National Institute of
Environmental Health Sciences

ANNUAL REPORT

NIEHS-WHO Collaborating Centre for Environmental Health Sciences

2013–2014

National Institute of Environmental Health Sciences

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NIEHS staff involved with the Collaborating Centre met with staff of WHO and the Pan American Health Organization (PAHO). Seated, left to right, are Agnes Soares, M.D. (PAHO); Marie-Noël Bruné Drisse, Ph.D. (WHO); John Balbus, M.D.; Linda Birnbaum, Ph.D.; Maria Neria, M.D. (WHO); and Luiz Augusto Cassanha Galvao, M.D., (PAHO). Standing, left to right, are Kimberly Gray, Ph.D.; William Suk, Ph.D.; Kathy Prout (WHO); Claudia Thompson, Ph.D.; Michelle Heacock, Ph.D.; Bono Sen, Ph.D.; Jerry Heindel, Ph.D.; Stephanie London, M.D., Dr.P.H.; and Kimberly Thigpen Tart, J.D. (Photo courtesy of Steve McCaw)

I. Background and Terms of Reference

The NIEHS-WHO Collaborating Centre for Environmental Health Sciences was designated September 14, 2013, building on several decades of productive partnership between the two institutions. The NIEHS vision, presented in the Strategic Plan for 2012-2017, is to provide "global leadership for innovative research that improves public health by preventing disease and disability." The NIEHS identifies Global Environmental Health (GEH) as a part of its strategic themes, recognizing that environmental health problems cross national boundaries. Conducting research around the world benefits not just those in areas being studied, but all people who suffer from the same or related environmental health problems. Through GEH, NIEHS continues a tradition of global leadership and collaboration on solving pressing environmental health problems and improving the lives of vulnerable people, both in the United States and around the world.

Directed by John Balbus, M.D., M.P.H., NIEHS Senior Advisor for Public Health, the Collaborating Centre provides a focal point and resource for the Institute to fulfill its global strategic goals. It also provides new opportunities for translating research findings into effective public health interventions.

Under the designation for 2013-2017, the Terms of Reference are to assist WHO:

1. By promoting international cooperation among environmental health research institutes around the world
2. In promoting global awareness of emerging issues in environmental health
3. In the preparation of training materials and support education and training efforts in environmental and occupational health sciences

The NIEHS is pleased to deliver this first annual report outlining activities of the Collaborating Center from September 2013 - September 2014.

II. Collaborating Centre Activities

This section briefly describes the progress made in the implementation of the agreed-upon workplan of the NIEHS-WHO Collaborating Centre during its first year, September 2013 to September 2014. Organized by specific focus areas of activity, the report describes how each workplan activity was implemented, the outputs and products of each activity.

Focus Area 1: Children's Environmental Health

Creation of a Network of Children's Environmental Health Collaborating Centres and Partners

In September 2013, the NIEHS centre began coordinating a children's environmental health network, comprised of eight existing WHO Collaborating Centres. Coordination of the ***network began with a meeting*** of the Pacific Basin Consortium in Hawaii in September, 2013. Representatives of current Collaborating Centres discussed and drafted a roadmap to facilitate communication, harmonize initiatives, and identify research and training needs. The roadmap also included developing targeted publications highlighting children's environmental health. The first of these publications, ***Networking to Advance Progress in Children's Environmental Health***, was published in Lancet Global Health, and publicly marked the formation of the children's environmental health network (Sly et al. 2014). NIEHS supports quarterly conference calls to facilitate networking among the Collaborating Centers, with the first conference call held in June 2014, followed by a second call in August 2014.

On July 11, 2014, ***NIEHS hosted Princess Chulabhorn of Thailand*** and scientists from the Chulabhorn Research Institute, which houses a WHO Collaborating Centre, at its Research Triangle Park, North Carolina campus. Speakers from NIEHS gave presentations describing the new NIEHS-WHO Collaborating Centre and overviews of focus areas, with an emphasis on children's environmental health.

On August 21-24, 2014, Claudia Thompson, Ph.D., Kimberly Gray, Ph.D., and Gwen Collman, Ph.D., of NIEHS attended the International Society of Children's Health and the Environment (ISCHE) retreat in Whidbey Island, Washington. This was the first time ISCHE convened a group of researchers and health professionals to discuss the future of children's health. Nine countries were present and the retreat was planned by ISCHE members and facilitated by the Collaborative on Health and Environment. The meeting included five-minute "ignite talks" on various trends, challenges, and opportunities in the field of children's environmental health. Attendees discussed approaches to sharing science and outreach materials, and ways to collaborate with WHO to enable a larger global presence.

Future Plans

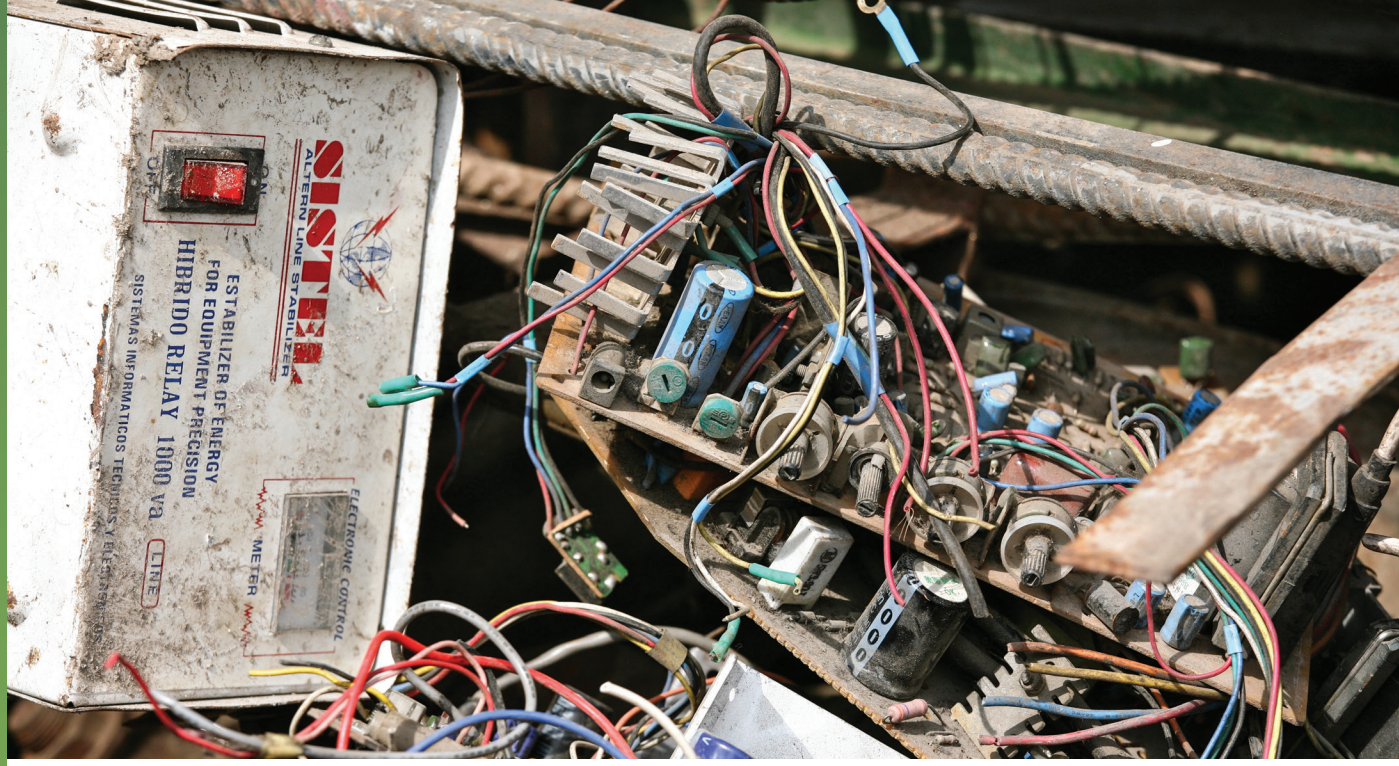
Led by NIEHS, the network is planning to design and host a dedicated website that will facilitate information exchange among the WHO children's environmental health Collaborating Centers. The site will list information on each Collaborating Centre, including purpose, activities, chemical(s) and health effects studied, training being developed or conducted, regional events, relevant publications, and collaborations and collaborators.

This information is currently being collected from each Collaborating Centre. The development of coordinated work activities, a framework, and finalized workplans are ongoing agenda items for all meetings and conference calls. A network newsletter is also being developed to promote coordination among Centres and information exchange between conference calls.

Focus Area 2: Electrical Equipment and Electronic Waste (e-waste)

The importance of electrical equipment and electronic waste (e-waste) as a research topic and health risk has acquired increased visibility through NIEHS in a number of ways. NIEHS supported the June 2013 meeting of health and policy experts at the international workshop on e-waste and children at WHO headquarters, which examined the current state of research and provided recommendations to the WHO. The workshop resulted in the ***2013 Geneva Declaration on E-waste and Children's Health***. A manuscript is being written by NIEHS Focus Area Lead Michelle Heacock, Ph.D., with an international group of about 20 co-authors, to raise awareness about harm to children's health from e-waste and to provide next steps in prevention and intervention efforts to reduce exposure to e-waste.

NIEHS supported the plenary session on e-waste at the 2013 Pacific Basin Consortium meeting and a post-event follow-up meeting. William Suk, Ph.D., co-authored a Lancet article entitled ***Health Effects of Exposure to E-waste*** highlighting exposures, vulnerabilities, and the importance of further research. Newsletter articles in the ***NIEHS Global Environmental Health Newsletter*** highlight the growing body of research in e-waste and help to



inform a broader audience of its impacts. Following the Pacific Basin Consortium Meeting, NIEHS, in conjunction with WHO and other Collaborating Centres, drafted an e-waste training program to inform healthcare providers and researchers.

As part of NIEHS efforts to bring the work of the CEH Network to an international audience, Michelle Heacock presented ***Prevention/Intervention Strategies to Minimize Exposure to E-waste*** at the May 2014 Central and Eastern European Conference on Health and the Environment in Cluj-Napoca, Romania.

William Suk and Michelle Heacock met with U.S. Environmental Protection Agency (EPA) staff involved in children's environmental health and domestic and international e-waste activities, such as recycling and transboundary movements of e-waste.

Finally, William Suk and Michelle Heacock are working with representatives from WHO, Solve the E-waste Problem (StEP), EPA, NIH Fogarty International Center, international e-waste experts, engineers and environmental scientists to develop a workshop to discuss and develop prevention and intervention strategies to reduce exposure to e-waste.

Focus Area 3: Developmental Origins of Health and Disease and Prevention of Early Life Exposures

Increasing awareness of the Developmental Origins of Health and Disease (DOHaD) concept is a primary objective. NIEHS instigated discussions on how to move the field forward, including the development of a global DOHaD network similar to that for children's environmental health.

Activities initiated during this first year include the following:

NIEHS is actively planning and co-sponsoring the fourth international summit of Prenatal Programming and Toxicity (PPTOX) in Boston, MA, in October 2014. WHO is also a conference co-sponsor. PPTOX provides a forum for interdisciplinary discussions on the current research landscape, future directions, and ongoing global implications of early life exposures in research, medicine, and regulation. NIEHS Collaborating Centre leaders are active members of the conference planning and scientific committees for the overall meeting. They have also developed two sessions for the scientific meeting focused on WHO Collaborating Centre interests, which are titled "Developing a Global Definition of DOHaD" and "Developing a Global DOHaD Network."

Conference calls with WHO have taken place to begin a dialogue of joint interests to pursue over the coming years. The three-pronged approach being discussed includes raising awareness and communication of DOHaD and non-communicable diseases; identifying and engaging researchers currently working in this area as well as bringing new researchers into the field; and identifying and communicating public health interventions for reducing avoidable exposures. This approach will be discussed during a post-meeting session jointly organized by WHO and NIEHS. Attendees will seek to set future directions for DOHaD to meet NIEHS and WHO needs and interests.

A series of review articles on various aspects of DOHaD will be published in the journal Endocrinology from presentations at PPTOX IV, as well as a consensus statement on the state-of-the-science.

NIEHS, led by Jerry Heindel, Ph.D., and Kimberly Gray, Ph.D., is initiating the systematic review and analysis of the strength of association between developmental exposures to environmental chemicals and later life disease and dysfunction. This is the first time systematic review methodologies are being applied to DOHaD. Health endpoints being considered include neurologic (both neurodevelopmental/behavioral and neurodegenerative outcomes), cancer, respiratory, reproduction, immune function and obesity/metabolic syndrome. The first systematic review being undertaken will be focused on obesity. WHO is very interested in these systematic reviews and has indicated a willingness to work with NIEHS and to coauthor the reviews. This review contributes to the first step of an international initiative on DOHaD, led by WHO, by providing scientific reviews of the evidence for early life effects.

Focus Area 4: Health Implications of Climate Change and Sustainable Development

NIEHS Collaborating Centre accomplishments related to Climate Change fall into several different categories:

1. Informational activities in international science and policy settings and support for meetings and convening of experts
2. Participation in and support for critical scientific assessments and reports
3. Development of NIEHS resources that serve the global health community

Informational activities in international science and policy settings and support for meetings and convening of experts

Building on the collaboration between NIEHS and WHO in conducting an Expert Consultation on Measuring Health Gains from Sustainable Development (May 17-18, 2012), John Balbus co-authored, along with WHO staff Maria Neira, Carlos Dora, Elaine Fletcher, and Heather Adair Rohani, a Lancet article entitled, ***Indicators Linking Health and Sustainability in the Post-2015 Development Agenda***, published in the Lancet.

As part of a set of activities coordinated with the WHO and related to the United Nations Framework Convention on Climate Change, 19th Conference of Parties (COP19) meeting that took place in Warsaw, Poland in 2013. NIEHS organized an event at the U.S. Center on "Health Adaptation in the United States and Around the World." John Balbus moderated the session, which included participation from Diarmid Campbell-Lendrum of WHO-Geneva, Magaran Bagayoko of WHO-Africa, Carlos Corvalan of PAHO, and Jan Semenza of the European Union Centre for Disease Prevention and Control. The event was the subject of an article published in the ***Environmental Factor***, NIEHS' primary means of communicating with its external stakeholders, in December 2013. A ***video of the event*** was created by the U.S. Department of State.

NIEHS was part of the Technical Advisory Group for the WHO Climate and Health Summit, held August 27-29, 2014. John Balbus spoke as a panel member in the parallel session on ***Strengthening Health Resilience to Climate Change*** and participated as part of the U.S. delegation.

Balbus (Center) and co-presenters at the WHO Climate and Health Conference. Photo courtesy of ***IISD/Earth Negotiations Bulletin***

NIEHS is also working with PAHO to conduct workshops on health sector climate resiliency and other issues related to climate change and health in the Americas, most likely in the context of the bi-annual PAHO Collaborating Centres meeting in 2015.

Participation of and support for critical scientific assessments and reports

John Balbus was a lead author of the ***Health Chapter of the U.S. National Climate Assessment***, which was released in May, 2014. The chapter affirms four key messages that are aligned with the WHO Climate and Health Program's areas of emphasis:

1. Climate change has wide-ranging health impacts, some of which are underway in the U.S.;
2. Certain people and communities are especially vulnerable to health impacts;
3. Public health actions can protect people from some of the impacts of climate change; and
4. Responding to climate change provides opportunities to improve human health and well-being across many sectors.

John Balbus and Kimberly Thigpen Tart, J.D., of NIEHS are authors and steering committee members for a current Climate Health Assessment being conducted under the U.S. Global Change Research Program. This assessment will combine an updated assessment of the climate change and health literature with national-scale modeling of selected health impacts in the U.S.

NIEHS continues to be active in researching and assessing the health impacts of climate change. In addition to supporting extramural research on the health impacts of climate change, NIEHS staff are publishing critical reviews and state of the art commentaries. In May, John Balbus published an article entitled, ***Estimating the Health Effects of Greenhouse Gas Mitigation Strategies: Addressing Parametric, Model, and Valuation Challenges*** in Environmental Health Perspectives.

Development of NIEHS resources that serve the global health community

NIEHS is updating and expanding a bibliographic database of climate change and health literature that was provided to the authors of the USGCRP Climate and Health Assessment. This project will result in a freely accessible, online literature search tool for more than 5,000 references related to climate change and health. It will also include a report on the current published literature on climate change and health that will feature an analysis of funding sources and numbers and types of publications for specific types of health outcomes. This report will be submitted for publication in early 2015.

Focus Area 5: Cookstoves, Indoor Air Pollution, and Child Health in the Americas

Exposure to indoor air pollution from household burning of solid fuels affects nearly half the world's population. These exposures can have acute and chronic health effects, particularly for young children.

In an effort to share the latest science and explore future research needs related to indoor air pollution, NIEHS scientists co-authored ***Household Air Pollution in Low- and Middle-Income Countries: Health Risks and Research Priorities***, published in PLOS Medicine.

In August 2014, NIEHS hosted a workshop focusing on ***Assessing Exposures and Health Effects Related to Indoor Biomass Fuel Burning***. Speakers explored the burden of disease resulting from biomass exposures and the latest science on cookstove interventions. Presenters included NIEHS scientists from the Collaborating Centre, as well as speakers from the United Nations Foundation and members of the CEH Collaborating Centre Network.

Future Plans:

NIEHS is collaborating with PAHO/WHO to determine the most relevant next steps in collaborating on research, training and capacity building, and development of public health guidance related to indoor air pollution in the Americas.

A commentary is in preparation summarizing the discussions of the NIEHS-hosted indoor air pollution workshop and includes future research directions to better understand the exposures and health effects associated with indoor biomass fuel burning.

NIEHS Health Science Administrator Kimberly Gray, Ph.D., served as moderator for a panel during the 'Assessing Exposures and Health Effects' workshop hosted at NIEHS. Photo courtesy of Steve McCaw.

Centre Theme: Promotion of Global Environmental Health Professional Training and Capacity Building

Crosscutting all Focus Area activities of the NIEHS WHO Collaborating Centre are Centre Themes. These themes are included in each area and aim to expand the impacts of Centre activities.

Training and Capacity Building is among the NIEHS strategic themes and an important element of the Centre. Through outreach activities and the development of training, NIEHS aims to reach new researches and build capacity.

Following the Pacific Basin Consortium meeting, a new training on the effects of e-waste on children's health was created by an international team, including NIEHS scientists. The training explores the health impacts on children, possible exposure routes and specifically focuses on educating healthcare providers on their role. NIEHS is helping promote the use of this training through extramural grantees working in Africa and Canada.

In March 2014, Bono Sen, Ph.D., NIEHS training and capacity building focus area lead, traveled to India, and through a partnership with the Public Health Foundation of India conducted a training on ***Research, Writing, and Publication***. This three-day workshop was developed to help researchers from LMICs strengthen their writing and publishing abilities.

Future Plans:

To better understand how NIEHS can support increased and sustained environmental health research and translation through training and capacity building, NIEHS recently conducted a training needs assessment. This needs assessment sought to identify existing resources, gaps, and best practices in environmental health training and capacity building. NIEHS is interested in building a clearinghouse of trainings related to environmental health to improve access to pre-existing materials.

Center Theme: Improving Global Awareness through Multimedia

NIEHS uses a number of outreach strategies to increase environmental health awareness among target audiences around the world. Specifically, the ***NIEHS Global Environmental Health Newsletter***, released quarterly, features research highlights that summarize relevant science, researcher interviews, events of international significance, and links to publications and resources. The newsletter is free to a global audience and includes translated articles to reach a broader audience. Feature articles focus on the implications of global policy that may be informative to decision makers.

The GEH podcast series, ***Global Environmental Health Chat***, was developed to provide first-hand interviews with scientists and decision makers to a global audience. Podcasts are freely available from NIEHS and iTunes© and cover environmental health policy, research and WHO collaborating events.

NIEHS and other NIH Institutes and Centers actively promote sponsored events on Twitter, Facebook, and websites. NIEHS and the Fogarty International Center promoted the WHO-NIEHS Collaborating Center launch event to a wide audience in February 2014 using social media and newsletters. In addition, upcoming events of significance to a global audience, including PPTOX (supporting DoHAD research) and climate change are routinely promoted via social media. An additional dissemination outlet is the NIEHS monthly newsletter, the ***Environmental Factor***, which highlights presentations by staff at international meetings and attendance at WHO or PAHO events, including the Pacific Basin Consortium meeting in 2013. Many of NIEHS' programs and offices

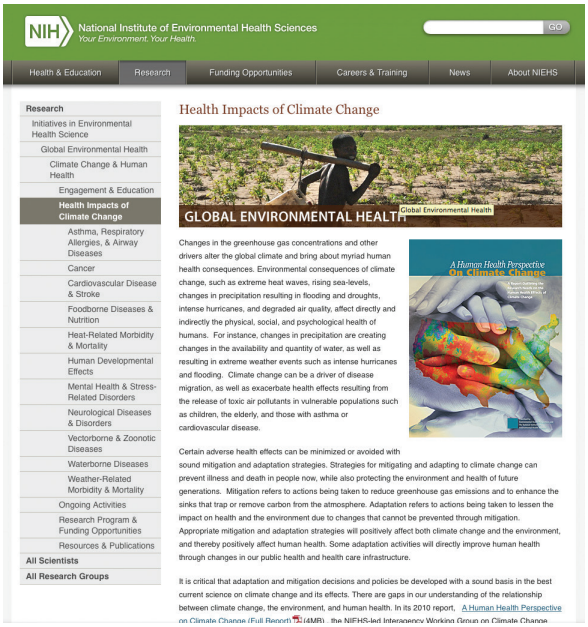
have created newsletters, podcasts, and social media accounts to help promote awareness of environmental health.

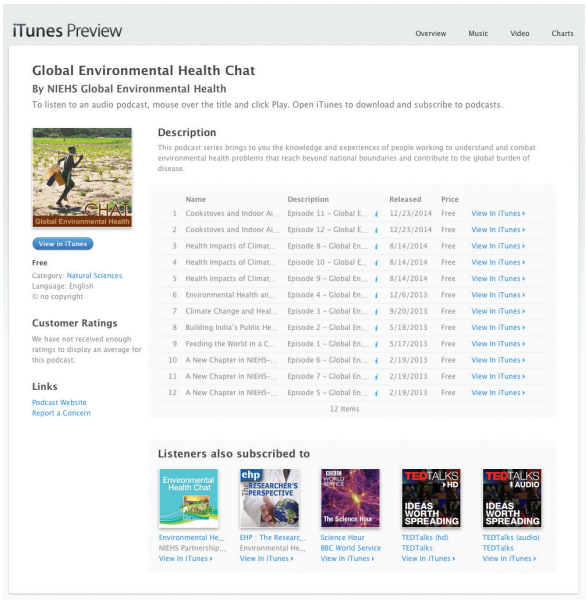
The ***WHO Healthy Environments for Children Alliance's Newsletter*** regularly includes short summaries of articles published by NIEHS staff, grantees, and its cornerstone journal, Environmental Health Perspectives. The newsletter has included stories on the Pacific Basin Consortium meeting, of which NIEHS was a sponsor, and other NIEHS-supported events.

NIEHS is in discussion with PAHO representatives to develop a collaborative webinar series, similar to the ***Global Environmental Health and Sustainable Development Innovation Collaborative*** webinar series held in 2013.

NIEHS and GEH Multimedia

- ***NIEHS GEH Newsletter:***
  http://www.niehs.nih.gov/research/programs/geh/geh_newsletter/index.cfm
- ***NIEHS GEH Podcasts:***
  http://www.niehs.nih.gov/research/programs/geh/podcasts/index.cfm
- ***NIEHS WHO Collaborating Center for Environmental Health Sciences Webpages:***
  http://www.niehs.nih.gov/research/programs/geh/partnerships/index.cfm
- ***NIEHS Environmental Factor Newsletter:***
  http://www.niehs.nih.gov/news/newsletter/previousissues.cfm
- ***NIEHS Twitter:***
  @NIEHS
  https://twitter.com/niehs
- ***NIEHS Facebook***
  https://www.facebook.com/NIH.NIEHS





NIEHS GEH Newsletter (Top) and GEH Podcast Series on iTunes© (Bottom)

VI. Contact information

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