With increasing rates of childhood cancers, neurodevelopmental disorders, and other illnesses often related to environmental exposures, some believe that children are modern-day canaries in the coal mine. Numerous major studies around the world have been designed specifically to address children’s environmental health. In the United States, the 1997 signing of Executive Order 13045, which charged federal agencies with identifying and assessing children’s environmental health risks, was the catalyst that really launched this area of research. The order spurred the creation of multiple federally funded research programs, including the Children’s Environmental Health and Disease Prevention Centers Program, the Children’s Health Exposure Analysis Resource, and the Environmental Influences on Child Health Outcomes program.

These and other programs are providing us with a much better understanding of the unique vulnerabilities of children. However, experts continue to stress that research findings must be translated into action through coordination and collaboration among the many stakeholders who provide education, health care, and other services to the youngest members of society. This is where children’s health advocacy groups and professional organizations come in: putting research findings into practice.

Children’s Special Vulnerability

It is well known and widely accepted that children are more biologically vulnerable than adults to chemical exposures. Decades of research have shown the particular vulnerability of the developing fetus as well as infants and young children. Harmful exposures during critical development periods can have lifelong impacts on the individual, and might even affect future generations through epigenetic changes. In addition, low-income families and minorities often face disparities in exposure to environmental hazards and the speed with which remediation occurs.

Furthermore, children have little control over the exposures they face. Parents and other caregivers determine the conditions of their home, childcare, and school environments, along with how they get to school, the food they eat, the places they go, and the activities in which they participate. Children may be unavoidably exposed to whatever chemical hazards surround these daily activities.

The 1966 establishment of the National Institutes of Health Division of Environmental Health Sciences (now the NIEHS) first brought the field of environmental health into focus. The mission of the new division was to achieve “a better understanding of the complex, interrelated phenomena underlying the human body’s reaction to the increasingly wide range of chemical, physical, biological, and social environmental influences imposed by modern living.” But it wasn’t until the late 1990s, with the signing of Executive Order 13045, that studies began addressing children’s unique exposures and special vulnerabilities to environmental insults. Image: © Shanina/Stockphoto.
activities—be it household cleaners, pesticides in their yards, lead paint in their homes, or flame retardants in their pajamas.

Research translation experts have long encouraged the coordination of efforts across all sectors of society that intersect with children’s environments. These sectors cover a lot of ground. They include federal and state governments, policy makers, business interests, health-care professionals, public health researchers, urban planners, nonprofit advocacy groups, impacted communities, families, the media, funders of research and philanthropic work, and industries, including agriculture, pharmaceuticals, transportation, and education.

In 2015, the Children’s Environmental Health Network (CEHN), a nonprofit advocacy group, published the Blueprint for Protecting Children’s Environmental Health, which outlined steps for taking action to protect children’s health and create a more child-centered, sustainable society. The Blueprint uses the term “homes of influence” to capture and integrate all the factors, practices, and services that contribute to children’s health. Kristie Trousdale, CEHN program manager, explains that the term incorporates place-based “homes” where children spend time (such as childcare facilities, playgrounds, and bus stops), as well as stakeholder groups from various disciplines and perspectives, that have an impact on children’s environmental health.

“The goal is to achieve a healthy ‘neighborhood of influence’ through not only cross-sector approaches to prevention, but also through weaving together these healthy ‘homes’ into safe and nurturing communities by engaging all stakeholders,” Trousdale says. “You can piece together an entire neighborhood if everyone is working together.”

Trousdale and colleague Nsedu Obot Witherspoon, executive director of CEHN, call on these “homes of influence” to better coordinate their efforts. In a 2017 brief they wrote, “Far too many of these ‘homes’ do their good work in isolation, which can lead to duplication of effort, loss of valuable resources, and ultimately, failure to achieve long-term success.”

The Health-Care Sector

Health-care professionals can be an effective first-line resource in protecting children from harmful exposures. However, few currently receive any training in environmental health. For example, a needs assessment conducted in the Pacific Northwest found that among health-care providers working with children who have a high risk of exposure to agricultural pesticides, only 50% had received training in pesticide-related health effects, and even fewer had received pesticide-related information specific to children.

In 1998, partly in response to the need to better train health-care professionals in environmental exposures and to reach communities and families affected by such exposures, the Agency for Toxic Substances and Disease Registry and the U.S. Environmental Protection Agency (EPA) created two Pediatric Environmental Health Specialty Units (PEHSUs, pronounced “pay sues”). Today, 13 PEHSUs provide community outreach to families for prevention, diagnosis, management, and treatment of environment-related health effects in children.

“Anyone can get a case manager trained in public health to take your call and listen to any issue related to children’s environmental health concerns or exposure, and even get a reference to
clinical care if needed,” says Witherspoon. “[The PEHSUs] have a very modest budget they work from, [and] they could use more support and staff, but they’re there, and the average American doesn’t even know about them.”

Also in 1998, the federal government established the Children’s Environmental Health and Disease Prevention Centers Program (or CEHCs, an abbreviation of the original name, Children’s Environmental Health Centers). Jointly funded by the EPA and the National Institute of Environmental Health Sciences, 14 CEHCs are headquartered at research hospitals and universities across the United States. The express purpose of this program is to promote the translation of basic research findings so as to raise awareness of detection, treatment, and prevention of environment-related diseases and health conditions.

To achieve this goal, each center is required to include a project focused on community outreach and research translation. These projects specifically engage the public, communities, healthcare professionals, and members of Congress in research and other activities.

“We have a research translation program, similar to the ‘homes of influence’ idea,” says Tracey Woodruff, director of the CEHC at the University of California, San Francisco, which is housed within the Program on Reproductive Health and the Environment. “Recognizing all the different actors and how we can leverage them is critical,” she says. “Research is important and only one component of making action happen.”

Professional Societies
To reach more health-care workers, Woodruff and others at the Program on Reproductive Health and the Environment worked closely with three major associations of health care professionals—the American Congress of Obstetricians and Gynecologists (ACOG), the American Society of Reproductive Medicine (ASRM), and the International Federation of Gynecology and Obstetrics (FIGO)—to write formal opinions on the urgent need to reduce prenatal and early childhood exposures to potentially harmful chemicals.

A joint ACOG/ASRM committee opinion published in 2013 outlined the many possible adverse outcomes for mothers and children alike resulting from harmful exposures during pregnancy. The opinion encouraged practitioners to intervene to reduce their patients’ exposures and emphasized that the Hippocratic oath aligns with the precautionary principle, which has been proposed as a guideline for environmental decision-making. The ACOG/ASRM opinion emphasized the need to pay special attention to underserved women and children, who are even more vulnerable to environmental hazards due to their socioeconomic status.

In 2015, FIGO issued a statement that reviewed the nature and extent of exposures to toxic agents and the associated health and economic burdens, which are estimated to exceed millions of deaths and billions of dollars every year. For example, air pollution is estimated to have caused 7 million deaths around the
world in 2012, and pesticide poisonings among African farm-workers will cost an estimated $66 billion over the period 2005–2020 in health-care costs and lost productivity.

Because toxic exposures during the preconception and prenatal periods are particularly harmful to a child, FIGO urged all reproductive health professionals to help reduce women’s and children’s exposures, and concluded with four recommendations for health-care workers: Advocate for a) policies to prevent toxic exposures, b) a healthy food system, including drinking water, c) environmental health as a part of health care, and d) environmental justice as a way to mitigate disproportionate exposures of minority and low-income communities.

Although organizations of health-care professionals are weighing in on various issues, Trousdale says more effort is needed to reach individual clinicians and teach them to become advocates. To fill this crucial need, CEHN created a free online curriculum for health-care providers consisting of 12 modules. One of the modules is on advocacy, which Trousdale says can help health-care professionals understand how they, as clinicians, can make their voices heard to prevent environment-related disease.

**The Business Sector**

Meanwhile, the business community also has an important role to play and opportunities to be realized. “It is smart business for companies to meet the consumer demand for safer products,” says David Levine, founder and director of the American Sustainable Business Council (ASBC), which brings together companies and business associations that seek to advance a sustainable economy. “What we mean by that is looking at the triple bottom line—people, planet, profit—understanding that we can, as business, do well by doing good,” Levine says.
As Levine puts it, “No mother or father would walk into a store and say, ‘Let me have the product with hazardous chemicals in it.’” Most consumers believe that if a product is on the shelf, the manufacturer and the government have both had some role in ensuring the product is safe, he says. Unfortunately, that is not always the case, he adds, but correcting the situation can provide enticing prospects for ASBC members.

“We have worked hard to make the case that this is an opportunity for businesses,” says Levine. Accordingly, an ASBC report showed rising market growth in green cleaning products (an average 20% per year between 2007 and 2011) and personal care products (an average 10% per year between 2012 and 2016); it also predicts 2,000% growth in green building products between 2009 and 2030.29 Plus, Levine says, “A society that values children and values families is a society that will benefit the economy overall.”

Levine would like to see the business sector as a whole support policies that advance sustainability. “All too often, we see companies institute some sustainable practices but work in opposition to policies that would mandate it,” he says. He gives the example of the opposition to ingredient disclosure based on the argument that ingredients constitute confidential business information. “Every company we talk to tells us that they can assess what is in their competitor’s product, so why are they fighting the bills to ensure ingredient disclosure at the federal and state level?”

In the end, advancement comes back to the power of economics. “The qualitative and descriptive information is important, but translating it into the bottom line can change decision-making,” says professor Sylvia Brandt of the University of Massachusetts Amherst, who studies economic costs related to childhood asthma. “Instead of talking about sickness, we need to talk about the economic gains from having healthy kids.”

The Childcare and School Sectors
Up to 11 million U.S. children under age 5 years receive care outside of their home,30,31 and the early learning facilities where they spend their days—preschools, childcare centers, and home-based childcare programs—are another relatively untapped sector to reduce environmental exposures for kids. CEHN is trying to change that. “The goal is to support and educate childcare professionals at all levels, including trainers, providers on the ground with children, health/nurse consultants, licensing staff, and everybody having to do with childcare,” says Hester Paul, director of CEHN’s Eco-Healthy Child Care® (EHCC) program.

The EHCC program reaches out to early learning facilities, explaining that they should be aware of and cautious about what children are exposed to on their grounds. “EHCC resources, training, and technical assistance are reflective of empirically based research, and the information provided is approachable and not too intimidating,” Paul says. “Childcare providers are very eager to implement eco-healthy changes as long as they are affordable and realistic.”

By complying with at least 24 of 30 simple, low- to no-cost environmental health best practices,32 early learning facilities can be endorsed as Eco-Healthy by CEHN for 2 years. Each facility
starts the endorsement process at a different place, Paul says. Some have never considered implementing changes such as removing carpeting, using only green cleaners certified by a third party, or adopting glass bottles for feeding. Others have already been working on such changes for several years. Around 350 facilities are currently endorsed.

To expand the reach and impact of its efforts, CEHN has worked with two national accreditation associations, the Association for Early Learning Leaders (AELL) and the National Association for the Education of Young Children (NAEYC). These organizations set quality standards for childcare facilities beyond what is mandated by state childcare licensing regulations. “Prior to working with the EHCC program,” Paul says, “the accreditation standards pertaining to environmental health were not nearly as comprehensive as what is needed to adequately protect children’s health and overall well-being.”

EHCC program staff partnered with AELL and NAEYC to update existing standards related to environmental health and to create new ones. NAEYC’s updated standards took effect in April 2017,23 and AELL anticipates releasing their updated accreditation standards by the end of the year.

Now CEHN has begun working with the National Association of Family Child Care to update their standards, too, and the organization intends to support state Quality Rating Improvement Systems, frameworks that promote quality standards that, again, go beyond what is required by childcare licensing regulations. The EHCC program also wants to begin working with vendors to help them offer eco-friendly alternatives for items such as cleaning supplies and soft plastic teethers and toys.

For older children, the Healthy Schools Network, an NGO founded in 1995, helps coordinate efforts in the same vein across several sectors. Factors stressed by the Healthy Schools Network include housekeeping practices, the purchasing of materials used in schools, and setting child-safe standards for school design, construction, and siting. The Healthy Schools Network partners with the EPA and the Centers for Disease Control and Prevention, works with Congress and other NGOs, and maintains a clearinghouse of educational resources on its website.24

Creating “Neighborhoods of Influence”

Children’s environments are affected by many more “homes” than those already discussed. Private foundations fund research, zoning agencies determine where schools and homes may be built, builders and housing authorities determine the quality of housing materials and location of neighborhoods, code enforcement agencies may or may not enforce regulations, the media determine what stories are covered, and consumers demand changes to products that may or may not enforce regulations, the media determine what stories are covered, and consumers demand changes to products through purchasing power. These groups can thereby influence a child’s environment in either a positive or a negative way.5

While it is essential to have intentional coordination among these community entities to ensure the most effective protections for children, funds and time can be constraining factors toward creating collaborations. “I think everyone has been feeling diminishing resources,” says Trousdale. “It has been hard for people to find the time and the funding…to work together. It has been really hard to reach industry and business interests.”

“It’s not that people don’t want to work together, but everyone is so busy,” says Linda S. Birnbaum, director of the National Institute of Environmental Health Sciences and the National Toxicology Program. She agrees that all “homes of influence” need to work together. “People shy away from including [some stakeholders]—for example, industries or companies—we need them to be part of the solution,” she says. “I think it’s very important that all the different stakeholders work together if we’re ever going to have healthy children.”

Wendee Nicole has written for Discover, Scientific American, and other publications.

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