

Characteristics of Individuals who Describe their Asthma as Being Caused or Made Worse by Workplace Exposures

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Work-Related Asthma (WRA)

- ❑ Asthma caused by work (occupational asthma) or made worse by workplace exposures (work-exacerbated asthma)¹**
- ❑ Discrepancy exists between patients' perception and physician recognition of the association between asthma and work²**
- ❑ 9.7% of ever-employed adults with current asthma have health professional-diagnosed WRA and 47.5% describe their asthma as being caused or made worse by workplace exposures**

¹ Tarlo SM, Balmes J, Balkissoon R, et al. Diagnosis and management of work-related asthma: ACCP Consensus Statement. *Chest*. 2008;134(3 Supplement):1-41.

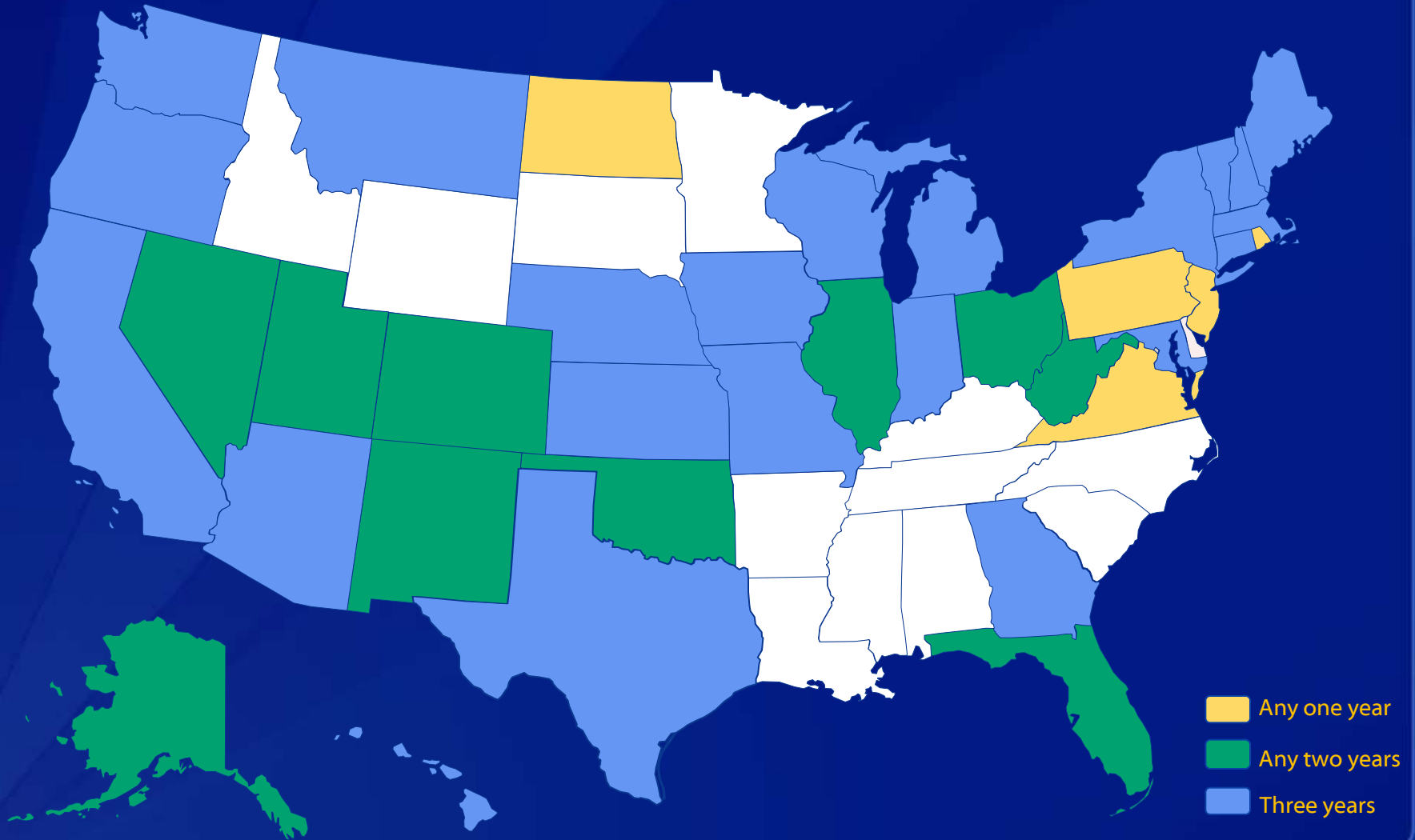
² Knoeller GE, Mazurek JM, Moorman JE. Work-related asthma among adults with current asthma: Evidence from the Asthma Call-Back Survey, 33 states and District of Columbia, 2006–2007. *Public Health Reports*. 2011;126(4):603-611.

Asthma Call-Back Survey (ACBS) Methods

- ❑ 2006–2008 data
- ❑ Behavioral Risk Factor Surveillance System (BRFSS) respondents who answered “yes” to the question “Have you ever been told by a doctor, nurse, or other health professional that you had asthma?”

	Median CASRO Response Rate (Range)	
	BRFSS (%)	ACBS (%)
2006	48.6 (36.9–66.0)	53.1 (37.0–70.8)
2007	47.6 (31.4–65.4)	54.3 (36.5–72.2)
2008	50.3 (35.8–65.5)	50.6 (35.1–67.7)

37 States and DC Completing the ACBS 2006–2008



Objectives

- ❑ Characterize adults with current asthma who describe their asthma as being caused or made worse by workplace exposures**
- ❑ Examine characteristics associated with health professional diagnosis of WRA among adults who describe their asthma as being caused or made worse by workplace exposures**

Study Population

❑ Current Asthma

- **“Have you ever been told by a doctor, nurse, or other health professional that you had asthma?” and**
- **“Do you still have asthma?”**

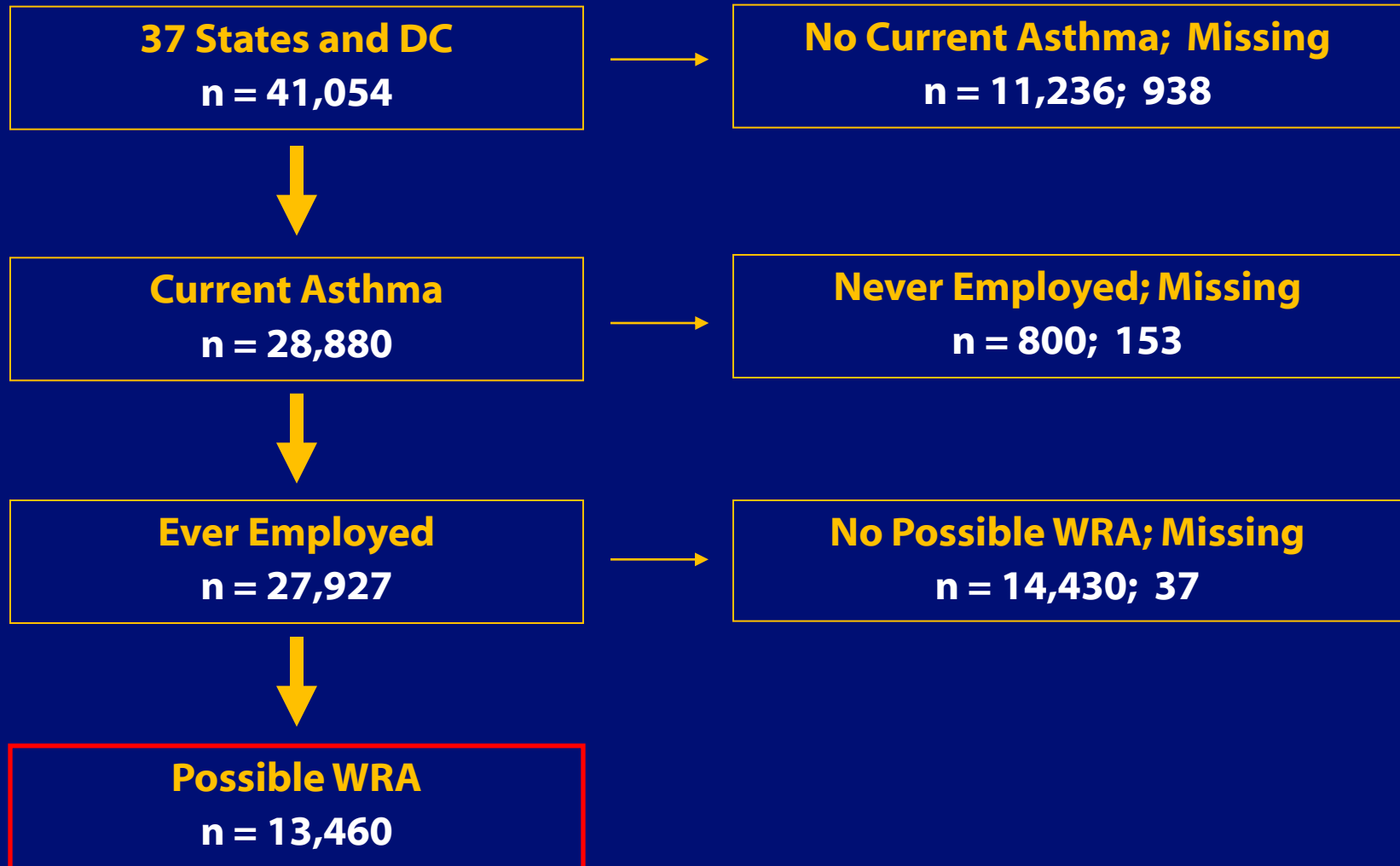
❑ Ever-Employed

- **Current employment status described as: “Employed full-time” or “Employed part-time”**
- **“Have you ever been employed outside the home?”**

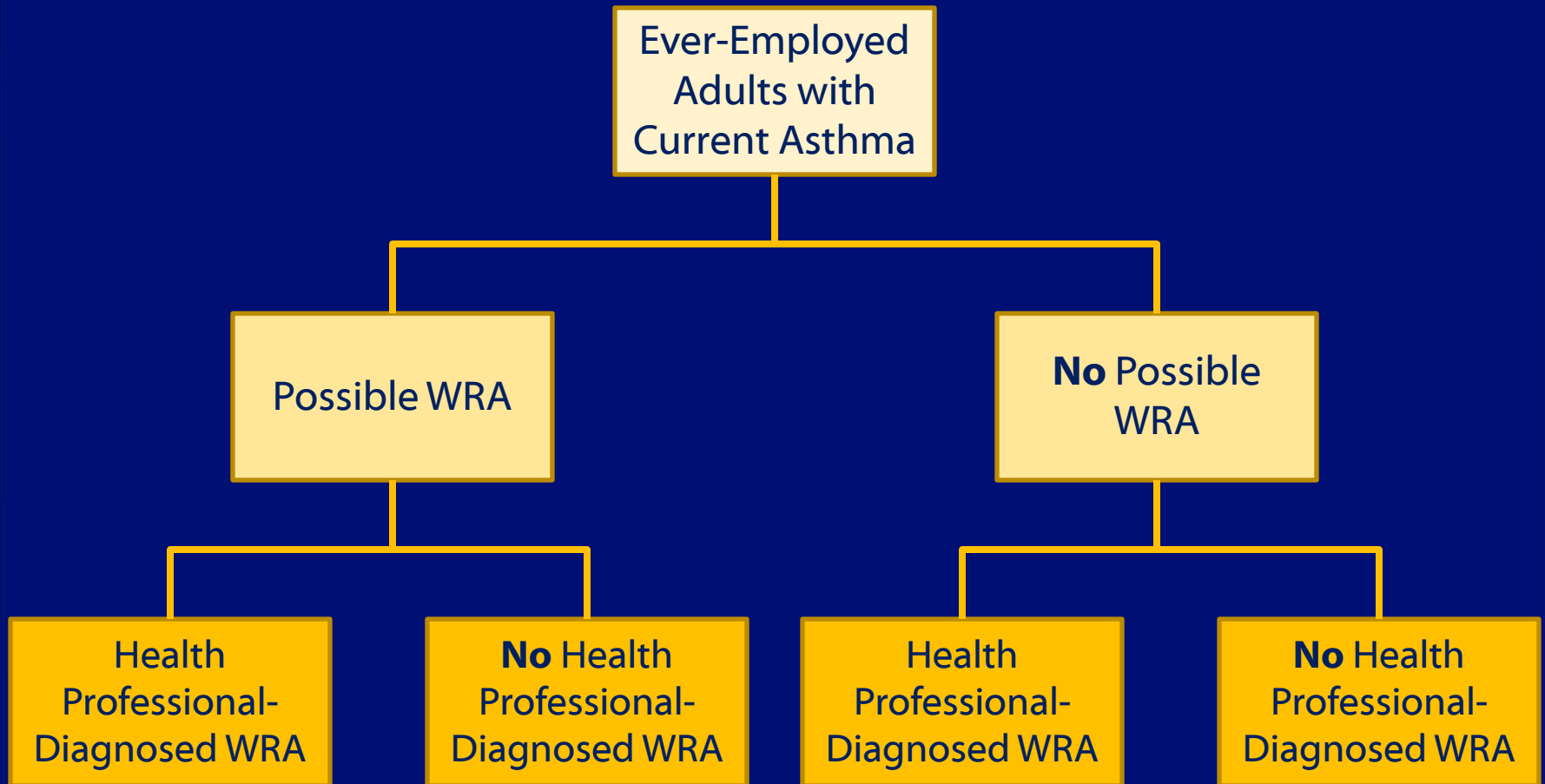
❑ Possible WRA

- **Responses indicate asthma caused or made worse by chemicals, smoke, fumes or dust in a current or previous job**

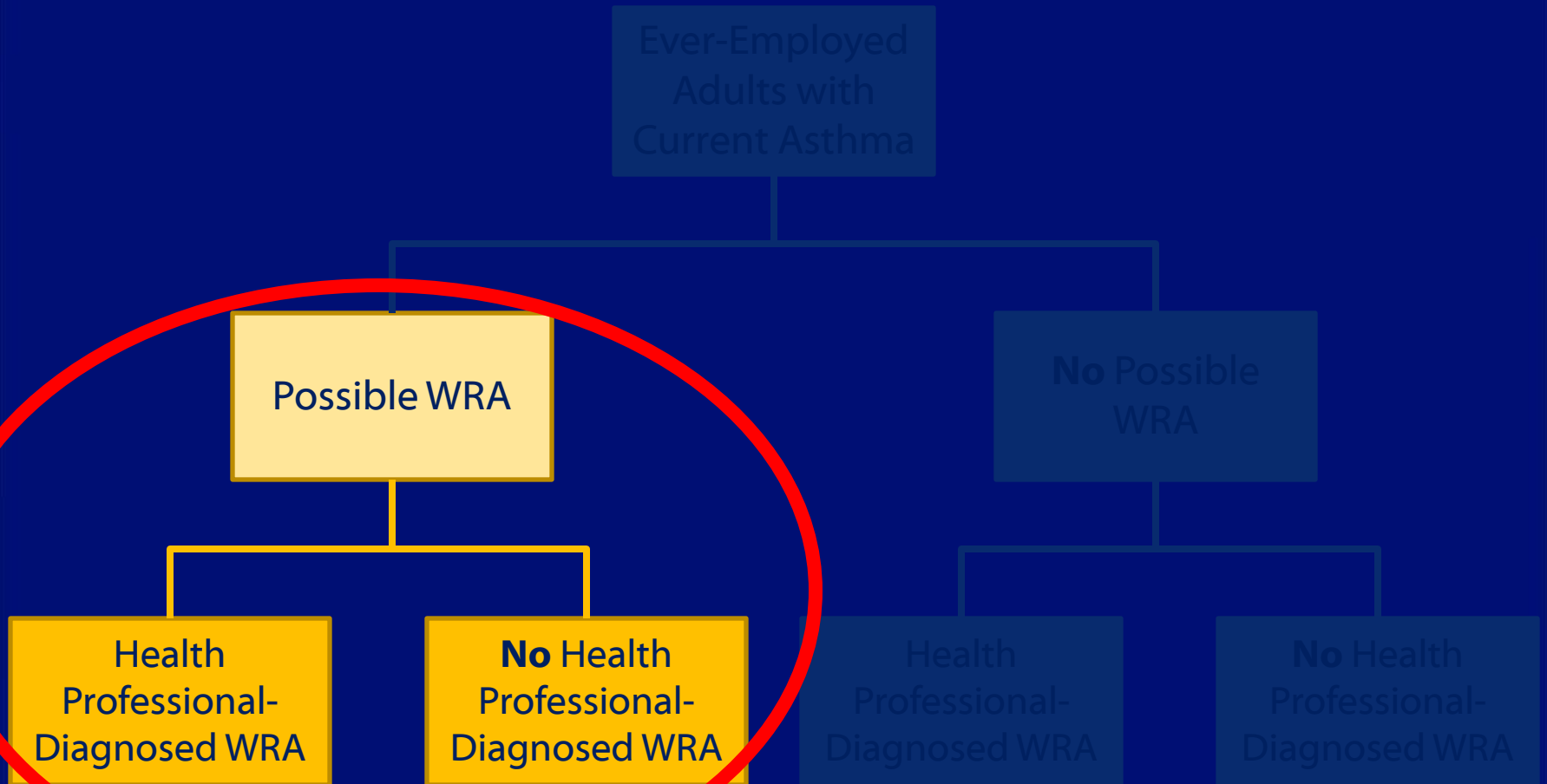
Study Population



Study Population



Study Population



Characteristics

❑ Sociodemographic Characteristics

- Age
- Sex
- Race/ethnicity
- Education
- Income
- Health insurance
- Employment
- Smoking status

❑ Asthma Control

- Days with symptoms
- Nighttime awakenings
- Rescue medication use

Characteristics

❑ Adverse Asthma Outcomes

- Asthma attack
- Urgent treatment for worsening asthma
- Asthma-related emergency room visit
- Asthma-related hospitalization

❑ Change/Quit Job Due to Asthma

- “Did you ever change or quit a job because chemicals, smoke, fumes, or dust caused your asthma or made your asthma worse?”

Characteristics

❑ Comorbid Conditions

- Depression
- Chronic obstructive pulmonary disease (COPD)
- Diabetes
- Cardiovascular disease

Analysis

- ❑ Rao-Scott χ^2 test to assess associations between possible WRA and selected characteristics
- ❑ Multivariate logistic regression models to calculate prevalence ratios (PR) adjusted for age and sex
- ❑ SAS[®] software version 9.2 (SAS Institute Inc., Cary, NC)
- ❑ SUDAAN[®] Release 10.0.1 software (Research Triangle Institute, Research Triangle Park, NC)

Results

- ❑ **An estimated 6.9 million individuals were ever-employed adults with current asthma and possible WRA**
- ❑ **Of these, 17.6% had health professional-diagnosed WRA**

Characteristics of possible WRA

Characteristics	Sample N	%	(95% CI)
Total	13,460		
Age group (years)*			
18–44	3,364	46.2	(44.0–48.4)
45–64	7,152	41.1	(39.2–43.0)
≥ 65	2,882	12.7	(11.8–13.7)
Sex			
Male	3,751	39.1	(36.8–41.3)
Female	9,709	60.9	(58.7–63.2)
Race/Ethnicity*			
White, non-Hispanic	10,830	72.2	(70.0–74.5)
Black, non-Hispanic	786	9.2	(8.0–10.4)
Hispanic	619	9.8	(8.2–11.4)
Other, non-Hispanic	1,115	8.8	(7.0–10.6)

* p-value <0.05

Characteristics of possible WRA

Characteristics	Sample N	%	(95% CI)
Education level*			
≤ High school	5,070	38.9	(36.8–41.0)
> High school	8,383	61.1	(59.1–63.2)
Household income*			
< \$15,000	2,310	15.5	(15.1–16.9)
\$15,000–\$49,999	5,938	44.8	(42.6–47.0)
≥ \$50,000	4,037	39.7	(37.6–41.8)
Health insurance*			
Yes	11,925	82.9	(80.9–85.0)
No	1,505	17.1	(15.0–19.1)

* p-value <0.05

Characteristics of possible WRA

Characteristics	Sample N	%	(95% CI)
Employment status			
Currently employed	6,672	57.6	(55.6–59.6)
Not currently employed	6,779	42.4	(40.4–44.4)
Smoking status*			
Current smoker	2,790	21.9	(20.1–23.8)
Former smoker	4,426	27.7	(26.0–29.4)
Never smoker	6,170	50.4	(48.3–52.5)
Asthma control*			
Well controlled	5,487	43.5	(41.4–45.7)
Not-well-controlled	3,643	27.2	(25.4–28.9)
Very poorly controlled	4,326	29.3	(27.5–31.1)

* p-value <0.05

Characteristics of possible WRA

Characteristics	Sample N	%	(95% CI)
Asthma attack in past year*			
Yes	7,891	59.3	(57.2–61.4)
No	5,421	40.7	(38.6–42.8)
Emergency room visit in past year*			
Yes	1,916	15.1	(13.8–16.4)
No	11,500	84.9	(83.6–86.2)
Hospitalization in past year*			
Yes	667	4.6	(3.9–5.3)
No	12,741	95.4	(94.7–96.1)

* p-value <0.05

Characteristics of possible WRA

Characteristics	Sample N	%	(95% CI)
Urgent treatment in past year*			
Yes	3,817	27.7	(26.0–29.4)
No	9,427	72.3	(70.6–74.0)
Changed/Quit job**			
Yes	2,784	21.7	(20.1–23.3)
No	9,933	78.3	(76.7–79.9)
At least one comorbidity*			
Yes	9,657	65.5	(63.4–67.6)
No	3,750	34.5	(32.4–36.6)

* p-value <0.05

** Cannot perform Rao-Scott χ^2 due to 0 individuals with no possible WRA changed/quit job

Characteristics of possible WRA

Characteristics	Sample N	%	(95% CI)
Depression*			
Yes	5,915	40.3	(38.2–42.3)
No	7,492	59.7	(57.7–61.8)
COPD*			
Yes	6,337	41.2	(39.2–43.1)
No	7,113	58.8	(56.9–60.8)
Diabetes*			
Yes	2,185	12.5	(11.5–13.6)
No	11,239	87.5	(86.4–88.5)
Cardiovascular disease*			
Yes	2,480	13.2	(12.2–14.3)
No	10,774	86.8	(85.7–87.8)

* p-value <0.05

Characteristics of possible WRA by health professional-diagnosed WRA status

Characteristics	PR*	(95% CI)
Age group (years)		
18–44	0.7	(0.6–0.8)
45–64	1.4	(1.3–1.5)
≥ 65	0.9	(0.7–1.1)
Sex		
Male	1.1	(0.9–1.2)
Female	1.0	(0.9–1.1)
Race/Ethnicity		
White, non-Hispanic	1.0	(0.9–1.0)
Black, non-Hispanic	1.3	(1.0–1.8)
Hispanic	1.0	(0.7–1.5)
Other, non-Hispanic	1.1	(0.7–1.6)

*Prevalence ratio adjusted for age and sex where appropriate

Characteristics of possible WRA by health professional-diagnosed WRA status

Characteristics	PR*	(95% CI)
Education level		
≤ High school	1.1	(1.0–1.2)
> High school	1.0	(0.9–1.0)
Household income		
< \$15,000	1.3	(1.1–1.6)
\$15,000–\$44,999	1.1	(1.0–1.2)
≥ \$50,000	0.8	(0.7–0.9)
Health insurance		
Yes	1.0	(1.0–1.1)
No	1.0	(0.8–1.3)
Employment status		
Currently employed	0.9	(0.8–0.9)
Not currently employed	1.2	(1.1–1.3)

*Prevalence ratio adjusted for age and sex

Characteristics of possible WRA by health professional-diagnosed WRA status

Characteristics	PR*	(95% CI)
Smoking status		
Current smoker	1.1	(0.9–1.3)
Former smoker	1.0	(0.9–1.2)
Never smoker	1.0	(0.9–1.1)
Asthma control [†]		
Well controlled	0.9	(0.8–1.0)
Not well controlled	0.9	(0.8–1.1)
Very poorly controlled	1.3	(1.3–1.5)
Asthma attack		
Yes	1.1	(1.0–1.2)
No	0.8	(0.7–0.9)

*Prevalence ratio adjusted for age and sex

[†] Based on number of days with symptoms, nighttime awakenings, and rescue medication use

Characteristics of possible WRA by health professional-diagnosed WRA status

Characteristics	PR*	(95% CI)
Asthma-related ER visit		
Yes	1.5	(1.2–1.8)
No	0.9	(0.9–1.0)
Asthma-related hospitalization		
Yes	1.7	(1.2–2.4)
No	1.0	(0.9–1.0)
Asthma-related urgent treatment		
Yes	1.4	(1.2–1.6)
No	0.9	(0.8–0.9)
Changed/quit job		
Yes	2.6	(2.2–2.9)
No	0.7	(0.6–0.7)

*Prevalence ratio adjusted for age and sex

Characteristics of possible WRA by health professional-diagnosed WRA status

Characteristics	PR*	(95% CI)
At least one comorbidity		
Yes	1.1	(1.1–1.2)
No	0.8	(0.7–0.9)
Depression		
Yes	1.2	(1.1–1.3)
No	0.9	(0.8–1.0)
COPD		
Yes	1.3	(1.1–1.4)
No	0.8	(0.8–0.9)
Diabetes		
Yes	1.3	(1.1–1.6)
No	1.0	(0.9–1.0)
Cardiovascular disease		
Yes	1.4	(1.2–1.7)
No	0.9	(0.9–1.0)

*Prevalence ratio adjusted for age and sex

Health professional diagnosis of WRA: Ever-employed adults with current asthma and possible WRA

❑ Associated with:

- Working age, low income, unemployment**
- Asthma control, adverse asthma outcomes, job change**
- Comorbid chronic conditions**

❑ Not associated with:

- Sex, race/ethnicity, education level, insurance, smoking status**

Limitations

- ❑ **Self-reported**
- ❑ **Cross-sectional survey**
- ❑ **Landline telephone**
- ❑ **No data on date of WRA diagnosis, occupation, or workplace exposures**

Discussion

- ❑ **WRA diagnosis associated with:**
 - **Poor asthma control**
 - **Adverse asthma outcomes**
 - **Job change**
 - **Frequent unscheduled health care visits**

- ❑ **WRA may be:**
 - **Diagnosed late**
 - **Difficult to manage**
 - **Misclassified as asthma not related to work**

Recommendations

- ❑ Use ACBS results to help prioritize prevention efforts**
- ❑ Collect information on industry/occupation and asthma-related workplace exposures**

Recommendations

- ❑ **Occupational histories should be collected from all adults with asthma, particularly among those with new-onset or worsening asthma.¹**
- ❑ **Patients with WRA who have frequent unscheduled visits for their asthma should be considered for referral to a specialist for care and management.**
- ❑ **Physicians should be alert to the possibility of WRA in working age patients who frequently have unscheduled visits for their asthma.**

¹ Tarlo SM, Balmes J, Balkissoon R, et al. Diagnosis and management of work-related asthma: ACCP Consensus Statement. *Chest*. 2008;134(3 Supplement):1-41.

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National Institute for Occupational Safety and Health

Division of Respiratory Disease Studies



Additional Slides

WRA

❑ Possible WRA

- “Was your asthma **caused** by chemicals, smoke, fumes or dust in your **current** job?”
- “Is your asthma **made worse** by chemicals, smoke, fumes or dust in your **current** job?”
- “Was your asthma **caused** by chemicals, smoke, fumes or dust in any **previous** job you ever had?”
- “Was your asthma **made worse** by chemicals, smoke, fumes or dust in any **previous** job you ever had?”

❑ Health Professional-Diagnosed WRA

- “Were you ever told by a doctor or other health professional that your asthma was related to any job you ever had?”

Health Care Utilization Definitions

❑ Asthma Attack

- **“During the past 12 months, have you had an episode of asthma or an asthma attack?”**

❑ Urgent Treatment

- **“During the past 12 months, how many times did you see a doctor or other health professional for urgent treatment of worsening asthma symptoms or for an asthma episode or attack?”**

❑ Emergency Room Visit

- **“During the past 12 months, have you had to visit an emergency room or urgent care center because of your asthma?”**

❑ Overnight Hospital Stay

- **“During the past 12 months, have you had to stay overnight in a hospital because of your asthma? Do not include an overnight stay in the emergency room.”**

Asthma Control Level

	Well Controlled	Not-Well-Controlled	Very Poorly Controlled
Symptoms*	≤8 days in past 30 days	>8 days in the past 30 days but not throughout the day	Every day in the past 30 days and throughout the day
Nighttime Awakenings [‡]	≤2 times in past 30 days	≥3 and ≤12 times in the past 30 days	≥13 times in the past 30 days
Rescue Medication [†]	≤0.29 uses per day	>0.29 and <2.00 uses per day	≥2.00 uses per day

The level of asthma control is based on the most severe impairment category.

*Symptoms were determined based on the response to the question "During the past 30 days, on how many days did you have any symptoms of asthma?"

[‡]Nighttime awakenings were determined based on the response to the question, "During the past 30 days, on how many days did symptoms of asthma make it difficult for you to stay asleep?"

[†]Frequency of inhaler rescue medication (not nebulizer) uses per day or per week for all reported rescue medications taken in the last 3 months was converted to the number of uses per day and summed. Rescue medications used only for treatment before exercise were excluded.