

Report of the Indoor Environment Workgroup on Indoor Environment

Attachment to November 17, 2011 CHPAC Letter to the EPA Administrator

The Children's Health Protection Advisory Committee (CHPAC) urges renewed attention to address indoor environmental exposures from the prenatal period throughout childhood in living and learning environments. There are many exposures in these environments which are potentially harmful to children including allergens, endotoxins, biological substances, pesticides, combustibles and volatile organic compounds. There are gaps in our knowledge regarding the exposure limits for children as well as the health impacts of these exposures. Additionally substandard housing, inadequate school buildings, overcrowding, and deteriorating conditions in indoor environments impact the lives of disadvantaged children daily in living (home, shelters) and learning (schools, childcare, Head Start) environments.

Indoor biologic and chemical agents figure prominently among environmental factors implicated in asthma morbidity, including allergens from cockroaches, rodents, dust mites, and fungi, in addition to respiratory irritants such as fungal cell wall components, formaldehyde, oxides of nitrogen, tobacco smoke and volatile organic compounds. Children are often exposed to these pollutants in indoor environments. Previously CHPAC submitted a report on Asthma Disparities and the Indoor Environment (http://yosemite.epa.gov/ochp/ochpweb.nsf/content/CHPAC_Comments.htm) which addresses many of our recommendations. The following information provides further evidence for CHPAC's recommendations.

The Learning Environment

Schools

According to the EPA, nearly one half of America's 115,000 schools have problems linked to poor Indoor Air Quality (IAQ). In the United States, about 55 million people- almost 20 percent of the population - spend their days in elementary and secondary schools. By the time a student graduates from high school, he or she has spent 14,000 hours breathing air inside high school buildings.

Research has also documented that schools serving low-income and minority students suffer disproportionately from poor IAQ which can cause or aggravate asthma. An increasing amount of scientific evidence suggests that the physical environments to which children are exposed have a profound impact on their ability to learn. Poor indoor air quality can increase the potential for long-term and short-term health problems such as asthma, the leading cause of student absenteeism. More than 14 million school days are missed annually due to asthma and, in turn, this reduces the productivity of students and staff.

Child Care Environments

In child care environments, when children are arguably the most vulnerable, there are no national standards on acceptable levels of indoor pollutant or standards on remediation techniques such as Tools for Schools. To our knowledge only Arizona, Connecticut, Florida, Iowa, Maryland, Michigan, New Hampshire, New Jersey, North Carolina, and Rhode Island have some form of minimum indoor air quality regulations for child care facilities. These regulations address pesticide application, radon testing and mitigation, along with mold, mildew, and lead hazards.

When there are state policies, there are differences in how they are implemented. That is some state laws "require" the establishment of standards, testing, etc., whereas other states "authorize" or "direct"

various departments to establish regulations. These state departments then establish regulations that "require" various standards and testing. For example:

—Rhode Island General Laws §§ 23-61 et seq.

Authorizes the Department of Health to undertake a variety of radon-related activities, including: Requires the state to establish regulations requiring the evaluation of all public buildings, schools and day care centers for elevated radon levels. Regulations establish radon standards; measurement and mitigation protocols; and requirements for testing and mitigation of high radon levels in public buildings, schools, and child care facilities. (See also R.I. Admin Code 31-1-37:28.0.)

—New Jersey Statutes § 30:5B-5.2

Requires that child care centers be tested for radon at least once every five years. Also requires posting of the test results and of any measures taken or proposed to mitigate the presence of radon.

Other state regulations are listed in the table below:

State	IAQ regulations for child care centers/facilities
AZ	pesticide application
CT	radon testing
FL	radon testing (state-licensed centers)
IA	radon testing and mitigation
MD	tested and free from radon, lead, and asbestos (residential child care programs)
MI	State required to develop standards for before- or after-school programs operated by school districts, and provides that the standards must address the indoor environment. Documentation of radon testing for basements used in family and group child care homes
NH	minimum standards including those pertaining to environmental safety for licensing of child care centers, including mold and radon
NJ	radon testing and mitigation; standards for maximum contamination levels in child care facilities and assessment methods; establish a certification program for facilities that meet the standards; facility siting
NC	mold, mildew, lead hazards in child care facilities housed in public school classrooms
RI	testing and mitigation of radon in child care facilities

Given the variability in regulations and/or policy, CHPAC has recommended (see the November 17, 2012, Indoor Environments Letter, page 4) that national standards are created and guidelines for remediation are developed for child care environments.

Partners in Improving the Indoor Environment

LEED and Indoor Air Quality

In seeking to improve the indoor environment, EPA should reach out to other partners. An example of a partner who has established building codes to improve indoor air quality is LEED.

LEED or Leadership in Energy and Environmental Design is an internationally-recognized green building certification system. This program was developed by the U.S. Green Building Council (USGBC) in March 2000. LEED provides guidelines for those who want to improve the quality of buildings and their impact on the environment. Buildings can become LEED certified if they meet the criteria set forth under the LEED rating system. It should be noted that Green Building and LEED certification has been embraced by many of the large construction companies and in fact is a growing business – improving the environmental impact of new and existing building and providing much needed jobs in a very challenging economy.

Listed below are examples of how LEED promotes healthy living and learning environments, specific to Indoor Air Quality. EPA should be encouraged to continue working with USGBC to incorporate more health focused indoor environment practices into the prerequisites for LEED certification. The CHPAC encourages EPA and other government agencies to build, renovate or lease buildings that meet or exceed LEED or other standards that will improve the quality of the indoor environment.

1. Required – There are numerous methods of getting certification points for consideration of IAQ in building. The vast majority of these are optional. There are two required measures:
 - a. Prerequisite 1 refers to minimum Indoor Air Quality Performance with reference to ASHRAE Standard 62.1-2007
 - b. Prerequisite 2 refers to the control of environmental tobacco smoke. A building cannot become LEED certified without meeting this requirement.
2. Optional - Other criteria apply toward the total points needed for LEED certification but are not required:
 - a. Outdoor air delivery monitoring
 - b. Increased ventilation
 - c. Construction IAQ management plan – during construction
 - d. Construction IAQ management plan – before occupancy
 - e. Low-emitting materials – adhesives and sealants – with a note addressing use of a total VOC budget.
 - f. Low-emitting materials – paints and coatings
 - g. Low-emitting materials – flooring systems
 - h. Indoor chemical and pollutant source control
 - i. Controllability of Systems: Thermal comfort
 - j. Thermal comfort – verification
 - k. Daylight and views – daylight 75% of spaces

The LEED guidelines are very good; however, since this is a voluntary program, its impact is not as great as it could be. Moreover, there are issues that are of concern for children that are not fully addressed by LEED. Some of these issues include:

1. Build-out materials, e.g. book cases, kitchen cabinets, etc., appear to be exempted and yet can potentially contribute to problems with IAQ.
2. It is important that the guidelines be evidence-based. EPA can collaborate with LEED and other similarly focused programs by supporting research regarding the materials used in construction. Such research might include developing methodology for measuring indoor air contaminants, researching the impact of building material components on IAQ, and researching exposures to children.
3. LEED can set criteria for building that support Integrated Pest Management.
4. Maintenance and recertification – if buildings are not maintained well, they might be labeled as LEED but no longer meet the criteria for certification. Indeed, the maintenance of a building can greatly influence the health of its occupants.

It is important to note that LEED cannot carry the weight of IAQ alone. It is not mandatory and can add to the initial construction/renovation costs.

Affordable Care Act

The Affordable Care Act (ACA) focuses on improving access to care, as well as focusing on prevention. The EPA should be engaged in ACA implementation, testing of new models, and establishment of standards that promote healthy living and learning environments.

Listed below are examples of how the EPA could promote healthy living and learning environments through the ACA.

1. Maternal, Infant and Early Childhood Home Visiting Program

This program seeks to strengthen and improve programs and activities of Title V, improve coordination of services to at risk communities, and identify and provide comprehensive services to improve outcomes for families in at risk communities (the focus of program is to improve outcomes in prenatal, maternal, newborn and child health and development, parenting skills, school readiness, family economic self sufficiency – to ultimately lead to reductions in crime, domestic violence and parental substance abuse). The program will be coordinated through MCHB, using the life course development and socio-ecological frameworks.

The program seeks to strengthen linkages with Title V, Child Abuse Prevention and Treatment Act (CAPTA) and Head Start; as well as NCANDS, SAMHSA, Community Health rankings, Behavioral Risk Factor Surveillance System, and HHS Community Health Status Indicators.

Environmental assessments, interventions, and surveillance should be integrated into the home visiting program, as the program will be serving the most vulnerable children and families. Home visiting programs will focus on child and parental assessments, and EPA should assist in integrating home environmental assessments as well as integrating anticipatory guidance educational messaging.

2. Medical/Health home

Medical homes have been defined as having the following components: having a usual source of care, having a personal physician or nurse, receiving all needed referrals for specialty care, receiving help as needed in coordinating health and health related care, and receiving family-centered care. Primary care practices that serve disadvantaged children, including federally funded Community Health Centers, will benefit from a more comprehensive way of approaching preventive care. An example of a comprehensive approach to preventive care is an interdisciplinary health care team that includes traditional and nontraditional providers, such as community health workers (CHWs).

The EPA should work with Community Health Centers to test such innovative interventions, explore nontraditional providers (CHWs), and systems to deliver preventive environmental health care. The EPA should encourage the development of asthma care models that integrate preventive environmental care, as well as standardization of asthma interventions that focus on both the living and learning environments.

A recent study by the CDC reveals that CHWs effectively implemented home asthma trigger removal and home asthma education. CHWs have also been utilized as health care navigators to work with the health team to identify barriers to quality care as well as resources to overcome barriers to care coordination around environmental health. CHWs should be considered a key player in bundled care for chronic disease since they may be most effective in promoting patient adoption of and removing barriers to preventive behavior.

Hazards of Special Concern in Indoor Environments

Volatile Organic Compounds (VOCs)

VOCs are a wide range of compounds that are emitted from gases or solids that are easily evaporated. These compounds can be man-made, natural, or, in many cases, both. VOCs can range from being a mere annoyance to being carcinogenic or immediately dangerous to life and health. University of Illinois at Chicago graduate student Colin Murphy has studied indoor air quality in new and old construction homes. In one study, he used the TO-15 technique to determine the concentrations of 60 different VOCs in homes. CHPAC finds the consumer products VOC standards set by the California Air Resource Board (CARB) an important standard for minimizing children's exposure VOCs in the indoor environment. The CARB regulates chemically formulated consumer products, fuel containers, and indoor air cleaning products. The standards for "Consumer product" means a chemically formulated product used by household and institutional consumers, including, but not limited to, detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products; home, lawn, and garden products; disinfectants; sanitizers; aerosol paints; and automotive specialty products; but does not include other paint products, furniture coatings, or architectural coatings. Such a scope of standard setting would capture a large component of indoor VOC exposure. More information can be found at www.arb.ca.gov/consprod/consprod.html.

Integrated Pest Management

CHPAC recognizes the work by EPA to define and establish an integrated pest management protocol for a wide array of settings. As the Agency re-focuses its efforts on children's health and the indoor environment, EPA should expand outreach to parents and daycare centers through local and regional children's services. For example, community health workers and state EPA organizations could help with

dissemination of information and implementation. While schools have rightfully been the focus of EPA's IPM programs to date, home and daycare settings need to be brought up to speed on the four steps of pest control.

Radon

CHPAC applauds the work by EPA and its fellow federal agencies to address the critical children's health risk of radon exposure. Exposure to radon is a serious health risk to children that can result in lung cancer later in life. CHPAC believes the education of professionals and the general public is critical to the radon action plan. We encourage the Agency to use all tools available including private and public organizations to educate, advocate and provide remediation. Securing funding for remediation will be critical to the success of the program as will training of sufficient numbers of individuals to conduct the remediation programs. To the latter funding need, perhaps the Department of Labor could join the group of federal agencies and re-appropriate funds not utilized in training people for green program energy jobs.

Resources

The following resources were used in the preparation of this report.

Berwick D. Launching Accountable Care Organizations — The Proposed Rule for the Medicare Shared Savings Program. N Engl J Med. 2011 Apr 21;364(16):e32

Crocker DD, Kinyota S, Dumitru GG, Ligon CB, Herman EJ, Ferdinands JM, Hopkins DP, Lawrence BM, Sipe TA; Effectiveness of home-based, multi-trigger, multicomponent interventions with an environmental focus for reducing asthma morbidity a community guide systematic review. Am J Prev Med. 2011 Aug;41(2 Suppl 1):S5-32

Fiscella K. Health Care Reform and Equity: Promise, Pitfalls, and Prescriptions. Ann Fam Med 2011;9:78-84.

Freudenberg N, Tsui E. Training New Community Health, Food Service, And Environmental Protection Workers Could Boost Health, Jobs, And Growth. Health Affairs 30 (11). 2011.;2098-2106

Martinez J, Ro M, Villa NW, Powell W, Knickman JR. Transforming the delivery of care in the post-health reform era: what role will community health workers play. Am J Public Health. 2011 Dec;101(12):e1-5. Epub 2011 Oct 20

Murphy, C., Poster Number 27. Indoor Air Quality in New and Old Construction Homes. AIHce2011 Student Poster Session 405, May 18, 2011.
http://www.aihce2011.org/aihce11/pdf/AIHce2011abstractbook_students.pdf

National Prevention Council. National Prevention Strategy. America's Plan for Better Health and Wellness June 16, 2011

Nurmagambetov TA, Barnett SB, Jacob V, Chattopadhyay SK, Hopkins DP, Crocker DD, Dumitru GG, Kinyota S; Economic value of home-based, multi-trigger, multicomponent interventions with an environmental focus for reducing asthma morbidity a community guide systematic review. Am J Prev Med. 2011 Aug;41(2 Suppl 1):S33-47.

Peacock N, Issel LM, Townsell SJ, Chapple-McGruder T, Handler A. An innovative method to involve community health workers as partners in evaluation research Am J Public Health. 2011 Dec;101(12):2275-80. Epub 2011 Oct 20.

LEED for New Construction & Major Renovations, Version 2.2, October 2005, Copyright 2005, U.S. Green Building Council.

Websites

Green cleaning in Schools: <http://www.healthyschoolscampaign.org/publications/greencleaning>

LEED: <http://www.usgbc.org/ShowFile.aspx?DocumentID=6700>

Pesticides: <http://www.epa.gov/pesticides/controlling/multifamily.htm#pestmgmt>

Radon: <http://www.epa.gov/radon/>

California Air Resource Board: <http://www.arb.ca.gov/consprod/consprod.htm>