BURDEN REPORT: ASTHMA TRIGGERS IN MONTANA

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Introduction

Asthma triggers are irritants and other substances that can aggravate a person's asthma.[1] Triggers can vary from person to person and knowing personal asthma triggers is an important step in asthma control. Some of the most common asthma triggers are tobacco smoke, dust mites, outdoor air pollution, pests such as cockroaches or mice, pet dander, mold, pollen, physical exercise, thunderstorms, cold air, fragrances, and strong scents from chemicals.[2] The purpose of this report is to illustrate the common asthma triggers in Montana as part of a larger series of reports highlighting the burden of asthma in the state of Montana.

Asthma Triggers:

A group of stakeholders met in 2012 to assess and identify some of the most common asthma triggers in Montana. They focused on environmental asthma triggers and were able to define some asthma triggers which Montanans may be exposed to in indoor or outdoor environments or in the workplace, excluding health triggers such as respiratory illness.[3] The results of their findings are summarized in Table 1 and Table 2 and the full report can be found here.

Table 1. Indoor Air Pollutants in Montana

Trigger	Present in Montana?	Associated With
Tobacco Smoke	Yes	Tobacco products
$PM_{2.5}$ or PM_{10}	Yes	Wood stoves and fireplaces
Mold (Fungi)	Yes	Damp indoor areas
Furry and Feathered Pets	Yes	Indoor pets, especially in bedrooms or carpeted areas
Nitrogen Dioxide	Yes	Unvented gas appliances (such as stoves) or improperly vented furnaces or fireplaces
Dust Mites	Sometimes	Carpet, upholstered furniture, bedding, or fabric
Rodents	Yes	Unsanitary indoor conditions (any home)
Cockroaches	Rarely	Unsanitary indoor conditions (warm and humid homes)
Ozone	Yes	Indoor air purifiers and copy machines
Volatile Organic Compounds	Yes	Fragrances, such as perfume or cologne, furniture finishers, or air fresheners

Table 2. Outdoor Air Pollutants in Montana

Trigger	Present in Montana?	Associated With
$PM_{2.5}$ or PM_{10}	Yes	Campfires, wildfires, wood stoves, trapped during atmospheric inversion conditions

Wildfires	Yes	Summer months
Cold Air	Yes	Winter months
Pollen	Yes	Spring, summer, and fall months. Pine, juniper, alder, birch, poplar, ash, maple, and grass.
Sulfur Dioxide	Yes	Fossil fuel combustion, coal, and petroleum
Nitrogen Dioxide	Yes	Automobiles, industry, powerplants, and forest fires
Ozone	No	Air pollution

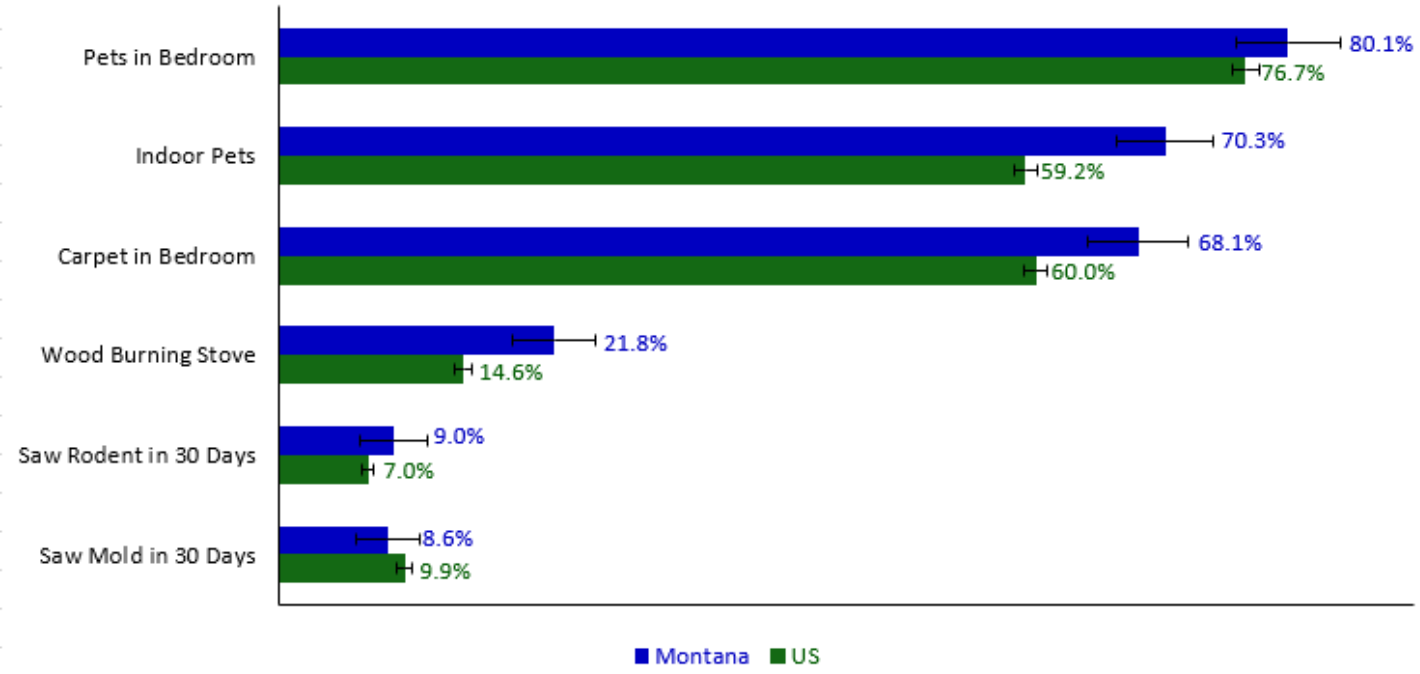
Methods

For this analysis, data from the 2015-2019 Montana Behavioral Risk Factor Surveillance System (BRFSS) and the 2013-2017 Montana Asthma Callback Survey (ACBS) were used to describe asthma triggers among adults with current asthma in Montana. The BRFSS and ACBS are telephone surveys of non-institutionalized adults aged 18 years and older. BRFSS respondents that report having current asthma are asked if they would like to participate in the ACBS. If they agree, they are called back within the next two weeks and are asked a series of questions about their asthma symptoms, medications, triggers, and other exposures. Current asthma was defined as a respondent reporting that a health care professional has ever told them they have asthma and then reporting that they still have asthma. Work-related asthma was defined by combining responses to a series of questions about workplace exposures, including being told by a healthcare provider that the person has work-related asthma or a possible asthma aggravation (Table 3). Adult health risk behavior, such as smoking, was measured using BRFSS as well. Smoking prevalence for youth was determined using the 2019 Montana Youth Risk Behavior Survey (YRBS), which is a national survey of high school students. Asthma prevalence in the YRBS was defined as a respondent reporting that a doctor or nurse ever told them they have asthma.

Asthma Triggers among Montana Adults

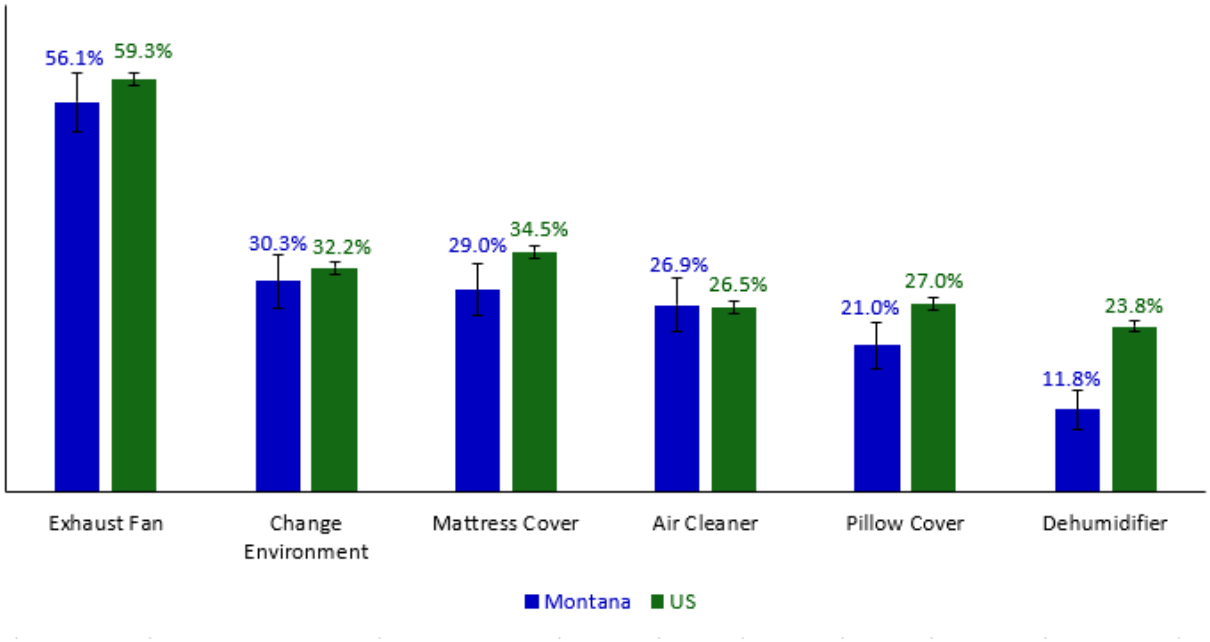
Asthma triggers are unique to the individual and knowing personal asthma triggers can help a person manage their disease and avoid exacerbations. The most common trigger exposure among adults with asthma in Montana was allowing pets in the bedroom (80.1%), having indoor pets (70.3%), and having carpet in the bedroom (68.1%). The latter two were also significantly higher among Montana adults with asthma compared to adults with asthma in the US (Figure 1). Being exposed to wood-burning stoves was also significantly higher among Montana adults with asthma, compared to the U.S. (21.8% versus 14.6%, respectively). There were no significant differences between Montana and the US for seeing a rodent or mold in the past 30 days, and they were the least common exposures at 7.0% and 9.9%, respectively (Figure 1).

Figure 1. Prevalence of Adults with Current Asthma by Exposure to Specific Asthma Triggers, US & Montana, ACBS, 2013-2017



There are several methods of mitigating or avoiding asthma triggers, such as vacuuming regularly to clean dust and pet dander, fixing leaks to prevent pests, running a dehumidifier or exhaust fan to prevent mold, and using mattress or pillow covers to prevent dust mites.[4] About 30% of Montana adults with current asthma reported discussing changing something in their environment to avoid asthma triggers with a healthcare professional. More than half (56.1%) of adults in Montana with current asthma used exhaust fans in the bathroom. The prevalence of dehumidifiers, mattress covers, and pillow covers use was significantly lower among Montana adults with current asthma than the US adult population with asthma. There were no significant differences between the rest of the preventative actions (Figure 2).

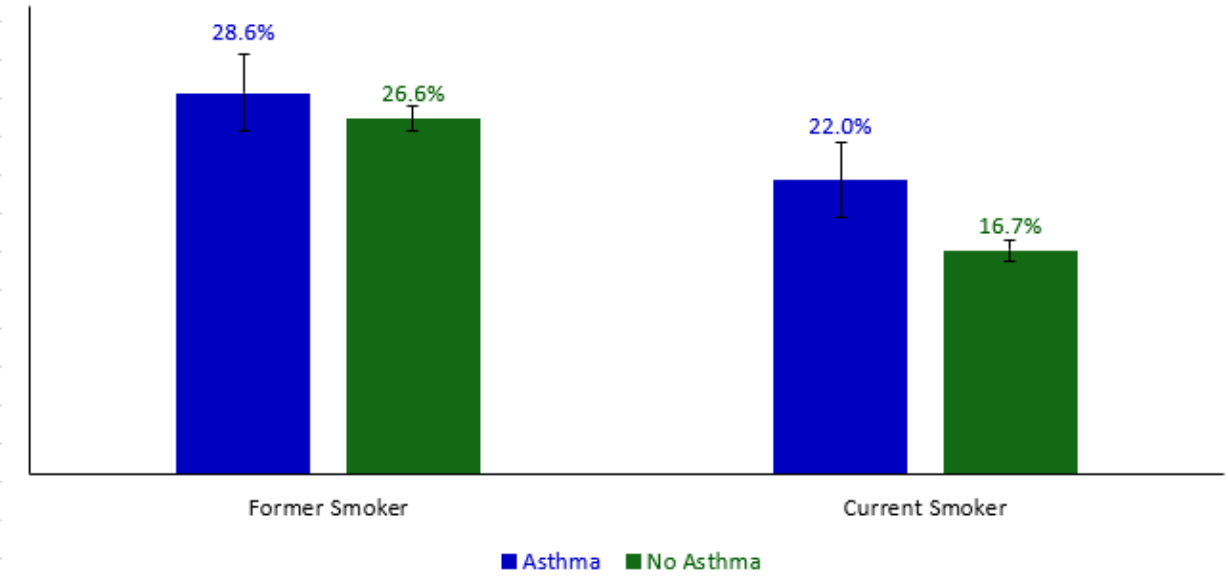
Figure 2. Prevalence of Adults with Current Asthma who Take Actions to Avoid Asthma Triggers, Montana & US, ACBS, 2013-2017



Tobacco

Both smoking and second-hand smoke are asthma triggers.[5] Despite this, about one in five (22.0%) Montana adults with asthma are current smokers, and over one in four (28.6%) are former smokers (Figure 3). The prevalence of Montana adults with asthma who are current smokers (22.0%) is significantly higher than the prevalence of Montana adults without asthma who are current smokers (16.7%) (Figure 3). In addition, more than 10% (12.2%) of Montana adults with current asthma live with someone who smokes inside their home.

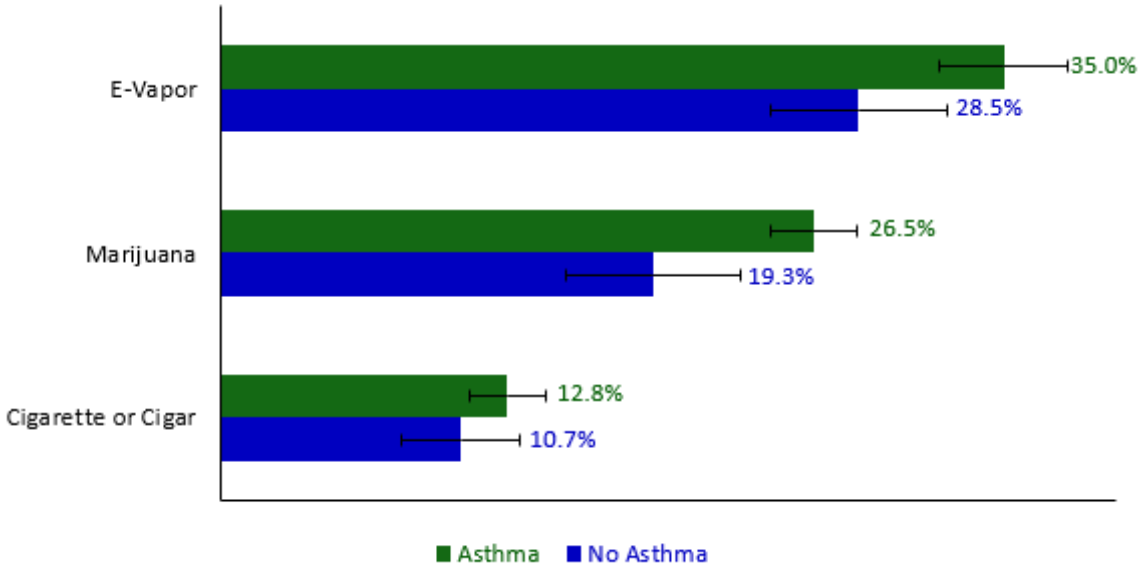
Figure 3. Smoking Prevalence by Current Asthma Status, Montana, BRFSS, 2015 - 2019



Limited evidence suggests that active smoking also exacerbates asthma in children and adolescents.[6] Furthermore, environmental tobacco smoke (more commonly known as "secondhand smoke") has a clear link to asthma in children and can trigger an asthma attack in a child. Children with asthma who are around environmental tobacco smoke tend to have worse and frequent asthma attacks.[7] Electronic cigarettes are a more recent nicotine delivery device and have been studied less, however they also have been found to increase the risk of respiratory disease (asthma, COPD, and chronic bronchitis).[8]

In 2019, electronic cigarette and marijuana usage were both significantly higher in high school students with asthma than in high school students without asthma (35.0% compared to 28.5%, respectively, for electronic cigarettes and 26.5% compared to 19.3%, respectively, for marijuana). One in eight (12.8%) high school students with asthma use either cigarettes or cigars, which was not significantly different than the prevalence of cigarette or cigar usage in students without asthma (10.7%) (Figure 4). The 2019 YRBS did not differentiate between smoking, vaping, or consuming marijuana. At this time, it is currently not recommended for patients with asthma to smoke or vape marijuana, due to risk of an asthma attack or exacerbation.[9]

Figure 4. Product Use Among High School Students by Asthma Prevalence, Montana, YRBS, 2019



Work-Related Asthma

The workplace can cause asthma as well as trigger or aggravate pre-existing asthma. Work-related asthma is defined as asthma triggered by an exposure found at the person's workplace. Over 300 known or suspected substances can be in the workplace that may cause or worsen asthma.[10] Some examples include animal dander, varnishes, soldering resin, detergents, nickel sulfate, rubber latex, chlorine gas, and sulfur dioxide.[11]

Nearly one in five Montanans with current asthma reported their asthma was caused by a current or previous job (18.5%), while over half (52.5%) of Montanans with current asthma reported their asthma was aggravated by a current or previous job. More than one in eight (13.1%) Montana adults with current asthma were told by their healthcare provider that their asthma was work-related. Eighteen percent of adults with current asthma reported that they quit or changed jobs because their workplace either caused their asthma or made it worse. About 31% of adults with current asthma reported they missed a day of work or couldn't do their usual activities in the past year due to asthma (Table 3).

Table 3: Self-Reported Work-Related Asthma Among People with Current Asthma, Montana, ACBS, 2013-2017

	Percent	95% Confidence Interval
Asthma Caused by Current Job	4.6	2.6 - 6.6
Asthma Caused by Previous Job	15.6	12.2 - 19.1
Asthma Aggravated by Current Job	22.4	17.9 - 26.8
Asthma Aggravated by Previous Job	42.5	37.5 - 47.5
Asthma Caused by Current or Previous Job	18.5	14.9 - 22.1
Asthma Aggravated by Current or Previous Job	52.5	47.5 - 57.5
Asthma Caused or Aggravated by Current Job	23.0	18.5 - 27.5

Asthma Caused or Aggravated by Previous Job	42.6	37.7 - 47.6
Quit/Changed a Job because it Caused/Made Asthma Worse	18.4	13.4 - 23.4
Ever Told by Health Care Provider that Asthma is Work Related	13.1	9.9 - 16.3
Ever Told Health Care Provider that Asthma is Work Related	17.0	13.5 - 20.5
Missed Any Days of Work Due to Asthma	30.9	25.9 - 35.9

Conclusion

Several asthma triggers are common in Montana both indoors and outdoors, such as indoor pets, wood stoves, carpeting, wildfire and tobacco smoke, and pollen. This report found that from 2013–2017, less than one-third of adults with current asthma took actions to avoid asthma triggers. Additionally, smoking was common among Montana adults with asthma (22%). Smoking cigarettes or cigars was less among youth with asthma (12.8%) compared to adults with asthma; however, electronic cigarettes and marijuana use among students with asthma was higher, at 35.0% and 26.5%, respectively. Work-related asthma and asthma aggravations at work are common, with over half of adults with current asthma reporting some form of aggravation of their asthma from a current or former place of work and nearly one in five (18.5%) adults with current asthma reporting that their asthma was caused by a current or previous job. Asthma also exacts a toll on missed work and wages, which can have negative impacts on both the employee and employer, and almost a third of Montana adults with current asthma report having to miss work or their usual activities due to asthma.

Recommendations for Healthcare Providers

- Provide patient education on common asthma triggers and encourage patients to learn what their own triggers are, including identifying any seasonality. Asthma can be controlled and should not cause disruptive daily symptoms.
- Provide education on potential preventative tools, such as pillow and mattress covers.
    - The Montana Asthma Home Visiting Program provides home assessments, HEPA filters, and pillow covers to patients with uncontrolled asthma.
- Encourage patients to assess their environment both at home and at work and take necessary precautions if a change in environment is not possible.
- Advise patients who currently smoke cigarettes or other nicotine delivery products to quit and recommend evidence-based tobacco cessation methods.
- Assess exposure to environmental tobacco smoke and advise on exposure reduction strategies.
- Refer patients to a pulmonary or allergy specialist, if necessary.

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