

Why was the study done?

In 1998, *The Health of the Merrimack Valley* report revealed that hospitalization rates for asthma and pneumonia were elevated above overall state rates in most urban areas of the Merrimack Valley. Furthermore, the Merrimack Valley region of the state carried a disproportionate number of solid waste incinerators, increasing the opportunity for potential exposures to air pollution/emissions including mercury and dioxin. To best address the concern over elevated hospitalization rates of pediatric asthma and possible exposures to incinerator emissions, the Massachusetts Department of Public Health, Bureau of Environmental Health (MDPH/BEH) designed a study to measure the prevalence rates of pediatric asthma for children in the Merrimack Valley.

What was the purpose of the study?

The purpose of the study was (1) to determine whether the proportion of children ages 5-14 living in 6 Merrimack Valley communities (Andover, Dracut, Haverhill, Lawrence, Methuen, and North Andover) with a diagnosis of asthma was statistically significantly greater than the proportion of children in other areas of Massachusetts; and (2) to evaluate whether asthma in children was associated with major air pollution sources in the Merrimack Valley.

How was the study done?

The study was conducted in two parts: In *Part A*, school nurses were asked to provide the number of children in their school who had a diagnosis of asthma. All public and private schools that served children in grades Kindergarten through 8th grade in the six Merrimack Valley communities were contacted, as well as in 15 comparison communities that were demographically similar but outside of the Merrimack Valley. The occurrence of asthma was compared between the Merrimack Valley (enrollment about 37,000) and comparison communities (enrollment about 37,000).

Part B involved geocoding the addresses of all children (about 34,000) living in the five Merrimack Valley study communities (Dracut did not participate in Part B). Residential proximity was then compared with the areas estimated to be impacted by air pollution from major sources, such as incinerators and vehicle traffic, to determine if the rates of asthma were likely to be associated with a greater potential for exposure to air pollution.

What communities were included in the comparisons with Merrimack Valley Communities?

Chelsea, East Bridgewater, Easthampton, Grafton, Hingham, Holbrook, Leicester, Marshfield, Medfield, Melrose, Seekonk, Somerset, Somerville, Swansea, Wakefield.

What environmental data was evaluated in the study?

In order to evaluate the relationship between asthma and air pollution, 1998 emission inventories for particulate matter (PM10) and total volatile organic compounds (VOCs) for 39 major stationary sources of air pollution were obtained from the Massachusetts Department of Environmental Protection (MDEP). These data, along with hourly meteorological data from Lawrence Municipal Airport for the period 1998-2001 were used to conduct dispersion modeling. This modeling calculates concentrations of the PM10 and VOCs at more than 6000 equally spaced points within the Merrimack Valley study area.

Data on the daily volume of traffic in 1999 at approximately 20 locations within each of the Merrimack Valley study communities was also analyzed. Although the data does not differentiate between automobiles and trucks/buses, estimates of traffic volume were obtained for streets and highways of varying sizes across the communities.

What were the main findings of the study?

1. The prevalence of pediatric asthma in the Merrimack Valley (9.4%) was statistically significantly greater than that in the comparison communities (7.7%).
2. Stationary major air pollution sources, such as incinerators, did not appear to be major contributors of particulates (PM10) or volatile organic compounds (VOCs).
3. The prevalence of asthma was not associated with PM10 or VOC air pollution levels from stationary sources. The geographic areas estimated to receive the highest levels of pollutants were usually the areas with the lowest asthma prevalence.
4. Children with asthma were statistically significantly more likely to live in close proximity to a higher volume of traffic than children without asthma.

What are the limitations of this study?

Since children were not interviewed for this study, it is unknown how common other established risk factors for asthma may be among the children. Indoor exposures, such as household cigarette smoke, mold, and other allergens can be important causes of asthma. Therefore, the relative contribution of exposure to outdoor air pollution compared with indoor air pollution is not known.

What public health related activities are in place to address the findings of this study?

Enhanced system of watchfulness:

Annual surveillance of pediatric asthma was initiated by MDPH beginning during the 2002-2003 school year. Surveillance is statewide with approximately 95% of public and private schools serving grades Kindergarten through 8th grade reporting. Annual reports are available on the MDPH website displaying asthma rates by school or community

Reduction in pollution sources and opportunities for exposure:

Since the onset of this study the number of incinerators in the Merrimack Valley has gone from 5 to 2.

A number of strategies to reduce emissions from on-road vehicles are in place under the administration of the MDEP. These include the state's Enhanced Motor Vehicle Inspection and Maintenance Program which requires the inspection and repair of failing emission control systems in both gasoline and diesel fueled vehicles and the required distribution and sale of ultra-low sulfur diesel fuel beginning in 2006.

- Results of this study will be presented to public health and health care providers at a conference in April. MDPH will also continue to provide support to the Lawrence Board of Health for promoting a healthy home environment.

Who can I contact if I want more information?

The full report *Air Pollution & Pediatric Asthma in the Merrimack Valley* can be viewed at the public libraries in Andover, Dracut, Haverhill, Lawrence, Methuen and North Andover. You can also download a copy of this report and the statewide asthma surveillance reports from the MDPH website at <http://www.Mass.gov/dph/asthma>

For more information, contact:

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Air Pollution & the Merrimack Valley Pediatric Asthma Study

Information Booklet



**Massachusetts Department of Public Health
Bureau of Environmental Health
Environmental Epidemiology Program**

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