

Commission for Environmental Cooperation of North America (CEC)



Education and Training on Children's Health and the Environment for Healthcare Professionals: Status and Opportunities

January 2003

I. Introduction

Purpose

This paper is developed for the CEC's Expert Advisory Board on Children's Health and the Environment in North America. It provides background on health professional education in children's health and the environment, and summarizes related ongoing activities in North America, analyzes gaps and provides several options for Expert Advisory Board consideration. Information presented in this paper is based on input from interviews with the Board members and outside experts, as well as from information resources in print and on the worldwide web.

Background

World leaders, international organizations, nations, individuals, and local groups have increased awareness and action to improve protection of children from environmental hazards. In 2000, the North American Commission for Environmental Cooperation (CEC) Council initiated a cooperative agenda on children's health and the environment and called for the establishment of the Expert Advisory Board to advise Council on issues in this area. In June 2002, Council adopted the *Cooperative Agenda for Children's Health and the Environment in North America*. Among the action areas in the *Cooperative Agenda* is "Working with Health Professionals,"¹ which emphasizes the role of health professionals as a primary conduit of information to families and communities and highlights the need to equip such professionals with relevant knowledge, information and capabilities.

Healthcare professionals serve a distinctive role, as ones who diagnose and treat diseases, raise awareness about health and well-being, and serve as trusted professionals with scientific backing who can successfully advocate for policy changes. Their knowledge about the special susceptibility of children and adolescents, their skills, actions and capabilities are pivotal to protecting, diagnosing and treating children with illnesses that are caused or exacerbated by environmental conditions. "People want to know about children's environmental health and they trust healthcare providers to be the source of information" asserts the United States based Children's Environmental Health Network in its training manual on children's health and the

¹ Cooperative Agenda for Children's Health and the Environment in North America, Section 5.3, Working with Health Professionals, http://www.cec.org/files/pdf/POLLUTANTS/Children_coop_agenda-en.pdf, June 2002, p. 25.

environment for healthcare professionals.² Even back in the 1980's, The United States Institute of Medicine advised that, "at a minimum, all primary care physicians should be able to identify possible occupationally or environmentally induced conditions and make the appropriate referrals for follow-up."³ It is generally presumed, though, that often the trusted healthcare worker does not have the basic information needed to fulfill this role. A study conducted in Georgia on the level of knowledge of healthcare professionals regarding children's health and the environment revealed a keen interest in the topic but also a dearth of information. Physicians did not even feel competent to ask their patients questions related to environmental exposures.⁴

A professional involved in the combined fields of health and environment serves as "investigator, educator and advocate,"⁵ and is a direct source of information to parents, families and communities. Increasing the level of knowledge and capability of healthcare workers is therefore a primary vehicle for communication, education, prevention and remediation of environmental hazards to children. A set of recommendations to the United States based Ambulatory Pediatric Association reflects these key roles of healthcare providers in a list of 27 core competencies for its new Fellowship Program in Pediatric Environmental Health. Core competencies are divided into three categories: academic, individual patient care, and community advocacy. The article contends, "Pediatricians need to know more about positive links between environment and health. They also need to learn how to recognize toxic exposures and to diagnose and treat illnesses linked to environmental hazards."⁶ Educating healthcare providers has a lasting impact on the professional community, which can lead to the prevention of environment related illnesses and ultimately benefit children. Competency in children's health and the environment is a necessity for today's health professional.

Building children's health and environment into existing educational programs

Society voices concerns for a healthy environment, especially as children face an increasing burden of disease associated with environmental causes. Despite the fact that this requires increased knowledge and capability in the area of environmental impacts on the health of children, all three countries lack basic education on the topic in core medical education programs. Doctors admit that even for the broader field of environment and health, the class time dedicated in this area amounts to a handful of hours scattered over their many years of medical education. The United States Institute of Medicine reported that in 1985, only half of the medical schools included environmental and occupational health as part of their curricula and that seven years later, only two-thirds of the schools required training of at least six hours in the field.⁷

² Children's Environmental Health Network, Training Manual on Pediatric Environmental Health: Putting it Into Practice, <http://www.cehn.org/cehn/trainingmanual/manual-form.html>, CEHN, San Francisco, June 1999, p. 10.

³ Pope, Andrew M., and Rall, David P., editors, *Environmental Medicine: Integrating a Missing Element into Medical Education*, Institute of Medicine, Committee on Curriculum Development in Environmental Medicine, Division of Health Promotion and Disease Prevention, 1995, p.1.

⁴ Kilpatrick Nikki, et. al. "The Environmental History in Pediatric Practice: A Study of Pediatricians' Attitudes, Beliefs and Practices," *Environmental Health Perspectives*, Vol. 110, No. 8, <http://ehpnet1.niehs.nih.gov/docs/2002/110p823-827kilpatrick/abstract.html>, August 2002.

⁵ Bonnie Clarke, MPH and Jean Westcott, Ed.D. "Strategies for Tactics and Teaching," *Training Manual on Pediatric Environmental Health: Putting it Into Practice*, CEHN, San Francisco, 1999, p. 23.

⁶ Ruth A. Etzel, M.D., Ph.D., et. al., "Pediatric Environmental Health Competencies for Specialists," final manuscript for *Ambulatory Pediatrics*, for publication in January-February 2003.

⁷ Pope and Rall, p. 9.

The Institute of Medicine offers three key reasons for including environmental health in medical professional training: 1) patients are increasingly informed about environmental contaminants and will expect physicians to have knowledge in this area, 2) with the advances of science, environmental influences on morbidity are becoming increasingly important and, 3) physicians are witnessing an increased expectation to participate in public health, legal and regulatory regimes.⁸ Similarly, topics of pediatric health and environment must be explicitly incorporated into undergraduate pre-medical programs and nursing curricula, as well as into graduate programs, medical school, post graduate training, residencies and fellowships.

Offering children's health and environment as a subject for post-graduate training

“The health, environment and other sectors should be able to exchange experience and knowledge, promote research, disseminate information and teach the community on how to protect children from environmental threats,”⁹ states the World Health Organization (WHO) in its proposal to develop training programs for healthcare professionals. Training opportunities most commonly occur in the medical professions through lecture series, continuing medical education and rounds. There is ample possibility to increase training in children's health and the environment through in-service lectures, rounds, grand rounds, at conferences and through seminars. Programs targeting school nurses or clinics in rural areas provide helpful information to both healthcare professionals and the public.

Promoting education and providing information resources through publications

Publications serve as important means of imparting knowledge, not only to share recent findings but also to inform ongoing research and inspire further investigation and writing. As journals publish articles on children's health and the environment, a wider audience in the professional community gains awareness and may increasingly place health and environment at the forefront. Web sites offer educational materials and serve as beneficial resources for healthcare professionals and trainees alike.

II. Ongoing Healthcare Professional Training in Children's Health and Environment

There is a great need to promote health professional training in children's health and environment. Recognizing this, several activities across North America have begun to materialize. All three countries have environment and health ministries, as well as professional associations and top quality academic institutions. Several universities in the countries already offer study in the more general field of health and environment. These may provide opportunities for independent study and self-directed work that can accommodate specialty study in pediatric health and environment. All of the countries host pediatric environmental health specialty units, (PESHUs), with a primary objective to educate healthcare providers about environmental risks associated with pediatric health.¹⁰ PESHUs also offer strong networking among specialties and facilitate the sharing of expertise throughout North America so that healthcare providers can better protect children. There are ten PESHUs in the United States, and

⁸ Pope and Rall, pp. 7-8.

⁹ Pronczuk, Jenny, M.D., “Training Seminar: Environmental Threats to the Health of Children, Draft Proposal,” World Health Organization, Geneva, December 2002.

¹⁰ The Association of Occupational & Environmental Clinics, “Pediatric Environmental Health Specialty Units,” www.aoec.org/pesu.htm, January 2003.

currently only one in Canada and one in Mexico. All three countries have strong public health infrastructures which also give explicit focus to health and environment and can accommodate particular emphases on children. All three countries have demonstrated their interest in formulating and implementing policies that increase protections of children's health from environmental harm, recognizing this is key to sustainable development and shaping the world's future. While not a comprehensive plan to increase health professional competency in children's health and environment, many of these ongoing activities pave the way for improvements. Highlights of key activities are provided below.

Educational and informational resources

There is a growing collection of information resources and manuals to support healthcare professional training, mostly from within the North American countries but also from some international sources. Perhaps one of the most important resource tools is the American Academy of Pediatrics (AAP) *Handbook of Pediatric Environmental Health*.¹¹ The Handbook is due for publication of a new edition in August 2003, with a plan to distribute to all pediatricians in the United States. The World Health Organization is developing an international resource manual on children's health and the environment, scheduled for publication in 2003, for healthcare providers in developing and industrialized countries in both rural and urban settings.

Several non-governmental and governmental organizations are targeting increased attention to children's health and the environment by providing on-line manuals and sample curricula, case studies and modules for healthcare professional training. Many of these are designed to support ongoing training efforts and are made to fit into a given curriculum or used to enhance existing educational programs.

- The PESHUs offer resource libraries and develop educational material for use by clinicians and public health officials. Some offer tutorials on specific environmental contaminants and all host practitioners who are willing to share experiences and expertise through participation in seminars, conferences, rounds and grand rounds as they continue to educate colleagues and strengthen a network of healthcare professionals across the region.
- The United States Ambulatory Pediatric Association (APA) has developed a set of guidelines for pediatric residencies, which provides goals and objectives, offers sources of educational material, and outlines contents of major subjects that serve as minimum competencies for pediatric residencies in the United States. In chapters 4 and 8, the guidelines specifically address environmental health and safety. The organization estimates that 80 percent of the pediatric residency programs in the United States uses these guidelines.¹²
- The United States Association of Occupational and Environmental Clinics (AOEC) provides access to training materials and promotes communication among clinics.

¹¹ Committee on Environmental Health, American Academy of Pediatrics, Ruth A. Etzel, M.D., Editor, http://www.aap.org/bst/showdetl.cfm?&User_ID=215985&St=5310&St2=-61566035&St3=-83242937&DS_ID=2&Product_ID=1697&DID=15, Elk Grove Village, IL, 1999.

¹² Ambulatory Pediatrics Association, Educational Guidelines for Residency Training in General Pediatrics, <http://www.ambpeds.org/guidelines/index.cfm>, 6/3/02.

Useful curriculum materials specific to children's health and the environment are available through the AOEC web site, including case studies, slide shows and curriculum guides.¹³

- The Canadian Association of Physicians for the Environment (CAPE) offers its project on children's health and the environment on-line, contributing a resource to healthcare providers through its introductory material, as well as its background on certain environmental hazards and suggestions for advocacy, prevention and other actions.¹⁴
- The International Joint Commission Health Professionals Taskforce has developed a curriculum on environmental health for family medicine, available on-line. The curriculum incorporates clinical case studies and targets pediatric health, while addressing the broader area of family medicine.¹⁵

A key component of training is learning to ask questions and recording patients' environmental histories. Through such practice, health workers will identify potential exposures of a child and begin to discern correlations between symptoms, diseases and health impacts of environmental contaminants. The Canadian Association of Physicians for the Environment, the American Academy of Pediatrics and the United States Institute of Medicine all offer recommendations to incorporate environmental history taking into well-child visits. The World Health Organization also supports related efforts.

As the field of children's health and environment expands, medical and peer reviewed scientific journals are increasingly publishing articles. The January-February 2003 *Ambulatory Pediatrics* will include at least two leading articles on the topic. Other journals, such as *Environmental Health Perspectives*, the AAP's *Pediatrics* and *American Nurse* are known to publish occasional articles on children's health and environment. As more reports, articles, and research findings are published, children's health and environment gains momentum and support, increasing the audience of interested experts.

Experiences in healthcare professional education

While there is not a unified program for educational experiences in pediatric health and environment, a significant number of people have succeeded in the development of progressive initiatives.

- A great stride was made by the APA with the establishment of a post-graduate National Fellowship Program in Pediatric Environmental Health, begun in 2001, with the first fellows beginning training in July 2002. Mt. Sinai Hospital in New York and Children's Hospital in Boston are hosting the three fellows. The hope is that the APA

¹³ Association of Occupational and Environmental Clinics, Lending Library, Pediatric Environmental Health, <http://www.aoec.org/LLDIR.htm>, December 2002.

¹⁴ Canadian Association of Physicians for the Environment, "Children's Environmental Health Project" <http://children.cape.ca/>, 2003.

¹⁵ Alan Abelsohn and Marg Sanborn, *Environmental Health in Family Medicine*, International Joint Committee, Health Professionals Task Force, <http://www.ijc.org/boards/hptf/modules/introd.pdf>, Ottawa, May 2002.

Fellowship is the beginning of a pipeline of new sub-specialists who will advance the field over the years.¹⁶

- The World Health Organization developed and secured funding to support healthcare professional training in children's health and environment, which led to the development of a workshop, piloted in India and targeted next for Argentina and the Philippines. The training can be geared toward doctors, nurses or other professionals and WHO is open to collaboration with CEC on offering a similar workshop in North America, for example, in Mexico.¹⁷
- A fairly extensive training effort is led by the American Nurses Association (ANA). Not only has it published curricula, available on the American Nurses Association website, but the organization has also undertaken a multi-year effort, in collaboration with the University of Maryland School of Nursing and funded by the United States Environmental Protection Agency (US EPA) to provide continuing education to practicing nurses in the area of pediatric health and the environment. This continuing education is in the form of on-line and in-print materials, as well as workshops, continued communication and follow-up.¹⁸ The University of Maryland School of Nursing is also supporting other efforts to increase training of nurses in environmental impacts on children's health.
- Physicians for Social Responsibility, a United States based organization, has developed three training programs for health professionals on environmental health, all of which have a significant focus on children. A fourth module on pesticides and children's health is under development, for release in 2003.¹⁹ The Greater Boston Physicians for Social Responsibility offers training for physicians, nurses and other interested individuals. The training has been conducted in New York, San Francisco, Minnesota and Boston, and is a one-day course that provides credit hours and contact hours for required continuing medical education. Several of the core materials are available in Spanish and the organization is interested in expanding its training efforts.²⁰
- The United States National Environmental Education and Training Foundation (NEETF) has developed a strategic plan on healthcare provider training, designed to "improve the medical and nursing professions' ability to recognize, manage and prevent pesticide-related health conditions," through teaching, application and access to information and other resources. The plan aims to influence existing medical

¹⁶ Ambulatory Pediatric Association, "Fellowship Training Program: Pediatric Environmental Health," http://www.ambpeds.org/apps/enviro_info.cfm, December 2002.

¹⁷ Jenny Pronczuk, M.D., email and telephone conversations, more information available at: "The Gateway to Children's Environmental Health", <http://www.who.int/peh/ceh/>, December 2002.

¹⁸ American Nurses Association, "On-Line Continuing Education," <http://nursingworld.org/ce/cetan.cfm>, January 2003.

¹⁹ Information on PSR children's health and environment activities and access to modules can be accessed at <http://www.psr.org/ceh.htm>.

²⁰ Greater Boston Physicians for Social Responsibility, "In Harm's Way Training Materials for Health Professionals," <http://psr.igc.org/iHW-training-materials.htm>, January 2003.

professional capabilities by underscoring the importance of environmental aspects of health as key to “responsible, superior quality health care.”²¹

Other training occurs in conferences and in national or international gatherings of physicians, nurses or other health professionals. The AAP has just recently approved the establishment of a section on pediatric health and environment that will increase training opportunities and offer participation in this field to all of the AAP membership. As workshops, conferences and training opportunities become more readily available, the cadre of healthcare professionals trained in children’s health and environment will grow.

- The American Academy of Pediatrics, with support from the US EPA, held their third workshop for Chief Pediatric Residents at the annual meeting of the Pediatric Academic Societies, designed to augment health and the environment educational activities in residency programs and increase awareness of the AAP Handbook of Pediatric Environmental Health.
- The First Annual Conference on Children’s Health and the Environment, supported by the United States National Institute of Environmental Health Sciences and one of the PESHUs, was designed for pediatricians and family medicine physicians. It provided an overview of children’s health and the environment and covered a variety of specific issues of environmental contamination. This conference also presented the case of children in rural settings.²²
- Upcoming Canadian Nurses Association conferences include children’s health and the environment throughout their agendas, responding to the calls of the 2002 United Nations General Assembly Special Session on children and promoting the theme, “Shaping the World for the Future.”²³

Promoting Training in Research

“If the sub-specialty of children’s environmental health is to remain, original research must be published to support it.”²⁴ This was the basic contention of several United States agencies when they combined efforts to establish the Centers for Children's Environmental Health and Disease Prevention Research, supporting grants to 12 research centers throughout the United States that target respiratory ailments, growth and development, and neurodevelopment. This joint-agency effort promotes research and includes a community-based prevention component of children’s health and environment.²⁵

²¹The National Environmental Education & Training Foundation, *Implementation Plan, National Strategies for Health Care Providers: Pesticides Initiative*, <http://www.neetf.org/Health/providers/implplan.shtm>, March 2002, quotes from website description.

²² The National Institute of Environmental Health Sciences website is found at <http://www.niehs.nih.gov/>.

²³ The Canadian Nurses Association website is found at <http://www.cna-nurses.ca/default.htm>.

²⁴ Dr. Michael Shannon, Director, Lead and Toxicology Clinic, Children’s Hospital Harvard Medical School, phone interview, Boston, 2002.

²⁵ “Centers for Children's Environmental Health and Disease Prevention Research,” <http://www.niehs.nih.gov/translat/children/children.htm>, January 2003.

- The Cincinnati Children’s Hospital Medical Center has developed a training program for Ph.D. or post-doctorate students to develop a career in independent research on children’s health and environment.²⁶

Furthering research on pediatric environmental health will generate opportunities for furthering training of health care providers on the linkages between environment and child health.

- An endeavor to increase focus on children’s health and environmental research was instituted by Health Canada when the agency convened a conference to consider various aspects of relevant research in March 2002.²⁷
- The World Health Organization is developing an initiative on collaborative research which aims at coordinating the efforts of selected developing countries and centers of excellence in the area of children’s environmental health.
- The US President’s Task Force on Environmental Health Risks and Safety Risks to Children initiated the National Children’s Study, a longitudinal cohort study of environmental influences on children’s health and development, supported by several United States government agencies. The National Institute of Child Health and Human Development describes this study as one that “will explore a broad range of environmental factors, both helpful and harmful, that influence the health and well-being of children.”²⁸ It will include “chemical, physical, social and behavioral influences on children”²⁹ and, as Dr. Philip Landrigan shared, will surely become a “potent generator” of training in children’s health and environment.³⁰
- As part of the *Cooperative Agenda*, the CEC is promoting interaction among the three North American countries on longitudinal cohort studies, building on the United States National Children’s Study and EPA’s related efforts to promote international collaboration, with a long-term view of having coordinated studies across the continent.

III. Considerations and Lessons Learned

1. **Children’s health and environment needs to enter the mainstream educational program for healthcare professionals.** A general consensus from within the field is that increased time and attention must be given to children’s health and environment in medical educational programs for doctors, nurses and other health professionals. The current situation, largely comprised of voluntary enrollment into training programs for the existing professional core, is not sufficient to equip healthcare professionals with

²⁶ “Research Training Programs in Children’s Environmental Health,” Cincinnati Children’s Hospital Medical Center, Pediatric Environmental Health, Molecular Epidemiology, Cincinnati, 2002.

²⁷ Canadian Children’s Environmental Health Research Workshop, Health Canada, http://www.hc-sc.gc.ca/pphb-dgspsp/cehs-esm/wkshop_e.html, March 2002.

²⁸ National Institute of Child Health and Human Development, “The National Children’s Study: Health, Growth and Environment, website, <http://nationalchildrensstudy.gov/>, Bethesda, MD, 2002.

²⁹ *ibid.*

³⁰ Philip Landrigan, M.D., MPH, Director, Pediatric Environmental Health Center, Mt. Sinai Hospital, email correspondence, New York, December, 2002.

knowledge and capabilities to diagnose, treat, prevent, remediate or advocate to protect children from environmental harm.

2. **Systems for healthcare delivery in each country vary.** In the United States, children regularly visit pediatricians while, in Canada, many children are attended to by family physicians and tend to visit pediatricians upon referral, except in large urban areas where they are more likely to be served by pediatricians. In Mexico, children are often seen in primary health care centers. For purposes of reviewing actions, making recommendations and targeting initiatives, these differences in healthcare delivery are important to keep in mind.
3. **Significant funding is required to support education and post-graduate training.** While money is not the only key to success, the effort needs funding or it cannot happen. National level investment supporting education and research on the environmental influences of pediatric health are pivotal to the continuation of pediatric health and environment as a specialty field.
4. **Education on children's health and environment requires champions.** When funding was provided to several universities in the United States by the National Institute of Environmental Health Sciences, there was sustained progress only in those institutions where a champion for health and the environment led the effort. In cases where the champion moved on, other priorities tended to take over and the field of health and environment faded from the curriculum.
5. **Education and training requires a long-term perspective.** Continued communication, updates and information are key to eventual general acceptance and awareness of children's health and the environment. A single pre-medical class or a continuing education training event is not sufficient to give professionals the confidence with which to carry forward a focus on children's health and the environment. New education and training initiatives must include multiple year funding and commitment to continued support over the long term.

IV. Gap Analysis

Significant work remains to be done in North America in the area of healthcare professional education in children's health and the environment. While several efforts are underway, there is no overall plan for healthcare professional training in any one country, not to mention across the three North American countries. While some governments have become strong leaders in healthcare professional training in children's health and the environment, many of the efforts underway across the region rely heavily upon the leadership of non-governmental organizations, with funds coming from foundations and national governments. Most of the training programs depend on voluntary enrollment. The examples found reveal comparative strength in educational materials, such as modules and manuals. Research is a critical field, as is advocacy, and these are less well supported.

With the general lack of focus on children's health and the environment in existent core health care professional education programs a question of where to begin arises: is it more important to ensure that all healthcare professionals have basic introductory training in children's

health and the environment or should emphasis be placed on in-depth training of a smaller lot of specialists and sub-specialists? To be effective, both approaches are likely to be needed. Given the scope determination, subsequent decisions need to be made on what basic minimum information and capabilities the target group of healthcare providers should have on children's health and the environment. Other questions such as eventual board certification also arise.

Concerted effort could result in increased activity in Canada and Mexico, as most of the undertakings reported currently are funded and advanced in the United States. An enhanced ability to share updates among professionals and across North America is needed, for example, in making information on healthcare provider training easily attainable and facilitating the ability among professionals to provide updates and share materials. As they are developed, standardized questionnaires for environmental exposures in children could be shared, publications could be posted and, as efforts progress, additional lessons learned could be imparted.

V. Opportunities for CEC Action

Within the CEC, there are several levels on which actions can be pursued. The trilateral Children's Environmental Health (CEH) Team, composed of environmental and health officials from the three countries, is continually engaged in collaborative actions to advance the protection of children's health from environmental hazards, particularly those that are outlined in the *Cooperative Agenda*. The CEC Council, comprised of the top-ranking environmental officials from the three countries, can act at the political level and commit to individual or collective action through Council Resolutions. The Expert Advisory Board, a nine-person board consisting of three experts from each country, can make recommendations to Council and help raise the profile of important issues of children's health and environment in North America.

Some options for possible action, intended as a starting point for discussion among the three countries and within the Expert Advisory Board and with potential partners, are listed below.

1. Convene a high-level meeting to raise the political profile of the need to train healthcare professionals in the area of children's health and environment, with the involvement of officials from government, medical boards, public health organizations and other relevant institutions.
2. Promote the inclusion of curricula on pediatric health and the environment in basic undergraduate, graduate and post-graduate health care provider education, and in continuing education and continuing medical education.
3. Gain support through the Fogarty International Center or another donor organization to increase opportunities for fellowships across borders of the North American countries, for example, to invite Mexican nationals to fellowship programs in the United States or Canada and visa-versa.
4. Actively seek funding and support to increase the number of PESHUs across the three North American countries, and use the network to improve education and training for healthcare professionals.

5. Promote concrete means to facilitate information sharing, such as providing access to training materials as well as contact information on trainers, develop a network of experts to share experiences, and promote a network of students in the healthcare arena.
6. Advocate to increase the number of pediatric fellows focused on children's health and the environment in the three countries.
7. Formulate a research agenda for North America on children's health and environment.

VI. Conclusion

Professional associations, national governments, international organizations and local groups are involved in a number of efforts to increase healthcare professional training in children's health and environment. At the same time, much work remains to improve the basic education of healthcare professionals in this field. Core training of healthcare professionals needs to change, necessitating existing programs to incorporate children's health and environment and requiring students to attain core knowledge and capabilities. Significant funding to support education and research is needed. Policy and medical institutions across the region must be effectively engaged.

The Expert Advisory Board has the opportunity to discuss options and determine actions to promote concrete improvements, potentially in collaboration with other groups and institutions. Increased awareness, competency, information and advocacy will boost the field and increase healthcare professionals' abilities to answer questions, advance research, create opportunities for information exchange and lead to healthier children in safer environments across North America.

Annex 1: Website Links Related to Healthcare Provider Training in Children's Health and the Environment

National Government Efforts

http://www.hc-sc.gc.ca/pphb-dgsp/cehs-esm/wkshop_e.html

Health Canada sponsored a March 2002 research workshop on children's environmental health which, among other results, proposed running a longitudinal cohort study. This site provides the agenda and background documents.

<http://www.atsdr.cdc.gov/child/ochchildhlth.html>

The United States Agency for Toxic Substances and Disease Registry (ATSDR) is working to increase access to information on children. Its website states that it will provide information on "sensitive developing systems, such as the immune, nervous, and reproductive systems," and that "important new pediatric and developmental toxicology data are being reported from the [Great Lakes Human Health Effects Research Program](#) and the Substance Specific Applied Research Program."

www.epa.gov

The United States Environmental Protection Agency (EPA) has been a strong national and international leader in healthcare professional training in children's health and environment and offers several points of interest, accessible from its homepage. Specifically related to healthcare professional training, EPA's Office of Air and Radiation offers access to a publication, *Indoor Air Pollution: An Introduction for Health Professionals*. U.S. Government Printing Office Publication No. 1994-523-217/81322, 1994, <http://www.epa.gov/iedweb00/pubs/index.html>, as well as information about the asthma initiative and its partners, including the National Association of School Nurses, <http://www.epa.gov/iaq/asthma/partners.html>. Additionally, EPA's Office of Children's Health Protection supports many of the ongoing healthcare provider training efforts and awareness building activities, with information available at <http://yosemite.epa.gov/ochp/ochpweb.nsf/homepage>.

<http://www.iom.edu/iom/iomhome.nsf?OpenDatabase>

The United States Institute of Medicine (IOM) was a forerunner in promoting healthcare professional training in environmental health. Two key publications, *Environmental Medicine: Integrating a Missing Element into Medical Education*, <http://search.nap.edu/nap-cgi/napsearch.cgi?term=environmental+medicine&submit=Search> and *Nursing, Health and the Environment*, <http://search.nap.edu/nap-cgi/napsearch.cgi?term=nursing%2C+health+and+the+environment> are available on-line in full text at the National Academies press website.

<http://nationalchildrensstudy.gov/>

The United States National Children's Study is a longitudinal cohort study on children's health and the environment, supported by several government agencies. This is a large, long-term study of environmental influences on children's health and development. Updates and information are available on this website.

<http://dir.niehs.nih.gov/dirocr/dukeunc/home.htm> In the United States, **The Duke University Medical Center and the University of North Carolina at Chapel Hill** have a joint program for training nurses and physicians in environmental medicine and health research, cooperating with United States scientists at the National Institute of Environmental Health Sciences.

www.niehs.nih.gov

The United States **National Institute of Environmental Health Sciences (NIEHS)**, supports several activities on children's environmental health and healthcare professional training, including research centers, project and policy related activities. NIEHS also supports a program to increase community outreach of scientific findings, that can be found at <http://www-apps.niehs.nih.gov/coeprc/calendar/0902.cfm>. Also, the *Environmental Health Perspectives* Journal is published by NIEHS, found at <http://ehp.niehs.nih.gov/>.

<http://www.niehs.nih.gov/translat/children/children.htm>

“The United States **Centers for Children's Environmental Health and Disease Prevention Research** are designed to conduct multidisciplinary basic and applied research in combination with community-based prevention research projects.” Access to the research centers is provided through this website.

Professional Organizations and Academic Institutions

<http://www.aap.org>

The United States based **American Academy of Pediatrics (AAP)** published the *Handbook of Pediatric Environmental Health* in 1999 and will release a second edition in August 2003. This provides background on children's environmental health and details on specific environmental contaminants. AAP also hosts a Committee on Environmental Health and has recently established an Environmental Health Nexus, which is a section on pediatric health and environment, opening participation to all AAP members.

<http://www.ambpeds.org>

The United States **Ambulatory Pediatric Association (APA)** recently initiated a three-year post-graduate Fellowship in Pediatric Environmental Health, and has published several articles on children's environmental health in its journal, *Ambulatory Pediatrics*. Listed under Hot Topics, APA also provides guidelines for pediatric residencies, which includes sections on environment and health (see chapters 4 and 8).

www.ana.org

The United States **American Nurses Association (ANA)** has collaborated with the University of Maryland School of Nursing to develop three modules on healthcare provider training, targeting nurses. All three modules were sent to 185,000 ANA members and are available at <http://nursingworld.org/ce/cetan.cfm>.

www.aoec.org

“One of the primary goals of the **Association of Occupational and Environmental Clinics (AOEC)** is teaching primary care health providers about the recognition, assessment and control of occupational and environmental hazards,” states text in the website of this United States and Canadian organization. The association offers an on-line “Lending Library,” that provides a section of teaching material on children’s environmental health. These include case studies and curriculum guides.

www.aoec.org/pesu.htm

Pediatric Environmental Health Specialty Units (PEHSUs) are found in all three North American countries. Access to each of the PESHU websites can be found at the AOEC website listed above. There are numerous resources available at each of the PEHSUs on healthcare provider training and research.

www.apha.org

The **American Public Health Association (APHA)** is a United States based non-profit public health organization. This website provides access to its on-line version of *The American Journal of Public Health* and the biweekly newsletter, *The Nation’s Health*.

<http://www.ehfc.ca/>

The **Environmental Health Foundation of Canada (EHFC)** is a Canadian non-profit organization “dedicated to advancing environmental health in Canada and internationally through the development and implementation of education and research initiatives,” as stated by the website.

www.cma.ca

The **Canadian Medical Association (CMA)** provides access to information, journal articles and other information resources through its website. Its search function delivers several articles on environmental health.

www.cna-nurses.ca

The **Canadian Nurses Association (CNA)** has a conference schedule in 2003 that includes children’s environmental health in several events. Information about this and other events are accessible at its website.

<http://www.cpha.ca/>

The **Canadian Public Health Association (CPHA)** provides access to information updates on national and international public health, as well as access by subscribers to *The Canadian Journal of Public Health*.

<http://www.insp.mx/>

The **Instituto Nacional de Salud Publica (INSP)** is a Mexican non-profit public health organization. This site provides updates on public health in both Spanish and English and offers access to its journal, *Revista Salud Publica de Mexico*.

<http://www.ocfp.on.ca/English/OCFP/Members/Committees/EHC/default.asp?s=1>

Canada's **Ontario College of Family Physicians** offers information from the Environmental Health Committee, including information on environmental history taking and lead exposure. It also provides partial publication of a manual on children and environment, which is the result of a nearly 2-year process of assessing standard setting in the context of environmental health and safety for children.

<http://steer.uthscsa.edu/housecalls.html>

The United States **University of Texas Health Science Center at San Antonio** supports an innovative study program with the goal to develop a protocol for "environmental house calls" for use by medical and nursing schools. The South Texas Environmental Education and Research Center (STEER) offers a training program that includes sending students out on environmental health house calls, targeting houses that have children with asthma.

Non-Governmental Organizations

<http://children.cape.ca/>

The **Canadian Physicians for the Environment (CAPE)** has released its children's environmental health program on line. It includes an introduction to children's health and the environment and is designed as a practical guide to healthcare professionals concerning environmental impacts on children's health.

www.cehn.org

The **Children's Environmental Health Network (CEHN)** is a non-governmental organization based in the United States with the goal of increasing attention to the topic of children's health and the environment. It is a network of professionals in the field and has a strong healthcare provider training component, including a training manual on-line.

<http://www.cich.ca/>

The **Canadian Institute for Child Health (CICH)** is a non-governmental organization based in Canada with the goal of increasing awareness of children's health and the environment, as well as educating parents and health professionals on the topic. It is a charitable organization with leading Canadian experts in children's health serving as advisors to a voluntary board.

<http://www.envirohealthaction.org/publications/>

The United States based **Environmental Health Action** is an organization that offers professional development in children's health and environment, as well as ongoing research in the field. It also provides background information and updates on children's health and environment.

<http://www.medscape.com/px/urlinfo>

The United States based **Medscape** provides access to journal articles. A search on "children's environmental health" delivers several articles on the topic.

<http://www.neetf.org/Health/providers/implplan.shtm>

The United States **National Environmental Education and Training Foundation (NEETF)** has developed a strategic plan on healthcare provider training on the recognition and management of pesticide poisonings. This site links the reader to the PDF version of its strategic plan.

<http://www.psr.org/ceh.htm>

The United States based **Physicians for Social Responsibility (PSR)** provides a strong voice on behalf of children's health and the environment, including the area of healthcare professional training. The organization has developed modules for training in three areas: water, cancer and endocrine disruptors, all of which have substantial children's health elements. A fourth module on pesticides and children will be released in 2003.

<http://psr.igc.org/>

The **Greater Boston Physicians for Social Responsibility** has developed healthcare professional training programs and presented them in various locations throughout the United States. Access to the training materials is provided at <http://psr.igc.org/ihw-training-programs.htm> and many of the materials are available in both English and Spanish.

International Efforts

http://www.cec.org/files/pdf/POLLUTANTS/Children_coop_agenda-en.pdf

The **Commission for Environmental Cooperation (CEC)** approved a cooperative agenda on children's health and the environment in June 2002. This link provides access to the Commission's accord and the outline of work.

<http://www.ijc.org/boards/health.html>

The **International Joint Commission Health Professionals Task Force** is an advisory group of clinicians and experts who provide advice on health and the environment to the international commission that was established to protect boundary waters between the United States and Canada. The Task Force offers a manual on environment and family health, which incorporates children's health and the environment.

www.paho.org

The **Pan American Health Organization (PAHO)** is an international organization in the Americas system and also the regional representative of the World Health Organization. PAHO has developed a strategic plan on children's environmental health which includes activities to promote healthcare provider training in children's environmental health. The most useful site for information on children's environmental health the PAHO system is that of the PAHO technical center on environment, www.cepis.ops-oms.org.

<http://www.who.int/peh/ceh/>

The **World Health Organization (WHO)** provides strong global leadership on improving children's health through improving the environments where children live, play, learn, and work. Included in this effort is a focus on healthcare professional training and the promise for an international resource manual on children's environmental health targeted to an audience of healthcare providers worldwide.