

Bad air breeds ailments in homes, schools, offices

By [ANDY MILLER](#)
The Atlanta Journal-Constitution

Nine workers in an Atlanta office went to their employer three years ago complaining about respiratory and sinus problems, wondering if their workplace was making them sick.

An inspection found mold on a wall and carpet and an air-handling unit that wasn't bringing in fresh air. The property owner made repairs. Complaints declined.

The employer? The federal Agency for Toxic Substances and Disease Registry, based in Atlanta. The agency's mission, in part, is "providing trusted health information to prevent harmful exposures and disease related to toxic substances."

The location may be a surprise, but the story isn't.

Polluted indoor air causes illness daily in offices, schools and homes across the country.

Evidence has been growing for more than 20 years that the air we breathe indoors typically is more polluted than outdoor air, even in an area such as metro Atlanta with high levels of outdoor air pollution. And most people spend 90 percent of their time indoors.

Indoor air pollution is "*the* environmental problem -- this is the one we should be worrying about," said Wayne Ott, a Stanford University engineering professor and former Environmental Protection Agency scientist.

Everyone is exposed to air pollution indoors. Contaminants include mold, chemicals such as pesticides, and particulate matter. Poor ventilation, a common problem, can push contamination to dangerous levels.

Breathing bad indoor air can cause respiratory infections; asthma and allergy attacks; skin, eye, nose and throat irritations; damage to the central nervous system; and cancer.

Although outdoor air quality has improved as it received funding and publicity, indoor air quality -- a more complicated problem -- has been neglected and under funded.

"With outdoor pollution, you can see the sources," said Dr. Philip Landrigan of Mount Sinai School of Medicine in New York, an expert on environment and health. "By contrast, you are looking at millions of individual sources [affecting indoor air]. It's a regulatory nightmare."

No federal agency has broad regulatory authority to address indoor air, as the EPA does with outdoor air. Medical schools barely touch on environmental health, so many doctors know little about links between illness and indoor pollution.



CURTIS COMPTON / AJC

Martha Eggleston, 35, uses a prescription inhalant to relieve asthma. Once a daily distance jogger, Eggleston can no longer run, and she has moved back in with her parents, Aggie and Doug Heath, in Rockmart.

ABOUT THIS REPORT

Awarded a Kaiser Family Foundation media fellowship to study indoor air quality and its effects on health, Atlanta Journal-Constitution staff writer Andy Miller spent a year interviewing hundreds of people in Georgia and across the country and reviewing thousands of documents to learn about the scope of the problem, its causes and solutions.

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In the vacuum, employers, landlords, school systems and public health agencies must field complaints from people who suspect they are ill from the air inside.

Costs of cleaning air grow

The cost of indoor pollution is mounting.

Insurers paid \$2.5 billion in mold-related claims under homeowner policies in 2002, up from \$1.3 billion the year before. Rising mold claims contributed to higher insurance rates. Medical costs related to indoor air quality dwarf the costs of sickness tied to outdoor air, say indoor air experts.

Consumers are spending more than ever on home remedies: In the past four years, sales of portable air cleaners increased 60 percent, and sales of whole-house units rose 38 percent, says the National Air Filtration Association, a trade group.

Research on the indoor environment is still developing. Even medical experts find it is often difficult to prove a link between an indoor contaminant and illness.

Nevertheless, there is growing public awareness.

Mike Crowe and his Georgia Technology Authority co-workers have endured a variety of pollutants for years in their windowless basement office near the state Capitol.

Crowe has been treated for sinus and respiratory problems that began after he started work there as a programmer in the late 1980s. He blames the illnesses on the air he breathes at work.

About 200 agency employees work in the converted parking deck Crowe calls "a hellhole" and "a dungeon."

Complaints from people who work there have accumulated over the years. State records show that as early as 1990, about 20 percent of the employees complained of vehicle exhaust odors and soot and symptoms including eye and sinus irritation, headaches and fatigue. An inspection found ventilation problems, high levels of volatile gases from solvents and cleaning supplies, and carbon monoxide from vehicle exhaust.

Three years later, extensive mold was found in the ventilation system. In 1994, a memo by a state official described complaints about exhaust fumes and chemical odors. The memo notes that an employee had resigned, requesting unemployment benefits "related to health hazards."

Crowe said workers' complaints continued during the 1990s but were largely ignored.

This year, when a technology authority employee switched workstations, movers uncovered mold. Then there was another inspection, which found water intrusion and leaks in the basement, making it prone to mold and bacteria.

"There are a disproportionate number of staff in this facility with breathing or sinus problems," reported supervisor Derrick Wheeler, who sought the inspection.

The agency and the Georgia Building Authority, which owns the building, know they have a problem, but remedial efforts haven't solved it. The building authority removed the moldy walls and is monitoring leaks and humidity problems.

The technology authority wants to move the workers, in part because of the poor environment. But budget constraints have put money for a new data center on hold.

"Everybody works hard for the citizens of Georgia, but we just can't breathe," said Susan Mewherter, a technology authority employee who has endured frequent coughing spells during the two years she has worked in the basement.

Scattershot approach

The term "sick building syndrome" emerged in the 1970s, when the national energy crisis sparked a rush to trim power use. New buildings were constructed tightly, with less fresh air coming in and windows that didn't open. Cheaper synthetic building materials and furniture were introduced, increasing the chemical stew trapped inside.

In a series of studies in the 1980s, EPA researchers discovered that test subjects inhaled carbon monoxide, pesticide vapors and chemical gases such as cancer-causing benzene at levels that were two to five times stronger indoors than outdoors, regardless of where they lived.

Those startling findings didn't inspire action. "Indoor air became the rock that no one wanted to look under," said Lance Wallace, who headed the EPA research team.

A serious effort to regulate the indoor environment came in the mid-1990s, when the Occupational Safety and Health Administration proposed rules covering employers in about 6 million nonindustrial workplaces.

The regulations targeted tobacco smoke and would have required employers to ban smoking or provide separately ventilated smoking areas. But they also would have required employers to develop plans to protect indoor air quality, inspect and maintain heating and air conditioning systems, and keep records of employee complaints.

Smoking dominated the debate. OSHA received more than 100,000 pieces of mail.

"The tobacco industry orchestrated quite an assault on OSHA, with 100 times as much written comment on rules as OSHA had ever received on any rule-making," said James Repace, a former EPA indoor air specialist. After protracted congressional hearings, the proposal was dropped.

So indoor air oversight is spread among a mishmash of agencies, each with a piece of the puzzle, but none with enough funding or clout.

EPA, which spends 10 times as much on clean air outdoors than indoors, has no regulatory authority over indoor air.

Due to tight budgets, the National Institute for Occupational Safety and Health investigates fewer worker complaints about indoor air pollution than it did 10 years ago. OSHA standards are for industrial workers and cover specific substances, rather than indoor air in general.

About half of the states have created some kind of indoor air program, but others, including Georgia, offer virtually nothing.

Because no one keeps comprehensive records, it's impossible to tell how many buildings are "sick" -- or whether the number is rising.

There are guesses: Using a 1999 U.S. Department of Education survey of 900 schools and other data, the EPA estimates that 30 percent to 40 percent of the nation's schools have indoor air problems.

A study last year in the American Journal of Public Health estimated that each week, 35 million to 60 million U.S. workers have symptoms of illness related to their workplace. That's at least 40 percent of the 89 million nonindustrial indoor workers.

The National Institute for Occupational Safety and Health has the only national public record of indoor air problems. But the agency's complaint list represents only a fraction of indoor problems, because many aren't reported or even recognized as problems.

List of hazards long

Martha Eggleston was running six to seven miles a day when she moved into a Buckhead condominium in 2000.

Almost immediately she began having respiratory problems.

She noticed dust buildup, dampness and leaks in the condo. Ventilation was poor. But when her mother suggested her condo might be causing her ailments, Eggleston laughed. Her skepticism faded when mold was found around the air conditioning vents and she tested positive for allergies to substances including mold.

Eggleston, 35, has developed asthma and is taking six medications daily. "Now I feel like I'm 60. I'm emotionally a wreck." She has moved in with her parents. She doesn't run anymore.

After tobacco smoke, mold is the indoor contaminant that has generated the most publicity -- and fear. It has emptied office buildings and schools and cost billions of dollars in home repairs.

But the list of indoor hazards is long. It includes biologicals such as bacteria and dust mites, metals such as lead, carbon monoxide from unvented appliances and wood stoves, and volatile chemicals from everyday sources such as dry-cleaned clothing, paint, pesticides and air fresheners.

Contamination also comes from surprising sources. Diesel fumes and carbon monoxide may be sucked into office buildings from loading docks or parking areas. And office machines, furniture and renovations - even carpet replacement -- can produce harmful gases.

Three years ago, about 25 AirTran employees sought medical treatment after being overcome by odor from a glue used to install carpet at a reservation center near Hartsfield International Airport. Workers complained of headaches, upper respiratory symptoms and eye irritation.

Dr. Ramana Dhara, who treated the employees at a nearby clinic, said gases emitted from workers' clothing even caused symptoms in the clinic staff.

The workers' ailments gradually disappeared, said AirTran spokesman Tad Hutcheson. The center recently replaced the carpet again, but, Hutcheson said, "We closed the facility this time, and used a different type of glue."

The AirTran exposure shows a clear cause and effect. But in many cases, the connection between sickness and indoor contaminants is hard to nail down.

That's because indoor pollution affects individuals differently, and doesn't bother some people at all. A building can contain multiple contaminants; symptoms such as headaches can have many sources and may develop slowly; and biological tests to detect contaminants are limited. A few incidents have even been blamed on psychosomatic illness.

Regardless of the medical challenges, research shows there's a payoff for healthy air. A study by Donald Milton of the Harvard School of Public Health found that Polaroid Corp. in 1994 had 35 percent higher sick leave rates in buildings that had lower ventilation.

But as with preventive medicine, it's often hard to convince those paying the bills that spending now can save money later.

"A lot of companies are afraid of finding a problem and having to correct it," said Michael Walters, who manages occupational health at Polaroid. "If you pay attention to indoor air quality, it's something you can cost-effectively manage."

Improved indoor environments could save employers at least \$7 billion annually from reduced health care costs and higher productivity, said William Fisk of the Department of Energy's Lawrence Berkeley National Laboratory.

Children most susceptible

Among the most vulnerable to indoor pollution are those who can do the least about it: kids.

Children are more susceptible to pollutants because they breathe in more air per pound of body weight than adults, and their lungs are developing.

"The highest risk is for crawling infants," said John Roberts, a research engineer in Seattle who has studied toxins in house dust. "They have one-sixth as much body weight as adults and eat two times the dust."

An urban baby, crawling around in his home every day, typically swallows as much of the chemical compound benzo(a)pyrene, a suspected carcinogen, as he would get by smoking three cigarettes, said Roberts. Benzo(a)pyrene can come from wood-burning, smoking and tracked-in dirt.

A Centers for Disease Control and Prevention study released this year found that children's blood and urine showed levels of a now restricted pesticide, chlorpyrifos, and a nicotine product that were twice as high as those in adults. The CDC research also found children had high levels of phthalates, chemicals found in plastic and consumer products and linked to reproductive problems.

Exposure to indoor contaminants has exacerbated the asthma epidemic among children. Allergists see more indoor-related allergy and asthma problems than 20 years ago, partly because people are inside more, said Dr. Kathleen Sheerin of the Atlanta Allergy and Asthma Clinic.

The incidence of asthma in children has doubled in two decades to nearly one in 10. The cause is unknown, but indoor exposure is being studied for its role. And many indoor pollutants trigger asthma attacks.

The elderly and people with compromised immune systems, or heart and lung disease, are also more vulnerable to indoor air pollution and often spend much of their time indoors. "A house is guilty till proven innocent," said Dr. Robyn Levy, an Atlanta allergy and asthma specialist who has seen dozens of patients with mold problems.

Levy may perceive mold as the likely cause of her patients' problems, but many doctors wouldn't.

The medical profession and medical educators have been slow to recognize indoor environmental illness, say doctors who practice occupational and environmental medicine.

"Most cases of occupational asthma go unrecognized," said Harvard's Milton. "It's an uphill battle to get people who don't learn about it in medical school to ask, 'What do you do for a job? Do your symptoms change on weekends and vacations?'"

Doctors who see upper respiratory symptoms typical of indoor air problems often diagnose viral infections, said Dhara, the physician who treated the AirTran workers and now practices at Snellville's Emory Eastside Medical Center. "Most physicians are trained on the basis of infectious disease, not environmental problems."

Indoor problems can often be traced to a simple condition: a lack of fresh air. Inadequate ventilation can make indoor conditions much more dangerous.

Standards for fresh air, established in building codes across the United States, are rarely enforced. Codes require that buildings be designed to bring in 15 or 20 cubic feet of outside air per minute per occupant, but building owners "don't have to operate it that way," said Mark Mendell of the Lawrence Berkeley lab. The guidelines, he said, "are not taken seriously in this country." Some buildings get less than half the recommended fresh air.

The National Institute for Occupational Safety and Health evaluated 104 buildings in 1992-93 and found ventilation problems in 93 of them. A European study of 800 students found that when carbon dioxide levels are high, indicating poor ventilation, student scores on concentration tests are low.

Two years ago, mysterious symptoms appeared in about 10 percent of teachers and students at a Fort Stewart elementary school. The ailments included respiratory illnesses, skin and eye irritation, headache, nausea and dizziness.

Parents were shocked and angry, said Kathy Jones, PTO president at Brittin Elementary. "We didn't know what was going on," she said. Jones' son had a rash on his face and arms, and a daughter had red, itchy eyes.

Tests found that an air conditioning system in one wing was bringing in no fresh air, which sent the carbon dioxide level to nearly three times recommended limits in one classroom. The level of formaldehyde was found to exceed a federal standard. Formaldehyde and other gases can build up when there's no outside fresh air. Formaldehyde can irritate the upper respiratory tract and exposed skin.

The school system closed the wing. Students were moved into trailers, which, in turn, were shut down when mold was found. Fourth, fifth and sixth grades finished the year in a nearby youth center. The school got a \$4 million renovation.

A case in Cobb

"The classroom environment is a dirty secret."

That stark assessment comes from John Lyons, a former U.S. Department of Education facilities official who's now a consultant. "There's a general assumption that schools are maintained at a reasonable and safe level, and that's not really the case," he said.

America's school systems, facing the budget squeeze, often save money by cutting down on maintenance. But less cleaning can create dust buildup, mold outbreaks, ventilation problems from dirty air filters -- and health complaints.

Nationally, spending on maintenance and operations as a percentage of school districts' expenditures has decreased for the sixth straight year, according to a survey by American School and University magazine. The figure is the lowest in three decades.

The maintenance issue has riled some parents and teachers in Cobb County.



BITA HONARVAR / AJC

Kathy Jones says problems at Brittin Elementary, where she is PTO president, were attributed to a poorly performing air conditioner system that wasn't bringing in fresh air and a level of formaldehyde that exceeded a federal standard.

Three years ago, Maggie Bailey, whose two children attended Cobb's East Side Elementary, became so concerned about her children's health that she brought her own mold inspector into the school building. Bailey's son and daughter were having respiratory problems, headaches and sinus and digestive symptoms.

Bailey, a volunteer at the school near Marietta, walked George Graham of the Tennessee Mold Lab into the school to take samples. Graham found mold in the ducts and carpeting in each child's classroom.

When Bailey made the findings public, the school system fired janitors who had failed to properly clean the building over the summer. The school was scrubbed and a testing firm hired. Evaluations of three classrooms found no visible mold, though tests showed signs of past or current mold growth.

"The problem was dust, inadequate vacuuming, inappropriate cleaning of carpets," said Roger Kubler, a Cobb assistant superintendent. "No mold was identified in carpet or ductwork." Bailey took her children out of East Side.

"We're low on janitors," said parent volunteer JoAnne Lengyel. East Side's principal has cleaned bathrooms, Lengyel said. The Cobb school system says this was a single incident that occurred because a custodian was ill.

Cobb schools spent \$440 per child on maintenance and operations in 2001-2002, below the state average of \$523 for schools. This past school year, the figure was \$453, vs. a state average of \$556.

To save money, the system cut 29 custodial jobs out of 495 two years ago, and teachers complained about air quality.

Liz Steiner, who teaches computer classes at Wheeler High, said dust piles up in her classroom, vacuuming goes undone and thermostats often don't work. "I am stuffed up a lot and have headaches," she said. "Kids are always coughing and sneezing in my classroom."

Kubler said school officials are concerned when complaints arise but that some health problems are wrongly blamed on classroom conditions. Teachers who complain "may be ill-informed," he said.

Across metro Atlanta, school district records show air quality problems and complaints in many classrooms, including portable ones. Collier Heights Elementary in Atlanta suffered such constant water intrusion and mold infestation in basement classrooms that the school was closed permanently in June.

There wasn't funding to fix the defects, said Jean Dodd, an Atlanta school board member who represents the Collier district.

Despite widespread school problems, a bill requiring indoor air inspections of Georgia's schools died in the 2002 General Assembly.

"DeKalb County schools and other school systems pitched a fit about what it would cost them -- replacing air systems, ductwork," said Rep. Mack Crawford (R-Concord), the bill's sponsor, adding that he may reintroduce the proposal in next year's session.

Government offices worst

Government buildings generally have more indoor air problems than private ones because "there is never enough money to do repairs," said former EPA indoor air specialist Repace. "So many sick buildings are government buildings -- colleges, courthouses, state and federal buildings."

Many state employees work in deteriorating 50-year-old facilities.

The Georgia Building Authority, which runs 51 state buildings and parking decks, has fielded health complaints about several of them. Workers are more aware of indoor air quality and the number of complaints is increasing, said Bob Satterfield, the authority's director of maintenance.

The Agriculture Department building has had three major mold outbreaks in the past year, and employees have complained of headaches from paint fumes and the shutoff of an outdoor air fan. "The building is so old that to correct the problems, it would take a lot of money," said Shirley King, who coordinates repairs for the department. Partial repairs will cost \$325,000.

Concern about air quality among Department of Audits workers helped drive a \$150,000 renovation of a parking deck.

bathroom and an air handler. Leaks in the building facade will require \$250,000 in repairs.

In five years, the state office building at 2 Peachtree St. has drawn at least seven health-related complaints from occupants, though the state has spent \$112 million renovating it in the last decade.

The condition of the building, a gift to the state, "was deplorable," said Satterfield. The worst floors were those housing the Department of Juvenile Justice, he said. Several employees there complained about asthma and other respiratory illnesses they linked to their workplace. "There were mushrooms growing in the carpet some years ago," said Juvenile Justice spokeswoman Jaci Vickers. The department moved to Decatur this year, citing air quality as one reason.

Mike Crowe hopes for the same outcome for the employees in the Georgia Technology Authority building. "It's not clean air there," he said.

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