Educational Brief on Children’s Environmental Health

Today’s pediatric health challenges are rarely the viral and bacterial scourges of old such as polio or tuberculosis. Rather, our children are facing early onset chronic conditions such as obesity (17% of U.S. children are obese\(^i\)) and asthma (10-14% of U.S. children have asthma\(^ii,iii\)). This generation may be the first to see a shorter life expectancy than their parents due to their poor health status. These modern problems bring a new host of challenges for the medical and public health communities, as well as for policymakers, whose legislation and regulations play a vital role in preventing – or contributing to – the myriad of causes of these chronic diseases. Various, and sometimes unexpected, sectors shape the environments, and thus the health and futures of our children.

**What is Children’s Environmental Health?**
Children’s surroundings -- including the air, water and food they consume, and where they live, learn and play – are one facet influencing today’s pediatric health challenges. For many chronic conditions faced by today’s children as well as premature birth, lead poisoning, some childhood cancers, and some birth defects, a child’s environment plays a role.\(^iv\) Environment-related disease manifests health disparities and puts a child’s health, educational achievements and future in jeopardy.

**How are Children’s Environments Shaped?**
Many factors -- such as policies and practices in education, transportation, housing, commerce, land use, and agriculture -- shape children’s environments, and thus their health and future. However, the relationship between a child’s surroundings and his or her health is seldom incorporated into decisions that influence their environments.
Decision-makers have a responsibility to improve their understanding of children’s environmental health issues and to consider these issues in their work.

**Why Are Children Particularly at Risk?**

Children are particularly vulnerable to environmental exposures and usually suffer more harm from exposure to toxic substances than do adults.

- Children have proportionally greater toxic exposure than adults. v,vi
- Children and adults process and respond to toxic exposures differently.vi
- Children’s body systems (e.g., the nervous, endocrine reproductive, respiratory and immune systems) are not mature and are more susceptible to irreversible damage.viii
- Children have many years ahead of them to develop disease after exposure. ix

While all children are vulnerable to the effects of environmental exposures, children living in poverty and in minority communities are particularly at risk for higher exposure. Many pollutants, such as lead, diesel exhaust, and mold, are more prevalent in lower-income communities. In addition, these populations frequently lack the resources, time or power to reduce their children's exposure to dangerous pollutants.x,xi

Protecting children’s health requires special attention to racial and economic inequities, which can be reduced by collaborating with non-health sectors.

**Past, Present and Future of Children’s Environmental Health**

**Past...**

The growing awareness of children’s unique vulnerabilities to environmental exposures should be incorporated into our decision-making. For example, when considering a chemical’s safety, its exposure estimates should reflect children’s unique diets and behaviors; health studies should include effects on developing organisms; and decisions should be based on protecting children’s health.

However, our decision-making paradigm has traditionally not incorporated this knowledge. For example:

- Standards are usually based on healthy adult males.
- Regulations do not consider children’s differing behavior or exposures compared to adults.
- Testing requirements don’t consider the full range of vulnerabilities of developing systems.
- Standards assume exposure to one chemical at a time.
- Standards do not adequately consider the length of children's lives or the potential for a toxicant to affect subsequent generations.
- Standards balance health with other considerations, such as cost.

In 1989, the Kids in the Environment Project started to train California health professionals on the environment’s impact on children’s health. The founding of this organization, which evolved into the Children’s Environmental Health Network, is considered by some to be the modern underpinning of the children’s environmental health movement. In the past 20 years, accomplishments of this movement have included:

- Passage of the Food Quality Protection Act, which reformed pesticide regulations to be more protective of children’s health;
- Creation of an executive order and Federal interagency task force on children’s environmental health and safety; and
- Research initiatives, such as the Children’s Environmental Health Research Centers and the National Children’s Study, to fill the many data and scientific gaps in our knowledge about the relationship between chemical exposures and children’s health.

- Improved information on children’s environments, such as the U.S. EPA’s *America’s Children and the Environment*, reports on trends in environmental factors related to the health and well-being of children in the United States, and CDC’s *National Reports on Human Exposure to Environmental Chemicals* reports on the levels of environmental chemicals in the U.S. population.

*Present...*

In spite of past accomplishments, our children continue to be exposed to environmental hazards. The traditional decision-making paradigm, described above, continues, with few exceptions. Over the last 50 years, more than 80,000 new synthetic chemicals have
been introduced into commerce, yet the relationship between these chemicals and human health is not fully understood.\textsuperscript{xv} Scientific advances now enable us to look for low levels of many chemicals or their breakdown products in human blood, urine and tissues; this practice is called “biomonitoring.” Through biomonitoring, traces of these chemicals have been detected in almost all Americans,\textsuperscript{xvi} \textsuperscript{xvii} including in pregnant women and newborns. Severe challenges to children’s health, wellbeing and future that are influenced by environmental influences include:

- **Asthma**
  
  Asthma prevalence has increased substantially over the past 30 years, and today more than one in 10 school age children in the U.S. has asthma.\textsuperscript{xviii} \textsuperscript{xix} Asthma is the third leading cause of hospitalization for children.\textsuperscript{xx} Black Americans are 2-3 times more likely to die from asthma than any other racial or ethnic group.\textsuperscript{xxi} Asthma is a complex condition with many potential causes and potential triggers. Allergens from dust mites, cockroaches, rodents and mold,\textsuperscript{xxii} environmental tobacco smoke,\textsuperscript{xxiii} and outdoor traffic pollution may lead to asthma attacks.\textsuperscript{xxiv} \textsuperscript{xxv}

- **Lead Poisoning**
  
  No study has found a blood lead level that does not impair child cognition.\textsuperscript{xxvi} Approximately 450,000 children in the U.S. have blood levels above the current 5 \( \mu \text{g/dL} \) reference value. Lead exposure can cause learning disabilities, behavioral problems, and, at very high levels, seizures, coma, and even death. Specific neurobehavioral effects may include attention deficit disorder (ADD), attention deficit hyperactivity disorder (ADHD), hearing problems, headaches, and memory and concentration problems. Lead is present in many consumer and industrial items; common sources of exposure for U.S. children are lead paint (including chips and dust) and contaminated water and soil.\textsuperscript{xxvii} Racial and economic disparities persist.\textsuperscript{xxviii}

**Future...**

Opportunities to improve children’s environmental health exist. But success will require coordination, strategic planning and common goals among decision-makers in all sectors of government, the private sector, researchers and other stakeholders.
Charting a Path to Improved Children’s Environmental Health

Improving children’s environmental health includes engaging systems and institutions outside of the traditional health sector and considering the uniqueness of children’s environmental health in decision-making. We have learned much about what makes an environment unhealthy for children. We have an understanding of what a healthy environment looks like for children. Our challenge is to transition from knowledge to action.xxix

Stakeholders in many arenas have a unique and important role in children’s environmental health. Here are some examples.

➤ Environment

A child’s immediate physical environment (including in the womb) can be the source of exposure to toxicants such as mercury, polychlorinated biphenyls (PCBs) and some pesticides.xxx,xxxi Assessing children’s exposure to environmental toxins through biomonitoring is an important step.xxxii Decision-makers must also assure that our policies and processes prevent exposures of concern to children’s health and development.xxxiii By working together, scientists, regulators, product manufacturers and sellers, can provide healthier environments through health-protective standards and safer, less toxic products.

➤ Housing

Housing has a direct impact on children’s health through its design, construction and maintenance. A safe and healthy home ensures the mental and emotional health and physical security of its inhabitants. Regulations concerning building codes, construction and furnishing materials, and energy efficiency are not created or enforced by health departments but have important implications for health outcomes such as injuries, lead exposure and asthma. For example, one aspect of preventing lead poisoning depends on maintaining a quality housing stock and the availability of community-based resources for vulnerable families. Asthma symptoms, asthma-related school absences and acute health care visits
have decreased when the home’s indoor environment has been improved through multi-component environmental interventions.xxxiv,xxxv

- **Land Use, Planning and Zoning**

  Children’s environmental health is shaped by their surroundings. Neighborhoods that provide access to healthy food, public transportation, safe and complete streets and other community services can improve physical activity and other aspects of health. For example, decreasing vehicle emissions through increased mass transit and decreased personal vehicle use can improve air quality and decrease children’s asthma-related hospital and medical visits.xxxvi Land use decisions are critical in determining which communities have easy access to goods and services and which are exposed to environmental contaminants. Fear of intentional and unintentional injury from crime or traffic can restrict physical activity and negatively impact mental health and stress levels. Planners and public health professionals have overlapping goals and priorities but traditionally have not worked together on land use and community design.

- **Educational and Early Childhood Environments**

  Approximately, 54 million children attend school each school day. xxxvii Thirteen million preschoolers—60% of young children—are in child care, many for 40 or more hours per week.xxxviii These environments play a vital role in children’s health and ability to learn,xxxix often setting the course of a child’s life. Education and child care professionals have not traditionally worked with environmental and public health experts to assure that these settings, where children spend significant and vital learning time, are free of environmental health hazards.

**Strategies for a Collaborative Approach**

The National Prevention Council is a significant Federal effort to create a forum to establish common goals across sectors. The Council’s recommendations for a Healthy and Safe Community Environment chart a path toward children’s environmental health in all policies by:xl

- Including health criteria in decision-making across sectors;
- Establishing common measures and performance targets across sectors;
• Defining community well-being as inclusive of health considerations and determinants such as transportation, economic security, housing quality, public safety, education, land use and air quality; and
• Enabling local, state and tribal public health agencies to provide skilled technical assistance to decision-makers in other sectors.

Decision-makers have the responsibility to assure that their decisions protect children’s health and future. Fortunately, they have numerous resources that can support them in meeting this responsibility, such as:

• Children’s Environmental Health Network, www.cehn.org/policyshapeshealth
• American Public Health Association, www.apha-environment.org/
• Association of State and Territorial Health Officials, www.astho.org/Programs/Environmental-Health/
• National Association of County and City Health Officials, www.naccho.org/topics/environmental/HiAP/index.cfm
• National Center for Healthy Housing, www.nchh.org
• National Conference of State Legislatures, www.ncsl.org  GO 18111
• Safe Routes to School National Partnership, www.saferoutespartnership.org/

Exposures and environments during childhood affect health across the lifespan, and children’s environments are shaped by decisions across sectors. Viewing decisions through the lens of children’s health and future, with shared goals and a collaborative approach, will result in more effective plans and strategies. By protecting the most vulnerable among us, we will protect everyone’s health.

This publication was supported by the Cooperative Agreement number EH11-1110 from the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention.
References


ii CDC NHIS, Asthma and chronic obstructive pulmonary disease: US, 1999-2010. Downloaded from: http://205.207.175.93/HDI/TableViewer/tableView.aspx?ReportId=60


xxii Krieger J. Home is where the triggers are: increasing asthma control by improving the home environment. Pediatric Allergy, Immunology, and Pulmonology. 2010;23(2):139–145.


Vandenberg LN, Chahoud I, Padmanabhan V, Paumgartten FJR, Schoenfelder G. Biomonitoring studies should be used by regulatory agencies to assess human exposure levels and safety of bisphenol A. *Environ. Health Perspect*. 2010;118(8):1051–1054.


Friedman MS, et al. “Impact of changes in transportation and commuting behaviors during the 1996 Summer Olympic Games in Atlanta on air quality and childhood asthma. JAMA 285(7)

NCES 2007 National Center for Education Statistics, *Digest for Education Statistics, 2007*

Many Young Children Spend Long Hours in Child Care (March 2005), by Jeffrey Capizzano and Regan Main, Urban Institute, examines the number of hours that preschool children (children younger than 5) with employed mothers spent in care. This resource is available at www.urban.org/UploadedPDF/311154_snapshots3_no22.pdf.

See summary of studies at EPA’s Web pages on “Improved Academic Performance -- Evidence from Scientific Literature” (www.epa.gov/iaq/schools/student_performance/evidence.html) and “Health and Achievement” (www.epa.gov/iaq/schools/benefits.html)