

Mold and Your Health

Molds can be found everywhere and we encounter them every day. Spores and fragments of these microorganisms can get into the air we breathe. We often touch mold in the home or on the job. We occasionally find mold growing on our food.

Mold thrives in wet places. In nature, it forms on damp materials and in decaying organic matter. Outdoor mold reaches its highest levels in the summer and fall. Inside, it can spread on damp surfaces, like the paper surface of wet drywall. Flooding, leaky pipes, humid conditions, and poor ventilation contribute to the growth of mold in our buildings and homes.

Most molds are not harmful. Some are used to make foods, like cheese and yogurt, or to manufacture medicines, like penicillin. A few species can be detrimental to human health. Some produce mycotoxins, which are substances that can cause severe illness if ingested. Molds also release spores that can irritate the nose and lungs and occasionally produce severe reactions.

Health effects of mold

Although not all species of molds have been studied, scientists have documented common health effects for 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. The severity of these symptoms depends on the type of mold, amount and duration of exposure, and unique characteristics of individuals in contact.¹

Asthma — A chronic disease characterized by inflammation of the airways and difficulty breathing. Studies have shown that mold exposure can increase a person's risk of developing asthma or worsen its symptoms — especially for young children.² Specifically, the common mold *Aspergillus fumigatus* has been linked to fungal asthma, a condition in which mucus overproduction can result in airway obstruction.³



Additional studies indicate that:

- Infants who live in moldy homes were three times more likely to develop asthma by age 7.⁴
- Babies exposed to mold were more likely to have asthma as young children.⁵
- Children exposed to mold in school experience significantly more asthma symptom days than those not exposed.⁶

Allergic reactions — The most common health effects in people, including symptoms such as runny nose, sneezing, coughing, and wheezing. Some people experience eye irritation, sore throat, congestion, skin rash, and headaches.⁷

Cognitive issues — Extended exposure to mold has been linked to short-term memory loss, lightheadedness, dizziness, blurred vision, tinnitus, and loss of other cognitive functions.⁸

Mental health issues — Studies have shown an association between prolonged mold exposure and increased levels of depression, anxiety, and stress in both children and adults.⁹

Immune effects — Long-term exposure to inhaled mycotoxins may promote inflammation and immune system changes.¹⁰

Cancer — Aflatoxin is a type of mycotoxin and may be found on corn and other grains, seeds, or nut crops. It has been listed by the NTP as a human carcinogen. Studies have found a link between aflatoxins and increased risk of liver cancer.¹¹

The Food and Drug Administration (FDA) has developed strategies and guidelines to minimize mycotoxins in the U.S. food supply. The FDA also monitors domestic and imported foods for compliance and safety.

Differing Impacts

Although precise information is not available about their presence in U.S. homes and buildings, indoor concentrations of pollutants, including molds, tend to be higher in the households of people of low socioeconomic status.¹² Their homes are more likely to have unresolved issues, like water leaks, that promote mold, and are less likely to have air conditioning or ventilation to prevent it. Mold remediation can be particularly difficult for families who rent homes or for those with limited financial resources. Native Americans living in Tribal areas¹³ and migrant workers¹⁴ may be particularly vulnerable to mold exposure because they often live in housing that is poorly designed and constructed, overcrowded, and not properly ventilated.

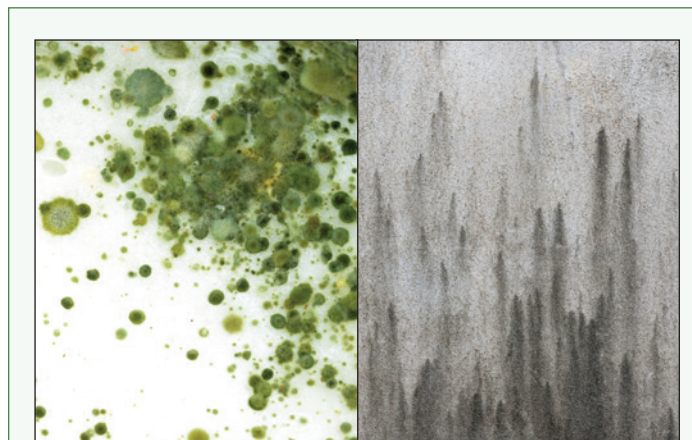
Worker safety

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>.

Extreme weather

Weather events and climate conditions have the potential to increase mold problems. Extreme weather and flooding cause deterioration of buildings and produce damp conditions that support mold growth. Warmer temperatures and high humidity contribute to this situation. In recent years, numerous severe storms and hurricanes have contributed to a rise in allergenic mold levels and adverse health effects.¹⁵

The National Institute of Environmental Health Sciences (NIEHS) supports the study of severe weather effects and seeks to reduce the health impacts. In 2005, for example, Hurricane Katrina devastated Louisiana, causing high levels of molds and other allergens, and disrupting health care for children with asthma. In response, NIEHS supported Head-off Environmental Asthma in Louisiana, an intervention study that combined counseling about asthma with action to address the conditions that supported mold growth. Participants in the study generally experienced a significant decrease in the number of days they experienced asthma symptoms — from an average of 6.5 days over a two-week measurement period to 3.6 days.¹⁶ Similar projects have been implemented in response to other hurricanes.



Mold and mildew are related, but distinct, types of fungus. Mold tends to be fuzzy, thicker, and greenish or black in color. Mildew is typically powdery and rests flat on surfaces.

Avoiding or controlling mold

The best way to control mold growth indoors is to control moisture. Properly functioning HVAC systems with humidity control can be effective. Use of fans and ventilation by opening windows also may help dry out indoor spaces. Small mold spots can be removed with household cleaning solutions, but experienced and qualified professionals should be consulted for major mold cleanup projects.

Learn more about mold:

U.S. Centers for Disease Control and Prevention: Mold
www.cdc.gov/mold

U.S. Environmental Protection Agency: Mold
www.epa.gov/mold

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

¹ Institute of Medicine. 2004. Damp indoor spaces and health. National Academies Press, Washington, DC.

² 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.

³ 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).

⁴ 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.

⁵ 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).

⁶ 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.

⁷ Bozek A, et al. 2017. Immunotherapy of mold allergy: a review. *Hum Vaccin Immunother* 13(10):2397-2401. doi:10.1080/21645515.2017.1314404.

⁸ Campbell AW, et al. 2004. Mold and mycotoxins: effects on the neurological and immune systems in humans. *Adv Appl Microbiol* 55 (2004), 375-406.

⁹ Gatto MR, et al. 2024 A state-of-the-science review of the effect of damp- and mold-affected housing on mental health. *Environ Health Perspect* 132(8):86001. doi:10.1289/EHP14341.

¹⁰ Rosenblum Lichtenstein JH, et al. 2015. Environmental mold and mycotoxin exposures elicit specific cytokine and chemokine responses. *PLoS One* 10(5). doi:10.1371/journal.pone.0126926.

¹¹ NTP, 2021, Aflatoxins, CAS No. 1402-68-2, Report on Carcinogens, 15th Edition, ntp.niehs.nih.gov/sites/default/files/ntp/roc/content/profiles/aflatoxins.pdf

¹² Adamkiewicz G, et al. 2011. Moving environmental justice indoors: understanding structural influences on residential exposure patterns in low-income communities. *Am J Public Health* 101 Suppl 1:S238-45.

¹³ Seltenrich, N. 2012. Healthier tribal housing: Combining the best of old and new. *Environ Health Perspect* 120:12.

¹⁴ Kearney GD, et al. 2014. The association of respiratory symptoms and indoor housing conditions among migrant farmworkers in eastern North Carolina. *J Agromedicine* 19(4):395-405, doi:10.1080/1059924X.2014.947458.

¹⁵ Institute of Medicine. 2011. Climate Change, the indoor environment, and health. National Academies Press, Washington, DC.

¹⁶ 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.