

Indoor Air Quality Counts with Students

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Dozens of staff and students at Artondale Elementary School were experiencing itchy eyes, headaches, rashes, breathing problems, sinus troubles, numbness, and other health problems. Although the illnesses were not life-threatening, they worried parents, teachers, and school administrators. Suspecting poor indoor air quality, school officials finally closed the school from February 12 - April 7, 2002, and sent the 470 students and their teachers to makeshift classrooms in four different schools around the district.

Indoor air quality in schools

Children spend about eight hours a day in school, where indoor air pollutants are often two to five times higher than outdoor levels of the same pollutants. Schools built with no openable windows during the energy crises of the 1970s and 1980s may suffer from a lack of fresh air. Additionally many of the roofs on these aging buildings are starting to leak, allowing moisture to enter and molds to grow.

In 1995, the U.S. General Accounting Office reported from a survey of more than 10,000 schools nationwide that more than 27 percent had unsatisfactory ventilation and almost 22 percent had unsatisfactory indoor air quality (IAQ). The National Education Association reported in 2000 that one-third of the nation's schools needed major repairs or replacement of leaky roofs and had poor ventilation systems and filthy carpets.

Children are particularly vulnerable to the health effects of indoor pollutants because their rate of breathing and metabolism are greater (relative to their size) than adults. Exposure to poor IAQ can lead to decreases in health status, learning, and general well-being of the children and school staff working in these buildings. Poor IAQ is related to illnesses such as respiratory diseases or irritant reactions requiring absence from school and can also cause acute health symptoms such as asthma and asthma-related illness, allergenic reactions, and rashes. The incidence of asthma in young children has risen by nearly 60 percent in the last 15 years and has been found to be responsible for 14 million missed school days per year. Furthermore, recent data from large population studies suggest that poor IAQ can reduce a person's ability to

perform specific mental tasks requiring concentration, calculation, or memory.

Washington State has 296 school districts with approximately 2,000 school buildings and more than a million students. School districts are often faced with severe budget restrictions, and general cleaning and maintenance often suffer as a result.

Artondale School

Artondale Elementary School's experience is an example of the problems IAQ can cause schools. Located near Gig Harbor in western Washington, the school is a single-story structure built in the 1988. Its students first began experiencing unexplained symptoms in 1997. School officials tested for molds and ventilation problems but found no source of the illnesses. In fall 2000 more unexplained illnesses occurred. This time testing and investigation turned up some problems, but found no single source of the illnesses. In fall 2001, health symptoms again emerged, this time including itchy eyes, sinus trouble, headaches, and body aches. On February 6, 2002, several dozen students developed rashes.

The school district administrators closed the school and turned to state and local health officials for assistance. The local health jurisdiction conducted a health survey of all interested students and staff. Symptoms reported on February 6 included unusual numbers of rashes. Public health professionals from both state and local health departments conducted a building investigation and found excessive dust, some pockets of mold, and problems with the ventilation system, including low humidity.

While the school was closed, extensive cleaning, building repairs, and re-evaluation of the ventilation system were done. Environmental testing consultants brought in by the District found high levels of non-fungal particulates, ventilation problems, and a low relative humidity in the building. The recommended repairs were completed, and the school reopened on April 8, 2002. Students and staff were monitored for health symptoms. Some health complaints continued, and the school was again closed on May 23, 2002. The school district hired a consulting firm to determine when to reopen the school, and during the summer did

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additional testing and cleaning of dusty areas, made further repairs of the ventilation system, installed huge air circulation fans, and replaced some of the carpeting with floor tiles.

Challenges to assessing IAQ

Addressing indoor air quality issues in schools can be extremely complicated, given the multiple parties involved—students, school staff, parents, school administrators, the community, and often, the media. An IAQ situation can easily become controversial and heated.

Health symptoms such as colds, headaches, rashes, stuffy sinuses, and even nosebleeds may be common among schoolchildren. Determining that there is an *increase* in symptoms is difficult because of limited background rates of occurrence of these symptoms for comparison. Determining *causality* is nearly impossible in poor IAQ situations; individuals experience symptoms differently and many symptoms can be related to multiple diseases and exposures.

The science of evaluating the quality of indoor air is still emerging, which creates another challenge for resolving IAQ problems. The science of monitoring and testing procedures is still limited for many of the indoor air pollutants. It may be difficult to interpret the test results even when the presence of a contaminant such as mold is found. In addition, several factors may contribute to poor IAQ, and a single source may not be found.

Another challenge in addressing IAQ in schools is the lack of standards and detailed regulations to provide clear requirements for what is acceptable in IAQ in school classrooms. No standards have been established for many of the indoor air pollutants for children in schools. Although the State Board of Education addresses curriculum issues, it does not have clear statutory authority to declare what a safe school environment is.

The State Board of Health (SBOH) is authorized to adopt rules controlling public health related to environmental conditions in all schools, but SBOH regulations governing environmental hazards in schools date back to 1955, with the most recent rule adopted in 1989. These rules contain only minimal standards for dealing with indoor air quality. The chapter on ventilation says only that rooms used by students must be kept reasonably free of all objectionable odor, excessive heat, and condensation. It goes on to say that all sources of air contaminants of public health importance must be controlled by the use of a mechanical exhaust ventilation system approved by the health officer. More specific language is found in

several guidance documents, but no agreed upon standards exist for air contaminants in schools.

Lessons learned

Collaborate. Experience in addressing IAQ problems in schools over the past decade at WDOH has shown the need for collaboration between health agencies and school officials. It also emphasizes the need for coordination with agencies and groups such as the Washington State Office of Superintendent of Public Instruction (OSPI), Washington State Boards of Health and Education, Educational Service Districts, Washington State Department of Labor and Industries, EPA, parent groups, school nurses, teachers union, academia, indoor air consultants, and clean air advocacy groups. In Washington State several committees with representatives from these groups have been meeting during the past year with WDOH and SBOH to look at short- and long-term solutions to school indoor air quality.

Communicate. One school superintendent who shared his experiences with WDOH and OSPI staff stated that the most important lesson he had learned in addressing his school's IAQ problem was that he needed to communicate more effectively with all people involved. Effective collaborations rely on maintaining open communication among agencies and developing common messages so that all agencies speak clearly and with a shared view of the event that is unfolding. Particularly important is that all information from the various evaluations and sampling efforts must be openly shared and clearly communicated to all school staff, students, parents, and the community at large.

Be proactive. Schools and health agencies need to approach indoor air issues actively. It is essential that health department staff and school staff are trained to identify potential problems at the plan review stage for new buildings, during construction, and routinely once the building is completed. Adequate funding is

How Public Health Addresses Indoor Air Quality Issues in Schools

When a local health district or the WDOH is asked to respond to an IAQ problem, environmental health staff might start with a building walk-through with school maintenance and administrative staff. The school walk-through generally includes the evaluation of: 1. Outside factors that can affect the building exterior, including water drainage and intrusion issues, structural issues such as damaged building areas, wood rot, and animal infestation; 2. Heating ventilation and air conditioning systems, including outdoor air intakes, filters, heat exchangers, supply air plenums, diffusers, and ductwork; 3. The occupied space, such as classrooms, where basic evaluations of carbon dioxide and humidity are conducted, as well as evaluations for dust loading, water damage, condensation, and presence of classroom plants and animals.

School nurses or administration staff usually track health concerns, onset and type of symptoms, and school absences. Environmental health staff uses this information to evaluate if health concerns seem to be related to facility and equipment problems. Often no clear relationship or pattern can be seen, but sometimes a short survey can determine the onset and location of most symptoms and the variability of health concerns among school staff and students.

Environmental health staff then evaluates the school facility information, looking for the onset, type, and location of symptoms to determine if there is any spatial or time relationship between building problems and health symptoms. A consultant may be hired to develop a sampling plan for contaminants, and samples are taken of the dust, ventilation surfaces, damp areas, and air to test for dust levels, spores, contaminants, bacterial agents, and molds.

needed for cleaning and maintenance to prevent IAQ problems. Prevention efforts are well worth the cost, given the high costs of health effects on students and of major remediation efforts.

Act quickly. Once IAQ health concerns are raised in a school, early action is needed. If the parents of sick children perceive that no action is being taken, trust may break down and will be difficult to reestablish. Public health agencies can help school officials gather health complaint information, conduct building inspections to look for potential sources, and recommend remediation measures. Health officials can also communicate public health information on IAQ issues to school officials, teachers, and concerned parents. A variety of communication outlets can be used, such as Web sites, indoor air committees, local media, and school assemblies. Whatever outlets are used, the key is to keep the information current and readily available.

Next steps

WDOH is working with national, state, and local partners to address indoor air quality in schools through several major efforts. OSPI and WDOH have begun a six-month focus on environmental health and safety in schools. The initiative has several anticipated outcomes, including development of clear, consistent communication protocols between the state and local agencies, data coordination, a crisis response team of appropriate experts available to districts, and system resource requirements for training, response, and remediation. In addition, the workgroup will make recommendations for rule or policy revisions needed to support a school environmental health system that takes into account environmental effects on student achievement. The results of this initiative are expected by the end of June 2003.

The State Board of Health has undertaken a review of its school health and safety rule (WAC 246-366), paying particular attention to indoor air quality. That work is expected to be completed in June, as well, with a report to the SBOH in July 2003.

In addition, WDOH is working on improving indoor air in schools through several grant opportunities:

- An EPA grant to pilot the Tools for Schools program in five counties in Washington. The money is being spent to provide training and equipment to the five local health jurisdictions. The LHJs are working with volunteer schools in their counties to conduct indoor air inspections aimed at preventing the types of problems experienced by Artondale.

- A three-year grant, "Addressing Asthma from a Public Health Perspective," funded by a CDC cooperative agreement, for planning an organized multidisciplinary approach to asthma in WDOH with special emphasis on collaboration with other state agencies, local health agencies, and nongovernmental organizations. Goals of the project are to: 1. Strengthen the public health infrastructure for asthma; 2. Formalize partnerships to develop a comprehensive state asthma plan; 3. Enhance the existing asthma surveillance data system; and 4. Begin statewide intervention activities for asthma prevention and control under the umbrella of the Washington Asthma Initiative.

- A CDC Environmental Public Health Tracking Network grant to develop pilot project activities that enhance public health disease surveillance and establish linkages with environmental health hazards. One activity focuses on public schools and development of a student health and environmental quality data collection system. Through the systematic collection of data, underlying student health complaint rates will be evaluated for changes in environmental quality, which includes indoor air quality, so that associations can be more clearly understood and adverse health conditions prevented.

The situation at Artondale School cost the school district \$810,000 in remediation efforts by the time it reopened in September 2002. These costs were a major burden on the 9,500-student school district.

Fortunately no significant problems have been reported at the school since it reopened. The school provided additional training for custodial and maintenance staff. Teachers are careful to minimize the amount of classroom dust and keep papers and other materials in sealed containers. Peninsula School district has hired an environmental resource specialist to evaluate potential indoor air problems and has conducted an environmental baseline assessment of all its schools.

An IAQ problem can seem insurmountable at the time a community, health district, and school find themselves engaged in one, but addressing these problems in a timely way by initiating and coordinating responses and communicating all information clearly can do much to resolve the issue and keep a school community intact. 🐾

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Resources

Health and Safety Guide for K-12 Schools in Washington, jointly published by the Washington State Department of Health and the Office of Superintendent of Public Instruction. www.doh.wa.gov/ehp/ts/iaq.htm

Tools for Schools Action Kit (EPA), www.epa.gov/iaq/schools/

School Indoor Air Quality Best Management Practices Manual (DOH and OSPI)
www.doh.wa.gov/ehp/ts/IAQ/SchoolAirBMP.pdf

Find more resource at www.nwcpnp.org/nph