

## Addressing Air Pollution and Asthma

### NIEHS-Funded Researchers Bring Solutions to Children in Rural Agricultural Communities

The National Institute of Environmental Health Sciences (NIEHS) supported a study that may lead to improved health for children suffering from asthma. Asthma is a serious respiratory disease that affects about 6 million children in the U.S., causing wheezing, difficulty breathing, and coughing.<sup>18,19</sup> Asthma can lead to permanent lung damage and can be fatal – more than 200 child deaths per year are attributed to asthma.<sup>20</sup>

NIEHS-supported researchers found that agricultural practices contribute to poor air quality and asthma among children.<sup>6,10</sup>

The team combined high-efficiency particulate air (HEPA) cleaners and a home-based education program to reduce children's exposure to pollutants in the home and improve lung health.<sup>10,17</sup>



Karr administers an asthma test in the clinic.  
(Photo courtesy of Catherine Karr)

*"This rural, primarily Latino community is exposed to worse air pollution than people in urban Seattle, which contributed to health problems among children," explained Catherine Karr, M.D., Ph.D., who led the team. "The home education program helps families understand asthma and how environmental factors affect the disease. Combined with HEPA cleaners, families feel empowered to improve the quality of life for their children."*

#### Then and Now

##### Then:

- Research largely focused on urban environments where cars, trucks, and industrial sources contribute to poor air quality and asthma.<sup>1</sup>
- Little information on how air quality in rural agricultural communities affects children with asthma, and few strategies to improve health.

##### Now:

- Scientists understand that poor air quality in rural agricultural areas can contribute to health problems in children.<sup>6,7</sup>
- HEPA cleaners combined with home education programs can significantly improve children's health and well-being.<sup>17</sup>

### Impacts of Addressing Air Pollution in Agricultural Communities



#### Pinpointing the Problem

Particulate matter, ozone, pesticides, and ammonia, a common product of animal farming, can worsen asthma. Air pollution is elevated in rural agricultural communities; linked to poor respiratory health in children.



#### Identifying Solutions

Portable HEPA cleaners can reduce indoor triggers of asthma.



#### Improving Health

Combining HEPA cleaners with in-home asthma education programs can reduce asthma symptoms and improve asthma control in children.



#### Sharing Results

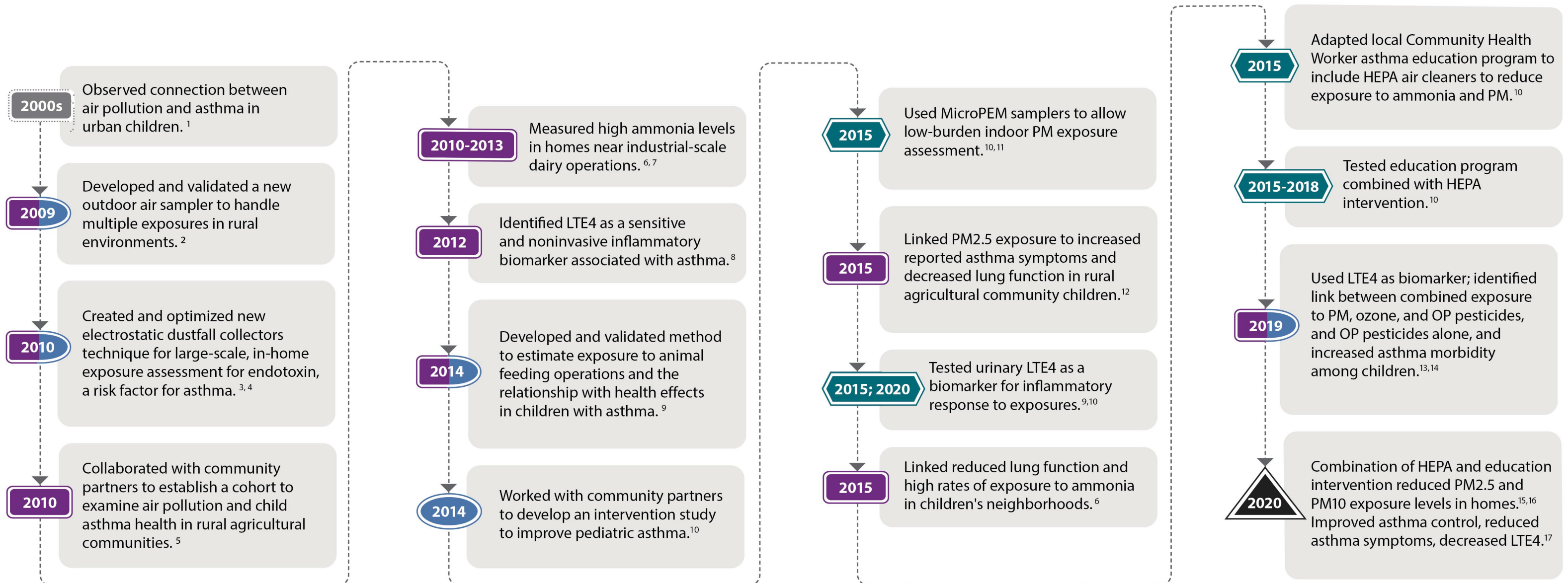
Disseminated findings through community events, health fairs, infographics, radio reports, a radionovela, and meetings with agency leaders.



#### Building Community Capacity

Built capacity in partner organizations to conduct health assessments, collect samples, and work with air quality monitoring equipment.

# Addressing Childhood Asthma in Rural Agricultural Communities





## Challenges and Lessons Learned

**Challenge:** Researchers had to address families' logistical concerns about participating in the study.

**Lessons Learned:** Researchers purposefully found a sensor that met the needs of family members. The MicroPEM technology was developed by other NIEHS researchers and is small, quiet, and unobtrusive.<sup>11</sup>

**Challenge:** The families who would most benefit from this intervention — immigrant Latino children with asthma living in rural agricultural Washington — can be reluctant to participate in medical research.

**Lessons Learned:** The research team built and sustained a long-standing partnership with the Northwest Communities' Education Center, Radio KDNA, the Yakima Valley Farmworkers Clinic, and Heritage University. The families were more willing to participate in the study because of the trust and goodwill established over time.

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*"The outdoor air monitors were very loud and not acceptable for use indoors in sleeping areas," Karr recalled. "Finding a sensor that was not disruptive or burdensome to the families was crucial to a successful intervention."*

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Community partners prepare air pollution monitors.  
(Photo courtesy of Catherine Karr)

### Engaging With Communities

The research team trained and fostered job skills within local partner organizations, building their capacity to conduct community-based research and enabling them to tackle other challenges within their community.



A trained community partner coaches a patient through an asthma test during a home visit.  
(Photo courtesy of Catherine Karr)

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*"By involving our community partners in all aspects of the research, we helped nurture important skills that they can use to address new and emerging community needs," Karr explained. "For example, they were better equipped to quickly identify and begin responding to the community's needs surrounding COVID-19."*

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For references, supplementary information, and more on the impact of NIEHS research, please visit <https://niehs.nih.gov/research/programs/translational/examples>.