

be primarily nonrespiratory (e.g., *Rickettsia rickettsii* infection and polio). The URDO working group has capacity to provide rapid, multipathogen testing with TaqMan Array Cards for investigations in which several etiologies are under consideration.

Information is available to guide investigations of unexplained respiratory disease outbreaks. These materials include documents that can assist public health officials with establishing case definitions, forming line lists, and generating epidemic curves, as well as a sample respiratory illness questionnaire and instructions for specimen collection.<sup>8</sup> Of particular importance are disease outbreaks that 1) might be interrupted by timely vaccination,<sup>5</sup> environmental interventions, or other control methods; 2) occur in institutional settings or among vulnerable populations; 3) might involve bioterrorism agents; 4) are severe, large, or rapidly progressive; or 5) cause public concern.<sup>8,9</sup> Such outbreaks might warrant notification of the URDO working group and further investigation.

The findings in this report are subject to at least three limitations. First, the fraction of unexplained respiratory outbreaks that are reported is not known; reported outbreaks might not represent the distribution of etiologies among all unexplained respiratory outbreaks. Second, the URDO working group is provided information while investigations are under way but does not systematically collect final reports from local public health officials. Therefore, the data in this report likely underestimate case counts, hospitalizations, and deaths. Finally, information was not collected about unexplained respiratory disease investigations occurring before March 2007, so determining whether the URDO working group has improved identification of etiologies or outbreak mitigation is not possible.

An etiology was identified in only about half of all investigations by the URDO working group. This might result, in part, from delays in clinical specimen collection because many

pathogens (e.g., influenza) only can be detected for a short time after illness onset.<sup>10</sup> The URDO working group was notified of each outbreak a median of 33 days after illness onset in the first case. These delays might have resulted from delayed outbreak recognition or because local investigators waited until local testing failed to identify the etiology. Reducing the time between outbreak recognition and notification might increase the likelihood that optimal respiratory specimens are collected. However, even when timely specimens are obtained, sensitive and specific laboratory diagnostic tests might not be available locally or at CDC for some known pathogens and for new pathogens. Finally, gaps in available clinical and epidemiologic information might decrease the URDO working group's ability to determine plausible etiologies and to recommend appropriate diagnostics.

Health-care providers and facilities are encouraged to report suspected outbreaks early to local public health officials, and health officials are invited to consult the URDO working group early in the course of any unexplained respiratory disease investigation. Additionally, CDC recommends that public health officials collect and store clinical specimens as an investigation evolves for potential future testing. The URDO working group provides an example of a successful, interdisciplinary approach to providing assistance to public health professionals in the United States and abroad. The URDO working group can be contacted through CDC's Emergency Operations Center by telephone, at 770-488-7100. Additional information and resources are available at <http://emergency.cdc.gov/urdo>.

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#### REFERENCES

10 Available.

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

MMWR. 2012;61:375-377.

1 Table omitted.

WORK-RELATED ASTHMA (WRA) includes work-exacerbated asthma (pre-existing or concurrent asthma worsened by factors related to the workplace environment) and occupational asthma (new onset asthma attributed to the workplace environment).<sup>1,2</sup> WRA is a preventable occupational lung disease associated with serious adverse health and socioeconomic outcomes.<sup>1,2</sup> Among workers with similar occupational exposures, WRA diagnosis offers unique opportunities for prevention.<sup>2,3</sup> The American Thoracic Society estimated that 15% of U.S. adults with asthma have asthma attributable to occupational factors.<sup>3</sup> 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  $\geq 18$  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 ( $p \leq 0.05$ ).

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  $\geq 65$  years (7.6%), men (6.3%), and Hispanics (6.3%). State-specific estimates of the prevalence of current asthma ranged from 6.3% to 10.4%.

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 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%). 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%.

### 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.

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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%]).<sup>4</sup>

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.<sup>2,5</sup> For example, in the early 1990s, health-care workers and other workers exposed to 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.<sup>5</sup> 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.<sup>5</sup>

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).<sup>1</sup>

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.<sup>6,7</sup> 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.<sup>8</sup> 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 CDC's sentinel-event surveillance currently is conducted only in selected states.<sup>9</sup> Fifth, exclusive use of landline telephones in some years might mean some groups are underrepresented in the sample.<sup>10</sup> 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.<sup>\*\*</sup> 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.

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 ef-

forts more effectively to reduce the burden of WRA.

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\*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.

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