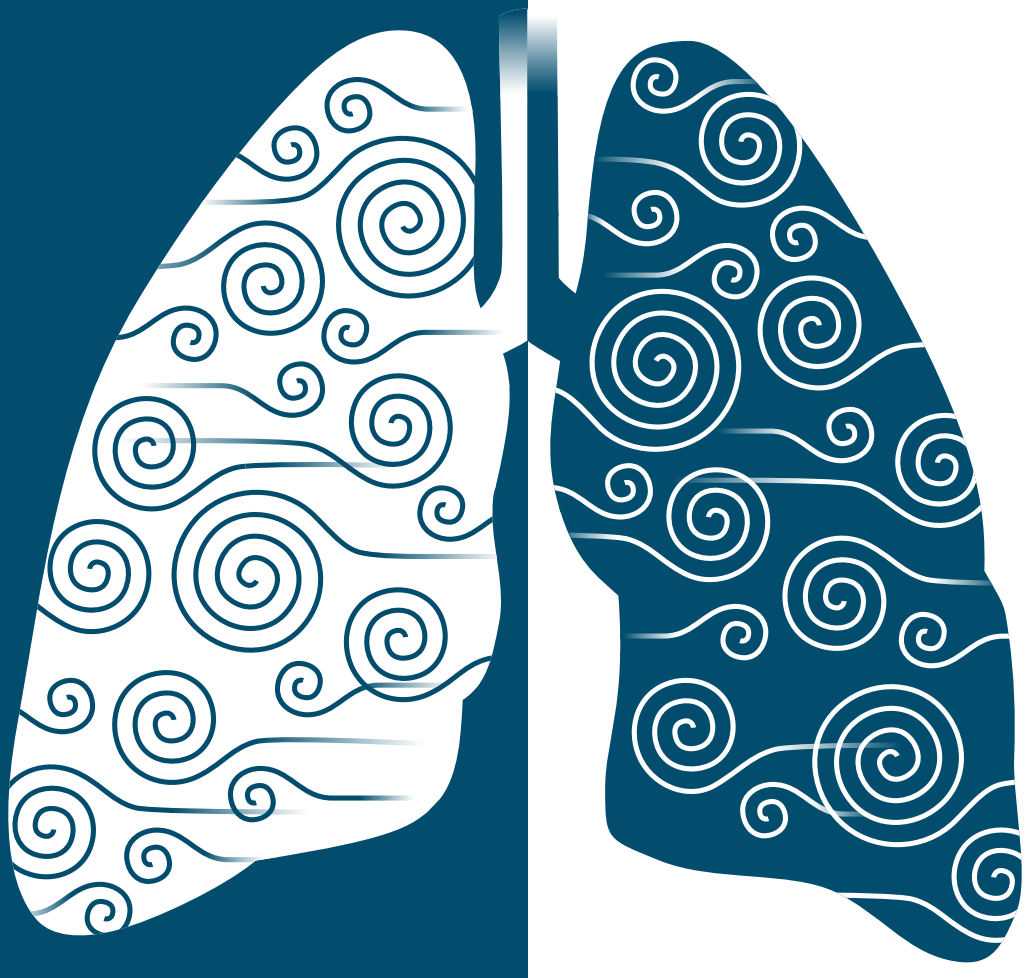
The Burden of Asthma in California

A Surveillance Report



CALIFORNIA BREATHING

California Department of Health Services

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The Burden of Asthma in California

A Surveillance Report

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Arnold Schwarzenegger
Governor
State of California

S. Kimberly Belshé
Secretary
Health and Human Services Agency

Sandra Shewry
Director
Department of Health Services

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6. Work-related Asthma

What is work-related asthma?

Work-related asthma (WRA) is asthma that is caused or triggered by conditions or substances in the workplace. There are two main types of WRA: 1) new onset asthma, or new asthma that develops from workplace exposures in a person who did not previously have asthma; and 2) work-aggravated asthma, or pre-existing asthma that is made worse by conditions in the workplace. To be considered WRA, there must be a doctor's diagnosis and symptoms that started after a possible workplace exposure. There are currently over 350 substances known to cause new onset WRA (also called sensitizers).[1] The most important treatment for WRA is to identify the things in the workplace that trigger asthma and control or eliminate them.

Between 137,000 and 315,000 adults in California have work-related asthma.

How many people in California have work-related asthma?

In California, it is estimated that between 137,000 and 315,000 adults have WRA.[2] However, WRA is very often unrecognized and therefore not always diagnosed. Research shows that health care providers rarely ask about workplace factors when diagnosing or treating adult asthma.[3]

Who gets work-related asthma in California?

People from all over California in a wide array of industries and occupations have WRA. Generally speaking, more women than men are reported with WRA, and more people are reported with new onset WRA, compared to work-aggravated asthma. Some of the industries with the highest rates of WRA include local transit, manufacturing of lumber and wood products, utilities, heavy construction, social services, and health services. Some of the specific occupations with the highest rates of WRA include correctional officers, firefighting occupations, special education teachers, health technicians, welfare eligibility clerks, and respiratory therapists. The most common asthma triggers that people with WRA are exposed to are: dust, unknown chemicals, indoor air pollutants, mold, smoke, paint, and cleaning materials. The most common sensitizers that people with WRA are exposed to are: latex, formaldehyde, isocyanates, rat antigens, glutaraldehyde, and redwood. (See page 67 for a description of these substances.)

How does work-related asthma affect the people who get it?

Work-related asthma has a significant impact on people who have it. Among people identified with WRA, 62 percent were either unable to perform their usual work or had to

[1] Association of Occupational and Environmental Clinics, AOEC Exposure Codes. Available at: http://www.aoec.org/tools.htm. Accessed October 23, 2006.

[2] Flattery J, Davis L, Rosenman K, Harrison R, Lyon-Callo S, Filios M The Proportion of Self-reported Asthma Associated with Work in Three States—California, Massachusetts, and Michigan, 2001. J of Asthma. 2006;43:213–218.

[3] Sama S, Hunt P, Cirillo P, et al. A Longitudinal Study of Adult-Onset Asthma Incidence Among HMO Members. Environ Health. 2003;2:10-18.

perform modified work. Among people who also had a follow-up interview, 27 percent said that they were still exposed to the substances associated with their breathing problems. Among those no longer exposed, 34 percent reported they had left their job, either from being fired/laid off or voluntarily to stop exposure. A majority of cases (71%) reported that co-workers also suffered from breathing problems. Over 60 percent had been to the emergency department for their asthma (an average of four times) since their breathing problems at work began, and 14 percent had been hospitalized. More than half (56%) had experienced asthma symptoms in the last two weeks. Among cases asked about workers' compensation, 42 percent had not filed a claim.

How is surveillance for work-related asthma done in California?

An ongoing surveillance system has been in place to track WRA in California since 1993. Health care providers report cases of WRA through Doctor's First Reports of Occupational Injury and Illness, and each case is contacted for follow-up, including a telephone interview to collect additional data and to provide the patient with educational materials and technical assistance. Even though this surveillance system is known to significantly undercount WRA cases, the data are very useful for identifying risk factors, characteristics, and outcomes of people who experience WRA. These data have in turn been used to identify prevention strategies.

In addition to surveillance through Doctor's First Reports, there were two WRA-related questions added to the Behavioral Risk Factor Surveillance System (BRFSS) survey in 2001. These questions are used to estimate the percent of adults with current asthma who have WRA and the percent who have discussed the possibility of WRA with their health care provider.

Summary:

- An estimated 137,000-315,000 people in California have asthma related to their work, yet WRA is often not recognized or reported.
- The majority of WRA cases are new onset asthma (59%); 41 percent are work-aggravated.
- More women than men are identified as having WRA (59% vs. 41%).
- The average age of people with WRA is 41.
- The majority of people with WRA are unable to do their usual work (62%), report continuing symptoms (56%), and have gone to the emergency department for their WRA (61%).
- The overall rate of WRA in California is 2.1 per 100,000 workers. However, some industries and occupations have rates that are many times higher than the average.
- People with WRA are most commonly exposed to the following asthma triggers: dust, unknown chemicals, indoor air pollutants, mold, smoke, paint, and cleaning materials.
- The WRA sensitizers to which people are most commonly exposed are: latex, formaldehyde, isocyanates, rat antigens, glutaraldehyde, redwood, and mites.
- In some industries and occupations, high WRA rates cannot be tied to any one or two specific exposures. Others, however, have very specific exposures associated with the majority of cases, allowing for targeted prevention efforts.

Definitions of Substances Named in this Section

Animal Dander	Small particles or organic matter from animals (mostly from skin and fur)
Epoxy Resin	Product used in paints and other surface coatings, molded and reinforced plastics, electronic component coverings, and adhesives ranging from spray foams to dental cement
Formaldehyde*	A chemical used to make building products like particle board, wrinkle-free fabrics, cosmetics, plastics, and as a disinfectant and a preservative; also called formalin
Glutaraldehyde*	A chemical used as a disinfectant and sterilizer in health care settings, for leather tanning, tissue fixative, x-ray processing, and in dental materials
Grain Dust*	A mix of grain proteins, bacterial toxins, pesticides, and soil that comes from agricultural activity
Hydrocarbons	A vast family of compounds containing carbon and hydrogen in various combinations; found especially in fossil fuels such as petroleum products and natural gas
Indoor Air Pollutants	Used as a general category for substances in the air inside a building that are associated with asthma-related symptoms
Isocyanates*	Chemicals used to make many different kinds of foams used in products as far ranging as car seats, foam mattresses, surfboards, and packing materials
Latex*	Also known as natural rubber, it is used in a wide variety of consumer products including rubber gloves, tubing, rubber bands, and balloons
Mites*	Extremely small insects that eat organic material from plants or animals
Pepper Spray	A chemical agent derived from chile peppers and used for defense to incapacitate an attacker
Pesticides	Chemicals used to kill unwanted plants and pests such as insects, weeds, rodents, and fungi; used in agriculture and other settings such as regular treatment of buildings in urban areas
Rat Antigens*	Substances and proteins from rats that can cause an allergic response
Roofing Tar	Tar used in many roofing installations; it contains substances that can irritate the respiratory system
Smoke	General category for any type of smoke exposure including cigarette smoke, plastic smoke, etc.
Solvents	A large class of chemicals used to dissolve other substances; used widely for cleaning, degreasing, and making glues, inks, paints, and thousands of other products

*Substances marked with an asterisk are sensitizers, or substances known to be able to cause new onset asthma.

Prevalence of Work-related Asthma

Percent of Adults with Current Asthma Reporting an Association with Work, California 2001

Overall, 7.4 percent of adults with current asthma had possible WRA. This equates to approximately 137,000 adults in 2001 with WRA in California. This is very likely an underestimate, as research shows that only a small percentage of adults with asthma ever discuss work as a possible factor in their asthma with their health care provider.

The American Thoracic Society conducted an extensive review of the epidemiological literature and estimated that 15 percent of all adult asthma is WRA[4]. When this number is applied to results from the California Health Interview Survey (CHIS) documenting the prevalence of adults with current asthma, an estimated 315,000 adults had WRA in 2003.

Questions on 2001 BRFSS	Percent "yes" % (95% CI)
Q1. Were you ever told by a doctor or other medical person that your asthma was related to any job you ever had?	
All	5.8 (2.6 – 9.0)
Male	8.4 (1.5 – 15.3)
Female	4.4 (1.1 – 7.7)
Q2. Did you ever tell a doctor or other medical person that your asthma was related to any job you ever had?	
All	3.9 (1.5 – 6.3)
Male	5.5 (0.4 – 10.6)
Female	3.1 (0.6 – 5.6)
Possible WRA (yes to either Q1 or Q2)	
All	7.4 (3.9 – 10.9)
Male	9.8 (2.6 – 17.0)
Female	6.1 (2.2 – 10.0)

Data Source: BRFSS 2001

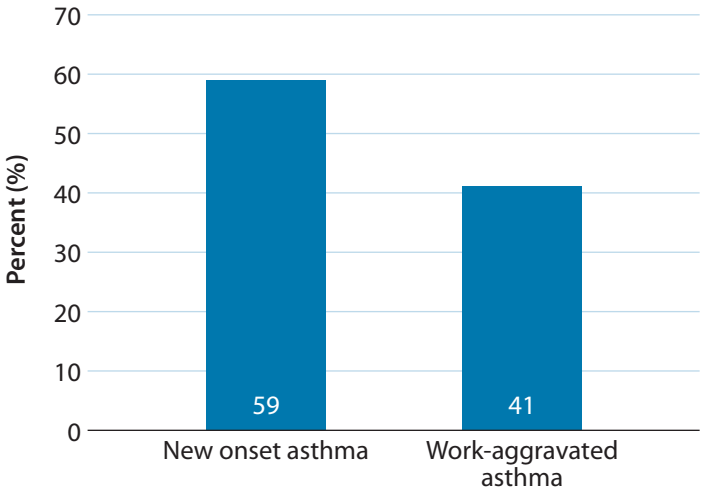
[4] Balmes J, Becklake M, Blanc P, et al. Environmental and Occupational Health Assembly, American Thoracic Society. American Thoracic Society Statement: Occupational Contribution to the Burden of Airway Disease. Am J Respir Crit Care Med. 2003;167:787-797.

Characteristics of Work-related Asthma

The characteristics of WRA presented below are from the WRA surveillance system from 1993-2005 (N=3,552).

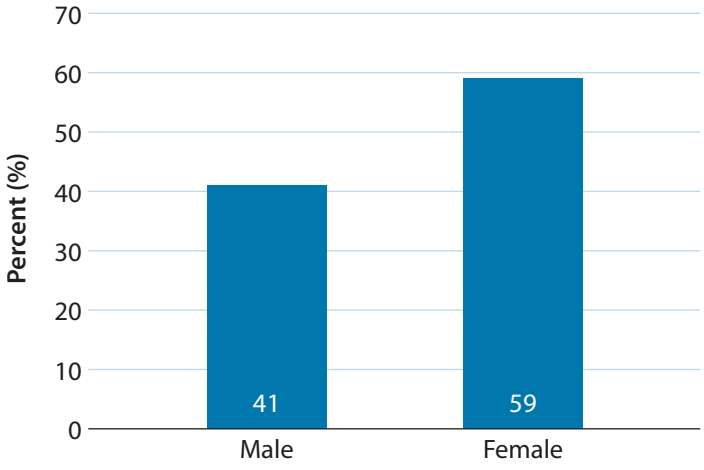
Classification of WRA Cases, California WRA Surveillance System, 1993-2005

The majority of people with WRA have new onset asthma, as opposed to existing asthma made worse by workplace conditions (work-aggravated asthma).



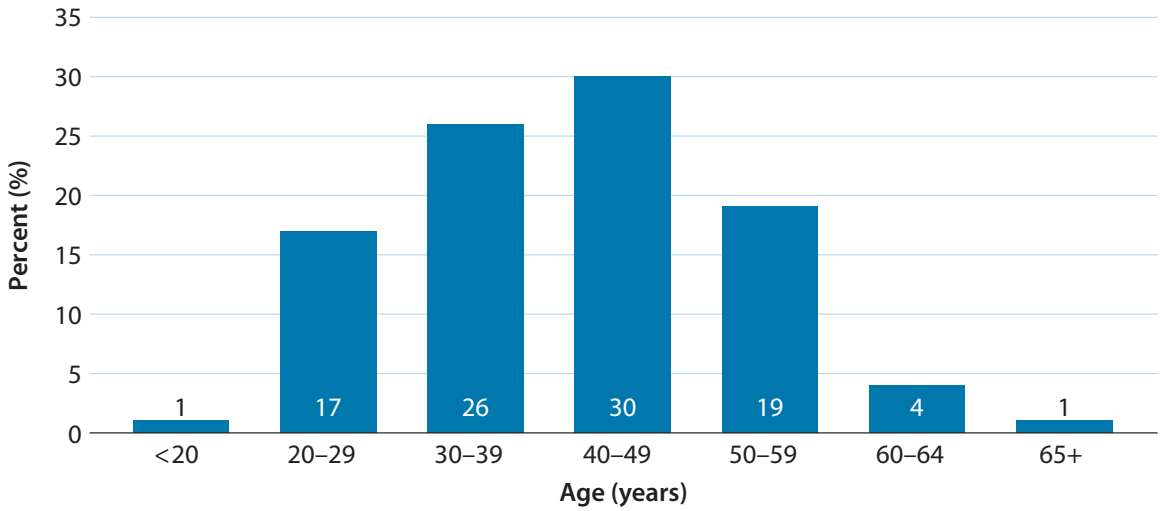
WRA Cases by Gender, California WRA Surveillance System, 1993-2005

More women than men are reported to the WRA surveillance system (59% vs. 41%).



WRA Cases by Age, California WRA Surveillance System, 1993-2005

The average age of people reported to have WRA is 41 years, although teenagers and people over the age of 65 also experience WRA.



Note: The surveillance of WRA includes working people of all ages, including teenagers.

Characteristics of WRA Cases, California WRA Surveillance System, 1993-2005

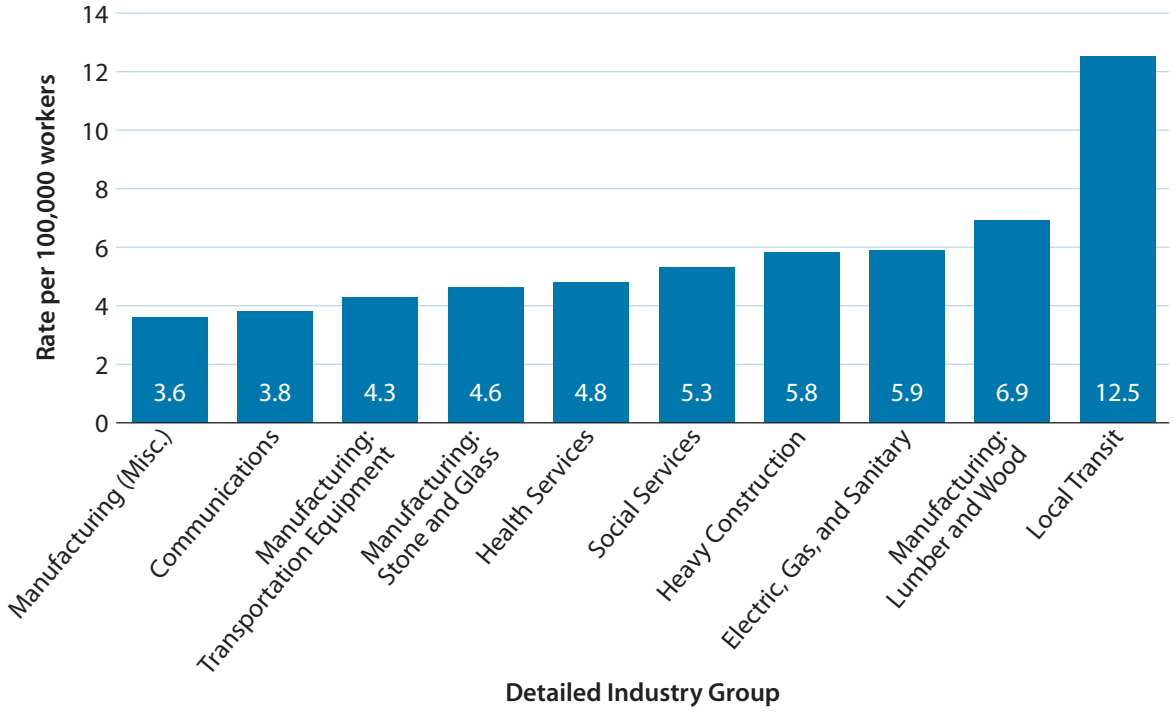
WRA has serious consequences: the majority of cases had been to the emergency department for their asthma (an average of four times) since their work-related breathing problems began. One in seven had been hospitalized and over half had experienced asthma symptoms in the previous two weeks. Yet just over half had applied for workers' compensation. Over 70 percent knew of other people at their workplace who were experiencing breathing problems similar to theirs, and 27 percent were still exposed to the substances that triggered their WRA in the workplace.

Severity/Impact	
Unable to perform usual work or had to modify work	62%
Emergency department visit since WRA began	61%
Average number of times in emergency department	4
Hospitalized since WRA began	14%
Filed for workers' compensation	58%
Symptoms in last two weeks	56%
Know others in workplace with similar breathing problems	71%
Still exposed to asthma trigger in workplace	27%
Other Risk Factors	
Personal allergy history	66%
Family asthma history	46%
Never smoked	61%
Current smoker	12%
Former smoker	27%

Industries and Occupations

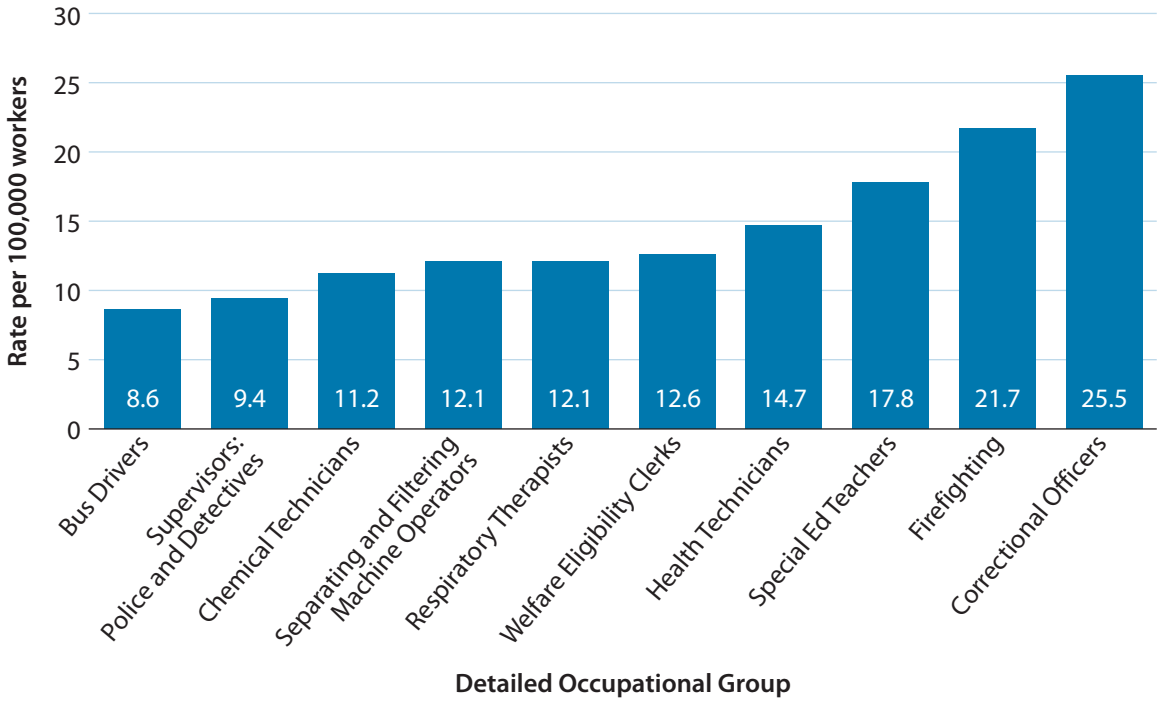
WRA Rates by Detailed Industry Groups, California WRA Surveillance System, 1993-2004 (n=3,479)

The overall rate of work-related asthma in California is 2.1 per 100,000 workers. Certain industries have substantially higher rates, including local transit (12.5 per 100,000); lumber and wood product manufacturing (6.9); electric, gas, and sanitary utilities (5.9); heavy construction (5.8); social services (5.3); and health services (4.8).



WRA Rates by Detailed Occupational Groups, California WRA Surveillance System, 1993-2004 (n=3,479)

Some specific occupations also have high rates of WRA. These include correctional officers (25.5 per 100,000), firefighting occupations (21.7), special education teachers (17.8), health technicians (14.7), and welfare eligibility clerks (12.6). Two of the ten occupations with the highest rates are in the health care industry (health technicians and respiratory therapists).



Exposures

A wide variety of substances (exposures) are associated with WRA. Understanding the conditions or substances contributing to people's asthma symptoms in the workplace is critical for creating effective prevention strategies. The tables below list the most commonly reported WRA exposures (both exposures that trigger asthma symptoms and those that can cause new onset asthma, or sensitizers). Note that sometimes workers do not know what specific chemical triggered their asthma symptoms.

Most Commonly Reported Exposures Among WRA Cases Receiving Follow-up, California WRA Surveillance System, 1993-2004

The most commonly reported exposures include dust, unknown chemicals, indoor air pollutants, mold, smoke, paint, and cleaning chemicals.

Exposure	Number of Cases (cases may report up to 3 exposures)
Dust	383
Chemicals	363
Indoor Air Pollutants	177
Mold	173
Smoke	158
Paint	140
Cleaning Materials, not specified	137
Plant Materials, not specified	104
Indoor Air Pollutants from Building Renovation	86
Pesticides, not specified	77

Most Commonly Reported Sensitizer Exposures Among WRA Cases Receiving Follow-up, California WRA Surveillance System, 1993-2004

The most common sensitizers reported were latex, formaldehyde, isocyanates, rat antigens, glutaraldehyde, and redwood.

Sensitizer Exposure	Number of Cases (cases may report up to 3 exposures)
Latex	32
Formaldehyde	26
Isocyanates	20
Rat Antigens	15
Glutaraldehyde	13
Redwood	12
Mites	10
Grain Dust	8
Epoxy Resin	8
Flour	6

Most Common Exposures Among the 10 Occupations with the Highest Rates of WRA, California WRA Surveillance System 1993–2004 (n=3,479)

Examining the most common exposures by occupation can help to focus prevention strategies. For example, diesel exhaust is by far the most common exposure reported by bus drivers, so measures should be explored to control or eliminate that exposure.

Occupation	Exposure
Correctional officers	pepper spray, smoke, dust
Firefighting occupations	smoke
Special education teachers	mold, dust, indoor air pollutants
Health technicians	glutaraldehyde, paint, latex, animal dander, dust, cleaning chemicals
Welfare eligibility clerks	roofing tar, paint, dust
Respiratory therapists	latex, cleaning chemicals, glutaraldehyde
Separating, filtering, clarifying machine operators	solvents, salts, acids, glues
Chemical technicians	solvents, inks, isocyanates, hydrocarbons
Supervisors, police and detective	pepper spray, mold, smoke, rat antigens
Bus drivers	diesel exhaust

Acknowledgments

This report was prepared by staff members of California Breathing, a public health asthma program of the Environmental Health Investigations Branch of the California Department of Health Services.

Authors:

Meredith Milet, MPH, Epidemiologist, California Breathing

Sarah Tran, MPH, Epidemiologist, California Breathing

Melody Eatherton, MPH, Epidemiologist, California Breathing

Jennifer Flattery, MPH, Epidemiologist, Occupational Health Branch

Rick Kreutzer, MD, Chief, Environmental Health Investigations Branch

Lauren Wohl-Sanchez, MFA, Graphic Designer, Environmental Health Investigations Branch

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Galatea King, MPH, Environmental Health Investigations Branch, California Department of Health Services

Jeanne Moorman, MS, National Center for Environmental Health, Centers for Disease Control and Prevention

David Nunez, MD, MPH, California Asthma Public Health Initiative, California Department of Health Services

Daniel Smith, DrPH, Environmental Health Investigations Branch, California Department of Health Services

Svetlana Smorodinsky, MPH, Environmental Health Investigations Branch, California Department of Health Services

Richard Sun, MD, MPH, Medi-Cal Managed Care Division, California Department of Health Services

For more information or to obtain additional copies of this report contact:

Meredith Milet, MPH
California Department of Health Services
Environmental Health Investigations Branch
850 Marina Bay Parkway
Building P, Third Floor
Richmond, CA 94804

Phone: (510) 620-3634
Fax: (510) 620-3720
E-mail: mmilet@dhs.ca.gov

This report is available on the web at: http://www.californiabreathing.org

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