



MOLD in the HOME and SCHOOL: *A Resource for Caregivers, Families, and School Personnel*

Summary of Key Points

- Too much mold in homes and schools is common. Mold grows in moist, dark, humid areas that may have water coming in from leaking roofs, pipes, etc.
- Mold exposure is associated with health problems, such as allergic symptoms.
- Testing for mold in a home or school is usually not necessary.
- Large amounts of mold damage should be cleaned and repaired by professionals wearing appropriate personal safety gear and sealing the area.

Molds are fungi, such as mildew, yeasts, and mushrooms, that are present everywhere, both indoors and outdoors. No one knows for sure how many species of fungi exist, but they are in the thousands. Molds commonly found in homes include *Penicillium*, *Cladosporium*, *Aspergillus*, *Alternaria*, *Stachybotrys* and many others. Homes built close to bodies of water like ponds, lakes or rivers, and homes built in wooded areas are likely to have a large variety of molds growing outdoors. Outdoor molds are carried indoors by wind, the fur of pets, or clothing.

How and where does mold grow?

Mold can grow almost anywhere there is water, high humidity, or damp conditions. Molds are often found in homes and schools that have been flooded or have had water leaks (such as from roofs, windows, or pipes). Mold grows faster in dark spaces with warm temperatures, high humidity and poor air flow. [1] Mold can “feed” on paper, fabric, cellulose, wallpaper glue, sheetrock, wood, soap scum, leather, upholstery, and many other surfaces. Molds reproduce by making small spores that can enter the air and settle on wet surfaces and grow to the visible forms of mold commonly seen in homes and schools. As fungi grow, they can produce chemicals called “volatile organic compounds” that cause the musty, sour, moldy smell. [1] Under some circumstances, some fungi can produce chemicals (termed mycotoxins). As climate change leads to higher temperatures, increased sea levels, and increases in severe storms and flooding, there can be more instances of unwanted water leaking into homes. This creates opportunities for mold growth.

Are damp indoor spaces a concern for health?

Damp indoor spaces alone may produce air contaminants and odors which may result in irritation of the eyes, nose, throat and skin, asthma or asthma-like symptoms. [13] Some people may experience general discomfort such as headaches, fatigue, and problems concentrating. [5,11] There is increasing evidence to suggest that indoor dampness is associated with people developing asthma and causing symptoms in those who have asthma. [15] Chemicals (such as those released) from deteriorating building materials), dust mites and pests growing in a wet and warm environment, may also play a role in worsening asthma and allergies. [11,12].

How are children exposed to mold?

Children can be exposed to molds in the home and at school or preschool. At home, mold exposure is commonly found in bathrooms, but may be in the living area, meal areas or basement.



In schools, bathrooms, shower rooms, gyms and science labs are environments suitable for mold growth. Mold exposure can also occur in any area where water from a leak comes in contact with paper, fabric, rugs, wallpaper glue, sheetrock, wood, and other surfaces. If disturbed, mold can release spores (usually not visible) that get inhaled. You can get mold on your skin or swallow mold if you eat spoiled food like moldy bread or sauces. Most people do not develop symptoms from such exposures. Those whose immune systems are already severely weakened may experience health problems

What are health problems related to mold exposure?

- **Allergy (Sensitization):** Some people are allergic to molds and may have a stuffy or runny nose, throat dryness, wheezing, difficulty breathing, or dry cough. [1] This means someone has a special sensitization and may have developed antibodies to mold. Parents with allergic rhinitis, skin rashes (eczema), or asthma are more likely to have children who develop these allergies. [1, 2,3,7,12] There have been some reported associations between prenatal mold exposure and an increased risk of eczema in children. [8] For those with such conditions, symptoms may worsen with exposure to mold and usually decrease after the mold is removed.
- **Irritant Symptoms:** Some people may experience general irritant symptoms like itchy or teary eyes, headaches, nasal congestion fatigue, or generalized weakness, when exposed to mold or damp spaces, even if they do not have a mold allergy. [14]
- **Pneumonia:** Rarely, some people may develop a reaction in the lungs (hypersensitivity pneumonitis), due to other types of antibodies to mold. [1,10]
- **Local or Systemic Infections:** Sometimes people get minor skin infections from fungi, such as athlete's foot, which is more related to chronically moist areas in the skin crevices, and not related to water intrusion and mold in a building. A mold infection in the lungs is a very rare reaction that can occur in some people who have weakened immune systems and are more likely to experience infections.

Should I see a doctor if my child has been exposed to mold?

If you think that your children have symptoms related to mold exposure in your home or school, they should see a doctor. If you suspect the exposure is from school, you should also notify the school nurse or administrators. Current evidence indicates that allergies are most often associated with molds, but could also be related to other exposures, such as cockroaches, dust, or other agents in the indoor environment. Many symptoms associated with mold exposure are also caused by other illnesses. The amount of mold exposure (small spot in bathtub versus large area of extensive mold growth due to flooding) is also a factor in seeking medical attention. We do not endorse or recommend testing of the blood or urine for mycotoxins.

How can you reduce dampness and mold in your home or school?

The best way to reduce mold exposure in your home is to remove water and moisture sources. Fix leaks, dry damp areas, and lower indoor air humidity (e.g., use a dehumidifier in basements; open a window while taking a shower in bathrooms with no exhaust fan or vent). The best way to clean mold from small area surfaces (less than about 3 ft by 3 feet) such as shower walls is to use detergent and water. Additional information about mold and mold removal can be found at the [EPA Guide to Mold](#) and The EPA web site [Mold Cleanup in Your Home](#). For larger areas, it is best to contact a professional mold remediation. These steps will limit mold growth:



- In schools, personnel must correct leaks and other sources of moisture, and safely remove damp, water-stained, moldy ceiling tiles, and other moldy materials.
- Fix leaky plumbing and leaks in the building envelope as soon as possible.
- Watch for condensation/wet spots. Fix source(s) of moisture as soon as possible.
- Prevent moisture due to condensation by increasing the temperature or reducing humidity.
- To increase surface temperature, insulate or increase air flow.
- To reduce the moisture level in air, repair leaks, increase air flow (if outside air is cold and dry), or dehumidify (if outdoor air is warm and humid).
- Keep heating, ventilation, and air conditioning drip pans clean, flowing, and unblocked.
- Vent moisture-generating appliances, such as dryers, to the outside.
- Maintain low indoor humidity, below 65% relative humidity (RH) [1], ideally 30-50%.
- Allow good air circulation between furniture and surfaces like floor, ceiling and wall
- Perform regular building/HVAC inspections and maintenance as scheduled.
- Clean and dry wet or damp spots within 48 hours.
- Don't let foundations stay wet. Provide proper drainage. Slope ground away from the foundation.
- In schools, maintenance personnel may be able to clean up small areas of mold. Masks, gloves, and other personal protective equipment should be worn. The best way to eliminate mold is to make sure that the source of leaking water is stopped.
- Mold spores are difficult to kill and some will remain in a home or school even after a cleanup. It is very important to reduce or eliminate moisture in areas prone to mold growth. This can be done by use of exhaust fans in bathrooms and increased ventilation in school rooms. If moisture remains, mold will grow again.

Should I have my home/school tested for mold?

If you find areas that are damp, or smell musty, you do not have to do mold testing. Simply identify and correct sources of unwanted water leaks, and clean up the moldy areas. Mold testing is expensive, time-consuming, and the results are not always related to health risk. The Centers for Disease Control and Prevention does not recommend routine sampling for molds. If air sampling for molds has already occurred, you can interpret the results. It is common to find mold spores indoors, since most come in from the outside. Usually, indoor measurements are compared to outside. If the molds measured inside are much higher than those outside, it suggests that there is a location for mold growth inside, usually indicating that there is an area of water leakage that needs fixing. No relationship exists between the level of mold spores and specific health effects.

Learn more about mold

<http://www.cdc.gov/mold/default.htm>

[EPA Guide to Mold](#)

EPA Fact Sheet: Mold in Schools <https://www.epa.gov/sites/production/files/2014-08/documents/moldfactsheet.pdf>

<https://www.epa.gov/mold/interactive-mold-house-tour>

<https://www.epa.gov/schools/green-cleaning-sanitizing-and-disinfecting-toolkit-early-care-and-education>

<https://www.mass.gov/mold-moisture-and-mildew>

<https://www.mass.gov/service-details/remediation-and-prevention-of-mold-growth-and-water-damage-in-public-schools-and-buildings-to-maintain-air-quality>

<https://www.mass.gov/doc/asthma-and-your-environment-english/download>.

References

- [1] Hurraß J, Heinzow B, Aurbach U, et al. Medical diagnostics for indoor mold exposure. *Int J Hyg Environ Health*. 2017;220(2 Pt B):305-328.
- [2] Baluch N, Gallant M, Ellis AK. Exposomal research in the context of birth cohorts: What have they taught us?. *Ann Allergy Asthma Immunol*. 2020;125(6):639-645.
- [3] Tischer CG, Hohmann C, Thiering E, et al. Meta-analysis of mould and dampness exposure on asthma and allergy in eight European birth cohorts: an ENRIECO initiative. *Allergy*. 2011;66(12):1570-9.
- [4] Harville EW, Rabito FA. Housing conditions and birth outcomes: The National Child Development Study. *Environ Res*. 2018;161:153-157
- [5] Gonzalez-Casanova I, Stein AD, Barraza-Villarreal A, et al. Prenatal exposure to environmental pollutants and child development trajectories through 7 years. *Int J Hyg Environ Health*. 2018;221(4):616-22.
- [6] Lu C, Zhang W, Zheng X, Sun J, Chen L, Deng Q. Combined effects of ambient air pollution and home environmental factors on low birth weight. *Chemosphere*. 2020;240:124836.
- [7] Karvonen AM, Hyvärinen A, Roponen M, et al. Confirmed moisture damage at home, respiratory symptoms and atopy in early life: a birth-cohort study. *Pediatrics*. 2009;124(2):e329-e338.
- [8] Lee E, Choi KY, Kang MJ, et al. Prenatal mold exposure is associated with development of atopic dermatitis in infants through allergic inflammation. *J Pediatr (Rio J)*. 2020;96(1):125-131.
- [9] Hamilton RG, Eggleston PA. Environmental allergen analyses. *Methods*. 1997;13(1):53-60.
- [10] Pettigrew HD, Selmi CF, Teuber SS, Gershwin ME. Mold and human health: separating the wheat from the chaff. *Clin Rev Allergy Immunol*. 2010;38(2-3):148-155. doi:10.1007/s12016-009-8175-5
- [11] Institute of Medicine (US) Committee on Damp Indoor Spaces and Health. *Damp Indoor Spaces and Health*. Washington (DC): National Academies Press (US); 2004.
- [12] Jaakkola JJ, Hwang BF, Jaakkola MS. Home dampness and molds as determinants of allergic rhinitis in childhood: a 6-year, population-based cohort study. *Am J Epidemiol*. 2010;172(4):451-459.
- [13] Sahakian NM, Park JH, Cox-Ganser JM. Dampness and mold in the indoor environment: implications for asthma. *Immunol Allergy Clin North Am*. 2008;28(3):485-vii. doi:10.1016/j.iac.2008.03.009
- [14] Edmondson DA, Nordness ME, Zacharisen MC, Kurup VP, Fink JN. Allergy and "toxic mold syndrome". *Ann Allergy Asthma Immunol*. 2005;94(2):234-239. doi:10.1016/S1081-1206(10)61301-4
- [15] Mendell MJ, Mirer AG, Cheung K, Tong M, Douwes J. Respiratory and allergic health effects of dampness, mold, and dampness-related agents: a review of the epidemiologic evidence. *Environ Health Perspect*. 2011;119(6):748-56.
- [16] Centers for Disease Control and Prevention (CDC). Update: Pulmonary hemorrhage/hemosiderosis among infants--Cleveland, Ohio, 1993-1996 [published correction appears in *MMWR Morb Mortal Wkly Rep* 2000 Mar 17;49(10):213]. *MMWR Morb Mortal Wkly Rep*. 2000;49(9):180-184.
- [17] Föllmann W, Ali N, Blaszkewicz M, Degen GH. Biomonitoring of Mycotoxins in Urine: Pilot Study in Mill Workers. *J Toxicol Environ Health A*. 2016;79(22-23):1015-1025.
- [18] Horner WE, Barnes C, Codina R, Levetin E. Guide for interpreting reports from inspections/investigations of indoor mold. *J Allergy Clin Immunol*. 2008;121(3):592-597.e7.

Lead Authors:

Larry K. Lowry, Region 6 (7/26/2016); Revision Rose H. Goldman, Alan D. Woolf & Anne Goei, Region 1 (2022)

About PEHSU

The Pediatric Environmental Health Specialty Units (PEHSUs) are a source of medical information and guidance on prevention, diagnosis, management, and treatment of environmental conditions that influence reproductive and children's health. PEHSUs work with health care professionals, parents, schools, community groups, as well as federal, state, and local agencies to address reproductive and children's environmental health issues where families live, learn, play, and congregate. For more information on PEHSUs and available resources, please visit: <https://www.pehsu.net/>.

This material was supported by the American Academy of Pediatrics (AAP) and funded (in part) by a cooperative agreement with the Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry (CDC/ATSDR). The U.S. Environmental Protection Agency (EPA) supports the PEHSUs by providing partial funding to CDC/ATSDR through an Inter-Agency Agreement. The findings and conclusions presented have not been formally disseminated by CDC/ATSDR or EPA and should not be construed to represent any agency determination or policy. Use of trade names that may be mentioned is for identification only and does not imply endorsement by the CDC/ATSDR or EPA.