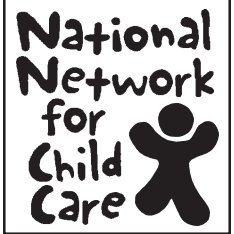




CHILD CARE CENTER CONNECTIONS

Volume 10 • Issue 4 • 2001

Sponsored by the Extension Cares Initiative



Is Mold Affecting the Air Quality in Your Childcare Facility?

by Janie L. Harris, M.Ed.

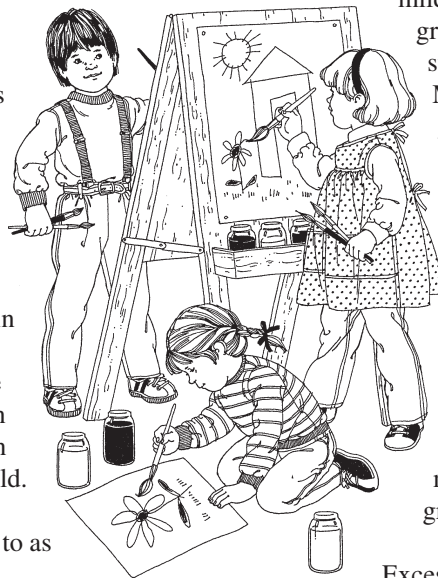
Ideally, we would all like to have clean, healthy, and safe indoor air to breathe. However, the U.S. Environmental Protection Agency reports that indoor air often is more polluted than the outdoor air we breathe. Since many systems in the young child's body are at critical stages of development, toxins in the indoor air can interfere with optimum growth and development.

There are numerous potential pollutants in indoor environments; however, the one receiving the most media coverage recently has been mold. While some molds can be a serious health threat, others, like the ones responsible for creating cheese and penicillin, are beneficial. Molds are fungi. Molds produce microscopic cells called "spores," which are very tiny and spread easily through the air. Mold spores are present everywhere—in indoor as well as outdoor air. Most people are regularly exposed to mold without being aware of it. An estimated 10 percent of the population is severely allergic to mold. A visual inspection or a musty odor may reveal the presence of mold.

The most common "problem" mold is referred to as "black mold." *Stachybotrys atra* (also called *S. chartarum*) is a black, slimy mold that grows on wet materials containing cellulose. This particular mold contains a toxic substance (endotoxin) that can cause serious illness and death in children (especially infants) and some adults. *Stachybotrys* is one of several molds that can produce potent mycotoxins (toxic agents). Whatever the type of mold, "a moldy home is not a healthy home," and the mold problem should be

corrected. Locating the mold, removing it, and implementing routine cleaning are the first steps to solving the mold problem. An additional step of removing the "cause" of the mold is critical to preventing it from reoccurring.

In order to take a proactive approach to combating mold, one must have a basic understanding of the environment that is conducive to mold growth. Mold needs a food source, moisture, mild to warm temperatures, and mold spores to grow. Even when mold has dried out and has stopped growing, the toxins can still be harmful. Mold spores act like seeds, forming new mold growth when they find the right conditions.



Many materials that are used in our homes/facilities provide suitable nutrients that encourage mold to grow. Materials such as wood, particle board, paint, wallpaper, insulation materials, drywall, carpet, and upholstery commonly support mold growth. The food source can be anything organic, such as dust, books, paper and paper products, animal dander, soap scum, etc. Wet cellulose materials are particularly conducive for the growth of mold.

Excessive moisture, reduced lighting, insufficient air circulation, and warm temperatures produce ideal conditions for mold growth. Flooding, pipe leaks, leaky roofs, moisture in the building walls, relative humidity, condensation, and poor HVAC design and operation all contribute to excessive moisture in a building. Special attention should be given to areas subject to water damage (behind and under cabinets, around plumbing fixtures, under carpet, inside wall cavities, attics and

continued on page 2

continued from page 1

other areas containing porous material). Water damage not addressed within 48 hours may result in the growth and spread of mold.

Studies indicate that mold and mildew contamination can be significantly reduced when surfaces are routinely cleaned and disinfected. Small areas of mold (less than a couple square feet) can be cleaned with a solution of one cup laundry bleach to a gallon of water. This can be applied with a sponge or spray bottle and rinsed after 15 minutes. Bleach will kill the mold but does not inactivate the toxin. Be sure to wear eye protection, rubber gloves, protective clothing, and respiratory protection (N-95 respirator). Provide plenty of ventilation, and keep others out of the work area. **To get rid of the mold for good, the underlying moisture problem must be identified and fixed!** Extensive contamination (30 or more square feet) should be assessed by an experienced health and safety professional and remediated by personnel with training and experience handling environmentally contaminated material.

The major strategies for reducing mold spores in the home/center environment include controlling moisture, thorough cleaning, preventing amplification, and restricting the entry and buildup of mold.

Control Moisture

- *Relative Humidity*: keep as low as possible within an acceptable range (30-50 percent RH).
- *Damp Areas*: clean and dry them (plumbing and flooring under sinks, around washing machines, toilets and faucets, condensate on window frames, refrigerator drain pans, refrigerator and freezer door gaskets, etc.). Wipe counter and floor spills immediately. Keep refrigerator clean and mold free.
- *Plumbing and Roof Leaks*: fix immediately, and inspect routinely.
- *Water-Damaged Areas*: dry within 24 hours. If flooding is extensive, utilize a trained, certified restoration specialist. Wet drywall and insulation must be replaced, without exception.
- *Heating/Air-Conditioning System*: service annually; check for standing moisture and contamination; clean or replace as necessary (unit, ductwork, drain pan, etc.).

Cleaning

- *Floors and Countertops*: use an effective cleaner or disinfectant-cleaner.
- *Garbage and Trash Cans*: clean and disinfect at least weekly; use disposable liners.
- *Carpet and Upholstery*: professionally “steam clean” at least twice a year. Maintain by frequent vacuuming with a high-efficiency vacuum cleaner with HEPA-filtered exhaust and double-wall dust collection bags. Central vacuum cleaner system is best as it exhausts pollutants directly outside the home.

- *Soft Materials*: launder area rugs frequently; vacuum upholstery at least twice a month and also mattresses, if not encased in plastic; vacuum blinds and curtains/drapes frequently.
- *Stoves and Refrigerators*: clean and vacuum behind regularly.

Prevent Amplification

- Apply alcohol-based spray after cleaning moisture-prone surfaces in kitchens and bathrooms, or use disinfectant-cleaner.
- Dry tub, shower, and shower curtain surfaces after using, or apply commercial products that dissipate moisture and prevent mildew growth.
- Replace mildewed shower curtains and/or liners, or launder with an effective mold and mildew-resistant product.

Restrict Pollutant Entry and Buildup

- *Entry-way Mats*: at each doorway to restrict mold-contaminated soil and debris.
- *Building Materials*: inspect prior to entering the home. Lumber, drywall, and other materials are often stored improperly and can harbor mold.
- *Carpet*: replace with hard surface flooring to reduce a significant dust/mold reservoir.
- *Upholstered Furniture*: replace with leather or vinyl-covered furniture to reduce dust/mold levels.
- *Mattresses*: use foam or rubber, or encase in plastic covering that can be cleaned and disinfected.
- *Houseplants and Pets*: eliminate them. Soil contains mold spores, and pets cause mold track-in; food and water trays can quickly become fungal reservoirs.
- *Heat/AC System Ductwork*: have inspected and sealed, especially if located in crawl space. Leaky system can pull mold spores from the crawl space. Cover the soil in the crawl space, and ensure that condensate and other water drains properly away from the home. For HVAC systems located in the attic or a closet, additionally check to make sure condensate drip pan drains into the plumbing system and that the emergency overflow drain is open and operative.

In summary, careful cleaning and disinfecting, diligent maintenance, and immediate repair are necessary in order to prevent the development and growth of mold in the indoor environment. If operators and staff of childcare facilities are aware of the harmful effects of indoor pollutants and implement simple measures to reduce them, the facility can be a healthier place for the children as well as the staff.

Ms. Janie Harris is an Extension Housing and Environment Specialist with Texas Cooperative Extension.

Creating and Maintaining Healthy Indoor Air Quality

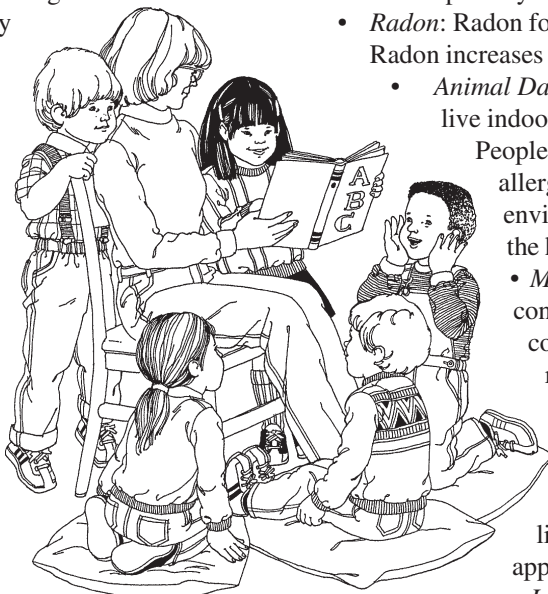
by Dr. Michael P. Vogel

Each working day across America, thousands of children are hustled off to childcare—ranging from informal, in-home settings to specifically designed and regulated centers. Some children spend a few hours at childcare while others make a day of it. For parents, childcare provides the assurance of a caring, safe, and secure environment. But is the childcare environment safe from unhealthy sources that contribute to poor indoor air quality (IAQ)?

Research has shown that children and adults are at risk from indoor air pollutants. Poor air quality can affect the attention span and retention ability of children, affect scholastic performance of children, increase absenteeism of children from school, and affect the care provider's productivity.

According to Dr. Joseph Ponessa of Rutgers University, here are some reasons why providing healthy surroundings for children is especially important:

- The young child's body is not as well equipped as the adult body to deal with harmful substances taken into the body.
- Many important systems in the body are still in an important stage of growth. Some harmful substances can interfere with this growth.
- Early childhood is a time of intense learning about many things: about the world, about how to speak, and how to behave. Some pollutants can upset this process and harm the child for a lifetime.
- Relative to their body size, children breathe more air and take in more food than adults. Children get higher "doses" of any harmful things that may be in air, food, and drink.
- Young children spend a great amount of time on the floor and put lots of things into their mouths while teething. This exposes them to any pollutants that are on the floor.



- *Second-hand Smoke*: Short-term effects include mucous membrane irritation. Long-term effects include lung cancer from inhalation of carcinogens within the smoke. There is evidence that passive cigarette smoke contributes to the development of asthma in children and causes increased risk for respiratory infections.
- *Asbestos*: Inhalation of fibers causes inflammation and tumors. Can also cause cancer of the lining of the lungs and in the abdominal cavity.
- *Carbon Monoxide (CO)*: CO exposure occurs through inhalation. Severe exposure can cause brain damage and death. The most common source of CO poisoning in the home is from incorrectly vented furnaces, heaters, and cook stoves.
- *Volatile Organic Compounds (VOCs), including Formaldehyde*: VOCs may be emitted by home furnishings as well as consumer-cleaning products. Ten to 20 percent of the population reacts to formaldehyde by developing eye irritation and respiratory effects.
- *Radon*: Radon forms in the soil from radium and uranium. Radon increases the risk of lung cancer.
 - *Animal Dander*: Dander from cats, birds, dogs, etc. that live indoors is a primary cause of allergic symptoms. People can suffer from asthma, allergic rhinitis, and allergic conjunctivitis. Dander can persist in the environment long after the pet no longer lives in the home.
 - *Mites*: Mites live in carpet, bedding, etc., and consume skin particles from humans. They are a common source of allergy (asthma and allergic rhinitis).
 - *Mold Spores*: Molds can cause an allergic reaction. Hypersensitivity pneumonitis is a type of allergic reaction that consists of fever, chills, dry cough, and a flu-like feeling. All or some of these symptoms can appear after repeated mold spore inhalation.
 - *Lead Dust*: From lead paint in pre-1978 buildings. In children, small amounts affect the nervous system. Larger doses can cause kidney and reproductive disorders, convulsions, and death.
- *Cockroaches and Rodents*: Droppings and body parts of pests can be asthma triggers.

What Factors Affect Indoor Air Quality in Childcare Facilities?

- *Relative Humidity*: Should remain between 35 and 55 percent. Lower humidity leads to dry and irritated skin. High humidity leads to growth of molds and bacteria, which cause other illnesses.
- *Ventilation*: Poor ventilation allows carbon dioxide to accumulate as well as other gases. This can be a problem in airtight buildings.

Indoor Air Quality and Asthma

Asthma associated with poor indoor air quality is especially worrisome because it is more prevalent among low income and minority groups. The national health and economic consequences of asthma are substantial. Control of asthma can be accomplished through identification and control of these primary "triggers": secondhand smoke, dust mites, pets, molds, and pests.

continued on page 4

continued from page 3

Tips for Controlling IAQ in Childcare Facilities

- **Control Secondhand Smoke:** Never allow smoking around children.
- **Control Dust Mites:** Wash bedding in hot water (at least 130 degrees Fahrenheit) frequently; since stuffed toys are a breeding ground for dust mites, choose toys that can be washed and thoroughly dried; use bedding encasements that do not allow the mites to pass through; and do not allow children to sleep on carpeted floors.
- **Control Pet Problems:** Do not allow pets in the childcare facility—keep pets outdoors. If you do remove an animal, do a thorough cleaning of floors, walls, and especially carpets and upholstered furniture.
- **Control Molds:** There is no practical way to eliminate all mold and mold spores in the indoor environment; however, you can control indoor mold growth by controlling moisture (repair plumbing leaks; remove soaked and molded carpeting, and maintain indoor humidity of between 35–55 percent relative humidity).
- **Control Pests:** Lowering moisture also helps reduce dust mites and cockroaches; do not leave food or garbage out; store food in airtight containers; clean all food crumbs or spilled liquids right away; wash dishes when you are done using them, and do not leave dirty dishes in the sink, especially overnight; and fix plumbing leaks and other moisture problems.
- **Housekeeping/Housecleaning:** Avoid clutter, dust catchers; reduce or eliminate carpeting or clean/shampoo carpets regularly without chemicals; and use a high-performance “HEPA” vacuum cleaner.

Indoor Air Quality Checklist for Childcare Providers

- If the building was built before 1978, has it been tested for lead?
- Is there evidence of peeling interior and/or exterior paint? (It could contain lead paint.)
- Do children occupy a basement area where radon levels could be high? Has building been tested for radon?
- Is there evidence of water around foundation and basement? (Mold could be present.)
- Is there evidence of mold growth in restrooms?
- Are chemical containers present in restrooms, utility areas, and food-service areas?
- Are solvent-based art supplies used?
- Can you smell fuel or exhaust? (It could be a problem with the fossil fuel heating system or water heater.)
- Is combustion equipment checked and tuned-up annually?
- If combustion equipment is used, are carbon monoxide detectors present in the childcare facility?
- If an older building, is there evidence of ductwork, pipes, and siding that may contain asbestos?
- Are there strong chemical odors following maintenance and renovation, such as carpeting and painting?
- Is there evidence of insects and rodents?
- Are there piles of trash outside of garbage containers?
- Are there indoor pets, such as rodents, birds, cats, dogs, etc.?
- Does the childcare staff smoke—even outdoors around children?
- Are carpets poorly maintained and cleaned (especially if children nap on the floor)?
- If beds, daybeds, and sofas are used for sleeping, is bedding changed daily?
- Is food left out and unattended?
- Are toys regularly disinfected?
- Are stuffed toys used?
- Does the childcare facility feel stuffy and smell stale?
- Do children complain or experience itchy eyes or sore throat while in your care?
- Do children feel less stuffy outside the childcare facility?
- Do you allow sick children to attend?
- Do you and other childcare staff practice handwashing and require children to comply as well?
- Is the childcare facility located adjacent to environmentally hazardous properties?
- What is the attitude of staff toward indoor air quality (good role models or defensive)?

Child Care Center Connections Editorial Staff Texas Cooperative Extension

Linda Ladd, Ph.D. and Stephen Green, Ph.D.
Managing Editors
Janie Harris, M.Ed.
Guest Editor
Susan Lee, B.A.
Design Editor
Carleen Cook, Ed.M.
Managing Supervisor
Laura Strawn, M.A.
Associate Editor

Learn more about indoor air quality and childcare facilities by checking out the USDA–CSREES Program, *Healthy Indoor Air for America’s Homes* website at www.healthyindoorair.org.

Dr. Michael P. Vogel is Professor and Housing Specialist for Montana State University Extension Service. He is also the director of Healthy Indoor Air for America’s Home.