

Asthma and Indoor Air Quality in the Home

One in every eight dwelling units in California is substandard.⁹⁸

— California Department of Housing and Community Development

“I have many patients who suffer from asthma where I know that the indoor air pollution triggers are the main cause. These tend to be the toughest cases to treat because no matter how much medicine we give them, with continued exposure to triggers, the lungs just close down.”

— Lisa Chamberlain, Stanford Medical Center



ON AVERAGE California adults and children spend nearly 90% of their time during the week indoors, and most of that time is in the home. Children can be exposed to many asthma triggers in their homes. The presence of uncontrolled environmental triggers causes irritation to the lungs and can lead to the development and exacerbation of asthma as well as allergies and other health-threatening conditions.

What Are the Major Environmental Triggers Found in Homes, and How Do They Impact Childhood Asthma?

Indoor air pollutants

Exposure to indoor air pollutants is linked with asthma exacerbations, decreased lung function, and other respiratory symptoms. Sources of indoor pollutants related to asthma include tobacco smoke, gas stoves, and space heaters. There is also growing concern about the chemical emissions from common consumer products, including household cleaning products and air purifiers.

Tobacco smoke

Environmental tobacco smoke, or secondhand or passive smoke, is produced when individuals use tobacco products inside the home or too close to open doors and windows. Environmental tobacco smoke has been identified by the California Air Resources Board as a toxic air contaminant.¹ Exposure to tobacco smoke has consistently been shown to increase both allergic sensitization and subsequent asthma attacks.²⁻¹² This is true for people who smoke tobacco as well as for those exposed to environmental tobacco smoke both in utero and in childhood. In addition exposure to environmental tobacco smoke has been linked with the development of asthma in infants and young children.^{3,12}

Gas stoves and space heaters

Space heaters, furnaces, and gas stoves can emit nitrogen dioxide (NO₂), a common outdoor air pollutant. Exposure to NO₂ indoors increases the likelihood, frequency, and severity of asthma symptoms.^{3,13-18}

Consumer products—emerging concerns

Volatile organic compounds (VOCs) are chemicals commonly found in household cleaning products, paints, and fuels.

They can also be emitted from building materials, new furniture, and carpet. Recent evidence suggests an association between exposure to VOCs and exacerbation of asthma.¹⁹⁻²² In addition some air purifiers or cleaning devices produce ozone, which has been linked to asthma symptoms and impaired lung function. Evidence suggests that the use of these cleaners can produce ozone indoors in amounts that exceed outdoor health standards.²³⁻²⁵

Indoor allergens

Exposure to indoor allergens is associated with exacerbation of asthma for sensitized individuals. Common indoor allergens include mold, dust mites, cockroaches, cats, and dogs.

Mold

Mold spores and bacteria found in the air, in settled dust, on surfaces, and behind walls have been significantly associated with increased prevalence of respiratory symptoms and decreased lung function among children with asthma.^{2,26-39} There is also emerging evidence of a relationship between exposure to mold and the development of asthma in children.^{34,35,37,40,41} Mold and bacteria problems are worse in certain conditions, such as when there is moisture damage or high indoor humidity.

Dust mites

Dust mites have been consistently associated with both allergic sensitization and increased asthma symptom prevalence and severity, especially when there is inadequate ventilation and high humidity.^{3,4,12,42-51} There is conflicting evidence regarding the role of exposure to dust mites in the development of asthma.^{12,51-55} Intervention studies have shown that dust mite allergen levels are reduced by putting polyurethane-coated covers on mattresses, quilts, and pillows; by removing carpets and rugs; and by improving ventilation to reduce humidity.^{38,50,56-70}

Cockroaches and rodents

Cockroach and rodent (mouse and rat) allergens in kitchens and bedrooms have been linked to an increase in the prevalence and severity of asthma symptoms.^{3,4,42,56,71-82} Intervention studies have demonstrated that professional cleaning, profes-

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sional extermination or integrated pest management, and air filtration reduced levels of these pest allergens or allergic responses to them, including asthma.^{57,58,83-85}

Cats and dogs

Allergens from dogs and cats can collect in dust on smooth floors, on upholstered furniture, and especially on carpets and rugs. Findings on the relationship between pet allergens and asthma have been inconsistent.^{3,86} While some studies found that exposure to cats is related to an increased risk of allergic sensitization,^{5,51,87,88} other studies found a decreased risk.^{3,77,89-92} Studies examining exposure to dogs suggest no effect or a protective effect.^{77,86-88,90,91,93} However, there is consistent evidence that both cat and dog exposure is related to asthma exacerbations among sensitized individuals.^{4,12,82,94-96} Intervention studies have reported that some air filtration devices⁵⁸ and the removal of carpets and rugs reduced levels of pet allergens in the home.^{66,97}

What Can Be Done About Environmental Triggers In The Home?

Community Action to Fight Asthma (CAFA) is a network of asthma coalitions in California working to shape local, regional,

and state policies to reduce the environmental triggers of asthma for school-aged children where they live, learn, and play. Examples of local and state policies aimed at reducing environmental triggers in the home include the following:

- Reduce children's exposure to environmental tobacco smoke.
- Develop indoor air quality guidelines for housing authority agencies and housing code inspectors, and improve inspection and remediation practices.
- Promote clean indoor air programs and policies for private and public landlords and tenants.
- Remove or reduce indoor exposures by promoting the use of building materials, consumer products, and appliances that emit little or no air pollutants.
- Engage tenants to be stronger advocates and spokespersons for indoor air quality improvement policies and tenant rights.

Please visit our website at www.rampasthma.org to learn more about Community Action to Fight Asthma, connect with local coalitions, locate asthma resources across California, and sign up for our e-newsletter.

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