

Work-Related Asthma — 38 States and District of Columbia, 2006–2009

Work-related asthma (WRA) includes work-exacerbated asthma (preexisting or concurrent asthma worsened by factors related to the workplace environment) and occupational asthma (new onset asthma attributed to the workplace environment) (1,2). WRA is a preventable occupational lung disease associated with serious adverse health and socioeconomic outcomes (1,2). Among workers with similar occupational exposures, WRA diagnosis offers unique opportunities for prevention (2,3). The American Thoracic Society estimated that 15% of U.S. adults with asthma have asthma attributable to occupational factors (3). State-level information on the proportion of asthma that is WRA is limited but could be useful to prioritize and guide investigations and interventions. To estimate current asthma prevalence and the proportion of asthma that is WRA, CDC analyzed data from the 2006–2009 Behavioral Risk Factor Surveillance System (BRFSS) from 38 states and the District of Columbia (DC). This report summarizes the results of that analysis, which indicated that among ever-employed adults with current asthma, the overall proportion of current asthma that is WRA was 9.0%. State-specific proportions of asthma that are WRA ranged from 4.8% to 14.1%. Proportions of WRA were highest among persons aged 45–64 years (12.7%), blacks (12.5%), and persons of other races (11.8%). These findings provide a baseline that state and national health agencies can use to monitor the proportion of WRA among persons with current asthma. Enhancing WRA surveillance through routine collection of industry and occupation information will greatly increase understanding of WRA.

BRFSS is a state-based, random-digit-dialed telephone survey of the noninstitutionalized U.S. civilian population aged ≥ 18 years. The survey collects information on health risk behaviors, preventive health practices, health-care access, and disease status.* In 2005, the Asthma Call-Back Survey (ACBS)[†] was pilot tested in three states and has been conducted every year since. ACBS collects detailed information on asthma, including data on asthma symptoms, health-care utilization, medication use, knowledge of asthma, cost of asthma care, work-related asthma, comorbid conditions, and complementary and alternative medicine use for asthma. BRFSS respondents are eligible to participate in ACBS if they answer “yes” to the question, “Have you ever been told by a doctor, nurse, or other health professional that you had asthma?” Those who agree are contacted to participate in ACBS within 2 weeks of

the BRFSS completion date. Data from BRFSS and ACBS for 2006–2009 from 38 states and DC are included in this analysis. The Council of American Survey and Research Organizations median response rates among the 38 states and DC ranged from 47.5% in 2007 to 51.4% in 2009 for BRFSS and from 47.2% in 2009 to 54.3% in 2007 for ACBS.

For this analysis, participants in BRFSS and ACBS who responded “yes” to the questions, “Have you ever been told by a doctor, nurse, or other health professional that you had asthma?” and “Do you still have asthma?” were listed as having current asthma. ACBS participants were considered to be ever-employed if they indicated that they currently were “employed full-time” or “employed part-time” or that they had ever been employed outside the home. Ever-employed adults with current asthma who responded “yes” to the question, “Were you ever told by a doctor or other health professional that your asthma was related to any job you ever had?” were classified as having WRA.

Combined data for 2006–2009 were weighted to account for unequal probability of sample selection and nonresponse differences in the sample.[§] For states with multiple years of data, annual weights were proportionately adjusted based on the number of years and the sample size in each year. Statistical software was used to calculate estimates and 95% confidence intervals (CIs), accounting for the complex survey design. Statistically significant differences in distribution were determined using the Rao-Scott chi-square test of independence ($p < 0.05$).

During 2006–2009, in the 38 states and DC included in the analysis, 1,082,135 adults participated in BRFSS (representing an estimated annual average of 198 million adults), and 56,097 adults participated in ACBS (representing an estimated annual average of 26 million adults). During this period, an estimated 8.4% of adults had current asthma. The prevalence of current asthma significantly differed by age, sex, and race/ethnicity.[¶] Prevalence was lowest among persons aged ≥ 65 years (7.6%), men (6.3%), and Hispanics (6.3%) (Table). State-specific estimates of the prevalence of current asthma ranged from 6.3% to 10.4% (Table).

A total of 38,306 adults who participated in ACBS were ever-employed and had current asthma, representing an estimated 16 million adults in the 38 states and DC. Of these, the estimated proportion who had WRA was 9.0% (representing an

* Additional information and survey questions available at <http://www.cdc.gov/brfss>.

[†] Additional information and survey questions available at <http://www.cdc.gov/asthma/survey/brfss.html#callback> and <http://www.cdc.gov/brfss/acbs/index.htm>.

[§] Additional information available at <http://www.cdc.gov/brfss/pdf/userguide.pdf>.

[¶] Persons identified as Hispanic might be of any race. Persons identified as white, black, or other race are all non-Hispanic.

TABLE. Prevalence of current asthma* in adults and proportion of ever-employed† adults with current asthma who have been told by a health professional that their asthma was work related,§ by state and selected characteristics — Behavioral Risk Factor Surveillance System (BRFSS), Asthma Call-Back Survey (ACBS), United States, 2006–2009

Characteristic	Adults				Ever-employed† adults with current asthma			
	No. in sample [¶]	Weighted no. (in thousands) ^{**}	Prevalence of current asthma % ^{**}	(95% CI)	No. in sample [¶]	Weighted no. (in thousands) ^{**}	Proportion with work-related asthma % ^{**}	(95% CI)
Total	1,082,135	198,634	8.4	(8.3–8.5)	38,306	16,192	9.0	(8.4–9.6)
Age group (yrs)^{††§§}								
18–44	310,293	98,673	8.6	(8.4–8.8)	9,637	8,089	6.9	(6.0–7.8)
45–64	446,365	65,329	8.6	(8.4–8.7)	18,402	5,716	12.7	(11.6–13.7)
≥65	315,814	33,434	7.6	(7.4–7.7)	10,113	2,353	7.5	(6.5–8.4)
Sex^{††}								
Men	412,560	96,676	6.3	(6.2–6.5)	10,199	6,018	9.1	(8.1–10.1)
Women	669,575	101,958	10.3	(10.2–10.5)	28,107	10,173	8.9	(8.2–9.7)
Race/Ethnicity^{†† §§¶¶}								
White	859,837	131,841	8.7	(8.6–8.8)	31,660	12,254	8.2	(7.6–8.8)
Black	64,650	17,586	9.8	(9.3–10.3)	2,069	1,360	12.5	(9.8–15.2)
Hispanic	81,402	33,268	6.3	(6.0–6.7)	1,599	1,028	10.5	(7.7–13.4)
Other race	65,426	14,321	8.8	(8.3–9.3)	2,694	1,091	11.8	(9.1–14.5)
State								
Alaska	4,665	479	8.6	(7.5–9.7)	222	28	—***	—
Arizona	21,187	4,646	9.6	(8.8–10.5)	551	451	4.8	(2.5–7.1)
California	40,388	27,662	7.9	(7.6–8.3)	1,328	2,308	8.9	(6.9–11.0)
Colorado	18,012	3,548	7.8	(7.3–8.3)	536	251	7.2	(4.6–9.8)
Connecticut	28,675	2,874	9.2	(8.6–9.7)	1,037	242	8.0	(5.7–10.2)
District of Columbia	16,127	462	9.7	(9.1–10.3)	514	42	5.9	(3.6–8.1)
Florida	62,478	14,342	6.4	(6.0–6.8)	1,260	899	14.1	(9.6–18.6)
Georgia	27,024	6,985	7.7	(7.3–8.2)	870	518	11.3	(8.1–14.5)
Hawaii	26,296	993	8.8	(8.3–9.3)	1,068	88	8.1	(5.8–10.4)
Illinois	16,244	9,679	8.4	(7.8–9.0)	618	782	6.9	(4.8–9.0)
Indiana	26,721	4,754	8.9	(8.4–9.4)	1,222	428	11.7	(9.1–14.2)
Iowa	22,901	2,302	7.0	(6.6–7.5)	848	155	7.5	(5.4–9.6)
Kansas	44,339	2,087	8.5	(8.1–8.9)	2,021	177	8.6	(6.9–10.2)
Louisiana	8,882	3,345	6.3	(5.6–7.1)	180	220	—***	—
Maine	25,740	1,051	10.4	(9.9–10.9)	1,145	108	9.5	(7.4–11.6)
Maryland	35,809	4,280	8.9	(8.5–9.4)	1,160	361	8.7	(6.5–10.9)
Massachusetts	71,545	4,989	10.0	(9.6–10.4)	924	480	5.2	(3.4–7.0)
Michigan	31,874	7,663	9.8	(9.3–10.2)	1,676	750	12.5	(10.0–15.0)

See table footnotes on page 377.

estimated annual average of 1.4 million adults). Distributions of the proportion of WRA differed significantly by age and race/ethnicity and were highest among persons aged 45–64 years (12.7%), blacks (12.5%), and persons of other races (11.8%) (Table). The estimated proportion of ever-employed adults with current asthma who had WRA was similar among men (9.1%) and women (8.9%). By state, the estimated proportions of ever-employed adults with current asthma who reported WRA ranged from 4.8% to 14.1% (Table).

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Editorial Note

The results of this analysis indicate that exposures in the workplace continue to contribute to asthma morbidity among adults in the United States and that blacks with asthma appear to be affected disproportionately by occupational conditions. Among adults who have ever been employed, an estimated annual average of 1.4 million WRA cases could have been prevented. These findings are consistent with the estimated proportion of adult asthma that is WRA reported from the 2005 ACBS in Michigan (7.6% [CI = 4.9%–10.3%]), Minnesota (5.6% [CI = 2.9%–8.2%]), and Oregon (9.0% [CI = 6.7%–11.4%]) (4).

Strategies to reduce or eliminate workplace exposures for persons with WRA range from substitution of chemicals to engineering and administrative controls and will aid in the prevention of new cases and slow the progression of subclinical cases in the same workplace (2,5). For example, in the early 1990s, health-care workers and other workers exposed to

TABLE. (Continued) Prevalence of current asthma* in adults and proportion of ever-employed† adults with current asthma who have been told by a health professional that their asthma was work related,‡ by state and selected characteristics — Behavioral Risk Factor Surveillance System (BRFSS), Asthma Call-Back Survey (ACBS), United States, 2006–2009

Characteristic	Adults				Ever-employed† adults with current asthma			
	No. in sample¶	Weighted no. (in thousands)**	Prevalence of current asthma %**	(95% CI)	No. in sample¶	Weighted no. (in thousands)**	Proportion with work-related asthma %**	(95% CI)
Missouri	15,812	4,468	8.5	(7.9–9.2)	727	372	7.9	(4.6–11.2)
Montana	26,518	740	8.8	(8.3–9.3)	966	62	11.0	(8.1–13.8)
Nebraska	51,154	1,334	7.5	(7.0–8.0)	1,745	96	8.5	(6.3–10.6)
Nevada	12,736	1,939	8.2	(7.4–9.0)	519	164	13.7	(6.8–20.6)
New Hampshire	24,914	1,027	10.2	(9.7–10.7)	1,026	105	7.8	(5.5–10.0)
New Jersey	24,130	6,672	8.1	(7.6–8.7)	657	518	8.1	(5.3–11.0)
New Mexico	21,670	1,482	8.6	(8.1–9.2)	708	121	9.6	(6.4–12.7)
New York	27,295	14,843	9.0	(8.5–9.4)	1,154	1,319	9.6	(7.2–12.0)
North Dakota	9,802	494	8.4	(7.6–9.2)	386	41	9.6	(6.1–13.1)
Ohio	33,965	8,752	9.5	(9.0–10.0)	1,000	805	8.7	(6.1–11.4)
Oklahoma	23,121	2,732	9.2	(8.7–9.7)	823	254	10.6	(7.8–13.3)
Oregon	18,910	2,876	9.8	(9.2–10.4)	1,019	261	7.8	(5.8–9.8)
Pennsylvania	13,231	9,693	9.3	(8.3–10.4)	205	814	7.9	(3.8–12.1)
Rhode Island	11,082	827	10.3	(9.5–11.1)	560	91	8.0	(4.5–11.6)
Texas	46,426	17,278	7.4	(7.0–7.8)	1,302	1,194	7.9	(5.8–10.1)
Utah	20,570	1,858	8.1	(7.6–8.7)	880	147	6.7	(4.7–8.6)
Vermont	27,367	493	9.7	(9.2–10.1)	1,532	49	8.9	(6.9–10.9)
Virginia	10,494	5,970	8.5	(7.6–9.5)	392	555	9.6	(5.9–13.2)
Washington	92,467	4,438	9.1	(8.9–9.4)	3,933	426	7.0	(6.0–8.0)
West Virginia	13,430	1,437	9.1	(8.5–9.7)	696	120	13.7	(10.3–17.2)
Wisconsin	23,894	4,290	9.3	(8.7–9.9)	896	392	8.4	(6.1–10.8)

Abbreviation: CI = confidence interval.

* Based on a “yes” response to the questions, “Have you ever been told by a doctor or other health professional that you have asthma?” and “Do you still have asthma?”

† Current employment status was defined as “employed full-time” or “employed part-time,” or based on a “yes” response to the question, “Have you ever been employed outside the home?”

‡ Based on a “yes” response to the question, “Were you ever told by a doctor or other health professional that your asthma was related to any job you ever had?”

¶ Unweighted sample size.

** Weighted to the state population using the survey sample weights for each BRFSS and ACBS participant.

†† For current asthma: Rao-Scott chi-square test; p-value <0.01.

‡‡ For work-related asthma: Rao-Scott chi-square test; p-value <0.01.

¶¶ Persons identified as Hispanic might be of any race. Persons identified as white, black, or other race are all non-Hispanic.

*** Relative standard error >0.30; estimate suppressed.

powdered, non-rubber latex gloves experienced high incidence of WRA. After recommendations were made to change the type of glove used and to reduce the powder and non-rubber latex protein content of the gloves if they needed to be used, considerable reductions in the occurrence of WRA were observed in the health-care industry (5). Another example is the substantial reduction in WRA prevalence among workers in the detergent industry after detergent enzymes were encapsulated during the production process to reduce exposure (5).

Continued administration of ACBS will allow state asthma programs to monitor the proportion of asthma that is WRA. Information on WRA respondents' industry and occupation is necessary to guide the development of successful intervention strategies. WRA management and prevention includes a public health aspect (i.e., workplaces suspected to pose a high risk for development of WRA should be investigated, and appropriate exposure control measures should be implemented to prevent WRA) (1).

The findings in this report are subject to at least six limitations. First, results likely are underestimates of the actual proportion of WRA because WRA is underdiagnosed in the United States (6,7). Second, ACBS might be subject to selection bias because BRFSS respondents with asthma were asked if they agreed to be called back for ACBS. Those who agreed to participate in ACBS might have more severe asthma or might be more likely to attribute asthma to their work (8). No information on asthma symptoms or work-relatedness was available in BRFSS for those who refused to participate. Third, BRFSS was not designed to allow assessment of the prevalence of current asthma among ever-employed adults. Therefore, findings on the prevalence of current asthma and the proportion of current asthma that is WRA were determined based on different denominator populations and should be interpreted with caution. Fourth, no information on industry and occupation was available for these participants. Information on industry and occupation for WRA cases is limited because

What is already known on this topic?

Work-related asthma, one of the most common occupational lung diseases, is preventable but often undiagnosed.

What is added by this report?

These results indicate that an estimated annual average of 1.4 million cases of adult asthma (9.0% of current asthma cases among ever-employed adults) could have been prevented and that ever-employed blacks with current asthma are disproportionately affected by work-related asthma.

What are the implications for public health practice?

Enhancing surveillance for work-related asthma through routine collection of data on industry, occupation, and workplace exposures could greatly expand understanding of potential causes and triggers. Such information could be useful to state and local health departments to guide investigation and prevention efforts, such as the use of engineering and administrative controls to diminish the current burden of work-related asthma.

CDC's sentinel-event surveillance currently is conducted only in selected states (9). Fifth, exclusive use of landline telephones in some years might mean some groups are underrepresented in the sample (10). Finally, because ACBS had low response rates and data are limited to the 38 states and DC that conducted the survey, these estimates are not generalizable to the entire U.S. population and do not represent the populations of nonparticipating states.

Currently, CDC provides technical and financial assistance to five states (California, Massachusetts, Michigan, New Jersey, and New York) to conduct expanded WRA surveillance.** These systems collect in-depth, case-based information on WRA cases, including workplace exposure and employment information, but do not allow assessment of WRA burden in the population. For many states, ACBS provides the only state-based estimates of WRA, and some states already have initiated the collection of information on industry and occupation in BRFSS. In 2013, CDC will sponsor a BRFSS optional module designed to collect respondents' current industry and occupation information.

** Information on WRA surveillance programs from CDC-funded states is available at <http://www.cdc.gov/niosh/topics/surveillance/ords/statebasedsurveillance/wra.html>.

Expanding surveillance for WRA to include collection of information on industry and occupation will increase understanding of WRA epidemiology. These important additions will enable states, other government agencies, health professionals, employers, workers, and worker representatives to target intervention and prevention efforts more effectively to reduce the burden of WRA.

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World No Tobacco Day — May 31, 2012

Tobacco use is the leading preventable cause of death worldwide. Approximately 6 million deaths related to tobacco use occur each year, including 600,000 from second-hand smoke. If current trends continue, according to the World Health Organization (WHO), by 2030, approximately 8 million persons will die each year from tobacco use, and 80% of those persons will reside in low- and middle-income countries (1).

In 1987, WHO designated May 31 as World No Tobacco Day to draw global attention to the health risks of tobacco use. In 2005, provisions of the WHO Framework Convention on Tobacco Control took effect. A total of 175 countries have ratified this treaty, making it one of the most widely embraced treaties in United Nations history (2).

The treaty commits countries to protect the public's health by adopting various measures to reduce demand for tobacco. Those measures include increased pricing of tobacco products, protection from exposure to tobacco smoke, and regulation of product contents, packaging, and advertising (3). **A reduction in smoking prevalence worldwide of 20%–25% could prevent 100 million premature deaths by 2020 (4).**

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Adult Awareness of Tobacco Advertising, Promotion, and Sponsorship — 14 Countries

According to the 2012 *Report of the U.S. Surgeon General*, exposure to tobacco advertising, promotion, and sponsorship (TAPS) is associated with the initiation and continuation of smoking among young persons (1). The World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) requires countries to prohibit all forms of TAPS (2); the United States signed the agreement in 2004, but the action has not yet been ratified. Many countries have adopted partial bans covering direct advertising in traditional media channels; however, few countries have adopted comprehensive bans on all types of direct and indirect marketing. To assess progress toward elimination of TAPS and the level of awareness of TAPS among persons aged ≥ 15 years, CDC used data from the Global Adult Tobacco Survey (GATS) collected in 14 countries during 2008–2010. Awareness of any TAPS ranged from 12.4% in Turkey to 70.4% in the Philippines. In the four countries where awareness of TAPS was $\leq 15\%$, three of the countries had comprehensive bans covering all nine channels assessed by GATS, and the fourth country banned seven of the nine channels. In 12 countries, more persons were aware of advertising in stores than advertising via any other channel. Reducing exposure to TAPS is important to prevent

INSIDE

370 State Tobacco Revenues Compared with Tobacco Control Appropriations — United States, 1998–2010

375 Work-Related Asthma — 38 States and District of Columbia, 2006–2009

379 Prevalence of Stroke — United States, 2006–2010

383 Announcement

Continuing Education examination available at http://www.cdc.gov/mmwr/cme/conted_info.html#weekly.



initiation of tobacco use by youths and young adults and to help smokers quit (1).

GATS is an ongoing, nationally representative, in-person household survey of noninstitutionalized adults aged ≥ 15 years.* Fourteen countries completed GATS during 2008–2010. Countries conducting GATS used a standardized core questionnaire, sample design, data collection method, and analysis protocol to enhance comparability across countries. A multistage cluster sample design was used in each country, and data were weighted in analysis to account for the complex sample design (3). Survey questions regarding direct tobacco marketing asked whether participants noticed cigarette advertising in five marketing channels during the previous 30 days: 1) television or radio, 2) newspapers or magazines, 3) billboards or public walls, 4) Internet, and 5) point-of-sale in stores. Questions were asked regarding four channels of indirect tobacco marketing: 1) sponsorship of sports or sporting events, 2) free samples of cigarettes, 3) sales or coupons for cigarettes, and 4) clothing or other items featuring a brand name or logo.

During 2008–2010, all 14 countries banned at least one form of tobacco marketing. Three countries (Egypt, Thailand, and Vietnam) banned all nine channels of tobacco marketing that were assessed. Eight other countries (Bangladesh, Brazil, India, Mexico, Philippines, Poland, Turkey, and Uruguay) banned five to eight channels. Three countries (China, Russia,

and Ukraine) banned four or fewer channels. All 14 countries banned advertising on television or radio, and all but Russia and Mexico banned advertising in newspapers or magazines. Russia and China were the only countries that did not ban advertising on billboards or public walls; China had no bans on any types of indirect marketing (Table 1).

Participants were aware of tobacco marketing in all countries, including the three countries that banned all nine TAPS channels: Egypt (13.0%), Thailand (15.0%), and Vietnam (14.7%) (Table 2). In general, awareness of TAPS was higher in those countries with the fewest bans. An exception was the Philippines, where participants had the highest awareness of TAPS (70.4%) despite bans on five TAPS channels. The next highest levels of awareness were in Russia (65.3%), which banned one channel, and Mexico (52.8%), which banned five. In China, which banned two channels, the government owns and operates the tobacco company. TAPS awareness in this country (16.9%) was lower than in other countries with partial bans (Table 2).

In seven countries, awareness of point-of-sale advertising in stores was $>20\%$ and, with the exception of China and Turkey, awareness of point-of-sale advertising in stores was higher than awareness of any other TAPS channel (Table 2). Awareness of tobacco advertising in newspapers or magazines was highest in Mexico (17.4%) and Russia (33.3%), the only two countries that do not ban tobacco advertising in print publications. Among the indirect marketing channels, awareness was $<10\%$

*Additional information available at <http://www.who.int/tobacco/surveillance/gats/en/index.html>.

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Morbidity and Mortality Weekly Report

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