



# Healthy homes, indoor triggers, and asthma

## Background

Controlling environmental factors that affect asthma is a main component of proper asthma management [1]. Indoor asthma triggers include:

- Allergens (animal dander, cockroaches, dust mites, mice, and mold)
- Irritants (cold temperature, tobacco smoke, indoor air pollution, and endotoxins).

Structural housing conditions such as housing type, overcrowding, location, home age, room temperature, and home ownership are important determinants of indoor trigger levels [4,5]. Multi-component, multi-trigger home-based interventions, such as better-quality heating, ventilation, and home weatherization, are pertinent housing modifications to Montanan residents and are associated with improved quality of life, health, and lower asthma trigger levels [2,3,6-10].

This report describes the relationship between home conditions and childhood asthma and provides feasible recommendations to help control the home environment.

## Methods

The Montana Asthma Call-back Survey (ACBS) is a telephone survey of non-institutionalized adults aged 18 years and older. Participants are recruited from the Behavioral Risk Factor Surveillance System (BRFSS) survey if they indicate they or their child previously had or currently have asthma. Using ACBS responses from 2012-2014, weighted prevalence frequencies for indoor asthma triggers, their sources, and remedies were determined and reported.

ACBS respondents who answered "yes" to "Has a doctor, nurse or other health professional ever told you that your child has asthma?" and subsequently "Does your child still have asthma?" were defined as having current asthma. Answering "no" to either question meant a child did not have current asthma.

The American Housing Survey (AHS) is a national longitudinal housing unit survey. It provides information on housing subjects and housing conditions. For this report, the dataset was limited to individuals living in the Mountain West Census Division in 2015. The U.S. Census Mountain West division includes New Mexico, Arizona, Colorado, Utah, Nevada, Idaho, Wyoming, and Montana. Weighted comparisons were made between housing characteristics and asthma prevalence, triggers, health care, and medication use.

## Report Highlights

27% of caregivers of children with current asthma had been advised to make a change in their home environment.

**Poor housing conditions** are associated with a higher prevalence of childhood asthma.

## Topic-related Programs

The **Low Income Energy Assistance Program (LIEAP)** pays a part of winter energy bills for eligible people.

The **Weatherization Program** helps participants improve the heating efficiency of their homes.

## Upcoming Events

Next **Montana Asthma Advisory Group (MAAG)** meeting:  
December 5th.

## Montana Asthma Control Program

1400 E Broadway

Helena, Montana 59260-2951

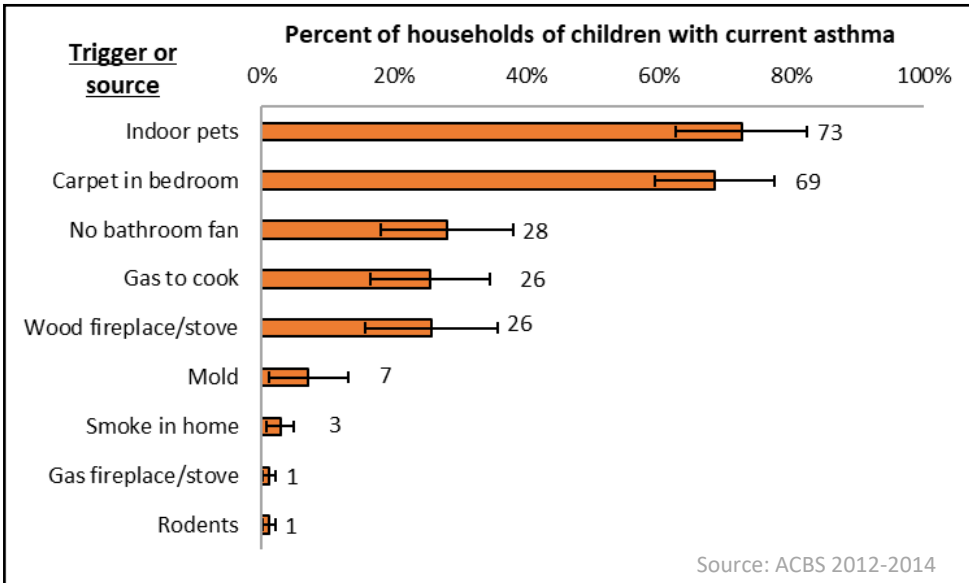
<https://dphhs.mt.gov/asthma/>



## Results

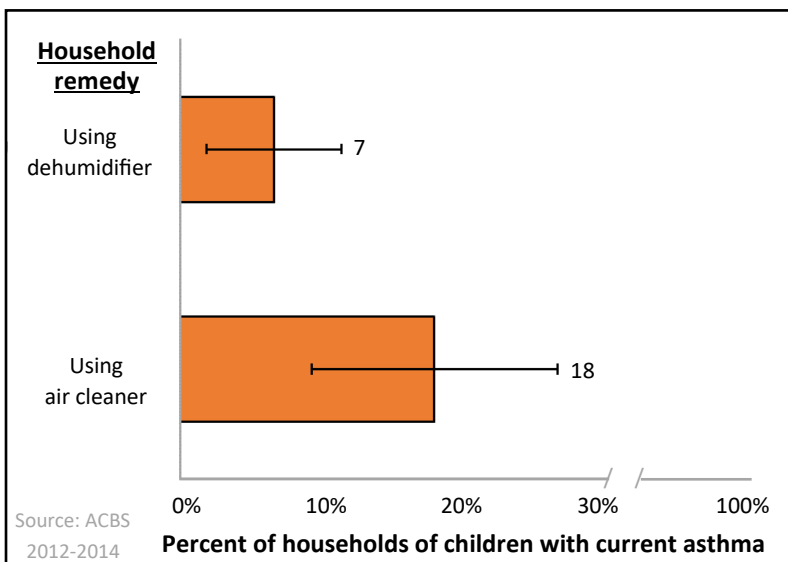
### 1. Indoor asthma triggers and trigger sources in Montana

Figure 1. Asthma triggers and their sources are common in the homes of children with current asthma.



- Among households that have children living with current asthma, the **most common triggers** were indoor **feathered or furry pets (73%)** and having **carpet in the bedroom (69%)** (Figure 1).
- **More than a quarter of households** lacked a bathroom fan (28%), used a wood fireplace/stove (26%), or used gas to cook (26%) (Figure 1).

Figure 2. Air cleaners and dehumidifiers are used in the homes of children with current asthma to remove triggers.



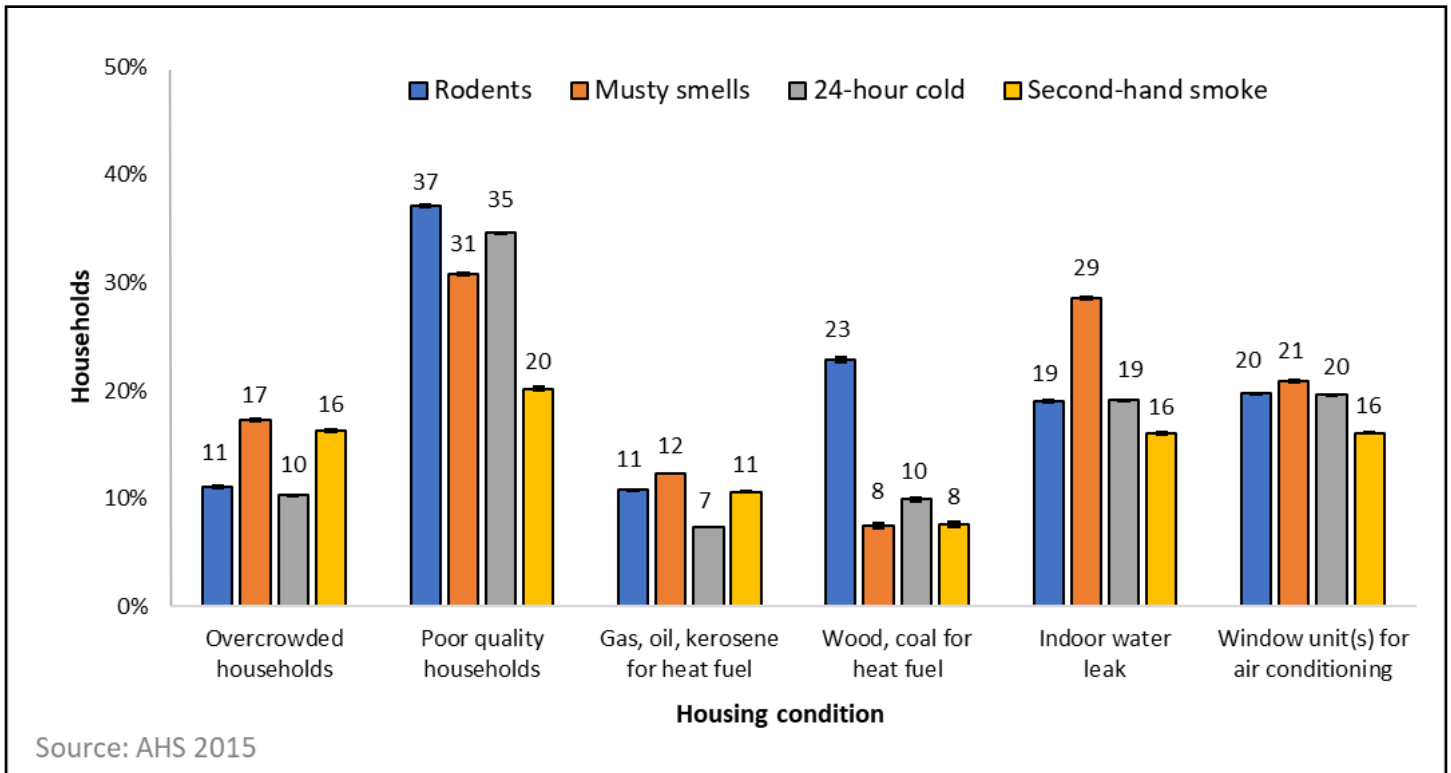
- **27%** of caregivers for children with current asthma had been advised to make an environmental change in their home (data not shown).
- Dehumidifiers were only being used in **7%** of homes and assist in the prevention of mold growth (Figure 2).
- Using wood or gas fireplaces or stoves releases harmful particulates. Air cleaners are one method to remove indoor particulate matter from the air and were used in **18%** of the homes of children with current asthma (Figure 2).

## 2. Housing characteristics, triggers, and asthma in the Mountain West Division

In the Mountain West Division one-family homes were the most common type of housing (70%), followed by apartments (20%), and mobile/trailer homes (10%). One in ten people reported living in poor quality households and 8% lived in overcrowded homes [13]. Indoor tobacco smoke (15%), musty smells (14%), rodents (9%), and  $\geq$  24-hour cold spells (7%) were commonly reported triggers (data not shown).

Housing conditions were first analyzed by asthma trigger prevalence (Figure 3) and then by child asthma status and having had an ER or urgent care visit in the past year (Figure 4).

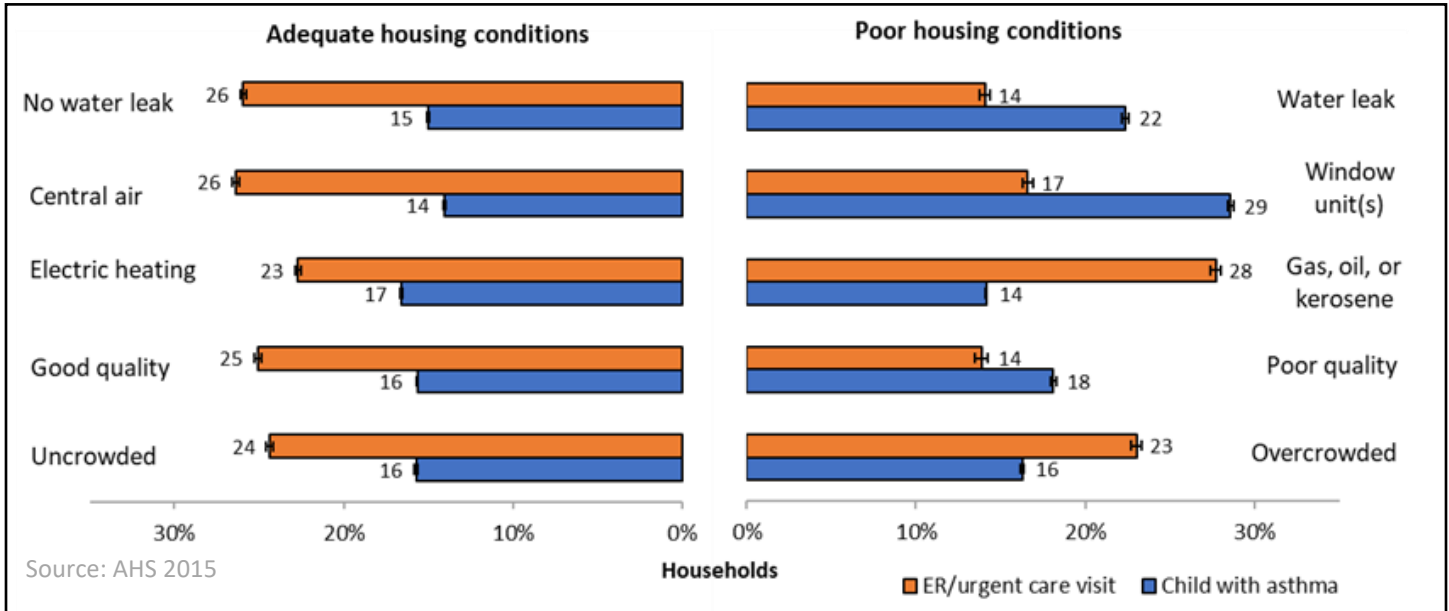
Figure 3. Indoor asthma triggers are common in poor housing conditions in the Mountain West Division.



Most indoor asthma triggers were prevalent among each poor housing condition (Figure 3):

- **Poor quality households** frequently reported all triggers: indoor rodents (37%), 24-hour cold spells (35%), musty smells (31%), and second-hand smoke (20%).
- About 1 in 10 houses using **gas, oil, or kerosene** for heating had rodents, musty smells, or second-hand smoke.
- 23% of households using **wood or coal for heat fuel** had rodents.
- 29% of households with an **indoor water leak** had musty smells.
- Households using **window unit(s) for air conditioning** also commonly reported all triggers: musty smells (21%), rodents (20%), 24-hour cold spells (20%), and second-hand smoke (16%).

Figure 4. Children with asthma regularly live in poor housing conditions in the Mountain West Division.



Overall childhood asthma prevalence (16%) in the Mountain West Division was higher than the national average for 2015 (13%) (data not shown) [14].

- 47% more of **households with a water leak** had a child with asthma than households without a water leak.
- 29% of households using **window unit(s)** for air conditioning had a child with asthma, **two times higher** than households using central air (14%).
- Surprisingly, greater proportions of households with **adequate housing conditions** (except for heating fuel) had an asthma-related ER/urgent care visit for their child in the past year.

Furthering the comparisons in Figure 4, odds ratios were calculated to compare the likelihood of childhood asthma between housing conditions (poor vs. adequate).

Children with asthma were (data not shown):

- 4% more likely to live in an **overcrowded** than an uncrowded home.
- 19% more likely to live in a **poor quality** home than a good quality home.
- 63% more likely to live in a home **with an indoor water leak** than a home without a leak.
- 144% more likely to live in a home using a **window unit(s) for air conditioning** than a home with central air conditioning.



## Conclusion

Poor environmental housing conditions are associated with increased exposure to asthma triggers and child asthma prevalence. Healthcare providers should understand an asthma patient's home environment and offer trigger avoidance solutions.

Important housing conditions to consider include (1) overcrowded homes; (2) homes with poor ventilation (especially if they use of gas, oil, kerosene, wood, or coal for heat and cooking); (3) homes with window units serving as air conditioning; (4) improperly sealed homes with indoor water leaks; and (5) carpet in the child's bedroom. Children with asthma should also avoid close and prolonged exposure to animal dander.

Structural remedies to poor housing conditions have the potential to improve health by diminishing indoor exposure to multiple asthma triggers.

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## Clinical Recommendations

- Refer patients to the **Low Income Energy Assistance Program (LIEAP)** and **Weatherization Program**. LIEAP pays a portion of winter energy bills for eligible people. The Weatherization Program helps participants to improve the heating efficiency of their homes and thus reduce their energy consumption. Households eligible for LIEAP are also eligible for Weatherization. Weatherization may include measures like: sealing the home (insulation, leaks, etc.), proper ventilation, and heating tune-ups or replacements, prescribed by data gathered through an on-site energy audit. More information and the 2018-2019 LIEAP application can be found on their website or by calling toll-free: <https://dphhs.mt.gov/hcsd/energyassistance>  
Montana LIEAP Office Phone Number: **1-833-317-1080**
- Refer patients to the **Montana Asthma Home Visiting Program (MAP)**, which provides in-home support and education to adults and children with uncontrolled asthma. Trained nurses and respiratory therapists assess the home environment, educate residents, and assist with care coordination. Participants can also receive allergen proof pillow and mattress covers and a HEPA filter. Contact information for a local MAP site can be found at: <https://dphhs.mt.gov/publichealth/asthma/astmahomevisiting>
- Recommend proactive housing inspections for people with asthma or caregivers looking to rent or buy a home. Section 8 housing inspections for health and safety are required per Housing Quality Standards established by U.S. Department of Housing and Urban Development (HUD).
- Encourage the adoption of Smokefree policies. Smokefree housing was mandated in all HUD-funded housing units by 2018. The policies can also be adopted by private landlords. More information and tools, for both landlords and tenants, can be found online: <https://dphhs.mt.gov/publichealth/mtupp/SFH>



To view this report and other MACP surveillance reports please follow the

link: <https://dphhs.mt.gov/publichealth/Asthma/data>

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