Asthma Triggers and Environmental Changes in Utah

An Assessment of Prevalence and Demographic Risk Factors

Utah Department of Health
Asthma Program
288 North 1460 West
PO Box 142106
Salt Lake City, UT 84114-2106
health.utah.gov/asthma

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Key Findings

Overall, the most common triggers across Utah for both adults and children were carpet in the bedroom and pets allowed in the house and bedroom. Reducing exposure to these triggers would help to improve asthma symptoms. The most commonly used environmental changes were use of exhaust fans in the kitchen and bathroom, and sheets being washed in hot water. Among the least commonly used environmental modifications were the use of pillow and mattress covers. Increasing use of these modifications would decrease exposure to asthma triggers and help improve asthma symptoms.

Introduction

Asthma is a chronic inflammatory disease of the lungs that affected about 8.8% of Utah adults and 6.7% of Utah children in 2011[1]. Symptoms of an asthma attack include wheezing, breathlessness, chest tightness, and/or coughing[2]. Currently, there is no cure for asthma, but through the use of appropriate medication, routine doctor visits, and the reduction of trigger exposures, it can be controlled. An important strategy in controlling asthma is to reduce or eliminate asthma triggers that cause or exacerbate symptoms.

Everyone has different asthma triggers. Common triggers include dust mites, mold, pests, household pets, pollen, grass, and tobacco smoke. Second, environmental modifications or changes such as using mattress and pillow covers and washing linens and bedding in hot water can reduce exposure to triggers that are more difficult to avoid, such as dust mites and other airborne allergens. The most effective environmental change is to reduce exposure to tobacco smoke.

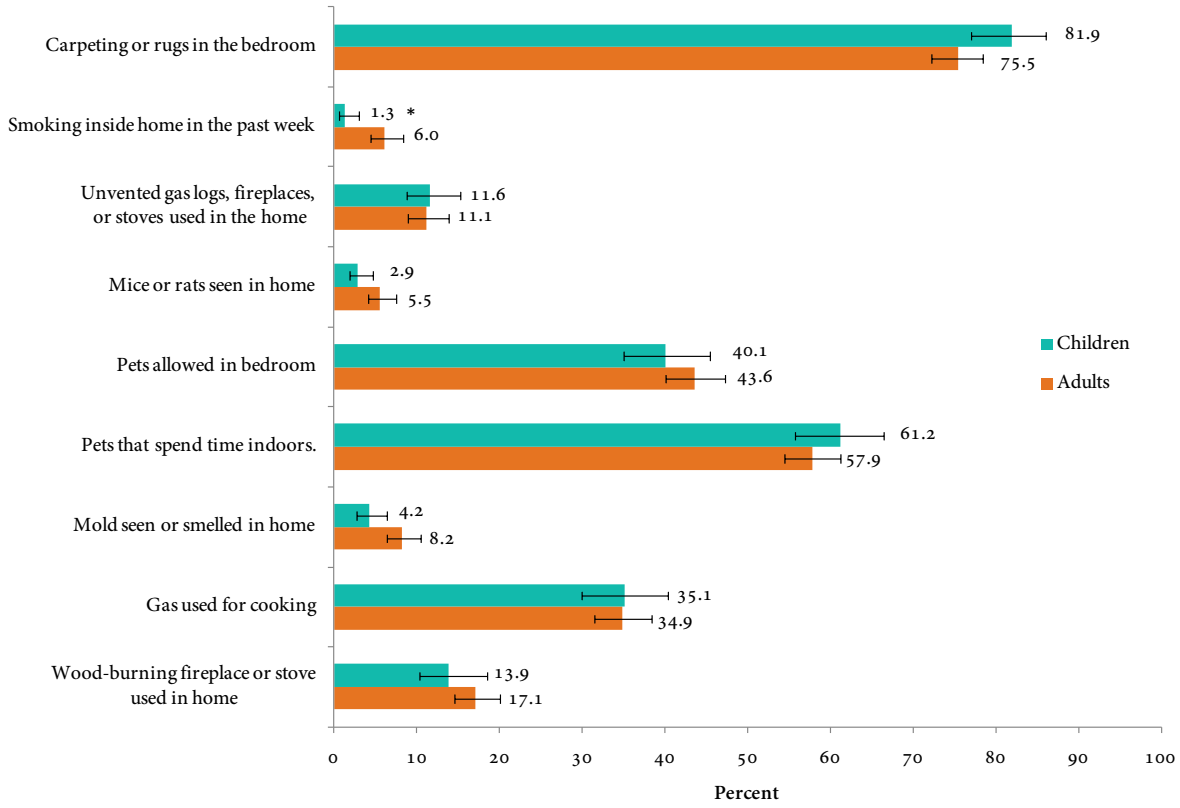
A physician or allergy/asthma specialist can help determine person-specific asthma triggers and discuss possible ways to reduce exposures. For more information on asthma triggers, visit http://www.atsdr.cdc.gov/csem/csem.asp?csem=18&po=9.

Each year the Utah Asthma Program conducts a representative survey of people with asthma. This survey, called the Asthma Call-Back Survey, assesses many components of asthma, including exposure to asthma triggers and environmental changes. In this survey, adults with asthma and the guardians of children with asthma are asked questions regarding their specific exposures to triggers and their use of environmental changes.

The purpose of this report is to identify the most prevalent asthma triggers and environmental modifications in Utah by local health district using the Asthma Call-Back Survey. Further, this report will identify key demographic variables that are related to asthma trigger exposure and environmental modification use.

Asthma Triggers at Home

Several triggers have been found to cause asthma exacerbations, including exposure to cats, cockroaches, environmental tobacco smoke, and the house dust mite. Other triggers associated with the exacerbation of asthma include exposure to dogs, fungi, molds, gas from stoves, pollution at high levels, and the virus that causes colds.



Source: Utah Behavioral Risk Factor Surveillance System, Asthma Call-back Survey, 2007-2010. Crude prevalence.

*Insufficient data to meet UDOH standard for data reliability, interpret with caution. The estimate has a coefficient of variation >30% and does not meet Utah Department of Health standards of reliability.

Figure 1. Asthma Triggers in Homes of Adults and Children with Asthma, Utah, 2007-2010

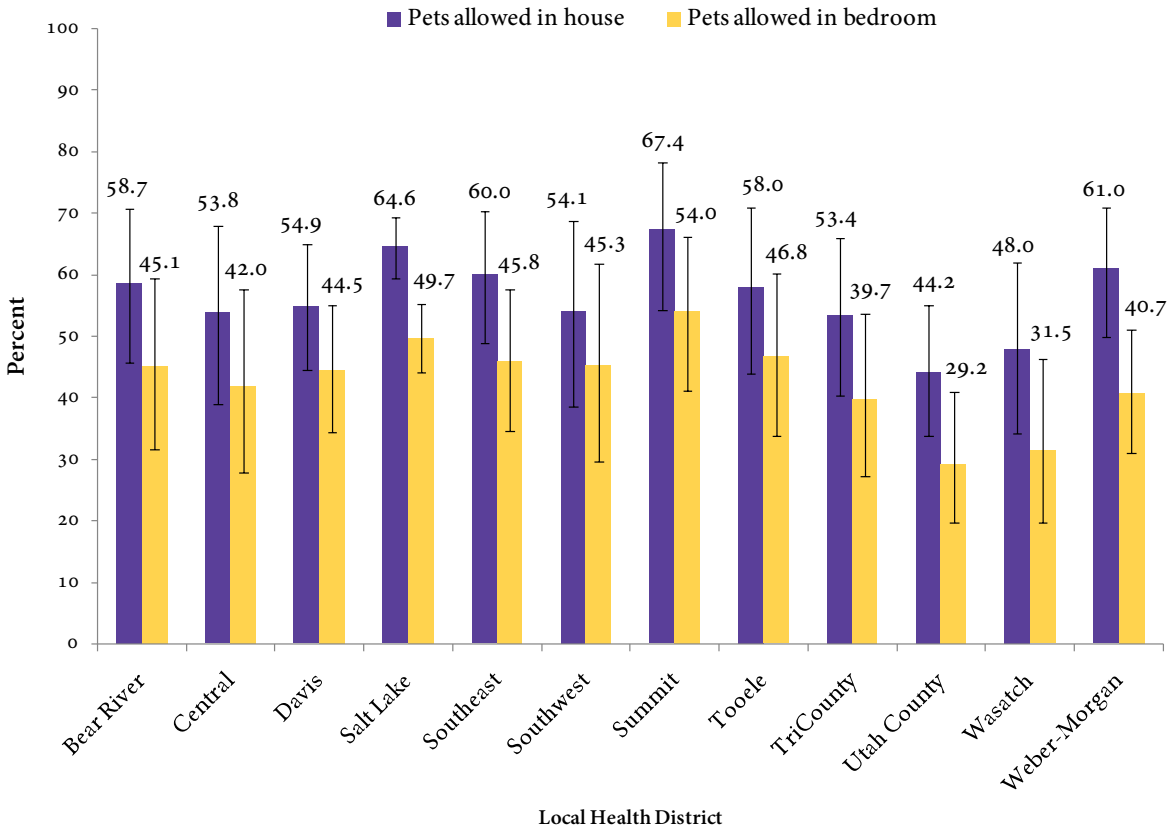
Analyses of triggers by child or adult showed the following:

- The most commonly reported asthma trigger was carpeting/rugs in the bedroom for both children (81.9%) and adults (75.5%).
- The majority of adults (57.9% adults) and children (61.2%) had pets in the house.
- Nearly half of adults (43.6%) and children (40.1%) had pets in the bedroom.

Carpeting or rugs in the bedroom are a concern for those with asthma because dust mites are commonly found there. Dust mites have been found to cause the onset of asthma and exacerbate asthma symptoms. Although dust mites require special environments to live in (low elevation and high humidity), they have been found in the Rocky Mountain region[3]. Overall, exposure to indoor asthma triggers was similar among adults and children.

Asthma Triggers by Local Health District

The triggers highlighted in Figures 2-5 were chosen because they were the most commonly reported triggers in Utah.



Source: Utah Behavioral Risk Factor Surveillance System, Asthma Call-back Survey, 2007-2010. Crude prevalence.

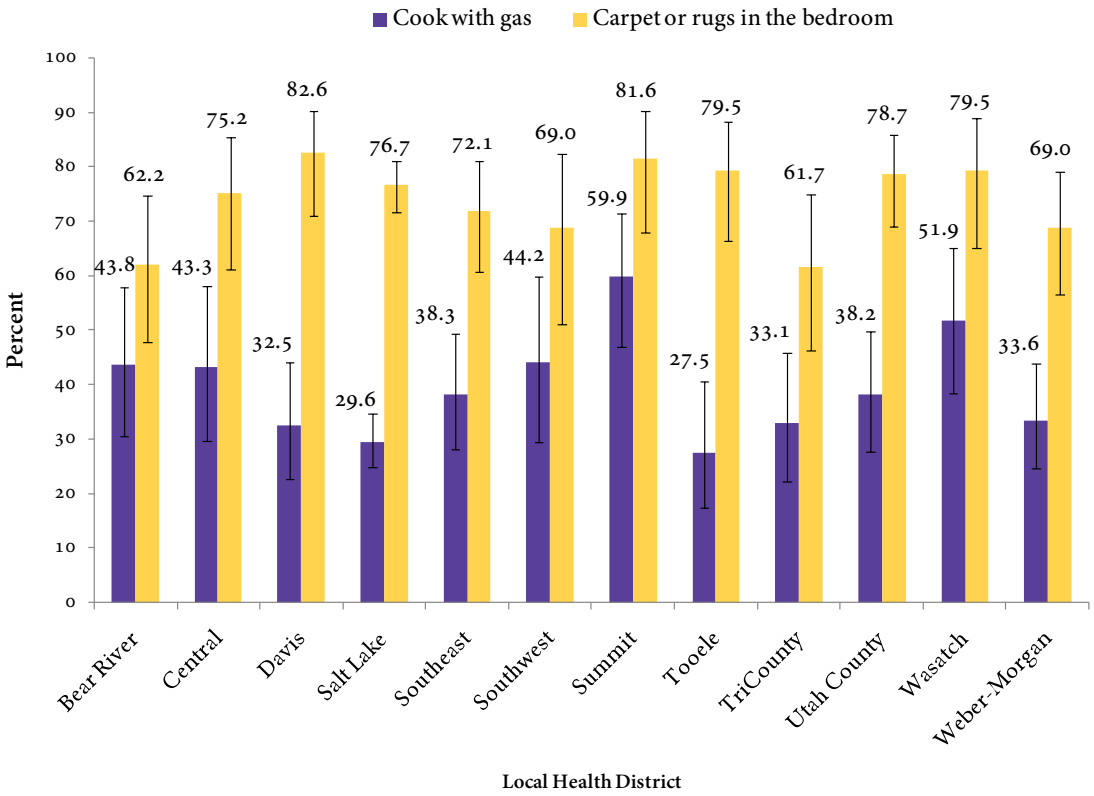
Figure 2. Asthma Pet Triggers in Homes of Adults with Asthma by LHD, Utah, 2007-2010

The most commonly reported asthma triggers in Utah were: cooking with gas, carpet or rugs in the bedroom, and pets allowed in the house or bedroom.

Analyses of pet triggers for adults by LHD showed the following:

- Pets in the house and pets in the bedroom were similar across all LHDs.
- For pets allowed in the house, Utah County had the lowest prevalence (44.2%) and Summit had the highest prevalence (67.4%), although the differences were not statistically significant.
- For pets allowed in the bedroom, Utah County had the lowest prevalence at 29.2%, while Summit had the highest prevalence at 50.4%.
- In Salt Lake County, 64.6% of adults had pets in the home, but fewer had pets in the bedroom (49.7%).

Asthma Triggers by Local Health District



Source: Utah Behavioral Risk Factor Surveillance System, Asthma Call-back Survey, 2007-2010. Crude prevalence.

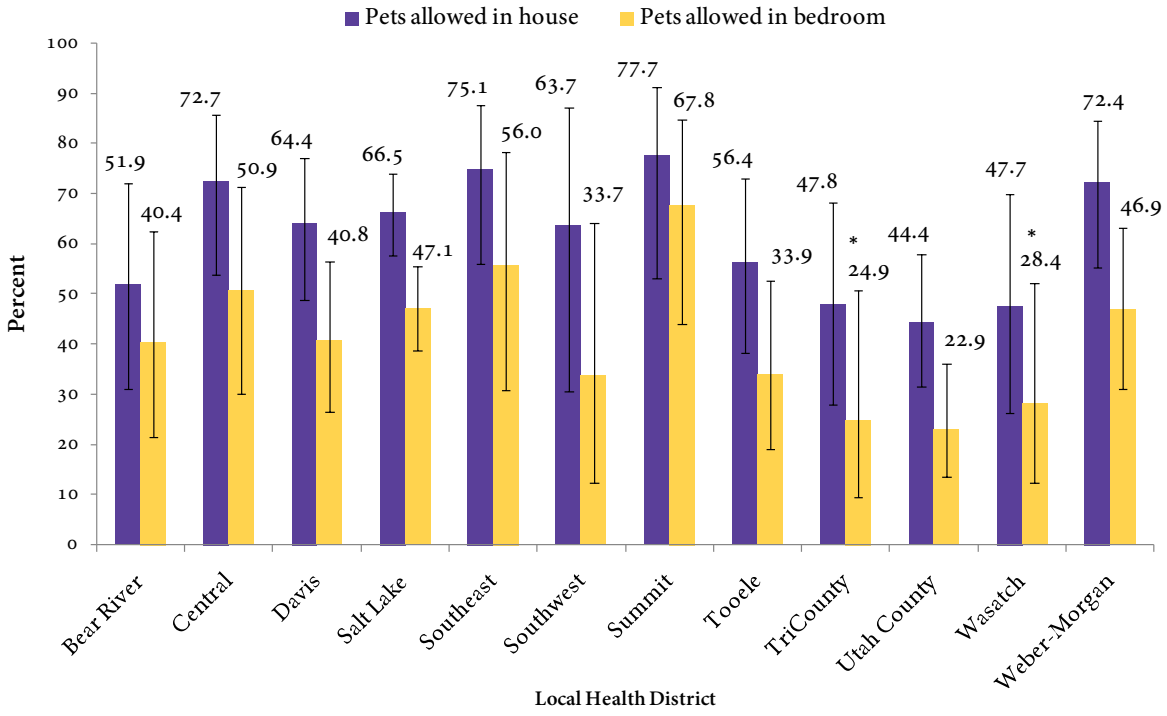
Figure 3. Asthma Triggers in Homes of Adults with Asthma by LHD, Utah, 2007-2010

Although not all differences across LHDs were statistically significant, cooking with gas did vary across some LHDs. Analyses of triggers for adults by LHD showed the following for gas used for cooking:

- Tooele (27.5%) reported less use than Summit (59.9%).
- Salt Lake (29.6%) reported less use than Summit (59.9%) and Wasatch (51.9%).

Analyses of triggers for adults by LHD showed the following for carpet or rugs used in the bedroom:

- There were no differences across LHDs.
- Davis (82.6%) and Summit (81.6%) reported the highest prevalence and TriCounty (61.7%) and Bear River (62.2%) reported the lowest prevalence (differences were not statistically significant).



Source: Utah Behavioral Risk Factor Surveillance System Asthma Call-back Survey, 2007-2010. Crude prevalence.

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Figure 4. Asthma Pet Triggers in Homes of Children with Asthma by LHD, 2007-2010

In general, pets allowed in the house and pets allowed in the bedroom did not vary among LHDs.

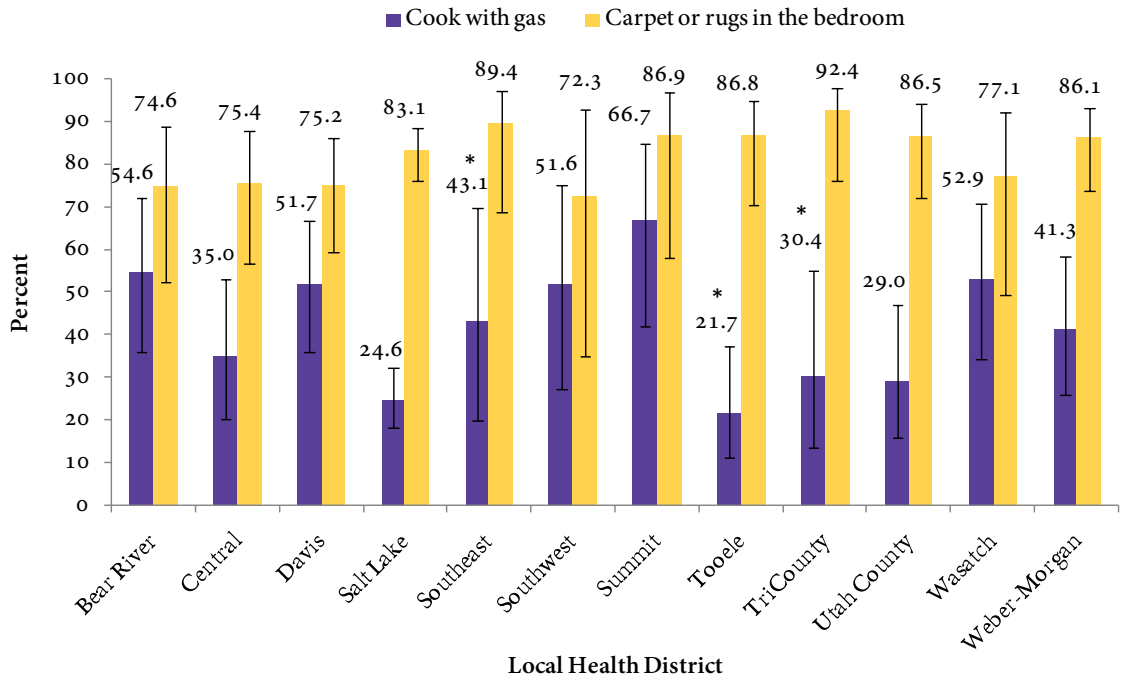
Analyses of triggers for children by LHD showed the following for pets allowed in the house:

- Summit had the highest prevalence at 77.7% and Utah County had the lowest prevalence at 44.4%, although the differences were not statistically significant.

Analyses of triggers for children by LHD showed the following for pets allowed in the bedroom:

- Summit had the highest prevalence at 67.8% and Utah County had the lowest prevalence at 22.9%. This difference was statistically significant.

Asthma Triggers Among Children



Source: Utah Behavioral Risk Factor Surveillance System Asthma Call-back Survey, 2007-2010. Crude prevalence.

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Figure 5. Asthma Triggers in Homes of Children (0-17) with Asthma by LHD, Utah, 2007-2010

Analyses of triggers for children by LHD showed the following for cooking with gas:

- Salt Lake County (26.6%) had a lower usage than Davis (51.7%) and Summit (66.7%).
- Most LHDs had similar usage.

Analyses of triggers for children by LHD showed the following for carpet or rugs used in the bedroom:

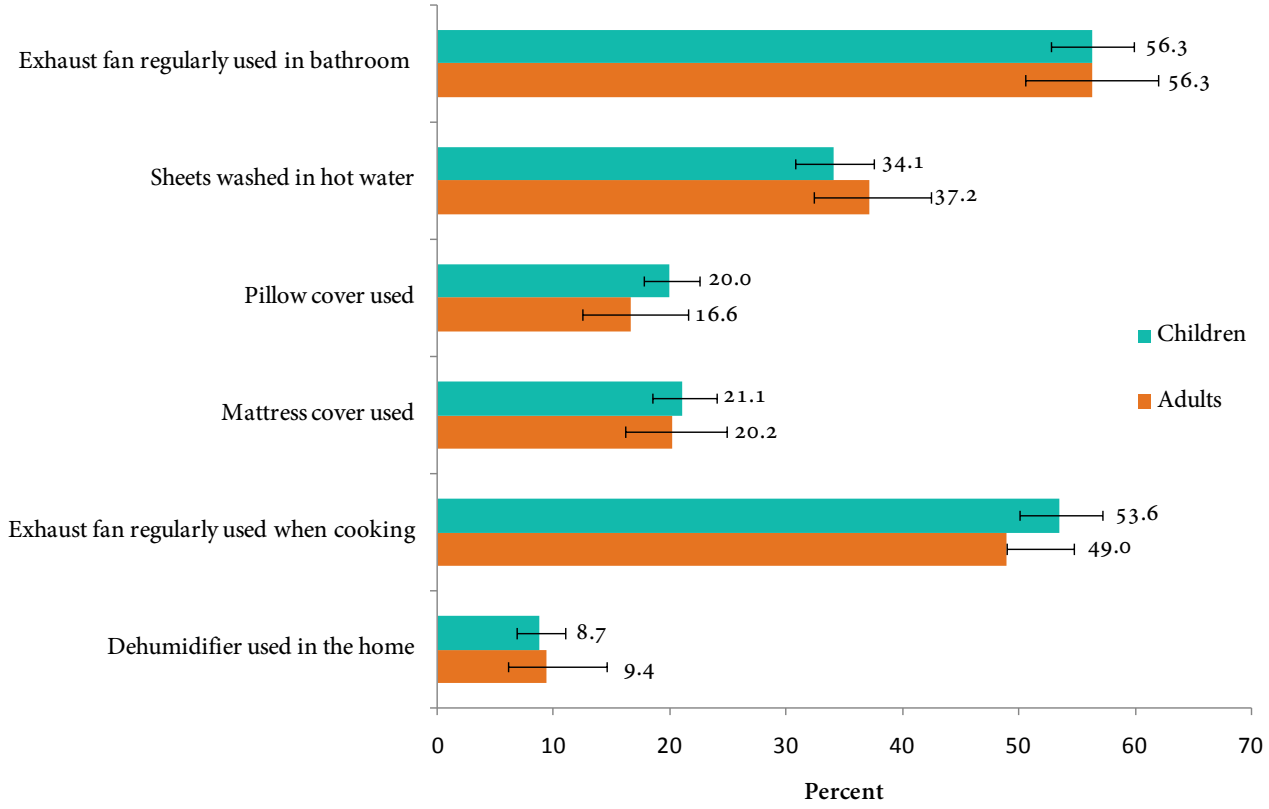
- Almost three-fourths of children with asthma in each LHD had carpet or rugs in the bedroom.
- Southwest (72.3%) had the lowest prevalence and TriCounty (92.4%) had the highest prevalence (differences were not statistically significant).

Environmental Changes to Reduce Exposure to Asthma Triggers

Environmental changes made in the home can help to reduce exposure to asthma triggers. Some affordable, simple, and effective changes include: using mattress and pillow covers and washing bedding and linens in hot water (at least 130°F). These will reduce dust mites and exposure to pet dander[4]. When replacing carpets or rugs and getting rid of pets aren't realistic options, using a high-efficiency particulate air filter (HEPA) vacuum is an effective strategy for removing allergens from a home[5]. Additionally, people who use gas stoves to cook should never use them as a home heating source. It's also important to properly ventilate the room where the stove is used[6]. For more information on other changes, visit: http://www.atsdr.cdc.gov/csem/csem.asp?csem=18&po=9.

Some studies have found that making environmental changes like using pillow covers, mattress covers, and washing items in hot water produce mixed results on asthma outcomes[7]. However, a systematic review completed by the Centers for Disease Control and Prevention's Community Preventive Services Task Force[7] found that children and adolescents who had home-based, multi-trigger, multi-component interventions had improved asthma symptoms and fewer missed school days due to asthma (http://www.thecommunityguide.org/asthma/multicomponent.html). Multi-trigger, multi-component interventions are aimed at reducing exposure to multiple asthma triggers in the home and educating patients on asthma care.

Environmental Changes to Reduce Exposure to Asthma Triggers



Source: Utah Behavioral Risk Factor Surveillance System Call-back Survey, 2007-2010. Crude prevalence.

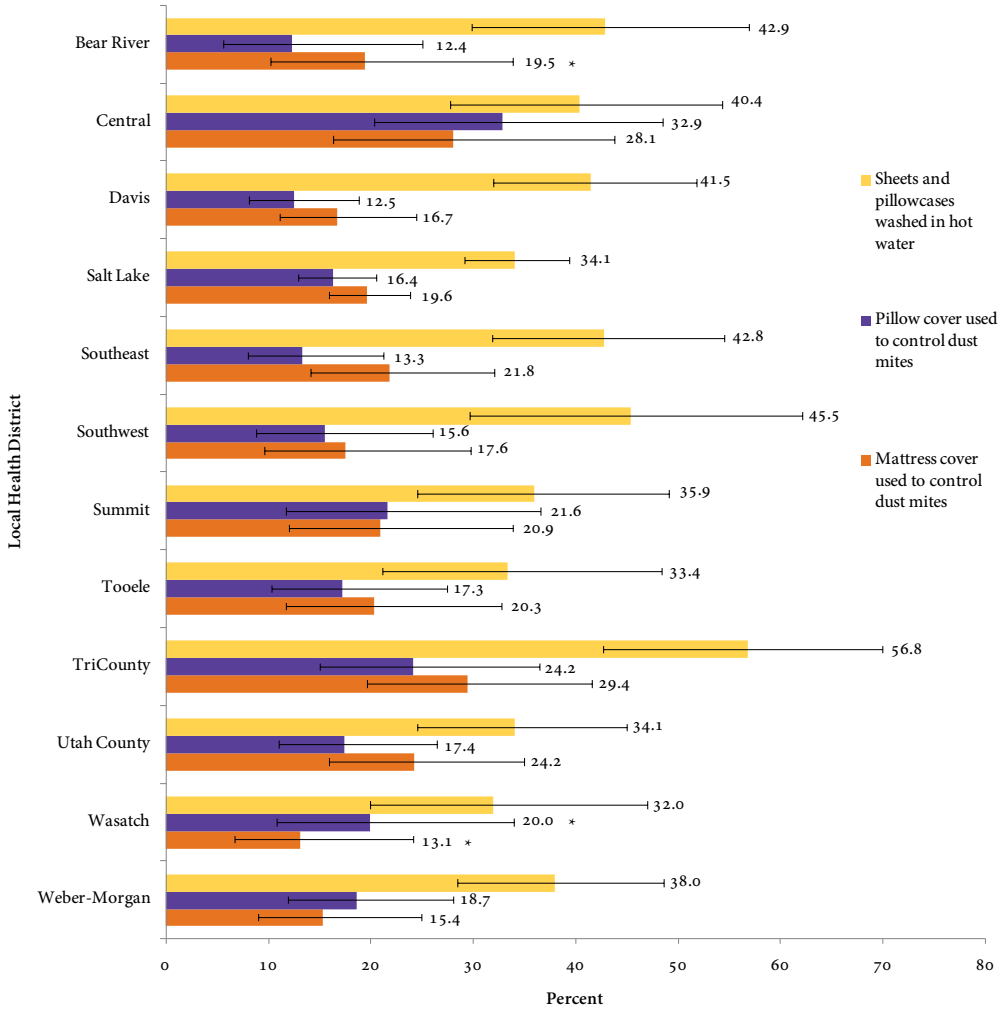
Figure 6. Environmental Changes in Homes of Adults and Children with Asthma, Utah, 2007-2010

Analyses of environmental changes by child and adult showed the following:

- There were no significant differences between adults and children in usage of environmental changes.
- Regular use of an exhaust fan in the bathroom (56.3% child and 56.3% adult) and exhaust fan used when cooking (53.6% child and 49.0% adult) were the most commonly reported.
- Use of a dehumidifier (8.7% child and 9.4% adult) was the least commonly reported.
- The second- and third-lowest reported changes were pillow covers (20.0% child and 16.6% adult) and mattress covers (21.1% child and 20.2% adult).

The environmental changes presented in the following analysis were chosen because they were the least reported but are effective modifications, with the exception of the dehumidifier. Using a dehumidifier in Utah may not be the most effective modification since Utah is already a relatively dry state. Other sources of humidity in kitchens and bathrooms can be easily controlled with exhaust fans.

Environmental Changes Among Adults



Source: Utah Behavioral Risk Factor Surveillance System Asthma Call-back Survey, 2007-2010. Crude prevalence.

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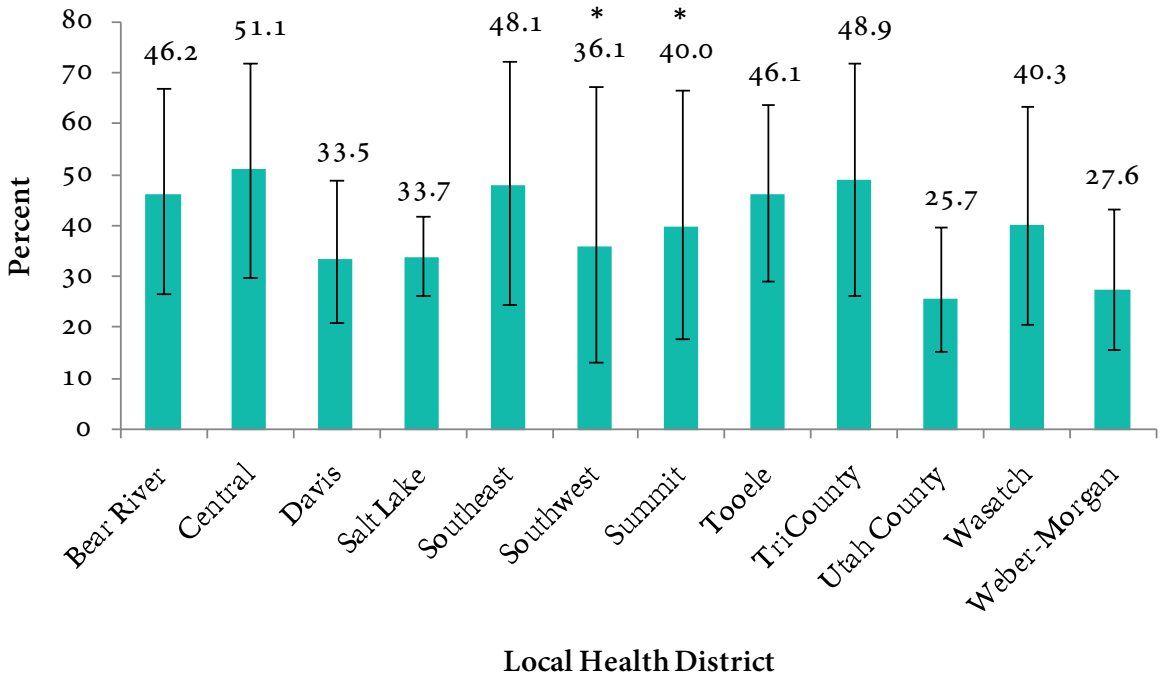
Figure 7. Environmental Changes in Homes of Adults with Asthma by LHD, Utah, 2007-2010

Analyses of adult environmental changes by LHD showed the following:

- For usage of hot water to wash bedding, TriCounty (56.8%) had the highest usage and Wasatch (32.0%) had the lowest usage (differences were not statistically significant).
- For use of pillow covers, Central had the highest use (32.9%) and Davis (12.5%) had the lowest use (differences were not statistically significant).
- For mattress covers, TriCounty had the highest usage (29.4%) and Davis had the lowest usage (16.7%) (differences were not statistically significant).
- Using hot water to wash bedding is higher than use of pillow and mattress covers in Davis (41.5% hot water), Salt Lake (34.1% hot water), TriCounty (56.8% hot water), and Weber-Morgan (38.0% hot water).

Environmental Changes Among Children



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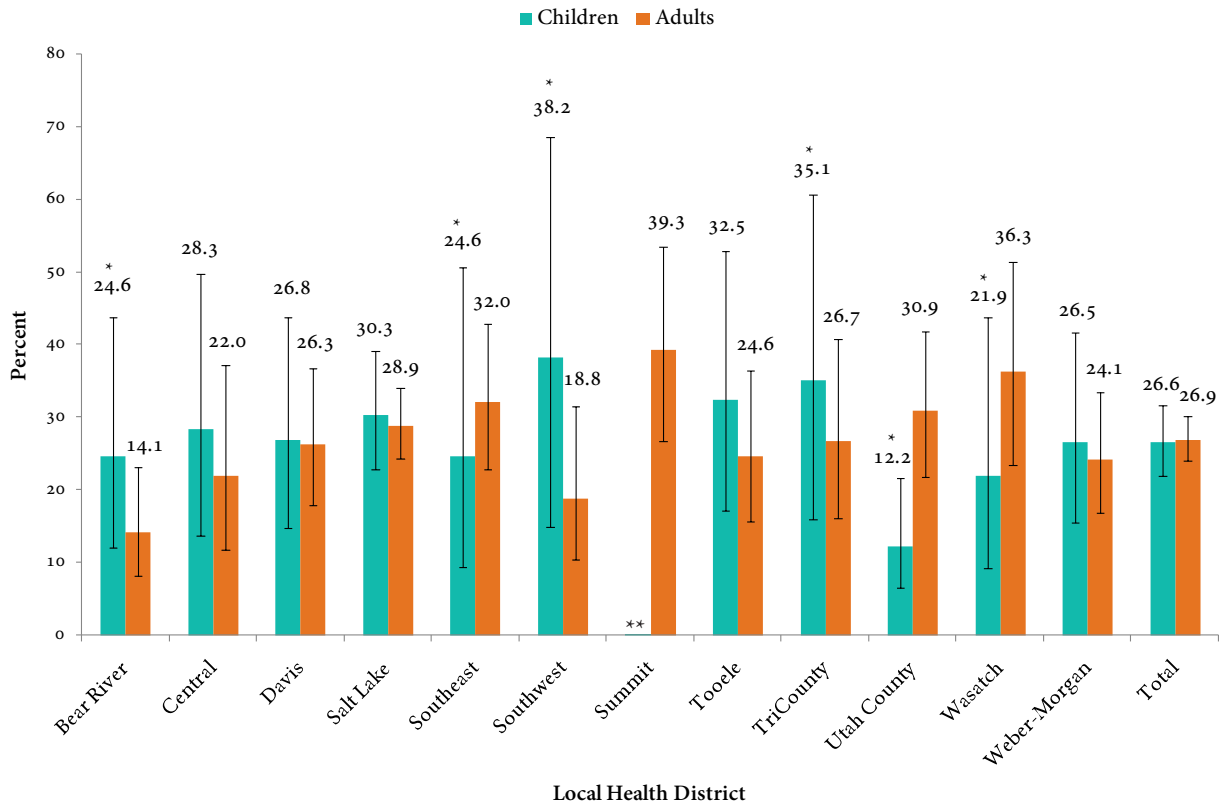
*Insufficient data to meet UDOH standards for data reliability, interpret with caution. The estimate has a coefficient of variation >30% and does not meet Utah Department of Health standards of reliability.

Figure 8. Sheets and Pillowcases Washed in Hot Water in Households Having Children with Asthma by LHD, Utah, 2007-2010

There were other changes used in the homes of children with asthma; however, due to data restrictions, using hot water to wash bedding was the only reportable modification. Washing bedding in hot water was highest in Central (51.1%) and lowest in Utah County (25.7%) with no significant differences.

The Role of Health Care Providers

Health care professionals play an important role in helping asthma patients recognize and limit their exposure to asthma triggers. The National Heart, Lung, and Blood Institute (NHLBI) EPR-3 recommends that medical professionals advise their patients with asthma to reduce or avoid exposure to indoor and outdoor asthma triggers.[8] Reduction of exposure to asthma triggers can improve asthma symptoms and reduce asthma episodes.



Source: Utah Behavioral Risk Factor Surveillance System Asthma Call-back Survey, 2007-2010. Crude prevalence.

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**The data cannot be reported because the estimate is unreliable. The estimate has a coefficient of variation >50% and does not meet Utah Department of Health standards to report.

Figure 9. Advised by a Health Care Professional to Change Things in the Environment of Children and Adults with Asthma by LHD, Utah, 2007-2010

Analyses of health care providers advising changes to the environment by LHD showed the following:

- Only 26.6% of children and 26.9% of adults with asthma were ever advised by a health care professional to change something in their home, work, or school environment.
- For adults, Summit (39.3% adults) had the highest prevalence and Bear River (14.1%) had the lowest prevalence.
- For children, Tooele (32.5% children) had the highest prevalence and Weber-Morgan (26.5%) had the lowest prevalence (differences were not statistically significant).

Factors Related to Asthma Triggers and Environmental Changes

Logistic regression models were constructed to assess which demographic variables increase or decrease the likelihood that someone with asthma will be exposed to a trigger or will make a change to their environment. Initially, all models considered age, sex, race, income, and local health district. Using a stepwise method, variables were removed from the model if they did not reach a level of significance ($p<.05$). This was done in order to understand the direct effect of the significant variables. See interpretation on page 13.

Table 1. Demographic Predictors of Asthma Triggers and Modifications in Adults with Asthma Odds Ratio and Confidence Interval

	Pets Allowed in House	Cook with Gas	Carpet/Rugs in the Bedroom	Mattress Cover Used to Control Dust Mites	Pillow Cover Used to Control Dust Mites	Sheets and Pillowcases Washed in Hot Water	Ever Advised by a Health Professional to Change Things in the Home
Female vs. Male	1.4 (1.1-2.0)			2.0 (1.4 -2.8)	2.1 (1.4-3.1)	1.7 (1.2-2.3)	
Age 18-34	2.5 (1.7-3.7)	1.9 (1.3-3.0)	ref				ref
Age 35-49	3.0 (2.1-4.1)	2.2 (1.5-3.1)	1.2 (.8-1.8)				1.7 (1.2-2.6)
Age 50-64	2.1 (1.6-3.0)	2.1 (1.5-3.0)	1.5 (1.0-2.3)				1.6 (1.1-2.3)
Age 65+	ref	ref	2.9 (1.9-4.5)				.7 (.4-1.0)
Bear River		1.9 (1.0-3.5)					
Central		2.0 (1.0-3.8)					
Davis		1.2 (.7-2.1)					
Salt Lake County		ref					
Southeast		1.6 (.9-2.6)					
Southwest		2.3 (1.1-4.6)					
Summit		3.6 (2.0-6.3)					
Tooele		.9 (.5-1.7)					
Tri-County		1.2 (.7-2.2)					
Utah County		1.5 (.9-2.6)					
Wasatch		2.6 (1.4-4.7)					
Weber-Morgan		1.2 (.7-2.0)					

Source: Utah Behavioral Risk Factor Surveillance System Asthma Call-back Survey, 2007-2010.
Ref=Reference Variable. Highlighted areas represent significantly different effects between groups.

Factors Related to Asthma Triggers and Environmental Changes

Results from the regression showed that after adjusting for age, sex, race, and LHD:

- Those aged 18-34, 35-49, and 50-64 are 2.5, 3.0, and 2.1 times more likely to allow pets in the house when compared to those who were 65+, respectively.
- Those who are aged 50-64 (OR: 1.5) and 65+ (OR: 2.9) were more likely than those aged 18-34 to have carpet/rugs in their bedrooms.
- Those who were aged 18-34 (OR: 1.9), 35-49 (OR: 2.2), and 50-64 (OR: 2.1) were more likely to cook with gas than those aged 65+.
- Those between the ages of 35-49 (OR: 1.7) and 50-64 (1.6) with asthma were more likely to be advised by a health care professional to make changes to their environments than those aged 18-34.
- Women with asthma were 1.4 times more likely to allow pets in the house than men.
- Women were about twice as likely as men to use mattress covers (OR: 2.0) and pillow covers (OR: 2.1) to control dust mites, and were 1.7 times more likely to wash their bedding in hot water.
- Those living in Bear River (OR: 1.9), Central (OR: 2.0), Southwest (OR: 2.3), Summit (OR: 3.6), or Wasatch (OR: 2.6) were 2 to 3 times more likely to cook with gas when compared to those living in Salt Lake County.

Conclusion

Overall, the most common triggers across Utah for both adults and children were carpet in the bedroom and pets allowed in the house and bedroom. Reducing exposure to these triggers would help to improve asthma symptoms. The most commonly used environmental changes were use of exhaust fans in the kitchen and bathroom and sheets being washed in hot water. Among the least commonly used environmental modifications were the use of pillow and mattress covers. Increasing use of these modifications would decrease exposure to asthma triggers and help improve asthma symptoms.

In Utah, there was almost no difference between children and adults in terms of exposure to asthma triggers or use of environmental changes. However, there were a few notable differences between LHDs in exposure to asthma triggers and use of environmental changes. These findings suggest that exposure to asthma triggers and use of environmental changes are nearly equally distributed among all Utahns with asthma.

Summit had nearly the highest prevalence of exposure to triggers for both adults and children, and also had the highest reported health care provider advising change in the environment for adults. This suggests that those with asthma who live in Summit LHD may be informed about environmental changes, but do not appear to be adopting the recommended changes. One study found that relationships with family, friends, and coworkers, and relationships with clinicians affected self-management[8]. Thus, those with asthma in Summit LHD may need more than just information about their asthma - they may also need support from important people in their lives and health care providers to implement changes. More data must be collected and analyzed to draw any strong conclusions.

TriCounty had nearly the highest usage of environmental changes for adults. This finding is interesting because in 2010, TriCounty also had the highest rate of age-adjusted emergency department visits (46.7 per 10, 000) in the state[1]. One explanation for this trend could be that the asthma triggers responsible for high emergency department rates are not assessed in this report. These triggers may include outdoor air pollution and allergens, strong emotions, and respiratory infections. More data must be collected and analyzed to draw any conclusions.

Conclusion

Overall, age was an important factor in trigger exposure. The relationship between age and trigger exposure may be due to differences of life stage and the roles and responsibilities that are accorded to those stages. For example, adults younger than 65 were more likely to use gas to cook than those 65 and over. This finding could be related to the cooking patterns of an older demographic that has fewer people in the household. One study found that as household size increased, so did the number of times hot meals were cooked at home per day[9]. As adults grow older and their children move away from home they may not cook hot meals as often, including those who use gas stoves.

Allowing pets in the house may also be related to life stage differences. Adults under 65 were more likely to allow pets in the house than those over 65. This could be related to those under 65 being more likely to have children in the house. One study found that pet owners are more likely to have pets if they have kids between the ages of six and 19[10]. The CDC recommends bathing pets every week, keeping them outside as much as possible, and vacuuming often to reduce exposure to the dander in their fur[11].

For environmental changes, logistic regression revealed that gender is an important consideration in modification use. Women were more likely than men to make changes to their environment. Differences in health beliefs and attitudes about asthma between men and women may contribute to women being more likely to use environmental changes to reduce exposure to triggers and asthma symptoms. One study found that women with asthma have a higher and more positive attitude toward treatment adherence than men[12].

Asthma is an incurable chronic disease. In order for those with asthma to have a high quality of life, they must control asthma symptoms. An important component of control is reducing trigger exposures through environmental changes. One way to accomplish this is for health care providers to understand the geographical, sex, and age-related differences in trigger exposure and use of environmental changes. This will help health care providers give those with asthma the best possible information on avoiding triggers and reducing asthma symptoms.

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