



MICHIGAN BRFS SURVEILLANCE BRIEF

A NEWSLETTER FROM THE CHRONIC DISEASE EPIDEMIOLOGY SECTION, MDCH

Home Environment Score Among Michigan Children with Current Asthma, 2005-2007  
Michigan Asthma Call-Back Surveys

**Background.** Asthma is a chronic inflammatory disease of the lungs and is characterized by wheezing, coughing, difficulty breathing, and chest tightness.<sup>1</sup> In Michigan, asthma is a serious public health problem among children, with a prevalence of 9.5% (95% CI = 8.0-11.2) in 2007.

Triggers, such as tobacco smoke, mold, dust, and animal fur, can bring about or worsen the symptoms of asthma. Avoidance of such triggers and behaviors to reduce their levels in the home can help increase the "asthma friendliness" of the home environment.

**Methods.** In cooperation with the CDC, Michigan has conducted an annual adult and child Asthma Call-Back Survey (ACBS) since 2005. Respondents to the Michigan BRFS (MiBRFS) who reported that they or the randomly selected child in their household had ever been diagnosed with asthma were asked to participate in a follow-up interview. Those who agreed were called back within 2 weeks and administered a standardized comprehensive asthma questionnaire.

Using data from the 2005-2007 child ACBS combined, we developed a Home Environment Score (HES) to describe the level of asthma friendliness of the home. Seventeen asthma triggers and trigger avoidance behaviors were used to create the HES; points were assigned to each and summed across the 17 items. These triggers/behaviors, their individual prevalence rates (n=316), and the point values they contributed to the HES are presented in Table 1. Point values were based on the Home Assessment for Asthma Triggers,<sup>2</sup> an in-home assessment tool. Cut-points were developed to define 4 levels of the HES, with level 1 representing the most asthma friendly home environment and level 4 the least asthma friendly. (Table 2)

Indicators related to asthma control and management were constructed based on the 2007 Guidelines for the Diagnosis and Management of Asthma: Expert Panel Report 3 (EPR-3)<sup>3</sup> and their prevalence rates with 95% confidence intervals were estimated by HES level (n=290). Chi-square and pairwise t-tests were used to identify statistically significant associations at the p<.05 level. The analysis was restricted to children with current asthma.

**References**

- <sup>1</sup>NIH. What is Asthma? [http://www.nhlbi.nih.gov/health/dci/Diseases/Asthma/Asthma\\_SignsAndSymptoms.html](http://www.nhlbi.nih.gov/health/dci/Diseases/Asthma/Asthma_SignsAndSymptoms.html). Accessed Feb. 25, 2009.
- <sup>2</sup>Lane, MJ. "The Efficacy of an Indoor Home Assessment Tool for Asthma Triggers used in Urban Households in Flint, Michigan", Master's Thesis, University of Michigan, School of Public Health, January 2002.
- <sup>3</sup>NHLBI. Guidelines for the Diagnosis and Management of Asthma: Expert Panel Report 3. NIH Publication Number 08-4051. August 2007. [www.nhlbi.nih.gov/guidelines/asthma](http://www.nhlbi.nih.gov/guidelines/asthma)

**Table 1. Asthma Triggers and Avoidance Behaviors: Point Values for HES and Prevalence Among Children with Current Asthma**

Trigger/Avoidance Behavior	%	Points
Cigarettes smoked in home (7d)	20.4	80
Seen or smelled mold (30d)	11.2	20
Saw cockroaches (30d)	0.0	20
Saw mice or rats (30d)	4.5	15
Inside pets	60.6	8
Pets allowed in child's bedroom	37.4	8
Kitchen exhaust fan not used	49.2	4
Carpeting in child's bedroom	73.2	2
Child does not use mattress cover	68.4	2
Child does not use pillow cover	65.5	2
Hot water not used for sheets	53.3	2
Bathroom exhaust fan not used	49.0	2
Unvented gas logs, fireplaces	8.3	2
Air cleaner not used	68.1	1
Dehumidifier not used	55.5	1
Gas used for cooking	45.0	1
Wood burning stove or fireplace	13.3	1

**Table 2. HES Levels Defined and Their Prevalence Among Children with Current Asthma (n=290)**

Level	Score	%
Level 1: Most asthma friendly	≤14	36.0
Level 2	15-30	33.5
Level 3	31-66	10.2
Level 4: Least asthma friendly	≥67	20.4

**MiBRFS News: 2009 in the field**

- The 2009 MiBRFS questionnaire is in the field and includes new state-added questions on kidney disease, genetic testing, skin cancer prevention, cognitive impairment, and disabilities and health.
- In addition to the landline telephone stratum, the 2009 MiBRFS includes a cell-phone only stratum.
- For the fifth consecutive year, Michigan is conducting an adult and a child Asthma Call-Back Survey associated with the MiBRFS.

**Results.** HES values ranged from 1 to 131, with a bimodal distribution. (Figure 1) Thirty-six percent of children lived in level 1 homes, 33.5% in level 2 homes, 10.2 in level 3 homes, and 20.4% in level 4 homes. (Table 2)

The distribution of HES levels were similar by child's age ( $p=.26$ ) and sex ( $p=.33$ ) but were significantly different by race ( $p<.05$ ), respondent's education ( $p<.05$ ), and household income ( $p<.01$ ). (Data by age, sex, and income not shown.) The proportion of children with current asthma living in HES level 4 homes was higher for black children compared with white (38.7% vs. 12.5%,  $p=.03$ ). (Figure 2) Children living in homes in which the adults had higher levels of education (as measured by the respondent to the BRFSS) were less likely to live in an HES level 4 home compared with those living in lower education households (3.6% for college graduates vs. 32.0% for high school or less,  $p=.003$ ). (Figure 3) Similarly, household income was inversely related to HES level, with only 5.5% of children in the highest income households (\$75,000+) living in HES level 4 homes compared with 24.9% of children in the lowest income households (<\$25,000) ( $p=.006$ ).

The prevalence of uncontrolled asthma and poor asthma management by HES level are presented in Table 3. (Levels 3 and 4 were combined due to sample size restrictions.) There were no statistically significant associations between any of these health indicators and the HES levels.

**Conclusions.** One-in-five Michigan children with current asthma live in homes that are not asthma friendly (HES  $\geq 67$ ), which may cause or worsen their asthma symptoms. Low levels of asthma friendliness were significantly associated with black race, low household income, and low education. Although not statistically significant, the data suggest that perhaps children with current asthma living in the least asthma friendly homes might experience greater activity limitations and more emergency room visits compared with those living in more asthma friendly homes.

Further examination is needed to determine the impact of smoking in the home on the HES and the relationships observed in this analysis.

Figure 1. Percent Distribution of HES (n=290)

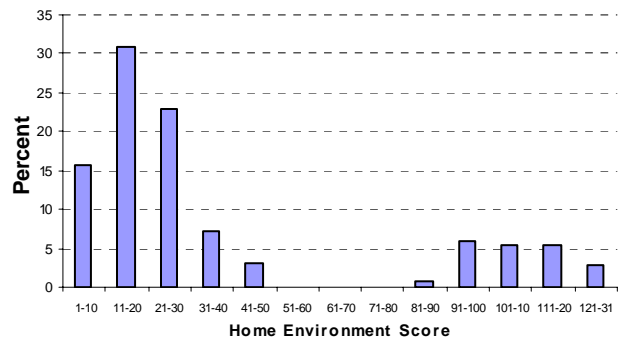


Figure 2. Percent Distribution of HES Levels by Race (n=262)

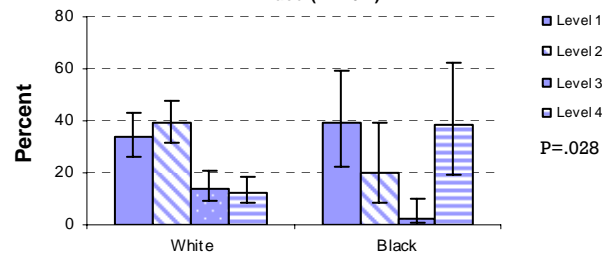


Figure 3. Percent Distribution of HES Levels by Education (n=290)

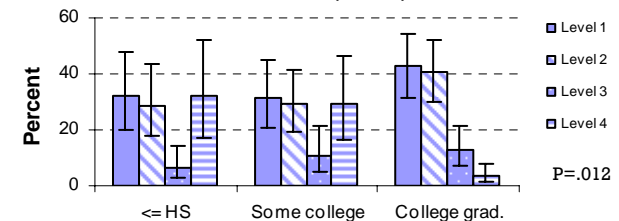


Table 3. Prevalence of Asthma Control and Management Indicators by HES Level Among Children with Current Asthma\*

	Level 1 (n=97)	Level 2 (n=110)	Levels 3-4 (n=83)
Had symptoms $\geq 9$ days out of 30	28.1	20.1	16.3
Nighttime awakenings $\geq 2$ days out of 30	30.4	14.0	16.8
Usual activities limited at least a little	65.2	61.9	74.0
Visited ER or urgent care $\geq 2$ times in past year	7.0	4.1	17.7
Hospitalized $\geq 1$ time in past year	3.1	1.6	3.7
Had routine checkup < 2 times in past year	58.6	59.3	60.3
Ever given asthma action plan	51.8	33.3	34.2
Ever taken asthma management class	9.3	6.0	7.1

\*Non-significant differences between HES levels for all characteristics of asthma control and management,  $p>.05$ .

**The Michigan Behavioral Risk Factor Surveillance System (MiBRFSS)**

The MiBRFSS comprises annual, statewide telephone surveys of Michigan adults aged 18 years and older and is part of the national BRFSS coordinated by the CDC. The annual Michigan Behavioral Risk Factor Surveys (MiBRFS) follow the CDC BRFSS protocol and use the standardized English core questionnaire that focuses on various behaviors, medical conditions, and preventive health care practices related to the leading causes of mortality, morbidity, and disability. Interviews are conducted across each calendar year. Data are weighted to adjust for the probabilities of selection and a poststratification weighting factor that adjusts for the sex, age, and race distribution of the adult Michigan population. All analyses are performed using SAS-callable SUDAAN® to account for the complex sampling design.

Michigan Department of Community Health



Jennifer M. Granholm, Governor  
Janet Olszowski, Director

**Suggested citation:** Wasilevich E, Rafferty AP, Lyon-Callo SK, Fussman C. Home environment score among Michigan children with asthma, 2005-2007 Michigan Asthma Call-Back Surveys. *Michigan BRFSS Surveillance Brief*. Vol. 3, No. 1. Lansing, MI: Michigan Department of Community Health, Chronic Disease Epidemiology Section, April 2009.