

Mold and Your Health

About mold

A microorganism and type of fungus, molds are part of the natural environment and can be found everywhere, outside and indoors. Mold thrives in wet places. It can form on damp materials—outside on decaying organic matter like leaves, and inside, for example, on the paper face of wet drywall.

People come in contact with molds every day. Mold spores and fragments can get into the air we breathe. You may touch mold through household or occupational activities. Some mold may grow on food.

Of the many species of mold, most are not harmful. Certain molds are used to make foods, such as blue cheese, or medicines, such as penicillin. Some molds are harmful, producing substances called mycotoxins.

Mold and mildew are related, but different, types of fungus. Both require moisture. Mildew is typically powdery and lives on surfaces, whereas mold tends to be fuzzy, thicker, and greenish or black in color.

Health effects of mold

Health-related reactions in people depend on mold type, the amount and duration of exposure, and individual characteristics.

Events, such as floods or leaky pipes, can lead to mold growth indoors and to public concern about potential health effects. Researchers have discovered relationships between some mold exposures and human health. Although not all species of molds have been studied, scientists have discovered health effects in people exposed to moldy environments.

The World Health Organization, National Academy of Medicine, and National Toxicology Program (NTP) all confirm that occupants of damp, moldy buildings have an increased chance of respiratory problems, such as shortness of breath and worsening asthma.

Asthma

Asthma is a chronic airway disease characterized by inflammation. Exposure to mold and dampness indoors is associated with increased risk of developing asthma in young children, and more severe asthma in people who have the disease.¹

Aspergillus fumigatus, a common mold, may cause fungal asthma and result in airway obstruction caused by mucus overproduction. Repeated exposure to an allergen, particularly mold, may lead to asthma development.²



Many studies show that mold exposure can worsen asthma symptoms, especially among young children. Some examples of findings follow.

- Infants who live in moldy homes were three times more likely to develop asthma by age 7.³
- Babies exposed to mold were more likely to have asthma as young children.⁴
- Some children may be exposed to mold in school, which can cause significantly more asthma symptom days than in school children who were not exposed.⁵

Other health conditions

Allergic reactions to molds are the most common health effects in people, including symptoms such as runny nose, sneezing, coughing, and wheezing. People without allergies, but who are exposed to mold, likewise may experience symptoms, including eye irritation, sore throat, congestion, skin rash, and headaches.

Not everyone who comes in contact with mold will experience symptoms, and most people will have only minor symptoms such as a runny nose.

Inflammation and immune system changes may be caused by long-term exposure to mycotoxins.⁶ A type of mycotoxin, aflatoxins may be found on corn and other grain, seed, or nut crops. The NTP lists aflatoxins as a human carcinogen, and human studies have found a link between aflatoxins and increased risk of liver cancer.

However, the Food and Drug Administration (FDA) has strategies to minimize mycotoxins in the U.S. food supply for people and animals. Following established guidelines, FDA monitors the food supply and analyzes domestic and imported foods.

Disadvantaged communities

Indoor concentrations of pollutants, such as mold, tend to be higher in low-socioeconomic status households. For example, their homes may have inside water leaks, a predictor of mold and moisture development. Research also shows that some low-income multifamily units may have low air exchange rates and inadequate ventilation, leading to higher exposure to mold allergens.⁷

Native Americans living in tribal housing in areas, such as North Dakota and Alaska, may be particularly vulnerable to mold exposure. Mold is also found in tribal homes in warmer climates, including California, Arizona, and New Mexico.⁸

Precise information is not available about how often and where different molds are found in buildings and homes in the U.S.

Worker safety

Disaster response and other workers must be properly protected when dealing with mold. The NIEHS Worker Training Program developed a Mold Cleanup and Treatment orientation for workers, volunteers, and homeowners who may be exposed through water-damaged buildings. This program offers free, multilingual booklets about mold and other hazards: <https://tools.niehs.nih.gov/wetp/booklets>.



Climate change and extreme weather

Climate change is a concern for mold spread because conditions inside buildings are influenced by the environment outside them. Building deterioration may result from extreme weather events, increasing the likelihood of mold growth. Under climate change, allergenic mold levels may rise through increased indoor dampness and warmer temperatures.⁹

NIEHS supported the Head-off Environmental Asthma in Louisiana (HEAL) study, following Hurricane Katrina. This storm led to high levels of mold and other allergens, and disrupted health care for children with asthma. HEAL tested an asthma intervention that combined counseling and environmental changes. It successfully decreased the number of symptomatic days in children from 6.5 days to 3.6 days over 12 months.¹⁰ This type of intervention is still used.

Avoiding or controlling mold

Controlling moisture is the best way to control mold growth indoors. One way is through properly functioning HVAC systems with humidity control. Using fans and opening windows may also help dry out indoor spaces. Small mold spots can be removed with household cleaning solutions.

Consult experienced and qualified professionals for major mold cleanup projects.

Learn more about mold:

U.S. Centers for Disease Control and Prevention: [Mold cdc.gov/mold](https://www.cdc.gov/mold)

U.S. Environmental Protection Agency: [Mold epa.gov/mold](https://www.epa.gov/mold)

For more information on the National Institute of Environmental Health Sciences, go to <https://niehs.nih.gov>.

¹ Baxi SN, et al. 2016. Environmental Allergens Workgroup: Exposure and health effects of fungi on humans. *J Allergy Clin Immunol Pract.* 4(3):396-404.

² Wu X, et al. 2020. Exposure to mold proteases stimulates mucin production in airway epithelial cells through Ras/Raf1/ERK signal pathway. *PLoS One.* 15(4).

³ Reponen T, et al. 2011. High environmental relative moldiness index during infancy as a predictor of asthma at 7 years of age. *Ann Allergy Asthma Immunol.* 107(2):120-6.

⁴ Ramirez LP, et al. 2018. High number of early respiratory infections in association with allergic sensitization to mold promotes childhood asthma. *J Allergy Clin Immunol.* 141(5).

⁵ Baxi SN, et al. 2019. Association between fungal spore exposure in inner-city schools and asthma morbidity. *Ann Allergy Asthma Immunol.* 122(6):610-615.

⁶ Pestka JJ. 2010. Deoxynivalenol: mechanisms of action, human exposure, and toxicological relevance. *Arch Toxicol.* 84(9):663-79.

⁷ Adamkiewicz G, et al. 2011. Moving environmental justice indoors: understanding structural influences on residential exposure patterns in low-income communities. *Am J Public Health. Suppl 1:*S238-45.

⁸ Seltenrich, N. 2012. Healthier tribal housing: Combining the best of old and new. *Environ Health Perspect.* 120:12.

⁹ Institute of Medicine. 2011. *Climate Change, the indoor environment, and health.* National Academies Press, Washington, DC.

¹⁰ Mitchell H, et al. 2012. Implementation of evidence-based asthma interventions in post-Katrina New Orleans: The Head-off Environmental Asthma in Louisiana (HEAL) study. *Environ Health Perspect.* 120(11): 1607-1612.