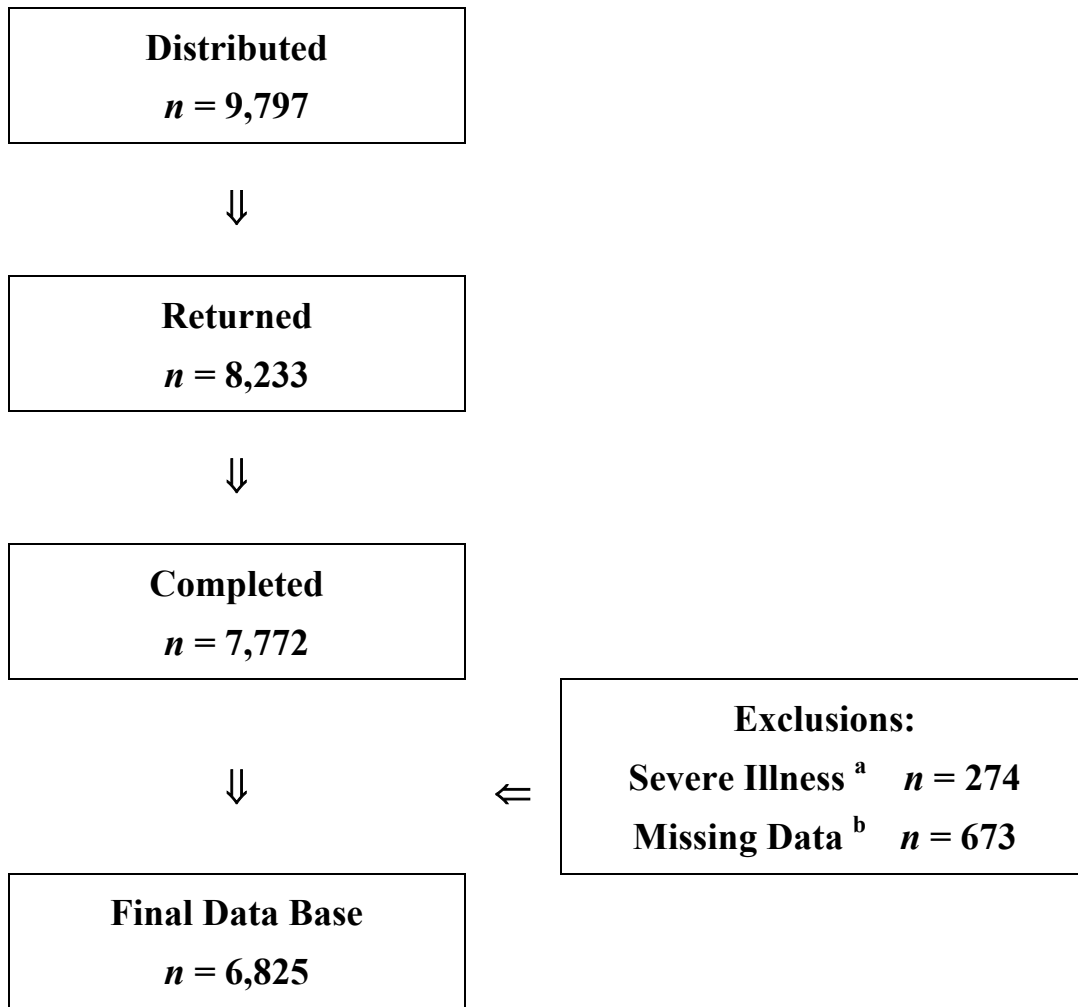
Noble, C.A.; Rodes, C.E.; Lawless, P.A.; Natarajan, S. Myers, E.A.; Mukerjee, S.; Norris, G.A.; Ozkaynak, H.A.; Gonzales, M.; Neas, L.M.; Smith, L.A. Correlation of fine and ultrafine particulate matter with meteorological conditions and

criteria pollutants in El Paso, Texas (11PJ10). Presented at 20th Annual Conference of the American Association for Aerosol Research, Portland, OR, October 15-19, 2001.

Noble, C.A.; Rodes, C.E.; Ozkaynak, H.A.; Mukerjee, S.; Gonzales, M.; Neas, L.M. Continuous measurement of ultrafine particulate matter in El Paso, Texas, USA, during winter 1999. Presented at the 13th Conference of the International Society for Environmental Epidemiology, Garmisch-Partenkirchen, Germany, September 2-5, 2001.

Gonzales, M; Walsh, D.; Rhoney, S.; Neas L.M. Low Prevalence of Asthma and Wheeze Among Hispanic Children Along the United States – Mexico Border. Presented at the 98<sup>th</sup> International Conference of the American Thoracic Society, Atlanta, GA, May 19-22, 2002.

Figure 1. Number of questionnaires distributed, returned, completed and the final number of questionnaires suitable for analysis after exclusions; El Paso Independent School District, El Paso, Texas, January-February, 2001.



**a** Severe illness includes cystic fibrosis ( $n = 4$ ), chest injury ( $n = 27$ ), chest operation ( $n = 59$ ), heart disease ( $n = 130$ ) or the need for supplemental oxygen for more than two weeks after birth ( $n = 86$ ).

**b** Data were missing on severe illness or child's sex, age, race or ethnicity.

Figure 2. Parental education level; 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January-February 2001.

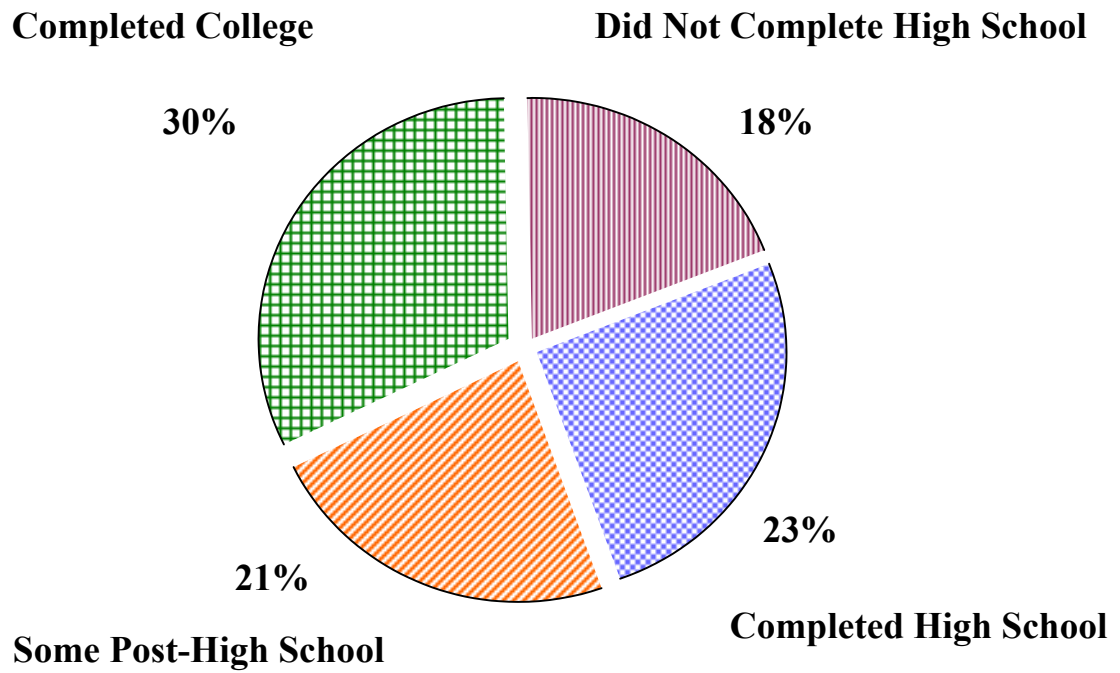


Figure 3. Questionnaire responses by child's Hispanic ethnicity status, language of the questionnaire, and school district region; 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January-February 2001.

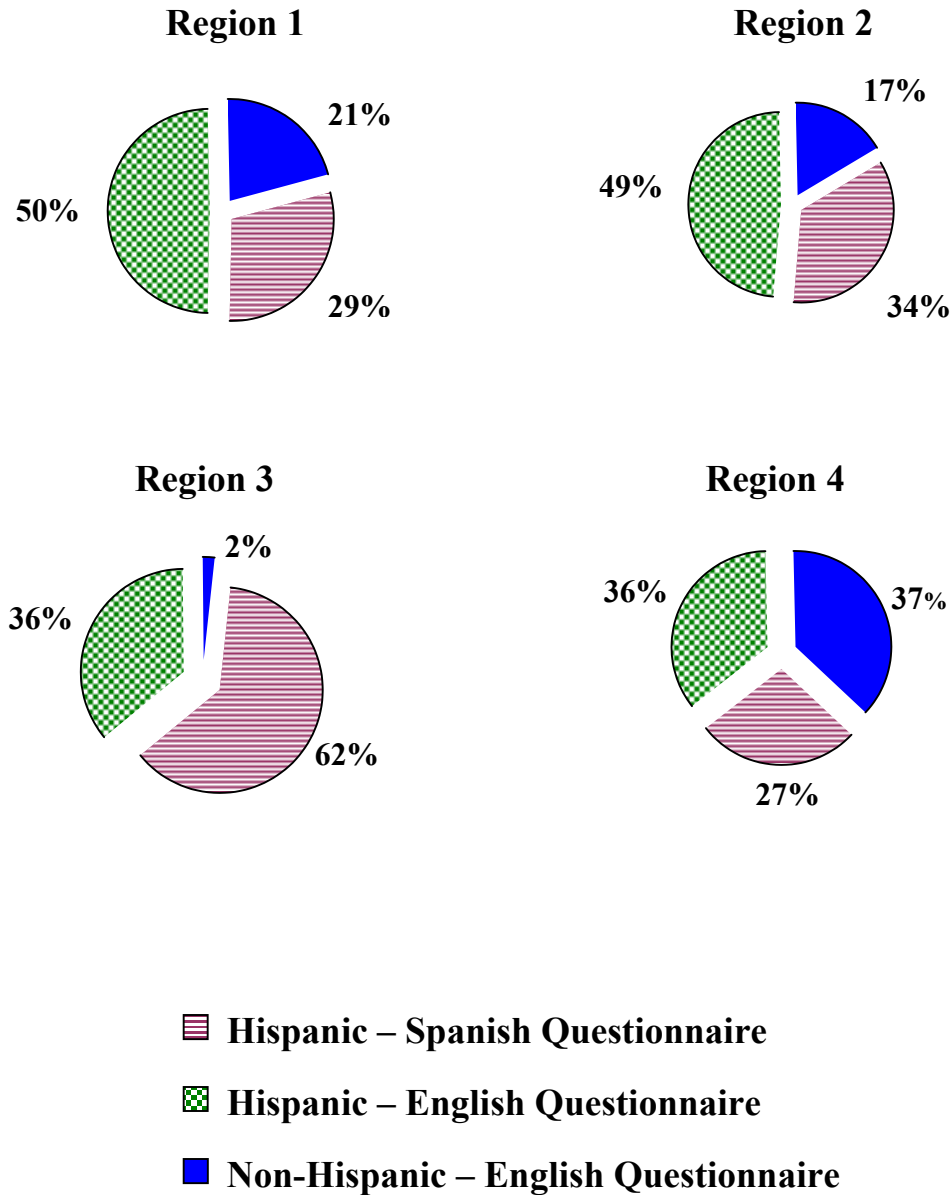


Table 1. Selected model covariate risk factors associated with respiratory health effects, El Paso Children's Health Study, February 2001.

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Demographic Information

Single parent family

Parental education level

Child's age

Child's sex

Life-long resident of El Paso

Parental Medical History

Parental history of asthma

Parental history of other lung disease

Parental history of allergy

Household Characteristics

Cigarette smoking in the home

Home mold or moisture problem

Furry pet (dog, cat, pet mouse or other rodent)

Gas stove

Table 2. Proportion of two-adult households, Hispanic ethnicity of the child, and questionnaire respondent's sex and relationship to the child by school district region; 6,825 4<sup>th</sup> and 5<sup>th</sup> grade school children, El Paso Independent School District, El Paso, Texas, February 2001.

Region	Two Adult Household	Hispanic Ethnicity	Female Respondent	Respondent's Relationship to Child	
1	70%	79%	84%	Biological Parent	88%
				Grandparent	2%
				Adoptive/Legal Guardian	6%
				Other Adult	1%
2	70%	81%	85%	Biological Parent	90%
				Grandparent	2%
				Adoptive/Legal Guardian	6%
				Other Adult	1%
3	59%	98%	86%	Biological Parent	82%
				Grandparent	3%
				Adoptive/Legal Guardian	10%
				Other Adult	1%
4	73%	72%	85%	Biological Parent	93%
				Grandparent	1%
				Adoptive/Legal Guardian	4%
				Other Adult	<1%

**Table 3. Demographic Information by Region and School: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso**

Elementary School	Single-Parent Household	Parental Education Level				Hispanic, Spanish Questionnaire and Lifetime El Paso Resident		
		No High School	High School	Post-High School	College	Hispanic	Spanish Questionnaire	Lifetime Resident
<b>District</b>	<b>32%</b>	<b>18%</b>	<b>22%</b>	<b>21%</b>	<b>34%</b>	<b>83%</b>	<b>37%</b>	<b>59%</b>
<b>Region 1</b>	<b>31%</b>	<b>17%</b>	<b>24%</b>	<b>22%</b>	<b>31%</b>	<b>79%</b>	<b>30%</b>	<b>63%</b>
Bradley	22%	7%	32%	24%	34%	70%	23%	62%
Burnet	29%	18%	28%	27%	20%	92%	48%	52%
Collins	23%	9%	21%	31%	34%	76%	15%	67%
Crosby	40%	21%	24%	20%	30%	84%	22%	69%
Dowell	32%	24%	25%	22%	26%	82%	32%	71%
Fannin	33%	17%	21%	26%	32%	76%	26%	66%
Lee	39%	27%	32%	18%	18%	95%	53%	68%
Newman	28%	18%	26%	19%	29%	87%	29%	69%
Nixon	18%	1%	12%	24%	58%	45%	7%	38%
Park	26%	7%	16%	20%	53%	67%	13%	63%
Schuster	34%	22%	33%	17%	20%	84%	38%	72%
Stanton	31%	31%	29%	22%	15%	95%	35%	73%
Wainwright	43%	27%	23%	29%	13%	92%	62%	49%
Whitaker	34%	13%	21%	15%	47%	62%	17%	61%

**Table 3. Demographic Information by Region and School: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso**

Elementary School	Single-Parent Household	Parental Education Level				Hispanic, Spanish Questionnaire and Lifetime El Paso Resident		
		No High School	High School	Post-High School	College	Hispanic	Spanish Questionnaire	Lifetime Resident
<b>District</b>	<b>32%</b>	<b>18%</b>	<b>22%</b>	<b>21%</b>	<b>34%</b>	<b>83%</b>	<b>37%</b>	<b>59%</b>
<b>Region 2</b>	<b>30%</b>	<b>14%</b>	<b>23%</b>	<b>23%</b>	<b>35%</b>	<b>81%</b>	<b>32%</b>	<b>56%</b>
Alta Vista	36%	23%	21%	24%	25%	95%	51%	75%
Bliss	21%	7%	20%	22%	49%	46%	16%	22%
Bonham	25%	7%	22%	38%	31%	91%	29%	60%
Cielo Vista	21%	0%	14%	13%	70%	76%	19%	63%
Clendenin	36%	17%	19%	27%	31%	94%	39%	70%
Coldwell	26%	20%	22%	26%	28%	95%	37%	70%
Crockett	31%	16%	31%	27%	21%	96%	43%	65%
Hawkins	37%	24%	24%	20%	21%	100%	46%	64%
Hillside	29%	9%	27%	27%	33%	92%	34%	73%
Houston	42%	26%	32%	20%	15%	98%	51%	63%
Hughey	37%	10%	27%	24%	36%	84%	27%	67%
Logan	16%	7%	26%	21%	43%	44%	14%	18%
MacArthur	40%	6%	18%	24%	46%	92%	19%	65%
Milam	16%	3%	11%	14%	68%	30%	3%	5%
Rusk	34%	23%	26%	23%	23%	99%	52%	68%
Travis	31%	20%	30%	17%	27%	69%	37%	40%

**Table 3. Demographic Information by Region and School: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso**

Elementary School	Single-Parent Household	Parental Education Level				Hispanic, Spanish Questionnaire and Lifetime El Paso Resident		
		No High School	High School	Post-High School	College	Hispanic	Spanish Questionnaire	Lifetime Resident
<b>District</b>	<b>32%</b>	<b>18%</b>	<b>22%</b>	<b>21%</b>	<b>34%</b>	<b>83%</b>	<b>37%</b>	<b>59%</b>
<b>Region 3</b>	<b>41%</b>	<b>33%</b>	<b>24%</b>	<b>20%</b>	<b>17%</b>	<b>98%</b>	<b>62%</b>	<b>62%</b>
Alamo	53%	33%	32%	14%	11%	100%	74%	68%
Beall	40%	45%	23%	15%	9%	100%	76%	57%
Burleson	51%	37%	25%	21%	13%	99%	58%	66%
Clardy	38%	25%	25%	25%	17%	100%	51%	79%
Cooley	39%	32%	20%	24%	18%	97%	54%	53%
Douglass	56%	50%	20%	16%	5%	99%	78%	57%
Hart	44%	41%	23%	17%	11%	99%	71%	61%
Lamar	35%	31%	29%	20%	17%	98%	58%	66%
Mesita	34%	4%	13%	22%	57%	86%	28%	70%
Moreno	38%	19%	24%	16%	35%	96%	31%	70%
Roosevelt	43%	43%	21%	20%	8%	99%	82%	58%
Vilas	35%	33%	26%	23%	14%	98%	73%	51%
Zavala	32%	40%	24%	22%	7%	100%	72%	48%

**Table 3. Demographic Information by Region and School: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso**

Elementary School	Single-Parent Household	Parental Education Level				Hispanic, Spanish Questionnaire and Lifetime El Paso Resident		
		No High School	High School	Post-High School	College	Hispanic	Spanish Questionnaire	Lifetime Resident
<b>District</b>	<b>32%</b>	<b>18%</b>	<b>22%</b>	<b>21%</b>	<b>34%</b>	<b>83%</b>	<b>37%</b>	<b>59%</b>
<b>Region 4</b>	<b>27%</b>	<b>9%</b>	<b>14%</b>	<b>18%</b>	<b>56%</b>	<b>72%</b>	<b>22%</b>	<b>56%</b>
Dr. Green	30%	5%	10%	16%	66%	69%	25%	51%
Johnson	41%	22%	26%	24%	24%	89%	48%	54%
Kohlberg	15%	2%	6%	16%	75%	58%	11%	43%
Lindbergh	25%	5%	13%	22%	58%	62%	13%	61%
Polk	21%	2%	6%	14%	78%	47%	8%	50%
Putnam	28%	13%	20%	23%	38%	85%	33%	56%
Rivera	22%	9%	7%	20%	61%	68%	18%	54%
Roberts	43%	29%	23%	17%	25%	92%	40%	64%
Rosa Guerrero	31%	5%	15%	22%	55%	77%	18%	57%
Western Hills	23%	1%	13%	9%	75%	75%	18%	62%
White	14%	5%	12%	18%	63%	64%	14%	64%

**Table 4. Prevalence of risk factors by school region and elementary school: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January - February, 2001.**

Elementary School	Parental History of Respiratory Illness			Home Environment			
	Lung Disease	Asthma	Allergy	Cigarette Smoking in the Home	Mold Problem	Gas Stove	Furry Pet
<b>District</b>	<b>7%</b>	<b>12%</b>	<b>31%</b>	<b>32%</b>	<b>18%</b>	<b>80%</b>	<b>52%</b>
<b>Region 1</b>	<b>7%</b>	<b>13%</b>	<b>33%</b>	<b>35%</b>	<b>19%</b>	<b>83%</b>	<b>59%</b>
Bradley	5%	14%	40%	34%	23%	98%	64%
Burnet	5%	14%	32%	47%	11%	86%	54%
Collins	8%	15%	35%	38%	18%	80%	69%
Crosby	14%	16%	40%	34%	21%	82%	63%
Dowell	3%	13%	36%	28%	21%	67%	53%
Fannin	7%	12%	35%	38%	21%	88%	68%
Lee	6%	7%	17%	34%	15%	91%	53%
Newman	6%	13%	30%	40%	16%	85%	67%
Nixon	7%	18%	44%	27%	18%	93%	64%
Park	8%	11%	44%	28%	23%	74%	64%
Schuster	13%	22%	30%	33%	25%	83%	56%
Stanton	7%	6%	19%	34%	20%	86%	61%
Wainwright	3%	8%	21%	40%	17%	70%	30%
Whitaker	4%	16%	41%	32%	19%	85%	51%

**Table 4. Prevalence of risk factors by school region and elementary school: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January - February, 2001.**

Elementary School	Parental History of Respiratory Illness			Home Environment			
	Lung Disease	Asthma	Allergy	Cigarette Smoking in the Home	Mold Problem	Gas Stove	Furry Pet
<b>District</b>	<b>7%</b>	<b>12%</b>	<b>31%</b>	<b>32%</b>	<b>18%</b>	<b>80%</b>	<b>52%</b>
<b>Region 2</b>	<b>8%</b>	<b>13%</b>	<b>34%</b>	<b>30%</b>	<b>19%</b>	<b>80%</b>	<b>55%</b>
Alta Vista	7%	11%	28%	34%	16%	91%	52%
Bliss	9%	17%	47%	28%	18%	94%	59%
Bonham	5%	16%	42%	33%	24%	60%	60%
Cielo Vista	6%	8%	30%	25%	17%	46%	60%
Clendenin	9%	15%	43%	34%	21%	69%	45%
Coldwell	9%	11%	31%	33%	20%	82%	50%
Crockett	9%	13%	32%	32%	18%	89%	52%
Hawkins	7%	6%	24%	30%	14%	79%	50%
Hillside	8%	15%	35%	34%	24%	88%	53%
Houston	5%	10%	15%	36%	12%	86%	51%
Hughey	10%	15%	32%	24%	22%	82%	60%
Logan	6%	17%	45%	39%	27%	95%	66%
MacArthur	10%	21%	44%	24%	24%	47%	50%
Milam	5%	8%	41%	16%	27%	95%	70%
Rusk	7%	8%	23%	32%	9%	91%	58%
Travis	10%	10%	27%	28%	14%	81%	41%

**Table 4. Prevalence of risk factors by school region and elementary school: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January - February, 2001.**

Elementary School	Parental History of Respiratory Illness			Home Environment			
	Lung Disease	Asthma	Allergy	Cigarette Smoking in the Home	Mold Problem	Gas Stove	Furry Pet
<b>District</b>	<b>7%</b>	<b>12%</b>	<b>31%</b>	<b>32%</b>	<b>18%</b>	<b>80%</b>	<b>52%</b>
<b>Region 3</b>	<b>7%</b>	<b>8%</b>	<b>18%</b>	<b>37%</b>	<b>16%</b>	<b>85%</b>	<b>35%</b>
Alamo	5%	5%	14%	40%	19%	89%	26%
Beall	6%	4%	11%	34%	19%	90%	34%
Burleson	8%	12%	22%	37%	15%	92%	33%
Clardy	6%	9%	27%	41%	15%	91%	48%
Cooley	5%	7%	18%	30%	18%	90%	45%
Douglass	6%	5%	10%	39%	12%	84%	17%
Hart	6%	10%	14%	40%	16%	86%	34%
Lamar	7%	5%	21%	39%	13%	86%	31%
Mesita	7%	13%	41%	30%	20%	62%	49%
Moreno	4%	12%	23%	34%	20%	76%	43%
Roosevelt	10%	10%	9%	39%	16%	84%	24%
Vilas	11%	11%	19%	38%	12%	85%	35%
Zavala	5%	6%	10%	40%	16%	83%	41%

**Table 4. Prevalence of risk factors by school region and elementary school: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January - February, 2001.**

Elementary School	Parental History of Respiratory Illness			Home Environment			
	Lung Disease	Asthma	Allergy	Cigarette Smoking in the Home	Mold Problem	Gas Stove	Furry Pet
<b>District</b>	<b>7%</b>	<b>12%</b>	<b>31%</b>	<b>32%</b>	<b>18%</b>	<b>80%</b>	<b>52%</b>
<b>Region 4</b>	<b>6%</b>	<b>15%</b>	<b>42%</b>	<b>25%</b>	<b>16%</b>	<b>69%</b>	<b>59%</b>
Dr. Green	4%	14%	38%	30%	15%	42%	54%
Johnson	6%	8%	29%	34%	12%	55%	30%
Kohlberg	7%	17%	47%	16%	9%	89%	66%
Lindbergh	5%	10%	45%	21%	17%	78%	75%
Polk	6%	17%	53%	17%	16%	69%	71%
Putnam	7%	16%	33%	29%	25%	60%	60%
Rivera	9%	19%	48%	21%	23%	63%	60%
Roberts	3%	12%	23%	33%	9%	89%	31%
Rosa Guerrero	7%	11%	40%	24%	18%	89%	63%
Western Hills	5%	21%	50%	26%	15%	49%	62%
White	5%	16%	50%	29%	17%	74%	77%

**Table 5. Unadjusted prevalence of selected respiratory conditions by school region and elementary school: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January - February, 2001.**

Elementary School	Ever in Lifetime		Respiratory Symptoms in the Last Year				
	Physician Diagnosis		Asthma	Bronchitis	Chronic Cough	Persistent Wheeze	Chronic Phlegm
	Allergy	Asthma					
<b>District</b>	<b>31%</b>	<b>11%</b>	<b>8%</b>	<b>7%</b>	<b>4%</b>	<b>4%</b>	<b>3%</b>
<b>Region 1</b>	<b>34%</b>	<b>11%</b>	<b>8%</b>	<b>6%</b>	<b>3%</b>	<b>4%</b>	<b>3%</b>
Bradley	35%	11%	8%	5%	3%	5%	2%
Burnet	35%	11%	10%	4%	3%	1%	3%
Collins	39%	10%	10%	12%	2%	4%	4%
Crosby	36%	12%	10%	6%	5%	4%	6%
Dowell	29%	11%	7%	4%	3%	1%	1%
Fannin	38%	9%	10%	7%	3%	4%	2%
Lee	25%	7%	6%	4%	2%	5%	2%
Newman	33%	11%	10%	5%	3%	1%	3%
Nixon	34%	18%	8%	5%	3%	7%	1%
Park	39%	11%	5%	10%	5%	7%	4%
Schuster	30%	8%	6%	3%	0%	5%	5%
Stanton	35%	10%	8%	6%	4%	5%	4%
Wainwright	27%	7%	8%	3%	1%	1%	1%
Whitaker	36%	14%	12%	10%	4%	4%	3%

**Table 5. Unadjusted prevalence of selected respiratory conditions by school region and elementary school: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January - February, 2001.**

Elementary School	Ever in Lifetime		Respiratory Symptoms in the Last Year				
	Physician Diagnosis		Asthma	Bronchitis	Chronic Cough	Persistent Wheeze	Chronic Phlegm
	Allergy	Asthma					
<b>District</b>	<b>31%</b>	<b>11%</b>	<b>8%</b>	<b>7%</b>	<b>4%</b>	<b>4%</b>	<b>3%</b>
<b>Region 2</b>	<b>31%</b>	<b>10%</b>	<b>8%</b>	<b>7%</b>	<b>5%</b>	<b>5%</b>	<b>4%</b>
Alta Vista	25%	4%	3%	5%	7%	4%	5%
Bliss	27%	9%	7%	8%	6%	3%	4%
Bonham	38%	15%	7%	5%	5%	4%	4%
Cielo Vista	40%	13%	10%	13%	2%	5%	2%
Clendenin	42%	16%	12%	6%	9%	9%	9%
Coldwell	34%	11%	9%	10%	5%	9%	8%
Crockett	29%	9%	7%	4%	3%	4%	4%
Hawkins	34%	4%	6%	3%	1%	4%	0%
Hillside	34%	14%	12%	12%	6%	4%	4%
Houston	20%	11%	11%	9%	5%	5%	5%
Hughey	26%	9%	6%	8%	3%	5%	1%
Logan	35%	14%	11%	8%	5%	6%	3%
MacArthur	36%	17%	10%	12%	8%	0%	4%
Milam	14%	8%	8%	8%	3%	0%	5%
Rusk	30%	5%	5%	4%	6%	6%	5%
Travis	25%	9%	6%	6%	0%	5%	1%

**Table 5. Unadjusted prevalence of selected respiratory conditions by school region and elementary school: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January - February, 2001.**

Elementary School	Ever in Lifetime		Respiratory Symptoms in the Last Year				
	Physician Diagnosis		Asthma	Bronchitis	Chronic Cough	Persistent Wheeze	Chronic Phlegm
	Allergy	Asthma					
<b>District</b>	<b>31%</b>	<b>11%</b>	<b>8%</b>	<b>7%</b>	<b>4%</b>	<b>4%</b>	<b>3%</b>
<b>Region 3</b>	<b>23%</b>	<b>7%</b>	<b>6%</b>	<b>5%</b>	<b>3%</b>	<b>3%</b>	<b>2%</b>
Alamo	18%	14%	7%	2%	4%	2%	2%
Beall	18%	5%	2%	2%	0%	4%	2%
Burleson	25%	4%	6%	6%	2%	3%	4%
Clardy	29%	5%	5%	5%	4%	2%	1%
Cooley	20%	9%	7%	4%	4%	5%	3%
Douglass	15%	3%	1%	3%	1%	0%	2%
Hart	18%	7%	10%	5%	3%	3%	1%
Lamar	23%	8%	5%	3%	4%	6%	3%
Mesita	44%	12%	12%	14%	4%	3%	3%
Moreno	30%	9%	7%	4%	1%	5%	1%
Roosevelt	15%	6%	5%	2%	2%	1%	1%
Vilas	21%	7%	7%	7%	1%	1%	5%
Zavala	12%	7%	7%	9%	2%	2%	1%

**Table 5. Unadjusted prevalence of selected respiratory conditions by school region and elementary school: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January - February, 2001.**

Elementary School	Ever in Lifetime		Respiratory Symptoms in the Last Year				
	Physician Diagnosis		Asthma	Bronchitis	Chronic Cough	Persistent Wheeze	Chronic Phlegm
	Allergy	Asthma					
<b>District</b>	<b>31%</b>	<b>11%</b>	<b>8%</b>	<b>7%</b>	<b>4%</b>	<b>4%</b>	<b>3%</b>
<b>Region 4</b>	<b>35%</b>	<b>13%</b>	<b>9%</b>	<b>11%</b>	<b>4%</b>	<b>5%</b>	<b>3%</b>
Dr. Green	31%	16%	7%	10%	4%	4%	6%
Johnson	26%	9%	8%	8%	4%	5%	4%
Kohlberg	39%	15%	9%	11%	4%	5%	2%
Lindbergh	41%	11%	9%	11%	4%	5%	3%
Polk	39%	14%	7%	11%	4%	7%	2%
Putnam	38%	12%	10%	13%	5%	8%	6%
Rivera	42%	14%	13%	15%	2%	5%	1%
Roberts	20%	8%	6%	4%	6%	3%	5%
Rosa Guerrero	37%	14%	11%	7%	4%	3%	3%
Western Hills	41%	16%	13%	15%	4%	7%	3%
White	37%	14%	9%	13%	2%	6%	2%

**Table 6. Adjusted prevalence of selected respiratory conditions by school region and elementary school: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January - February, 2001.**

Elementary School	Ever in Lifetime		Respiratory Symptoms in the Last Year				
	Physician Diagnosis		Asthma	Bronchitis	Chronic	Persistent	Chronic
	Allergy	Asthma			Cough	Wheeze	Phlegm
<b>District</b>	<b>23%</b>	<b>6%</b>	<b>4.1%</b>	<b>2.7%</b>	<b>1.3%</b>	<b>1.4%</b>	<b>1.2%</b>
<b>Region 1</b>	<b>25%</b>	<b>6%</b>	<b>4.2%</b>	<b>2.2%</b>	<b>1.0%</b>	<b>1.4%</b>	<b>1.2%</b>
Bradley	22%	4%	2.7%	1.5%	0.9%	1.4%	0.7%
Burnet	32%	8%	4.9%	1.4%	0.5%	0.6%	0.7%
Collins	28%	6%	4.7%	4.0%	0.7%	1.2%	1.8%
Crosby	25%	5%	3.1%	2.1%	1.2%	1.5%	2.1%
Dowell	18%	6%	3.4%	1.7%	1.0%	0.5%	0.5%
Fannin	30%	6%	4.8%	2.6%	0.9%	1.2%	0.7%
Lee	22%	6%	4.9%	2.3%	1.1%	2.3%	1.4%
Newman	26%	6%	5.3%	1.2%	1.1%	0.3%	1.3%
Nixon	23%	10%	3.4%	1.2%	0.6%	1.8%	0.2%
Park	23%	6%	2.5%	3.4%	1.4%	1.7%	1.3%
Schuster	22%	4%	3.1%	0.5%	0.0%	1.6%	1.8%
Stanton	33%	8%	5.4%	2.7%	2.1%	2.6%	2.3%
Wainwright	25%	5%	5.5%	1.5%	0.6%	0.6%	0.6%
Whitaker	21%	6%	4.6%	3.3%	1.5%	0.8%	1.1%

**Table 6. Adjusted prevalence of selected respiratory conditions by school region and elementary school: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January - February, 2001.**

Elementary School	Ever in Lifetime		Respiratory Symptoms in the Last Year				
	Physician Diagnosis		Asthma	Bronchitis	Chronic	Persistent	Chronic
	Allergy	Asthma			Cough	Wheeze	Phlegm
<b>District</b>	<b>23%</b>	<b>6%</b>	<b>4.1%</b>	<b>2.7%</b>	<b>1.3%</b>	<b>1.4%</b>	<b>1.2%</b>
<b>Region 2</b>	<b>23%</b>	<b>6%</b>	<b>4.3%</b>	<b>2.9%</b>	<b>1.7%</b>	<b>1.7%</b>	<b>1.6%</b>
Alta Vista	19%	3%	0.9%	2.4%	2.8%	1.4%	2.2%
Bliss	18%	5%	3.5%	2.8%	2.0%	0.8%	2.0%
Bonham	25%	7%	2.9%	1.8%	1.1%	1.0%	1.1%
Cielo Vista	31%	8%	5.0%	4.2%	0.5%	1.8%	0.6%
Clendenin	26%	9%	5.5%	2.1%	3.8%	2.8%	3.4%
Coldwell	27%	7%	5.0%	3.8%	2.2%	3.3%	3.7%
Crockett	23%	5%	3.8%	1.4%	1.3%	1.3%	1.6%
Hawkins	26%	4%	4.8%	1.6%	0.8%	2.3%	0.0%
Hillside	24%	8%	5.7%	4.6%	1.3%	1.3%	1.4%
Houston	19%	9%	9.0%	5.0%	2.1%	2.3%	1.9%
Hughey	17%	5%	3.0%	3.2%	1.2%	1.5%	0.2%
Logan	26%	8%	5.6%	3.1%	1.3%	1.9%	0.4%
MacArthur	24%	9%	4.4%	4.2%	2.0%	0.0%	1.3%
Milam	9%	3%	3.2%	1.0%	0.0%	0.0%	1.2%
Rusk	26%	3%	3.7%	1.5%	2.9%	2.6%	2.7%
Travis	22%	4%	3.2%	3.3%	0.0%	1.3%	0.0%

**Table 6. Adjusted prevalence of selected respiratory conditions by school region and elementary school: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January - February, 2001.**

Elementary School	Ever in Lifetime		Respiratory Symptoms in the Last Year				
	Physician Diagnosis		Asthma	Bronchitis	Chronic	Persistent	Chronic
	Allergy	Asthma			Cough	Wheeze	Phlegm
<b>District</b>	<b>23%</b>	<b>6%</b>	<b>4.1%</b>	<b>2.7%</b>	<b>1.3%</b>	<b>1.4%</b>	<b>1.2%</b>
<b>Region 3</b>	<b>19%</b>	<b>5%</b>	<b>3.9%</b>	<b>2.3%</b>	<b>1.1%</b>	<b>1.1%</b>	<b>0.9%</b>
Alamo	17%	15%	6.7%	0.0%	2.5%	0.9%	0.9%
Beall	16%	4%	1.6%	0.6%	0.0%	2.3%	1.0%
Burleson	20%	3%	4.0%	2.7%	0.9%	1.0%	1.5%
Clardy	23%	3%	3.1%	1.6%	0.9%	0.8%	0.3%
Cooley	14%	9%	4.6%	2.1%	1.6%	2.0%	0.7%
Douglass	15%	4%	1.3%	2.3%	0.0%	0.0%	1.7%
Hart	18%	6%	8.7%	2.9%	1.6%	0.9%	0.4%
Lamar	23%	6%	3.6%	0.8%	2.1%	2.2%	1.6%
Mesita	32%	6%	4.6%	4.3%	1.0%	0.7%	0.2%
Moreno	24%	6%	3.2%	2.0%	0.6%	2.2%	0.0%
Roosevelt	13%	4%	3.6%	0.9%	1.2%	0.0%	0.3%
Vilas	17%	4%	3.2%	3.1%	0.5%	0.5%	2.9%
Zavala	11%	4%	2.7%	7.6%	1.0%	1.6%	0.9%

**Table 6. Adjusted prevalence of selected respiratory conditions by school region and elementary school: 6,825 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January - February, 2001.**

Elementary School	Ever in Lifetime		Respiratory Symptoms in the Last Year				
	Physician Diagnosis		Asthma	Bronchitis	Chronic Cough	Persistent Wheeze	Chronic Phlegm
	Allergy	Asthma					
<b>District</b>	<b>23%</b>	<b>6%</b>	<b>4.1%</b>	<b>2.7%</b>	<b>1.3%</b>	<b>1.4%</b>	<b>1.2%</b>
<b>Region 4</b>	<b>24%</b>	<b>7%</b>	<b>4.0%</b>	<b>3.5%</b>	<b>1.3%</b>	<b>1.5%</b>	<b>1.2%</b>
Dr. Green	20%	12%	3.9%	2.9%	1.3%	1.3%	2.1%
Johnson	19%	6%	4.4%	4.1%	2.0%	1.6%	1.8%
Kohlberg	25%	7%	3.6%	3.2%	1.1%	1.4%	0.8%
Lindbergh	28%	6%	3.8%	3.4%	1.0%	1.3%	1.0%
Polk	24%	7%	3.1%	3.2%	1.0%	1.5%	0.8%
Putnam	33%	7%	5.2%	5.0%	1.7%	2.9%	2.4%
Rivera	26%	7%	4.9%	4.3%	0.5%	1.3%	0.2%
Roberts	14%	5%	3.3%	2.4%	3.1%	1.1%	2.3%
Rosa Guerrero	27%	8%	5.1%	2.6%	1.3%	0.9%	1.1%
Western Hills	28%	8%	4.6%	4.2%	1.2%	1.8%	1.0%
White	23%	6%	3.7%	4.0%	0.7%	1.7%	0.5%

## Appendix A

### Glossary of Terms

#### Demographics

<b>Hispanic</b>	Child is Spanish/Hispanic/Latino
<b>Non-Hispanic</b>	Child is not Spanish/Hispanic/Latino
<b>Spanish language</b>	Spanish language questionnaire was completed and returned
<b>Relation to child</b>	Relationship of the questionnaire respondent to the child
<b>Maximum education</b>	Highest grade or education level completed by the respondent or other primary adult in the household.
<b>No High School</b>	Did not graduate from high school
<b>High School</b>	High School Graduate
<b>Post-High School</b>	Some post-high school education
<b>College</b>	College graduate

#### Respiratory Health Outcomes (Illness and Symptoms)

<b>Lifetime Allergy</b>	Diagnosis of allergies by a medical professional ever in lifetime
<b>Lifetime Asthma</b>	Diagnosis of asthma by a medical professional ever in lifetime
<b>Asthma in last year</b>	Asthma symptoms within the last year
<b>Bronchitis</b>	Bronchitis within the last year
<b>Chronic Cough</b>	Chronic morning cough without a cold in the last year
<b>Persistent Wheeze</b>	Persistent wheeze without a cold in the last year
<b>Chronic Phlegm</b>	Chronic chest congestion or phlegm without a cold in the last year

## Appendix A, continued

### Risk Factors

<b>Parental allergy</b>	Diagnosis of allergies or hayfever in either the biological mother or biological father
<b>Parental asthma</b>	Diagnosis of asthma or reactive airways disease in either the biological mother or biological father
<b>Parental lung disease</b>	Diagnosis of chronic bronchitis, emphysema, or chronic obstructive lung disease in either the biological mother or biological father
<b>El Paso life</b>	Lifetime resident of El Paso
<b>Furry pet</b>	Furry pets in the home (dog, cat, mouse or hamster)
<b>Gas stove</b>	Gas stove used for cooking
<b>Mold problem</b>	Evidence of mold or water damage in the home
<b>Cigarette smoking in the home</b>	One or more person who lives in the child's household smokes inside the child's home

## Appendix B

**Exclusions Due to Severe Illness or Missing Critical Information on Questionnaire By School Region and Elementary School; 7,772 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January-February 2001.**

<b>Elementary School</b>	<b>Number of Children Excluded</b>		<b>Percent Excluded</b>	<b>Final Number</b>
	<b>Severe Illness</b>	<b>Missing Data</b>		
<b>District</b>	<b>274</b>	<b>673</b>	<b>12%</b>	<b>6825</b>
<b>Region 1</b>	<b>68</b>	<b>167</b>	<b>11%</b>	<b>1648</b>
Bradley	8	15	12%	152
Burnet	4	11	14%	79
Collins	6	7	8%	137
Crosby	4	12	11%	115
Dowell	2	12	14%	72
Fannin	6	15	11%	151
Lee	5	24	11%	201
Newman	10	7	10%	144
Nixon	1	16	8%	190
Park	5	11	10%	133
Schuster	1	7	10%	64
Stanton	14	16	16%	124
Wainwright	2	14	14%	86
<b>Region 2</b>	<b>66</b>	<b>140</b>	<b>10%</b>	<b>1659</b>
Alta Vista	7	17	15%	116
Bliss	8	17	13%	138
Bonham	3	5	11%	55
Cielo Vista	0	0	0%	63
Clendenin	6	8	10%	117
Coldwell	3	7	7%	121
Crockett	7	12	10%	157
Hawkins	5	4	10%	70
Hillside	6	10	9%	139
Houston	2	7	9%	81
Hughey	7	6	8%	147
Logan	1	6	5%	118
MacArthur	1	6	8%	78
Milam	1	7	15%	37
Rusk	3	19	12%	141
Travis	6	9	14%	81

**Appendix B, continued.**

**Exclusions Due to Severe Illness or Missing Critical Information on Questionnaire By School Region and Elementary School; 7,772 children in the 4th and 5th grades of elementary schools in the El Paso Independent School District, El Paso, Texas, January-February 2001.**

<b>Elementary School</b>	<b>Number of Children Excluded</b>		<b>Percent Excluded</b>	<b>Final Number</b>
	<b>Severe Illness</b>	<b>Missing Data</b>		
<b>District</b>	<b>274</b>	<b>673</b>	<b>12%</b>	<b>6825</b>
<b>Region 3</b>				<b>1519</b>
Alamo	5	10	17%	57
Beall	6	18	14%	124
Burleson	5	17	14%	111
Clardy	10	15	12%	164
Cooley	12	20	15%	148
Douglass	4	17	15%	102
Hart	3	14	11%	117
Lamar	6	19	14%	132
Mesita	6	6	7%	138
Moreno	3	11	14%	74
Roosevelt	5	25	13%	169
Vilas	3	11	11%	101
Zavala	6	8	13%	82
<b>Region 4</b>	<b>66</b>	<b>175</b>	<b>10%</b>	<b>1999</b>
Dr. Green	5	11	10%	134
Johnson	7	22	14%	143
Kohlberg	10	20	8%	295
Lindbergh	8	17	10%	208
Polk	5	12	7%	214
Putnam	4	12	11%	120
Rivera	5	11	11%	114
Roberts	4	15	8%	186
Rosa Guerrero	5	18	10%	174
Western Hills	6	12	14%	92
Whitaker	2	7	6%	86
White	5	18	10%	174

## Appendix C

### Analytic Methods

Epidemiology is an observational science that relies on the collection of data on a large numbers of study participants in order to draw meaningful conclusions regarding the prevalence of health outcomes. As with experimental science, a baseline, or background, level of risk factors must be established so as to be able to observe real differences. In the current analysis, the first step in this process was to exclude children with severe illness. Also excluded were questionnaires that were missing important information about the child, the child's health status. Simple, or crude prevalence rates of respiratory illness were then estimated for each school. However, these prevalence rates did not account for the influence of risk factors, which were present in differing proportions at each school. To correct for this, we adjusted the prevalence rates of all respiratory health outcomes and symptoms using a specialized statistical technique known as a fixed-effects logistic regression model. This multivariate model produced prevalence rates at each school that were adjusted for:

- the child's age, sex, and ethnicity (equal proportion of boys and girls who are 10 years old and white Hispanics);
- the duration of child's residency in El Paso, TX (life-time El Paso resident);
- the questionnaire language (English-speaking household as reflected in the language the questionnaire was completed);
- the number of primary adults in the household (two-parent household);
- indoor cigarette smoking in the home (non-smoking households);
- mold/moisture problem in the home (no mold problem);
- furry pets in the home such as a dog, cat, mouse, hamster or guinea pig (no furry pets);
- maximum parental education level (high school graduate);
- biological parents' history of asthma, allergy or lung disease (no parental history of these ailments); and
- Gas stove in the home (no gas stove).

The adjustment of the prevalence for these risk factors allows for a more precise comparison of the prevalence of respiratory health outcomes between schools.

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Luis Villalobos, Executive Director, Communications and Business Partnerships  
Robert LaGrone, Evaluator, Research and Evaluation  
Judith Hunter, Assistant Director for Health Services  
Elementary School Principals  
Elementary School Nurses  
Fourth and Fifth Grade Schoolteachers  
Region Associate Superintendents

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### **US EPA El Paso Study Team**

Debra Walsh, Scott Rhoney, Ed Hudgens, Suzanne McMaster, James Scott, Cara Carty, Erik Svendsen, and Gina Terrill

Special Thanks to Laurance N. Nickey, MD

# Quality Assurance/Quality Control

## El Paso Children's Health Study

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The study "Health Effects of Particulate Matter and Co-Pollutants in Children Living in El Paso, Texas" was conducted by the Epidemiology and Biomarkers Branch (EBB), Human Studies Division (HSD), National Health and Environmental Effects Research Laboratory (NHEERL), Office of Research and Development (ORD), U.S. Environmental Protection Agency, Research Triangle Park, NC, in compliance with NHEERL QA Guidelines. This project was conducted in two separate phases: phase 1) questionnaire distribution to all students in 4<sup>th</sup> and 5<sup>th</sup> grades in the El Paso Independent School District, and phase 2) in selected schools air monitoring was conducted as well as health measurements collected from children with parental consent. This report describes the preliminary research findings from phase 1 of this project.

<b>Date of Approval</b>	<b>Item</b>
March 1, 1995	Multiple Project Assurance issued from the Office for Protection from Research Risk to the Institutional Review Board of the University of North Carolina's Committee on the Protection of Rights of Human Subject.
December 3, 1999	Institutional Review Board Approval received from the University of North Carolina's Committee on the Protection of Rights of Human Subjects. This approval included: <ul style="list-style-type: none"><li>• Questionnaire - Spanish and English</li><li>• Selection of schools</li><li>• Parental Informed Consent</li><li>• Student/Subject Assent Form</li><li>• Incentives to class rooms for participation</li><li>• Thank you gifts to students for participation</li></ul>
January 11, 2000	Recommended Operating Procedure for School-Based Questionnaire Distribution, Collection, and Processing <ul style="list-style-type: none"><li>• Contact with the school district</li><li>• Informational meetings at the schools</li><li>• Preparation of the questionnaire packets for the classrooms</li><li>• Distribution of the questionnaire packets</li><li>• Collecting the questionnaire packets</li><li>• Questionnaire handling and storage</li><li>• Statistical portion of each questionnaire to be scanned twice and the two electronic versions compared to ensure accurate scanning</li></ul>

# Quality Assurance/Quality Control

## El Paso Children's Health Study

Page 2 of 2

- October 11, 2000 OMB Information Collection Request 2080-0065
- Study Protocol and Respondent Burden
  - English Questionnaire
  - Spanish Questionnaire
  - Spirometric Examination
- November 13, 2000 Renewal of Institutional Review Board Approval from the University of North Carolina's Committee on the Protection of Rights of Human Subjects.
- January 5, 2001 Approval of Quality Assurance Project Plan entitled "El Paso Children's Health Study" - Specific quality control activities and data quality objectives as described in the document included:
- Accountability of the questionnaires would be 100% or an explanation for those missing
  - One percent of the questionnaires will be manually compared to a printed version of the scanned data to ensure that the electronic version of the data corresponds to the physical record
  - Electronic version of questionnaire data will be reviewed to ensure the data is internally consistent and agrees with historical data and with scientific knowledge
- January 5, 2001 Approval of Data Management Plan entitled "El Paso Children's Health Study"
- Completed questionnaires sent to home office for key entry and scanning
  - Questionnaires scanner using high-speed scanner
  - Verification of scanned data by manually checking one percent
- March 16, 2001 IRP-NHEERL-H-HSD/EBB/LMN/01-001-000 -Health Effects of Particulate Matter and Co-Pollutants in Children Living in El Paso, Texas

The Director of Quality Assurance for NHEERL has concluded the conduct of this project was in compliance with EPA quality requirements.

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