Asthma Prevalence among New Hampshire Workers, Behavioral Risk Factor Surveillance System, 2011-2012

INTRODUCTION

More than 17.5 million adults in the United States suffer from asthma.[1] The American Thoracic Society estimates that 15% of U.S. adults with asthma have asthma attributable to occupational factors.[2] Work-related asthma (WRA) includes work-exacerbated asthma (pre-existing or concurrent asthma worsened by factors related to the work environment) and occupational asthma (new onset asthma attributed to the work environment).[3,4]

Exposure to irritants or sensitizers in the workplace can either cause new-onset asthma or exacerbate a worker's pre-existing asthma. Workers who have work-related asthma have a higher likelihood of hospitalizations than workers who do not have work-related asthma.[5] In addition, evidence has demonstrated that indirect costs to businesses from lost productivity among employees with asthma and direct medical costs from unnecessary hospitalizations due to asthma can be reduced substantially if certain best practices are implemented.[6]

The proportion of WRA among persons with current asthma may differ within various industry and occupation groups. To discern what industry and occupation groups of workers may be at highest risk for asthma, we used the New Hampshire Behavioral Risk Factor Surveillance System survey. This information can be useful to prioritize and guide prevention strategies within high-risk industries and occupations.

METHODS

The Behavioral Risk Factor Surveillance System (BRFSS) is an ongoing nationwide surveillance system conducted jointly by state health departments and the Center for Disease Control and Prevention (CDC). It collects data annually on a variety of health behaviors and health outcomes through random digit dial telephone and cell phone interview surveys (learn more at http://www.cdc.gov/brfss/).[7] Since 2006, an increasing number of states/territories have implemented the Asthma Call-Back Survey (ACBS) to those BRFSS respondents who reported an asthma diagnosis.[8] The ACBS collects additional information on asthma.

The New Hampshire BRFSS included additional questions in their survey about a respondent's industry and occupation. The NH BRFSS interviewed 6,362 adults in 2011 and 7,530 in 2012. These data along with asthma data were used to calculate current asthma prevalence by industry and occupation for 2011 and 2012.

Current asthma was defined as a survey respondent reporting that a doctor, nurse, or other health professional had ever told them they had asthma and the respondent also reported that they currently had asthma. The ACBS, an extension to the core survey, asks additional questions of adults reporting on the BRFSS that they had ever been told they had asthma.

An employed respondent was defined as an adult who was currently employed, self-employed, or had been out of work for less than one year at the time of the BRFSS interview.

Text responses for occupation and industry reported by New Hampshire BRFSS respondents were coded into the most recent U.S. Census North American Industry Classification System (NAICS) and Standard Occupational Classification (SOC) codes by a combination of expert coders in the National Institute for Occupational Safety and Health (NIOSH) and the NIOSH Industry & Occupation Computerized Coding System (NIOCCS).

Some industry and occupation categories were combined to simplify BRFSS analysis. For example, industries with a NAICS code 42 (Wholesale Trade) were combined with NAICS codes 44-45 (Retail Trade) and defined as Wholesale and Retail Trade. NAICS codes 48-49 were defined as Transportation and Warehousing and NAICS codes 31-33 were defined as Manufacturing of Food, Paper and Wood.[9] Service occupations included SOC codes 31 (Healthcare support), 33 (Protective Service), 35 (Food Preparation and Serving), 37 (Building and Grounds Cleaning and Maintenance), and 39 (Personal Care and Service).

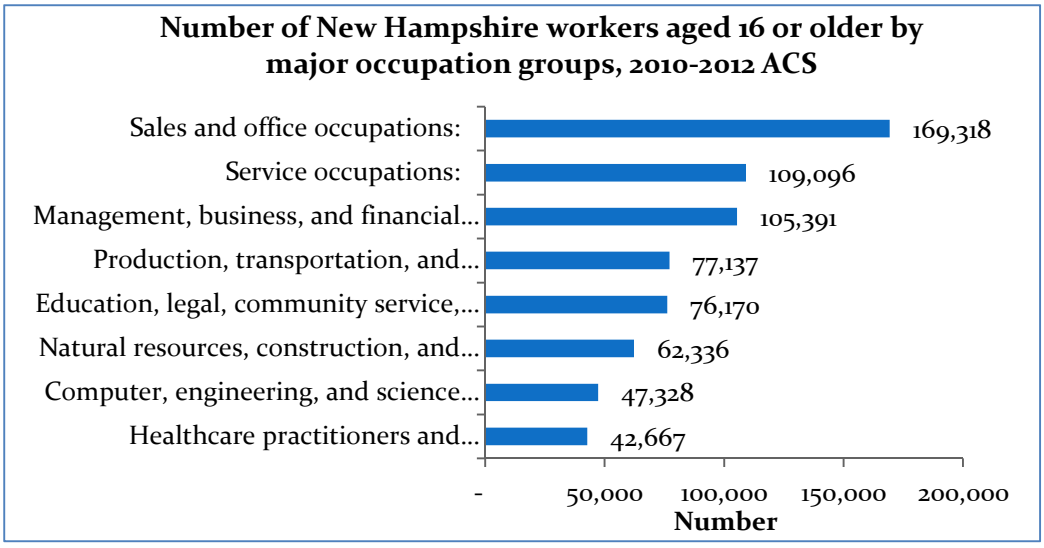
Analysis for this report was conducted using SAS/STAT software, Version 9.3 of the SAS System for Windows (Copyright ©2002-2010 SAS Institute Inc. Cary, NC, USA). Standard analysis methods were used to account for the complex sample designs and weighting of the BRFSS.

For this report, statistical significance was determined by comparing the 95% confidence intervals of estimates. If the confidence intervals did not overlap, the estimates were considered statistically significant.

The American Community Survey (ACS) is conducted by the U.S. Census Bureau each year. ACS three year estimate data were combined (2010, 2011 and 2012) to estimate the numbers of New Hampshire workers aged 16 years or older grouped by the same NAICS and SOC industry and occupation categories as in the BRFSS analysis.[10,11]

NEW HAMPSHIRE WORKERS

There are approximately 690,000 workers aged 16 years or older in New Hampshire. The four top industries (*with the four highest numbers of employees*) are Retail and Wholesale Trade; Health Care and Social Assistance; Manufacturing; and Educational Services.[10] Occupations with the highest number of New Hampshire workers include Sales and Office, Service, and Management Business and Financial occupations.



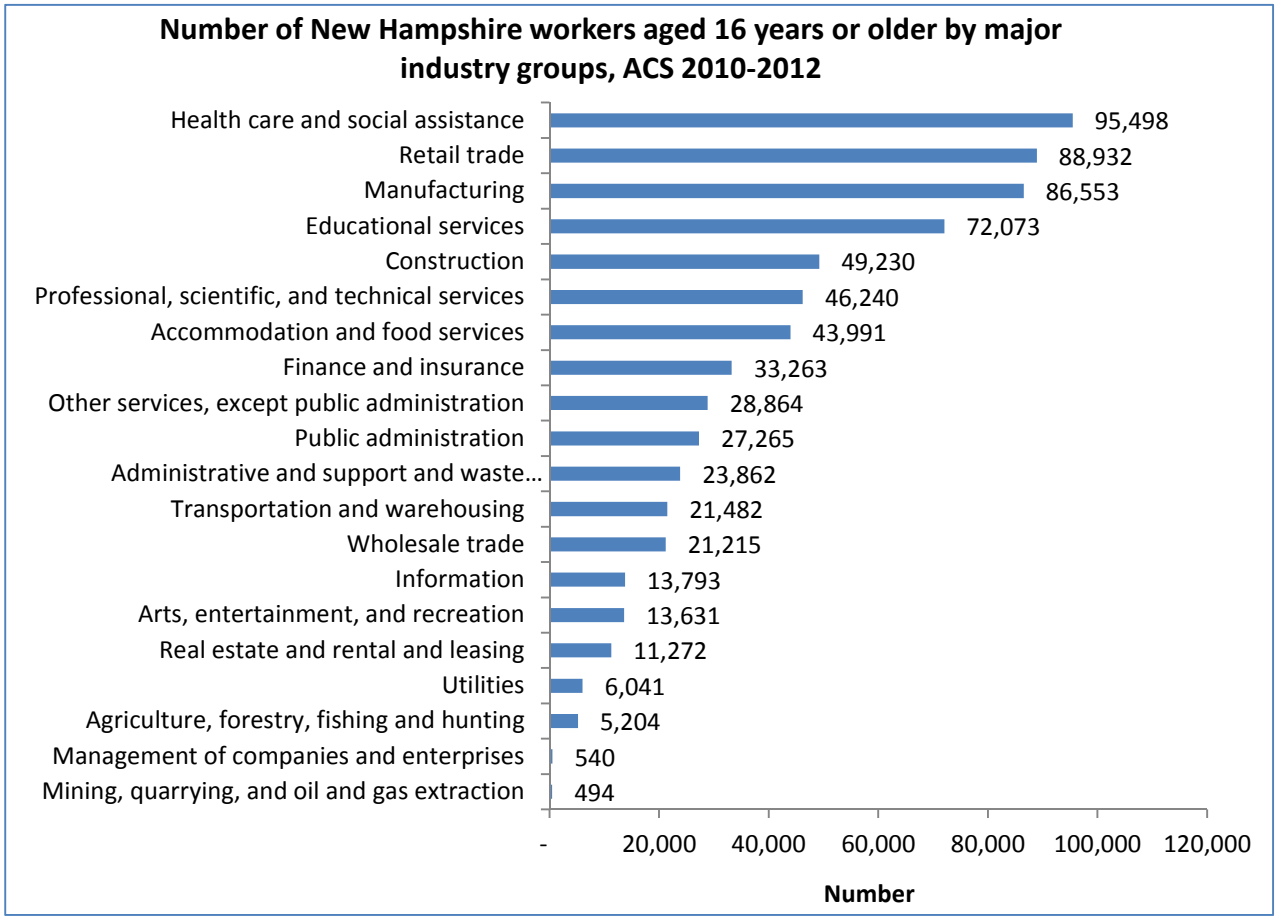
CURRENT ASTHMA AMONG NEW HAMPSHIRE WORKERS

According to the New Hampshire BRFSS, in 2011 and 2012, 9.6% (95% CI: 8.6-10.5) of New Hampshire's employed adults reported they had current asthma (approximately 62,000 working residents).

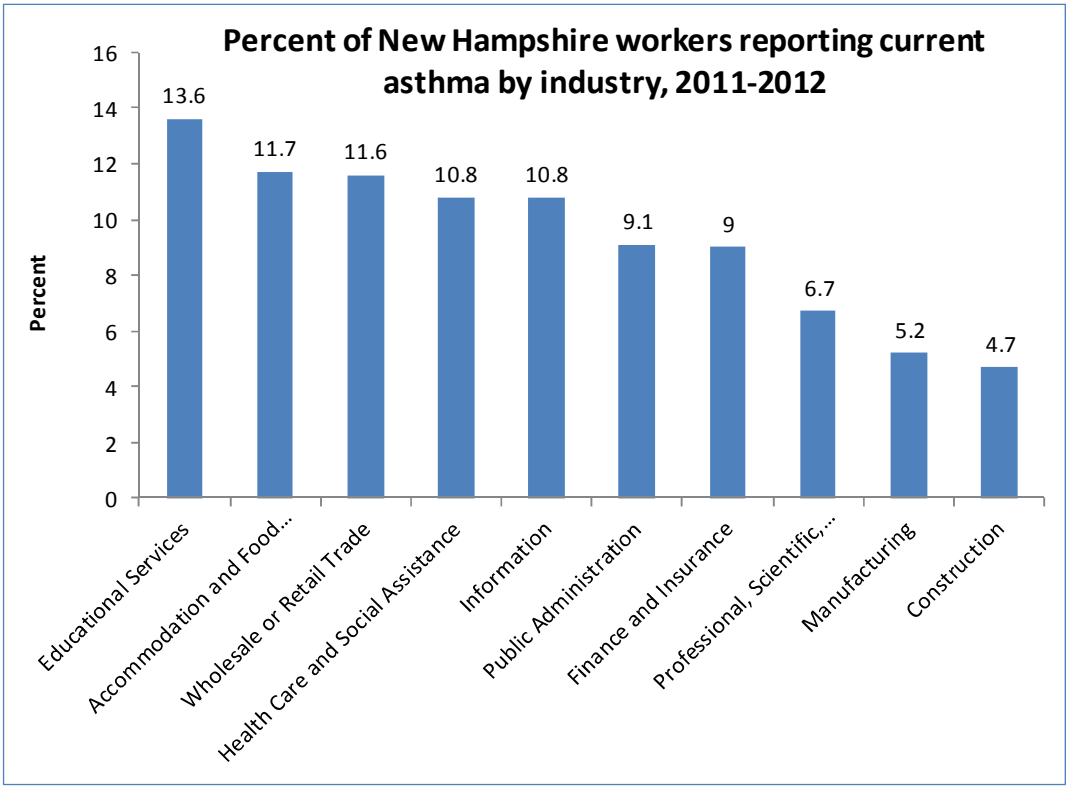
CURRENT ASTHMA BY INDUSTRY

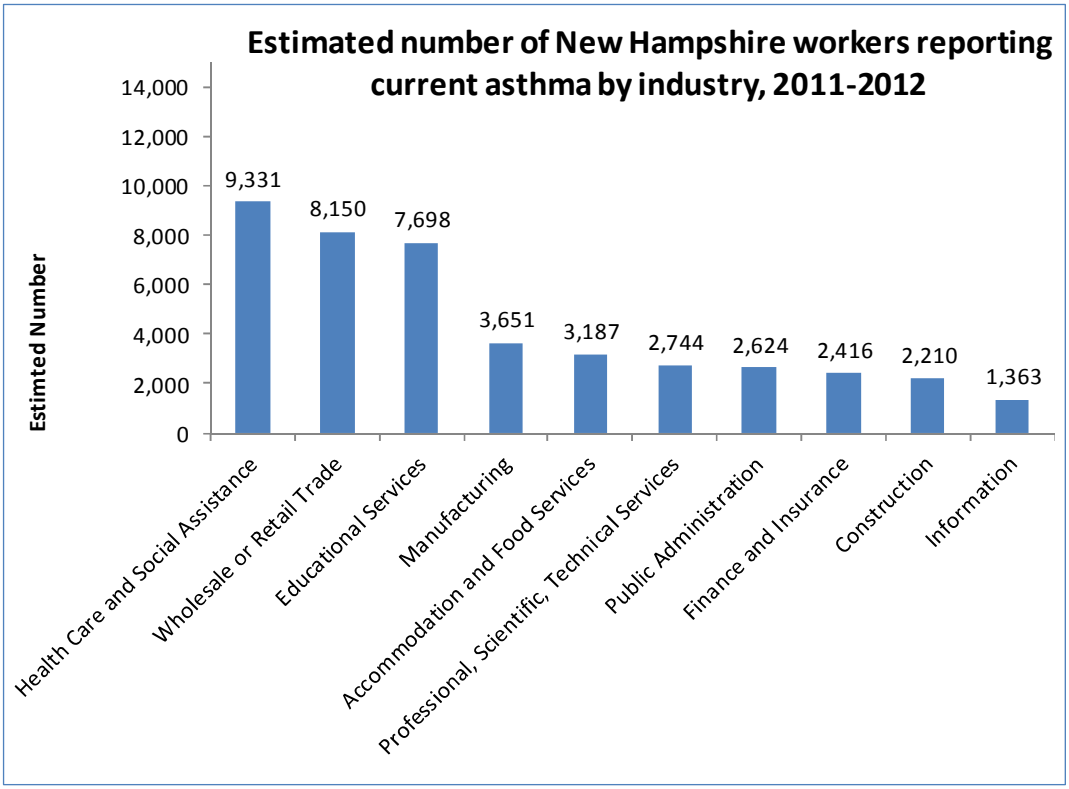
The burden of asthma in a given industry or occupation is the result of a variety of factors including the proportion of workers with asthma and the number of workers employed in each industry or occupation.

An analysis of current asthma prevalence by industry found a significantly higher proportion of working adults with current asthma employed in Education Services (13.6%) compared with the average proportion for New Hampshire adult workers with current asthma.



Industries with the highest numbers of workers with current asthma included Health Care and Social Assistance; Wholesale or Retail Trade; and Educational Services.

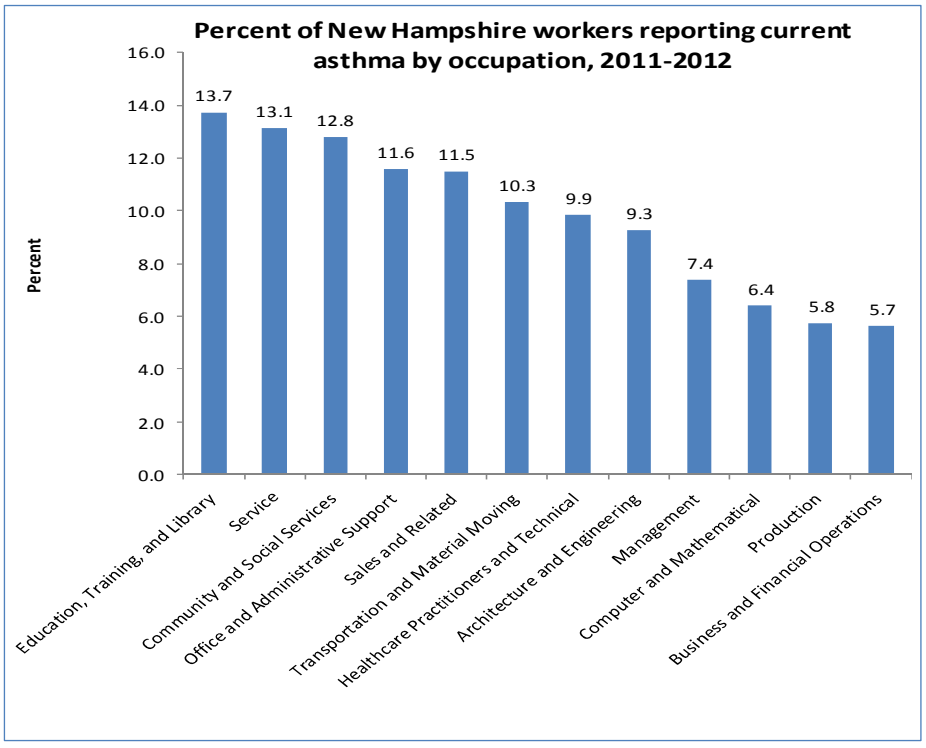

Percent of New Hampshire workers reporting current asthma by industry, 2011-2012
Percent
16
14
12
10
8
6
4
2
0
13.6
11.7
11.6
10.8
10.8
9.1
9
6.7
5.2
4.7
Educational Services
Accommodation and Food...
Wholesale or Retail Trade
Health Care and Social Assistance
Information
Public Administration
Finance and Insurance
Professional, Scientific,...
Manufacturing
Construction


Estimated number of New Hampshire workers reporting current asthma by industry, 2011-2012
Estimted Number
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
9,331
8,150
7,698
3,651
3,187
2,744
2,624
2,416
2,210
1,363
Health Care and Social Assistance
Wholesale or Retail Trade
Educational Services
Manufacturing
Accommodation and Food Services
Professional, Scientific, Technical Services
Public Administration
Finance and Insurance
Construction
Information

Current asthma among New Hampshire workers, by industry, 2011-2012 BRFSS				
Industry	**Percent with current asthma**	**95% CI for percent**	***Weighted Frequencies**	**95% CI for weighted frequencies**
Educational Services	13.6	10.6-16.5	7,698	5,913-9,484
Accommodation and Food Services	11.7	6.2-17.2	3,187	1,598-4,775
Wholesale or Retail Trade	11.6	7.9-15.3	8,150	5,337-10,964
Information	10.8	5.1-16.6	13,63	598-2,129
Health Care and Social Assistance	10.8	8.6-13.1	9,331	7,301-11,362
Public Administration	9.1	5.3-12.9	2,624	1,473-3,775
Finance and Insurance	9.0	5.3-12.7	2,416	1,391-3,441
Professional, Scientific, and Technical Services	6.7	4.0-9.3	2,744	1,618-3,870
Manufacturing	5.2	3.6-6.9	3,651	2,482-4,820
Construction	4.7	2.3-7.2	2,210	1,037-3,383
Statistically unreliable estimates (relative standard error more than 30) are not reported ** Weighted Frequencies (Approximate number with current asthma)*				

CURRENT ASTHMA BY OCCUPATION

No statistically significant differences were found in the prevalence of current asthma by occupation when examining the proportion of workers with current asthma. The occupations with the highest proportion of New Hampshire workers reporting current asthma included Education; Training and Library; Service; and Community and Social Service.



Current asthma among New Hampshire workers by occupation, 2011-2012 BRFSS				
Occupation	**Percent with current asthma**	**95% CI for percent**	***Weighted Frequencies**	**95% CI for weighted frequencies**
Education, Training, and Library	13.7	10.2-17.2	5,488	3,987-6,990
Service	13.1	8.9-17.3	9,758	6,301-13,216
Community and Social Services	12.8	5.6-20.0	1,124	465-1,783
Office and Administrative Support	11.6	8.6-14.6	6,656	4,846-8,467
Sales and Related	11.5	7.3-15.7	6,562	3,936-9,188
Transportation and Material Moving	10.3	5.1-15.6	2,153	988-3,319
Healthcare Practitioners and Technical	9.9	7.0-12.7	3,840	2,697-4,983
Architecture and Engineering	9.3	4.6-13.9	1,616	783-2,448
Management	7.4	5.3-9.4	5,839	4,167-7,511
Computer and Mathematical	6.4	2.9-9.9	1,247	548-1,946
Production	5.8	2.6-8.9	1,889	818-2,959
Business and Financial Operations	5.7	2.8-8.5	1,499	724-2,275
Statistically unreliable estimates (relative standard error more than 30%) are not reported ** Weighted Frequencies (Approximate number with current asthma*				

ASTHMA AND WORK

Asthma is a chronic lung disease that inflames and narrows the airways. Asthma causes recurring, reversible periods of wheezing, chest tightness, shortness of breath, and coughing.[12]

The exact cause of asthma isn't known. Researchers think some genetic and environmental factors interact to cause asthma, most often early in life.

In 2011 and 2012, nine percent of New Hampshire adults with current asthma who had ever worked outside of the home reported being diagnosed with work-related asthma.

However, only 21 percent of adults with current asthma ever employed reported they had ever discussed work and asthma with their doctor or health professional.

Work related asthma among New Hampshire adults with current asthma, ever employed outside of the home, 2011 and 2012, BRFSS Adult Asthma Callback Survey		
	Percent	95% Confidence interval
Ever discussed work and asthma with doctor (2012 only)	21.3	13.5-29.0
Ever told by doctor or other health professional that their asthma was work related (diagnosed with work-related asthma)	9.2	5.6-12.9

More than a third of New Hampshire adults with current asthma who were currently employed in 2011 and 2012 reported they believed their asthma was caused or made worse by something at their current job.

The proportion of adults with asthma who believed their asthma was caused or made worse by their current job was higher among those with a high school education or less, compared with those who had graduated from college. No statistically significant differences were found by income, age, or gender.

New Hampshire adults with current asthma, who were currently employed and who reported they believe their asthma is caused or made worse by their current job, 2011 and 2012 BRFSS Adult Asthma Callback Survey		
Characteristic	**Percent**	**95% Confidence interval**
Total	34.7	22.2-47.1
Sex		
Male	23.7	9.4-38.0
Female	40.0	23.8-56.1
Age		
18 to 49	32.9	16.3-49.5
50 to 64	39.5	27.2-51.7
65 or older	37.3	13.3-61.4
Education		
High school or less	56.5	30.8-82.3
Technical school or some college	33.1	15.0-51.2
College graduate or more	20.9	13.0-28.8
Household income		
Less than $35,000	44.2	22.3-66.1
$35,0000 to less than $75,000	31.4	18.9-43.9
$75,000 or more	17.2	8.7-25.8

LIMITATIONS

The data used in this study were based on self-reported survey responses. Inaccurate reporting by respondents may result in under- or overestimating the prevalence rates or other measures. Industry and occupation categories are purposefully broad, due to small numbers in two years of data. Therefore, more detailed occupation or industry types are not available.

DISCUSSION

Some substances encountered by workers on the job can cause asthma or trigger an asthma exacerbation or attack. There are over 400 known asthma-causing agents in the workplace. Thousands more have not been evaluated for their asthma-causing potential.[13] Examples of these agents include animal proteins, enzymes, flour, natural rubber latex, and certain reactive chemicals.[14]

Our study shows that the occupations with the highest proportion of New Hampshire workers reporting current asthma included Education; Training and Library; Service; and Community and Social Service. These include teachers, paraprofessionals, janitors, healthcare support, protective services, food preparation and serving related, building and grounds, cleaning and maintenance, and personal care services.

Service occupations, in particular, are potentially exposed to a number of well-known asthma-related substances in the workplace. These include cleaning products, disinfecting agents, latex, formaldehyde, paints/solvents, mold, environmental tobacco smoke, dust, plant pollens, mites, pesticides, hair dyes, bleaches and straightening products, baking flours, and enzymes.[15]

There are also environmental substances that may be encountered at work that can make asthma symptoms worse, including tobacco smoke, smoke from burning wood, air pollution and allergens from plant pollen, animal dander, and perfumes. Workers who are exposed to both environmental and workplace irritants are at higher risk. Fortunately, when potential substances are recognized, work-related allergies and asthma can often be prevented or their effects minimized.[16]

PREVENTION

Best practices involving control of environmental triggers can lead to reduction of exposures to asthma-causing agents in all industries. For example, in service and education support occupations, replacing cleaning products with products without hazardous chemicals such as ethylene oxide or formaldehyde is one way to reduce exposure. In general, using non-toxic or natural products, especially those with Green Seal certification, are alternatives that can be effective in reducing the prevalence of asthma among workers. In education, the Environmental Protection Agency offers the "Tools for Schools" Action Kit, which provides best practices, industry guidelines, sample policies, and a sample indoor air quality management plan to improve school air. It is especially important to ensure that leaks and moisture problems in schools are thoroughly dried within 24-48 hours to prevent mold growth.[17] Make sure schools are dusted and vacuumed thoroughly and regularly, and keep classrooms free of clutter. If stuffed toys are present, ensure they are washable and wash them regularly in hot water. Use Integrated Pest Management (IPM) to prevent cockroach and other pest problems (e.g., store food in tightly sealed containers and place dumpsters away from the building).[18]

In industries where latex is used, switching to latex-free alternatives has been shown to be effective in reducing asthmagen exposure. For those in food service, using pre-mixed or ready-to-bake products may help to reduce the exposure to flours, wheat, and cereal dust.

Overall, proper ventilation and use of personal protective equipment such as respirators, eye protection and gloves, while they do not provide absolute protection, will help in limiting risk of exposure to certain asthmagens.

Workers should seek regular medical care for their asthma, even when symptoms are not apparent, and should work with their medical providers to gain a good understanding of their asthma medications and triggers. Workers and others with asthma should ask their medical providers for an "asthma action plan" with clear steps for living with asthma. Workers should also avoid potential asthma triggers in their lives outside of work. Medical providers should ask their patients with asthma about their work and consider possible exposures in the workplace when assessing asthma triggers.

RECOMMENDATIONS

In order to further investigate the relationship between asthma and work in the future, ensuring the capture of industry and occupation data in the BRFSS will be crucial. This information will help to expedite efforts to reduce exposures to asthmagens in workplaces where it is most prevalent. It can help improve prevention and control strategies to workers who, because of their occupation or the materials they handle, are at high risk for the burden of work-related asthma.

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