

# Environmental Improvements for Children's Asthma:

## The impact on symptom burden and return on investment of a home-based environmental assessment and modification project

### ACKNOWLEDGEMENTS

- Angie Carlson, PhD, RPh, Data Intelligence, LLC
- Medica Health Plans for providing administrative data
- Minneapolis/St. Paul Partners for Asthma Action (formerly Controlling Asthma Project)
- Pediatric Home Service, Roseville, Minnesota, for their outstanding contribution in delivering the asthma education and home assessment components
- Ucare for providing funding for home-based assessments and modifications

This project was supported, in part, through a cooperative agreement with the Centers for Disease Control and Prevention, US Department of Health and Human services, under program announcement 03030.

See the American Lung Association in Minnesota and the Partners in Asthma Action websites for asthma-related trainings, tools, and resources at [www.lungmn.org](http://www.lungmn.org) and [www.americancitiesmsp.org](http://www.americancitiesmsp.org).

For more information:  
Jill Heins Nesvold, MS  
American Lung Association  
in Minnesota  
490 Concordia Avenue  
St. Paul, MN 55103  
651-223-9578  
[jill.heins@lungmn.org](mailto:jill.heins@lungmn.org)



The evaluation of Environmental Improvements for Children with Asthma (EICA) indicated significant improvement on asthma-related health service utilization, quality of life outcomes, and return on investment. While other studies have shown positive results from home-based environmental assessment and modifications for children with asthma, this is the first to measure an impact on symptom burden and report actual return on investment.

EICA was one of 14 community-based initiatives conducted by the Minneapolis/St. Paul Partners for Asthma Action (formerly Controlling Asthma in American Cities Project). EICA was an in-home program with goals of:

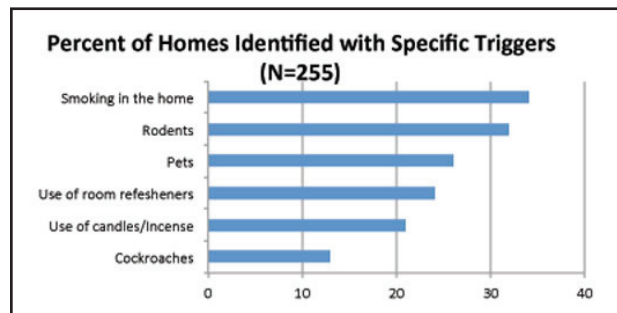
1. Reducing asthma symptoms by lessening exposure to environmental asthma triggers in the home environment
2. Reducing school absences
3. Decreasing health service utilization and thereby reducing health care costs.

EICA was modeled after two successful home-environment modification programs for children with asthma in the Minneapolis and St. Paul metropolitan area—Environmental Action for Children's Health led by Minneapolis Environmental Regulatory Services and funded by the Department of Housing and Urban Development and the Minnesota Department of Health's Reducing Environmental Triggers for Asthma funded by the Environmental Protection Agency.

A home-based environmental assessment and modification project was implemented for 255 limited income children with asthma and their families between January 2005 and Decem-

ber 2008. Children were required to meet income qualifications and have moderate or severe persistent asthma. Children with intermittent or mild persistent asthma who had had a recent emergency department visit or hospitalization for an acute exacerbation of asthma or experienced school absences due to asthma were also eligible.

The program protocol included two in-home visits approximately two weeks apart (a baseline visit to assess the home and a follow-up visit to deliver or install allergen-reducing products by a certified asthma educator). Data on health service utilization, symptom burden, and quality of life outcomes was collected at baseline, as well as at 3, 6, and 12 months post-intervention. In addition, the health plan administrative data was reviewed 12 months pre and post-intervention for each child.



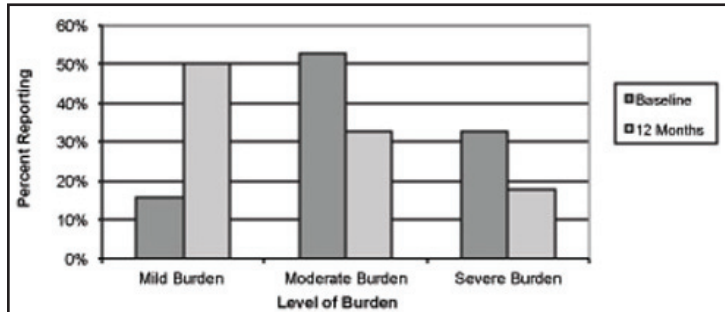
**CHILD SYMPTOM BURDEN RESULTS**  
There was a statistically significant reduction in daytime and nighttime symptoms and functional limitations from baseline to 12 months ( $p < 0.05$ ). At baseline, 32.5% of children had severe daytime symptom burden based on Child Asthma Short Form score; at 12 months the percent with severe daytime symptoms had declined to 17.5%. At baseline, 30.8% of children had severe

nighttime symptom burden; at 12 months 11.5% reported severe nighttime symptoms. At baseline, 19.2% had severe functional limitations; at 12 months only 7.7% had severe functional limitations.

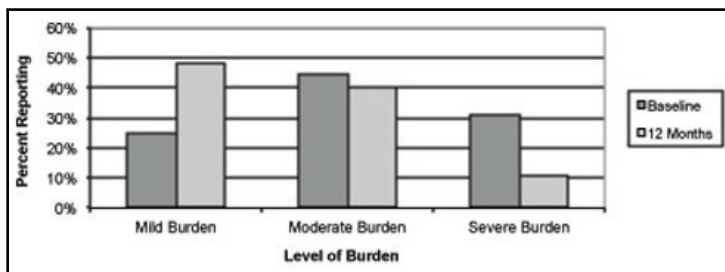
### Children with Day and Night Symptoms and Functional Limitations

Baseline Compared to 12 Months Post-Intervention

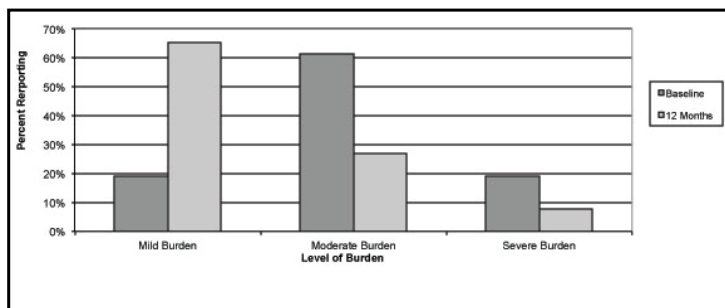
#### Daytime Symptoms



#### Nighttime Symptoms



#### Functional Limitations



#### HEALTH SERVICES UTILIZATION – PARENT REPORT

At each observation period, parents were asked to recall the number of hospitalizations, emergency department visits, and prednisone uses for asthma in the past three months. There were statistically significant reductions in hospitalizations at 3 and 6 months; emergency department visits at 3, 6, and 12 months, and prednisone use at 12 months ( $p < 0.05$ ).

#### HEALTH PLAN ADMINISTRATIVE DATA

The health plan enrollment data obtained from Medica Health Plans confirmed 48 participating members. From 12 month pre-intervention to 12 months post-intervention, there was an asthma-related hospitalization and emergency department visits reduced by 68% and 44%, respectively.

Using the health insurance claims filed for the 48 children, there was a total of \$194,214 in allowed costs for all-cause health service use (medical + pharmacy) in the 12 months pre-intervention (mean=\$4,406) and \$128,968 in the 12 months post-intervention (mean=\$2,687). The mean difference (\$1,359) is statistically significant ( $p=0.037$ ) and represents a reduction of 33%.

Asthma-associated health care costs accounted for 42% of the pre-intervention and 41% of the post-intervention costs. Asthma related pre- and post-intervention medical costs were significantly different ( $p=0.042$ ); non-asthma related pre- and post-intervention medical costs were not statistically significant ( $p=0.169$ ). Neither asthma nor non-asthma related pharmacy costs were significantly different.

#### COST IMPLICATIONS

The average EICA cost per home was \$320 in professional home visitor fees and \$301 in allergen-reducing products, for a total cost per home of \$621. Based on health plan administrative claims data, the mean reduction in:

- Total health care costs (medical care plus pharmacy for all medical conditions) was \$1,359 for the 12 months pre-intervention to the 12 months post-intervention
- Asthma-related health care costs was \$1,091 for the 12 months pre-intervention to the 12 months post-intervention.

#### THE RETURN ON INVESTMENT (ROI) FOR:

- Total health care costs was \$2.19: \$1.00
- Asthma-related total health care costs was \$1.76: \$1.00

The return on investment for home-based environmental assessments on modifications can provide a large cost savings for health plans and public health care programs nationwide.