

Partnerships for Environmental Public Health
Request For Information (RFI) Response Analysis

Partnerships for Environmental Public Health: RFI Executive Summary

June 2008

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Introduction

On November 23, 2007 the National Institute of Environmental Health Sciences (NIEHS) released a Notice ([NOT-ES-08-002](#)) soliciting feedback from the public, environmental health researchers, healthcare professionals, educators, policy makers and others with a vested interest in the effects of environmental exposures on public health. This Request for Information (RFI) was directed toward the establishment of a 5-10 year plan for a new, unified program titled, “Partnerships for Environmental Public Health” (PEPH) to promote and advance partnerships for environmental public health. NIEHS encouraged “out of the box, innovative, visionary” ideas and comments to help revitalize, stimulate and shape NIEHS activities in environmental public health.

In the RFI, people were asked to respond to the following questions:

1. What are your needs to address the effects of environmental exposures on public health?
2. Where are the new and/or best opportunities for NIEHS to be engaged in the following areas? What are the roadblocks? (2.A) Development of educational and outreach materials for the following audiences: lay public, students and teachers, healthcare professionals, researchers, policy makers, other groups (2.B) Research: such as - Biomedical research (population-based, intervention, prevention, translational, behavioral), Evaluation research (methods for

- evaluating public health and science education activities), Communication/Dissemination research (Health literacy strategies), and Other research
3. What are the highest priority tools or resources needed to facilitate the opportunities or overcome the challenges you identified in Question 2?
 4. What scientific themes, exposures, health outcomes, or other issues are most important to address in this program? What issues should NOT be addressed?
 5. What specific research approaches (existing and novel) should be a part of this broad-based program?
 6. What new partnerships need to be developed for the PEPH Program? How can existing partnerships be strengthened?
 7. To help us better understand your perspective, please mark the following set of boxes that best describe you. This information will only be used for the purposes of organizing the data and will not be used for other reasons.
 - A NIEHS/NIH grantee
 - A partner on an NIEHS-funded project
 - From the following Audience:
 - Lay Public
 - EHS Researcher
 - Healthcare professional
 - Policymaker
 - Other: _____

Methodology

NIEHS disseminated the RFI through a variety of electronic channels. E-mail lists were the primary avenue for getting the word out on this RFI. In addition, there was a direct link to the RFI from the NIEHS homepage (www.niehs.nih.gov).

NIEHS accepted responses to the RFI until the end of January 2008. NIEHS received over 120 responses from diverse groups across the U.S. including advocates, policy makers, nurses, health care professionals, researchers, public health professionals, urban planners, educators, and representatives of professional societies and federal agencies.

NIEHS received RFI responses in a variety of formats such as e-mail, the provided interactive .pdf form, MS Word documents, regular .pdf documents, letters, and faxes. NIEHS copied and pasted all responses into a spreadsheet for analysis purposes. As NIEHS entered each response into the master spreadsheet, NIEHS assigned it a Response Number. During this data entry process, NIEHS did not change the content of the documents; however, formatting, in some instances, was lost. If NIEHS found typos, NIEHS fixed them. NIEHS did not include the names of the respondents in the spreadsheet.

Using a “Mail Merge” from the spreadsheet into an MS Word document, NIEHS organized all the data by Question rather than by respondents to help us see the variety of responses to each question. The individual responses were clearly identified by a consistent, unique number and separated by a line. Since all questions were optional, not everyone responded to each question. Where individuals did not respond to a question, the response number was listed followed by a blank.

NIEHS formed a small group of NIEHS staff and two NIEHS External Advisory Council members to read through the full 216 page document and discuss the major themes and recommendations. This analysis group met for a full day discussion at the end of May. Following are the major themes and recommendations identified from that meeting with a synthesis of the responses. This document may not capture all responses. The full, un-edited document of responses to the RFI can be found on the NIEHS website.

Summary of Responses: Primary Themes

Respondents to the RFI clearly supported the general concept of an umbrella program that includes many aspects of Environmental Public Health. “Environmental Public Health should be established as a jewel in the NIH Roadmap.” (49) People expressed enthusiasm for NIEHS’ desire to re-establish work in this area.

“We encourage NIEHS to expand its emphasis on environmental justice, community-driven and community-based environmental health research, health disparities, and impacts of the built environment. This emphasis is consistent with NIH’s commitment to cross-disciplinary collaborations and holds the greatest promise for impacting our most intransigent public health problems.” (111)

With 120 different individuals and groups responding to the RFI, there were a wide range of ideas and recommendations. NIEHS has attempted to organize the range of recommendations and comments into the following themes:

1. Research: approaches, exposures, outcomes and populations
2. Communication strategies
3. Evaluation
4. Capacity building
5. Cumulative exposures
6. Interaction between the social and physical environment
7. Built Environment

From the responses received, the first four themes are seen as cross-cutting components that can be used to establish an organizational model for a future program in PEPH. NIEHS has crafted a draft model based on these first four elements (see Figure 1). The remaining issues were highly recommended by many respondents and should be considered as part of a new program.

Research: Approaches, Exposures, Outcomes and Populations

The recommendations received affirm the work that NIEHS has been supporting for the last 15 years.

Approaches

Two primary research approaches were consistently recommended to be a part of the future PEPH vision: community-based participatory research (CBPR) and prevention research. Several individuals noted the value of multidisciplinary teams for each of the approaches listed, “... good environmental health research and training NECESSITATES inter/multi-disciplinary participation --- environmental health questions are too complex to be addressed by any single discipline or group of disciplines.” (119) As another respondent recommended, “This program should try to fund systems research, research that is ecological or multi-level in

nature, and research that focuses on intervention, translation, dissemination, and replication.” (53) Other research areas touched upon include: health literacy (5, 37, 67, 73, 87, 96, 98), science literacy, communication strategies, evaluation research, dissemination research, and behavioral and social science research.

CBPR

Over the last 15 years, CBPR has gained greater recognition as an approach that can add value to some forms of biomedical research. Many respondents noted the value of this approach in environmental public health and recommended that it be central to PEPH. “CBPR approaches, with their emphasis on engaging community and academic partners in all aspects of the research, are particularly relevant for partnerships for environmental public health aimed at examining and addressing health disparities.” (5) However, one respondent commented that CBPR should be used only when appropriate. “[P]rime emphasis must be on the science, and the CPR [community participatory research] should be looked as complimentary to the science in facilitating its application.” (28)

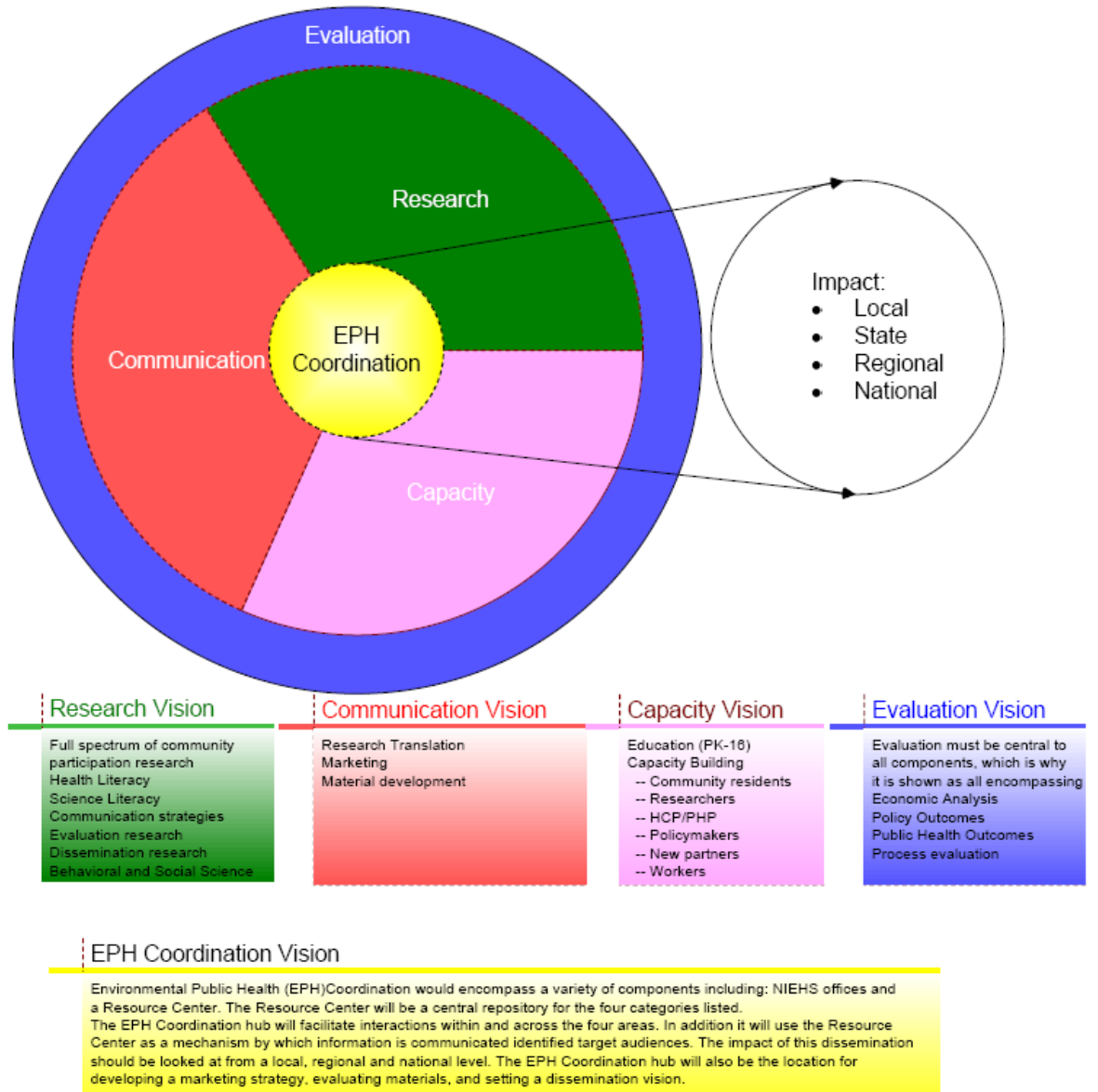
The importance of CBPR to PEPH seems to come from the expressed need for research that addresses the concerns of communities. (46) Throughout the document, respondents commented that research to address environmental public health issues should be guided by the community affected by the work. A major obstacle identified by respondents is the lack of understanding of the CBPR approach by those reviewing proposals in the peer review system

Prevention

Many respondents communicated the importance of prevention. “NIEHS needs to continue to be a strong and loud voice regarding prevention of exposures.” (82) A commonly expressed recommendation was that public health efforts should focus on the reduction or prevention of harmful exposures rather than on the treatment of disease. Some advocated for a systems-based approach that identifies the drivers of poor health and seeks to control them using prevention strategies or a combination of prevention and treatment strategies. Several individuals emphasized the value of utilizing the Precautionary Principle (13, 19, 52, 60, 64), like Europe, which places the burden of proof on companies that a chemical is not harmful to humans.

Within the context of prevention, some respondents expressed the need for community involvement. By building the capacity of community residents and community-based organizations to be involved in prevention and intervention projects, it would help to sustain efforts. Others suggested educational intervention research projects to examine the public health impact of teaching students environmental health concepts in the classroom. (1, 2)

Figure 1: Proposed Model for Partnerships for Environmental Public Health



Exposures

Many different exposures were identified in the responses (see Table 1). As part of the RFI, NIEHS asked if there were any exposures that should be de-emphasized. Only a few responded directly to this question, and the feedback was mixed. A few commented that everything should be on the table. Or topics should be decided by merit of a proposal and not limited prior to the development of a program. However, others recommended that exposures like lead and pesticides should be de-emphasized. While we know a great deal about lead and pesticides, there are local issues that require these exposures to remain on the table. Some individuals suggested that exposures be prioritized, and that communication strategies be developed to address those priority topics to inform the public about potential or known health outcomes. Of greatest concern was the notion of the myriad environmental exposures that the public comes in contact with daily, how to measure the exposures, develop prevention programs, and educate the public about these cumulative exposures and cumulative impacts. For that reason, we have dedicated a full section to that particular topic.

Diseases

NIEHS received a wide range of recommended outcomes to consider as part of the PEPH program. While many respondents suggested traditional health outcomes such as asthma; others emphasized the opportunity of PEPH to focus on complex health conditions that “are both affected by environmental exposures and affect the responses to them, in particular, obesity.” (57) Still others noted the importance of understanding health outcomes that may result from cumulative exposures throughout the life course of an individual since most exposures do not occur in isolation of one another and many exposures begin early in life. (84, 92) Several respondents identified pregnancy and early childhood as a particularly important window for exposure. “In order to give individuals good information about potential lifestyle or environmental changes and their impact on health outcomes, future studies should concentrate on providing ‘whole picture’ information for the general public, so they are able to evaluate what is best for them.” (84)

Populations

The recommendations NIEHS received regarding important populations for consideration in environmental public health projects validate much of the research and outreach programs NIEHS has been funding for the last decade. Recommended populations included: children, elderly, urban, rural, low socio-economic status, Native American, and immigrant workers. Of these, children’s environmental health seemed to be the greatest concern.

Table 1: Exposures of Interest to Respondents

# resp.	Exposure
17	Cumulative Exposures / multiple exposures
10	Air Pollution: PM 2.5, ultrafines, agriculture-related, hydrogen sulfide
6	Endocrine disrupting compounds: BPA, Pthalates
6	Pesticides
5	Nanoparticles and Nanotechnology
5	Water Pollution: VOCs, metals, microbes, pharmaceuticals, swimming pools and recreational waters
5	Built environment exposures
4	Metals: Pb, Mercury
3	Radon
3	VOCs
3	In utero exposures
3	Consumer products exposure
2	Chemicals in food, water, homes, workplace
2	Radiation
2	Diet and nutrition
1	Carcinogens
1	Exposure to inappropriate fish farming techniques
1	Exposure to spills of hazardous materials during transport
1	Cleaning agents
1	Glutaraldehyde
1	Formaldehyde
1	EMF
1	Neurotoxicants
1	PAH (Polycyclic Aromatic Hydrocarbons)
1	Toxins
1	Perfluorinated chemicals
1	Phenols (certain ones)
1	Noise
1	Mold
1	Social stress
1	Occupational exposures

Communicating environmental public health messages

Respondents emphasized the need for innovation and leadership in translating research findings for action and communicating environmental public health messages. (4).

NIEHS could host an NIEHS Director's Research Seminar and webcast/podcast it. A major stipulation would be that the seminar would have to be understandable to a non-scientific audience and would have to discuss both public health and policy implications of the research. (94)

Development of science-based materials

Consistently, individuals noted the need for the development of and access to science-based information for outreach and education to diverse communities, including the public, policy makers, healthcare professionals, developers, nurses, researchers and educators. A common recommendation was the need for materials in foreign languages for immigrant populations.

Respondents listed a diversity of formats and strategies (see table 2). A noteworthy tension that emerged from the comments was the desire for materials and information that address local issues, but the desire also for NIEHS to take a greater leadership role in setting priorities for certain topics. "Although NIEHS, to a certain degree, defines EH research directions, outreach is a process defined by community needs." (58) Some respondents suggested the creation of science-based materials that could be modified to meet local needs. "[NIEHS] should support efforts to develop the materials so that they are locally appropriate but incorporate national standards." (23)

A few respondents emphasized the need for NIEHS to consider and promote the development of new, innovative communication materials and strategies to reach the intended audience.

Many of the scientific materials produced are boring, difficult to understand, and thus not useful to non-academic audiences. NIEHS should network with graphic designers, web developers, and media producers to expand the types and formats of materials available to the public. (41)

Others recommended tapping into existing networks and organizations that are already doing work in this area. (64, 73, 124, 125)

NIEHS should work in partnership with others already doing this work and build off of models already in progress. Provide funding to invest in webinars, conference calls, and online resource centers. There are so many environmental health materials floating around but there are several trusted sources of information in the environmental health community that have risen to the top. ... Working in coalition with these and other groups

would be powerful and an acknowledgement of the human and financial resources already invested in these efforts. (64)

Several respondents suggested that all researchers be encouraged to think about the translation of their research projects. “There is no reason for all research projects not to include a translation component in all phases of the project, especially if they are community-based and participatory in nature.” (41)

Marketing of Environmental Public Health

Marketing is seen as a role for PEPH for two reasons: 1) need to increase national awareness of EPH and NIEHS as a trusted resource of materials, 2) increase pipeline to environmental public health work. (70, 124)

Respondents commented on the continued need to emphasize the connection between environmental exposures and human health outcomes to a broad range of audiences, from the general public to policy makers, to health care professionals. Some noted that there exists a general “lack of awareness of what environmental health is and its importance in protecting the public’s health (within many areas, e.g., education, health care, industry, etc.)” (43) To overcome this recognized obstacle, there exists a need to promote literacy in this particular area. Such work will require many different partnerships at multiple levels.

In addition, the development of marketing materials would be useful in efforts to increase the pipeline of people going into environmental health-related work.

Evaluation was a common theme expressed in the context of material development and communication. This issue is addressed in the evaluation section of the summary report.

**Table 2: Communication Strategies/Products
Recommended by Respondents**

Canned slide presentations
Cell phone applications
Celebrity promotion of environmental health
Continuing Education Units (CEUs) for Healthcare professionals (HCP)
Educational materials
Educator listserv
Flash-based materials
Gaming
Guides: "How to..." green cleaning, green building, purchasing, etc.
Hotlines
Podcasts (e-learning)
Public Service Announcements (PSAs) on specific topics
Pubcasts
Radio
Regular reviews of research findings that can be used by state and local agencies - put into .ppt, video, pamphlet form
Research briefs (policy)
Resource Center: data and materials
Social marketing campaigns
Social networking web space
Talking points
Tool Kits: HCP, community, researcher
Training curricula - prepare HCP, researcher, policy, community members to communicate research findings appropriately
TV: community cable
TV: NOVA-like programming
YouTube-like broadcasts

Capacity Building

For activities in environmental public health to be successful, capacity building efforts were noted as essential. Capacity building includes engagement of existing and new stakeholders, training for a variety of audiences, as well as pre-kindergarten through college education. Historically, the NIEHS has focused on capacity building of community residents, researchers and health care professional so that they can work together in environmental health research projects. In addition, through existing programs NIEHS has promoted training of workers to respond to environmental health hazards, including natural and manmade disasters. NIEHS has also had a long-standing commitment to science education with a focus on teachers and students in pre-kindergarten through 12th grade. Respondents to the RFI noted the value of those efforts, but also identified other audiences to which capacity building and educational efforts should be targeted. They include:

- a. New Partners
- b. Communities and Community-based Organizations
- c. Health Care Professionals
- d. Nurses
- e. Policymakers
- f. Workers
- g. Teachers
- h. Students
- i. Researchers

As part of this effort, respondents noted the need for the development of specific training and educational materials. Some of these materials may overlap with those recommended in the communication section (see Table 2), but others would be specialized for training and education. As recommended by respondents, it will be essential that the materials be created using novel approaches, come in user-friendly formats, be useful to the target audience, and be culturally and linguistically appropriate (112).

New Partners

There were many new partners recommended to be a part of the PEPH program (see Tables 3a and 3b). These potential partners may possess limited knowledge of environmental health and require some degree of capacity building and education to be effective partners in environmental public health initiatives. Fact sheets and other educational resources were identified by respondents as being useful to this group.

Communities and Community-based Organizations

Respondents supported the capacity building efforts of communities and community-based organizations the NIEHS has supported through its Environmental Justice program. (52) They distinguished between ‘communities’

and ‘community-based organizations’ in that they are not always the same, and that each needs to be offered the opportunity for capacity building.

The best opportunit[y] for NIEHS to be engaged in protecting the public health is the training and development of an informed leadership at the community level who will be able to effectively communicate information to strategic stakeholders and policy makers to make the necessary changes. (122)

Respondents highlighted the importance community access to and training on tools that can be used in environmental public health projects. Specifically, monitoring equipment that community residents could afford and use to contribute to the collection of data. Health, science and research literacy were all identified as important elements in this area and recommended to be elements of PEPH. Often the lack of literacy in these areas was cited as a roadblock to environmental public health research. Respondents also recommended training of residents to be leaders within their communities to sustain environmental public health communication efforts and to establish the necessary partnerships to address environmental health concerns. One respondent recommended the creation of Community research centers to build capacity at the local level (117). Others suggested that it would be helpful to develop measures for setting local environmental public health priorities, and provide training to evaluate community-based projects (124).

Beyond training on tools and literacy issues for individuals, respondents noted that community-based organizations need capacity building as institutions (5, 53, 89, 98). The work of CBOs could be enhanced by their ability to hire health professionals, communication experts, and professionals from other disciplines. Several respondents noted the importance of capacity building for CBOs to write grant proposals.

Health Care Professionals

There is therefore a direct need to effectively employ clinicians and health care providers as educators and community leaders to minimize the impact of environmental exposures on child health. It is the role of public health professionals to provide health care providers with the tools and resources necessary to provide effective education to their patients. (92)

Respondents emphasized that health care professionals are important partners in environmental public health projects. However, as one respondent noted the Institute of Medicine (IOM) has repeatedly reported that medical school core curricula do not have a robust section on environmental health. (105) As such, there is a gap that must be addressed. Respondents suggested that the best way of building the capacity of this audience is to offer continuing education units.

(37) Still others recommended resources and materials that health care providers could use in their offices to help them identify and communicate environmental health issues. Suggested strategies included ‘Grand Rounds’ style presentations by environmental health researchers and the creation of talking points that physicians could pass on to patients. (92) A more difficult approach would be to integrate environmental health materials into medical school curricula. (49)

Nurses

NIEHS has tried to find ways to best engage the nursing community over the last 15 years through various public health programs at the institute. Responses to the RFI affirm the importance of working with nurses and highlight the new opportunities that can be pursued as part of the PEPH program. Many respondents emphasized the unique contributions and potential of nurses in environmental public health. “Nurses, in a variety of specialty areas from public health to acute care settings, are often the first point of contact for the public when it comes to environmental health concerns.” (9) So, while they are truly health care professionals, we have created a separate category for nurses. As noted in previous reports (61), nurses reside at the intersection of research, health care delivery, and community. They are seen as trusted sources of health information, and like doctors, their educational core curriculum does not adequately prepare them for environmental public health. (23) Key issues and needs for nurses expressed by respondents include communication tools, assessment tools, educational materials, training on risk assessment and communication, environmental public health education and research centers for nurses, and evaluated exposure reduction materials.

Policymakers

Many respondents noted that environmental public health prevention and exposure reduction strategies are outside the control of individual or community behavior changes. Such changes will require the development of new policies that are beneficial to the public’s health. To accomplish this, respondents recommended the development of materials and resources that are targeted toward policymakers to help them better understand the interaction between environmental exposures and human health. Recommended strategies and resources include town hall style meetings directed at policy makers (122), research updates for state and local agencies (13), and an NIEHS policy liaison to help identify and create a list of key environmental public health issues. (94)

Workers

The NIEHS supports a nationally renowned program on worker education and training for environmental public health. Respondents recognized this and recommended that capacity building of workers also be considered within the PEPH program. Key recommendations for this particular audience included materials and training offered in culturally and linguistically appropriate formats to protect the health of vulnerable workers. Others noted the importance of

providing training to skilled support personnel as they will often be exposed to same environmental conditions as emergency responders. (106) Structured, mandatory continuing education addressing public health needs was expressed to be a valuable contribution to PEPH. Finally, building partnerships among various groups to provide training to environmental justice (EJ) communities that are disproportionately affected by the siting of hazardous waste facilities was seen as an important issue, as residents of these communities are often faced with clean up situations similar to those encountered by skilled hazmat cleanup teams.

Researchers

In much the same way that communities and CBOs can benefit from training to participate in the research process, respondents highlighted the need for researchers to receive training to work effectively with communities. It was thought that researchers could benefit from formal training to improve the dissemination of their research findings. To accomplish this, respondents made several recommendations for training opportunities.

To give capacity building opportunities for working with local communities, it was recommended that NIEHS create small grant awards to build the next generation of scientists who are able to work effectively with communities.

THE NIEHS ONES program is a great program. It can be used as a model for a smaller grant program for new investigators particularly investigators who are studying the linkages between environmental justice, disproportionate and increased exposure, and environmental health disparities.(53)

As noted throughout the responses, the future of environmental public health will require new partnerships that extend beyond the traditional research models. Therefore, several respondents recommended training for scientists on how to work in integrated, interdisciplinary teams involving social scientists, economists, urban planners, community organizations, and others.

In terms of developing the skills of scientists to communicate their research, respondents suggested several different strategies. One was the development of science communication fellowships that could be tied into Environmental Health Perspectives (EHP) the leading journal for environmental health information. Respondents noted several times that EHP could serve as a useful mechanism to help researchers develop the necessary skills to communicate their work. Others suggested promoting the use of Communication Mentors to help scientists craft appropriate messages based on their research findings.

It is clear from the responses to the RFI that communicating research results to policy makers is crucial. Several respondents recommended that scientists receive training on how to communicate the latest research to policy makers.

Teachers

NIEHS has had a long-standing commitment to professional development of teachers. Respondents emphasized the value of this work and recommended that NIEHS continue supporting work in this area because of the impact teachers can have for educating the next generation of scientifically literate citizens within the classroom and in the community. (50, 57)

Most schools, museums, informal science institutions, and community organizations still do not adequately educate teachers, students or families about the connections between the environment and human health. We regard education, particularly education from a scientific point of view, to be the first line of defense in changing personal behaviors, community actions and decision-making at all levels. (51)

Respondents noted that there exist many roadblocks to this type of work. Principally among them is the lack of science content knowledge possessed by teachers and the paucity of time and institutional support teachers have to bring environmental health concepts into the classroom.

With so many US science teachers teaching out-of-field, or teaching without even a minor in a science field—science teaching, in general, is not of sufficient quality. Teaching about environmental exposures, health, and related topics requires a level of integration across subject areas (biology, chemistry, environmental science, health, etc.) that simply is not possible for many teachers. In depth professional development on these topics will be necessary if teachers actually are to use real-world examples from environmental health to stimulate student enthusiasm and learning. (51)

Even though recent research shows that integrative teaching approaches, as promoted by NIEHS, have positive impacts for student learning and teacher skills, the reality is that cultural and institutional barriers exist. Suggested solutions to overcome these barriers include integrating core environmental health concepts into the National Science Education Standards. (1, 2, 43, 50)

Recommended training tools for teachers include a spectrum of traditional workshop-based activities (12) to more innovative resources and communication strategies (1, 2, 37, 43, 51). Mechanisms of providing teachers with the most current environmental health information include “Above the Fold-type news feeds [such as Environmental Health News] (<http://www.environmentalhealthnews.org/>) would be an effective way to give teachers a quick overview of current environmental news. ... Maintaining the student edition of EHP is essential.” (37)

Students

The importance of educating students in environmental health from an early age in the classroom is that it promotes the “development of critical thinking and problem-solving skills by students so that they are able to evaluate complex environmental issues and make well-informed decisions for their own health and that of their families.” (51) In addition, respondents note that such educational intervention projects have the potential for improving health, scientific and research literacy of future generations. Young students are seen as ‘inoculators’ of public health messages, since they are so receptive to them and typically communicate them well to parents and family members. Some respondents stated that students should be encouraged to get involved in environmental public health projects. (54) Others note that such programs impact more than just scientific literacy and environmental disease prevention, “they can also contribute to the recruitment of new, young scientists to the field.” (57)

In light of the identified needs, benefits and historical context of NIEHS’ involvement in science education, respondents recommended the continued development of innovative curricular materials that integrate environmental health concepts across different subject areas. Some respondents recommended identifying core environmental health concepts to promote consistently. (2) Many respondents emphasized the need to evaluate existing curricular materials and any new materials developed on two levels: content and impact. Due to the importance of evaluation, it is addressed in the next section.

Table 3a: Partners within Projects Recommended by Respondents

Advocacy groups
Artists
Association for Schools of Public Health
Bioinformatic Specialists
Community-Based Organizations
Collaborative for Health and the Environment
City council
City MATCH
Childcare providers
Communication specialists (communication materials development)
Community based organizations (take lead in intervention efforts, participate in review)
Community development corporations
Community members
Community networks
Community planners
Communication industry
Consumers
Coop Extensions
COSH department.
County Public Health Departments
Developers
Economic analysis centers
Economists

Education/information & outreach organizations (occupational health & safety training)
Educators
Environmental education community
Faith Based Organizations (FBOs)
Government Agencies (local, state, federal)
Health educators
Home builders
Journalists
Labor unions
Local health agencies
Manufacturers
Media
Midwives
National & state public health tracking networks
Nurses (Alliance, Quad Council)
Oceanographers
Organizations that support developers
Parents
Plumbers and builders
Policy Science
Post docs with Community-Based Organizations
Professional associations American Academy of Nursing American Association of Occupational Health Nurses, National Environmental Health Association National Association of County and City Health Officials Association of Schools of Public Health
Promotoras
Public planning offices
Public policy centers
Public Health nutritionists
Researchers/scientists
Science and math teacher organizations
Schools
Social service organizations
Social workers
Sociology
State legislators
State outreach centers
Surgeon general
State departments of education
State departments of health
Students
Teachers
Teaching colleges
Training organizations
"The alarmists"
US Climate Change Science Program
Utilities companies
Worker education & training

Table 3b: Partners with NIEHS Recommended by Respondents
Advocacy groups
Breast and Cervical Cancer Control Program
Collaborative for Health and the Environment
County Public Health Departments
Government Agencies (local, state, federal)
Federal agencies <ul style="list-style-type: none"> OSHA (Occupational Health and Safety Administration) Mine Safety & Health FEMA (Federal Emergency Management Agency) CDC (Centers for Disease Control and Prevention) EPA (US Environmental Protection Agency) HUD (Housing and Urban Development) ACF (Administration for Children and Families) DOT (Department of Transportation) DOE (Department of Energy) DOD (Department of Defense) USDA (US Department of Agriculture) ATSDR (Agency of Toxic Substances and Disease Registry) NOAA (National Oceanic and Atmospheric Administration) National Institutes of Health: other Institutes and Centers National Science Foundation
National Childrens Study
Professional associations <ul style="list-style-type: none"> American Academy of Nursing American Association of Occupational Health Nurses, National Environmental Health Association National Association of County and City Health Officials Association of Schools of Public Health American Public Health Association
Foundations
Public Health Laboratories
Universities
Television affiliates
Nurses (Alliance, Quad Council)
US Climate Change Science Program

Evaluation

It is clear from the responses that the extramural community sees an all-encompassing need for greater work in evaluation in the areas of research, communication and capacity building. It is also evident that there exists a need for capacity-building and tool development in this area.

Research

“Responsible science requires that action result and be measured: exposure reduction, decreased disease, [and] increased quality of life.” (49) Respondents highlighted the desire to evaluate and test the outcomes of CBPR and prevention research approaches. If the scientific community is to promote them as valuable research approaches, it would be important to evaluate their impacts. “Evaluation research can also be participatory and include communities. NIEHS should fund projects that include community members in the evaluation of project accomplishments, which will require training of community members, of course.” (41) Within this area of evaluating research outcomes, several individuals expressed the importance of economic analysis of public health interventions as well as behavior change. In addition, individuals recognized the need to evaluate research tools being used, especially survey instruments.

Communication

Since communicating environmental health messages to have an impact on public health is central to this topic, many respondents expressed the need to evaluate the efficacy of educational and outreach materials and strategies. (51, 57) If new and innovative materials and strategies will be developed, evaluating their format, content and outcomes will be essential, especially if NIEHS wishes to market the strategies broadly. (43)

Capacity

In the area of training and education, there is an expressed need for evaluation to determine the efficacy of educational projects and materials. (43) However, there exist two major obstacles: tools and resources.

Evaluation is a tremendous need for all educational/outreach activities. The truth is that we cannot budget enough for an effective evaluation plan. Somehow the community of EHS educators needs to share resources and plans for effective evaluation. (35)

We struggle in science education to find evaluation models that are sufficiently rigorous to demonstrate that instructional programs are effective with teachers or students and also are cost efficient. (51)

Tools and training

The majority of respondents commented that the biggest roadblock to evaluation is the lack of tools. Respondents noted the following tools and training materials that could be useful for their work in this area. They include:

- Successful models documents
- Evaluation research metrics
- Template for evaluation questions and tools – must be modifiable to meet local needs
- Mechanisms to share evaluation tools designed to assess programmatic impact and outcomes
- Training website for evaluators
- Web-based tools
- NIEHS evaluation experts as resources to grantees
- Promote partnerships to insure evaluation expertise is a part of environmental public health projects
- Establish a national committee of evaluation experts
- Validation tools
- Guides for conducting randomized trials
- Community involvement performance measures

Cumulative Exposures and Impacts

Many respondents identified cumulative exposures and their potential health effects as a major area of concern since they are more reflective of 'real life.' They communicated this issue in terms of 'mixtures' and 'chronic low-dose exposures' and 'multiple exposures over the life course.' Respondents encouraged NIEHS to examine the impacts and risks of exposures that individuals may come in contact with as a result of where they live, work, and play. This dovetails with exposures found in the Built Environment and social factors in all environments which is described in more detail in the following sections.

This program [PEPH] should focus on funding research that performs more comprehensive exposure assessment that takes into account cumulative impacts and aggregate exposures for disparately burdened populations from multiple emission sources, across multiple pathways, and through air, water, and soil media. (53)

The one chemical-one disease model has been proven ineffectual in identifying causes of cancer and in the identification of prevention strategies. We know that certain chemicals display a synergetic effect on health impacts (radon and smoking and lung cancer). It is obvious that the multitude of chemicals that we are both exposed to and harbor in our bodies interact and affect our risk for disease--we must begin to direct resources toward that research. (19)

Workers may have environmental exposures due to their job, the community they live in, at home, and because of their lifestyle. As an example, a worker may have noise exposure from working with loud equipment, noise exposure because they live in the flight path of an airport, noise exposure from cutting their grass, and noise exposure from riding motorcycles for a hobby. The cumulative effects of exposures from all of these sources is unknown and needs further investigation. Longitudinal studies over the life cycle of a group that would represent working men and women could offer a great amount of valuable information on exposures' effects when multiple exposure to a single hazard or exposure to multiple hazards when these occur in the "real world". (4)

Respondents emphasize that this area of research is still emerging and that there are many needs to enhance work in this area. "Methods of quantifying cumulative impacts, and creating the data needed for cumulative impact assessment, are still in early stages of development, and could use more research." (76)

NIEHS was reminded that community involvement will be crucial to research on cumulative exposures. By its nature, research will need to include a great deal of monitoring from the personal level to the community-level. To do so, community residents will need to be partners. Their involvement will likely enhance the research and will hopefully advance more public health friendly policies on a variety of social,

political and development issues. “Community residents and members of community groups feel empowered when they do their own community monitoring, such as counting traffic or using ultrafine particle counting devices.” (94)

Further, research that looks at the cumulative impacts of environmental contaminant sources on affected persons and the correlation with overall stress levels and impaired health. For example, unless community residents demonstrate a cause and effect relationship between a specific industrial emission and health outcome, a permit will proceed given that it meets air quality criteria air pollutant standards. Little consideration by the permitting agency is given to the cumulative impact of numerous air quality emissions on the affected community's health. (16)

Respondents recommended that such research should focus on the full life course (in-utero to old age) of individuals. (84, 105)

Respondents identified the need to develop new or refine existing technology and tools. “The project partners expressed great interest in developing methods for the improved assessment of multiple environmental agents-in short being better able to evaluate cumulative risk.” (100) Some respondents noted expressed the need for validated survey instruments that can be used by community residents to assess a variety of local, neighborhood factors. (24, 76)

[We need the d]evelopment of methodologies to better assess combined exposures and cumulative impacts, and be able to integrate that information into the regulatory framework as well as policy and prevention strategies. (105)

Research in cumulative exposure and impact will require tool development in monitoring at the personal and community levels. (33, 69, 72, 90, 94)

Interested and trained community residents offer a huge cadre of “community monitoring volunteers” that are being underutilized because there are few validated community level monitoring tools for air pollution constituents. Funding the development of affordable and portable monitoring instruments, sensors, GPS devices, etc. would greatly enable the ability of outreach programs to engage community members in community-based “pilot studies” and potentially enable trained volunteers to participate in formal scientific studies with stipends for placement of monitors (which could be verified by cell phone photos). (94)

As part of the technology and tool development discussion, respondents also noted the need for inclusion of biomonitoring. (90, 125) “We also encourage development of new personal exposure measurement and biomonitoring techniques and studies of cumulative impact and effects of mixtures.” (52)

Communication and material development will also be essential for this cross-cutting topic. As noted by respondents, communities want to know more about the potential

health outcomes from cumulative exposures. They want to know risks and how they can minimize the risks from developing diseases. To this end, there is a need for outreach and education materials targeted to communities. Respondents also identified the importance of educating policy makers about cumulative exposures and health outcomes.

Providing community members and non-profit organizations with materials on the cumulative impacts of multiple emission sources on health in an easily-understood manner, perhaps, as a power point presentation, would be extremely helpful. (16)

... it is critical that we begin to study and appreciate the complexity of environmental public health and help the public understand that in almost all cases, health is determined by a combination of genetics and many environmental exposures. Themes that are important to cover are: complexity, interactions (synergistic and cumulative effects), low dose exposures, endocrine disruption, the importance of prevention (not detection and screening but truly preventing disease), epigenetics and precautionary approaches to public health. (64)

Utilizing the effective leadership and research of all of the partners and collaborators is essential. For example, promoting the need to addressing cumulative risk assessments prior to allowing air quality permits, conducting a community risk assessment prior to approval of a new development, or defining the criteria for a "vulnerable Community" are regulations which can be modeled after current regulations or laws in other states. (122)

Social and Physical Environment Interaction

Many respondents recommended that NIEHS address both the social and the physical environment when considering health outcomes. The predominant concepts communicated within this topic area were health disparities and environmental justice. In particular, respondents emphasize the need to better understand the complex interaction of the two environments. Specifically, how influences from the social environment may lead to disproportionate environmental exposures in vulnerable populations, which may lead to more adverse health outcomes in those populations. As one respondent noted, it is important to understand “How social inequality and community psychosocial stressors amplify health impacts of pollutant exposures.” (126) However, another respondent commented that the potential healthful effect of the social environment must be considered also. (89)

We recommend that the PEPH Program incorporate attention to both social and physical environments, and that emphasizes the interface between socioeconomic inequalities, physical and social environmental exposures and their cumulative impact on the health and well being of low-income communities of color. (5)

The program should fund work that assesses the intersectionality of environmental and social determinants of health, disproportionate burdens and impacts of land uses, environmental health hazards, and pollution on communities of color, poor and disadvantaged populations, ,marginalized and disenfranchised groups such as Native Americans and immigrant groups who all can be classified as vulnerable populations. (53)

It is of critical importance that we understand how the role of the social as well as the physical environment impact health and how the interaction of the two may contribute to differential exposures to environmental hazards or protective factors, and that we understand how social inequalities may interact with environmental exposures to modify (exacerbate or reduce) their effects on health. (89)

We recommend that the PEPH Program develop an overarching framework for its proposed work that emphasizes the interface between physical and social environmental exposures and their cumulative impact on low-income communities of color that are experiencing health inequalities. Such a framework would guide the development of research partnerships aimed at gaining an increased understanding of these exposures and the mechanisms through which they impact health disparities, and addressing these exposures through evidence-based interventions and policy changes to reduce and eventually eliminate health disparities. (96)

For epidemiological studies, they must take into account complex social, economic, behavioral, and environmental conditions (physical, biological, chemical, and built environment) at multiple levels (e.g., home, workplace, neighborhoods, and community/population influences). (104)

We strongly urge NIEHS to increase its attention to health disparities as a fundamental aspect of environmental health, and to increase its emphasis on research into social inequalities in environmental exposures and the role of these exposures in mass disease. (111)

These recommendations emphasize the importance of continued research in health disparities. As several respondents noted, the work must generate evidence-based interventions as well as lead to evidence-based policy changes that could eventually lead to reduced disparities. Research, training and outreach in this area would include many aspects of work currently supported by NIEHS including environmental justice, health disparities, and built environment.

Respondents also emphasized the importance of training researchers in this area, since a focus on the intersection of social and physical environments will require a greater set of skills than one researcher typically possesses. Respondents also identify the need to develop new partnerships with social scientists, economists, and health policy experts to conduct research in this area. As part of building partnerships, some recommended that the NIEHS work with other federal agencies, such as the National Science Foundation, with a history of funding social scientists.

The focus on the social environment will require communication and education strategies that engage policy makers. As noted in the Capacity Building section, there will be intervention strategies that extend beyond personal behavior changes, and require policy development that are beneficial to the public's health. As such, research will need to be translated and communicated in ways that are appropriate and understandable to decision makers.

We recommend that the PEPH program support research into community and policy strategies for change, such as the conditions under which communities are able to mobilize effectively to address social and physical environmental conditions that contribute to adverse health outcomes, and the long term implications of policy changes for such exposures. (5)

Built Environment

Respondents emphasized the importance of research and outreach that focuses on the built environment.

Definition of the Built Environment: It encompasses all buildings, spaces and products that are created, or modified, by people. It includes homes, schools, workplaces, parks/recreation areas, greenways, business areas and transportation systems. It extends overhead in the form of electric transmission lines, underground in the form of waste disposal sites and subway trains, and across the country in the form of highways. It includes land-use planning and policies that impact our communities in urban, rural and suburban areas. ([RFA ES 04-003](#))

The above definition is from a Request for Applications issued by the NIEHS to address the impact of the built environment on obesity in humans. Various aspects of the built environment and their impact on human health are being examined by grantees within different research programs at NIEHS. Respondents list myriad issues that would benefit from research; some of which encourages the examination of healthful outcomes of built environment interventions. (36) Comments covered issues from smart growth, to sustainable development, land use, design for the environment, food production, food access, green building, and environmental justice issues (siting of landfills, incinerators, traffic routes, Superfund sites, sewage treatment plants, industrial farm operations, etc.).

Respondents noted that research on specific exposures such as air pollution as it relates to the built environment is important. As one person noted,

Air pollutants continue to be the most significant environmental exposure in our communities, and research that can be used for land use, zoning, and building code guidance is needed. The development of standards for counts of ultrafine particles would be valuable for communities that are close to freeways or other combustion sources that produce very high levels of ultrafines close to the source, whereas current air quality standards are based on PM_{2.5} mass. (76)

Another key issue is that the built environment needs to be seen as one component of the social and physical environment.

We need to examine how risk and protective aspects of the social and physical environment: a) may be more prevalent in some neighborhoods than others and why; b) may interact with other factors to compound the effects of exposure; and c) may result in greater exposure of some groups based on, for example, location, economic status, ethnicity. (89)

For epidemiological studies, they must take into account complex social, economic, behavioral, and environmental conditions (physical, biological, chemical, and built

environment) at multiple levels (e.g., home, workplace, neighborhoods, and community/population influences). (104)

At a time when the notion of smart growth communities are being championed as healthy alternatives to the current sprawl model, it is important to consider evaluation projects. Smart growth initiatives need to be evaluated for their claims to benefit the public's health. To do that effectively, baseline measurements need to be taken to examine the true impacts of smart growth initiatives. (26)

Often it is simply assumed that the new projects being proposed will essentially automatically result in improvements in public health. In many cases—on a site specific basis—that may be a valid assumption. However, such a result is not universal and a well documented failure—one that impacts public health severely as an unintended consequence—will likely have negative impact on the future of Smart Growth initiatives. (26)

Many of the same tools identified for use by communities in social environment projects and community-based projects are applicable to research in the built environment. The development of inexpensive, easy to use, and mobile monitoring equipment can be useful to collecting data. Personal monitoring equipment would also be beneficial. Survey instruments, GIS mapping software, and other tools were identified as essential to research built environment issues. Some respondents expressed the value of developing tools for the construction of non-toxic homes.

Partnerships and capacity building will be very important given the complexity of this particular topic area that reaches beyond the mission of NIEHS.

NIEHS is encouraged to seek new federal agency partners for joint funding of RFAs in the area of air pollution, including the Federal Highway, Federal Railroad, and Federal Maritime Administrations of the U.S. Department of Transportation, which in a new Administration may be more willing to address environmental health issues in communities where highways, rail yards, rail lines, and ports are being considered for construction or expansion. These federal agencies have few, if any, environmental health scientists on their staffs and little independent understanding of environmental health research and how research findings should be legitimately considered in the environmental reviews of infrastructure projects. Thus, the latest scientific research results are virtually being ignored by these federal agencies and those state agencies to whom they provide guidance. (94)

Since much of the work in this area will require research approaches utilizing a variety of community partnerships, building local community capacity will help residents become even stronger partners in the research process for all the reasons mentioned in the Capacity Building Section. Respondents note that community leadership will be crucial for built environment issues. Having strong community leaders who are able to communicate science-based information to decision makers will be essential. Some

respondents noted the importance of building partnerships between environmental health science centers and State Departments of Transportation to communicate the latest environmental health science research as it relates to health outcomes of children living or going to school within close proximity of busy roads. (94)

Respondents recommended a variety of communication strategies and material development opportunities. Guides for green building and green cleaning can be helpful tools for the public to utilize at home as well as for business so the work environments and built environments are clean. (8) Curricular materials for use in schools that help students understand the interaction between the built environment and human health. (2) Podcasts and/or webcasts of presentations by the NIEHS director on the latest environmental health research in this area could be useful for educating a wide variety of audiences.

Emerging Issues

Through this RFI process, the NIEHS also received recommendations to focus on several emerging areas in environmental public health. The two most prominent were Nanotechnology and exposures to nanoparticles (4, 15, 21, 41, 61, 72, 73); and Global Climate Change. (1, 3, 8, 9, 14, 15, 21, 34, 43, 53, 61, 67, 106, 117)

Specific topics for research that promise to be major issues in the near future are nanoparticles, their potential health effects. Another area that can have a hug[e] impact on public health is carbon emissions. Research to determine the best way to operate buildings and facilities more efficiently and "greener" to reduce the "carbon footprints". (4)

The issue of nanotechnology relates to concepts of precautionary principle as well as long-term low-dose exposures and the unknown health effects that may result. Respondents noted the lack of data at this time and the many uncertainties about how nanotechnology may affect health. (73, 21) To date, NIEHS has supported little extramural work in this area.

Many respondents recommended that NIEHS consider global climate change as a central component to the new PEPH program. As one person suggested, "Climate change and environmental health is a promising 'umbrella' because it embodies interactions, preparedness, education, and adaptation". (15)

Climate change and the health effects from it must be addressed in coming years. Particular attention should be paid to how populations with varied socio-economic backgrounds are affected and to note if there are any apparent health disparities resulting from climate change-related health outcomes. (67)

Respondents emphasized the complexity of global climate change and its intersection of social and physical environments. A few respondents also noted the health disparities and environmental justice aspects of global climate change, commenting on the need to consider disproportionate impacts of global climate change on vulnerable populations. Respondents also highlighted that global climate change presents opportunities for PEPH to focus on communication and education efforts.

Final thoughts

Since the early 1990s, NIEHS has had a prominent role in environmental public health. The institute developed many different programs to address the myriad environmental health issues facing communities across the US. While some degree of coordination among the different programs has existed, there has not been a strategic vision to strengthen the overall impacts. Using the RFI mechanism to solicit feedback from the extramural community is the first step in developing this coordinated vision. Through the RFI process, NIEHS learned from respondents that there are emerging opportunities for the institute to take a stronger leadership role in environmental public health.

Most striking were the many recommendations for NIEHS to take a stronger role in communicating environmental health information, and to use and promote more innovative communication strategies. An underlying theme in the Communications Section is the expressed need for leadership. As one respondent succinctly states, “The NIEHS should not ‘just leave it to others’, but should lead in the development of a structured, national program with other agencies.”(49) While another commented, “A national effort to get appropriate exposure information out to decision makers and the public (like the efforts for diet, smoking, and exercise) is overdue.” (40) As part of this, was the recommendation for a well-coordinated national approach in partnership with the NIEHS Office of Communication and Public Liaison to communicate important environmental health concepts and promote scientific literacy. (58)

As evidenced in the Communications Section of this report, central among respondent recommendations is that through the PEPH program NIEHS should explore the use of new communication strategies to reach target audiences more effectively. As one person expressed, “If NIEHS wants to get their knowledge out, they will have to give some thought to using these more contemporary forms of education delivery.” (73) Principal among the more contemporary strategies is the use of social marketing and social networks, both of which are unexplored opportunities.

An important, underlying theme throughout the report is the need for NIEHS to take a leading role in developing new and strengthening existing partnerships to better address the complexities of environmental public health. While NIEHS has worked with State Departments of Public Health in a few of the institute’s public health programs, NIEHS has not actively engaged State Environmental Health Departments. Responses to the RFI highlight different opportunities to engage the departments to help them fulfill their mission.

Many respondents recommended increased coordination among the federal agencies doing work in environmental public health. They noted that the complexity of environmental public health will require partnerships among other federal agencies that have not historically been a part of environmental health discussions. (see Table 3b) Respondents expressed the need for coordination among agencies actively engaged in environmental public health to help the public and policy makers better understand

how federal dollars are being used to address environmental health issues, and to minimize duplication of efforts. In addition, such coordination can help establish clear environmental public health messages, which can, in turn, improve the public's health.

The respondents have articulated many diverse and complex challenges for the future of environmental public health. These comments are all valuable in helping to point out critical needs and opportunities for advancement of the field. Respondents spoke to the critical role that NIEHS can play in the development of the discipline and for varieties of supports that are needed for success. These recommendations fit into four key areas: Communication, Research, Capacity Building and Research. The feedback also serves to remind NIEHS to retain a balance in the overall environmental health science portfolio without heavy emphasis on one approach over another. It is with these responses and other inputs that NIEHS will move forward to create an integrated vision for a coordinated umbrella program that will be called Partnership for Environmental Public Health (PEPH). Based on this new vision, NIEHS will design a number of funding opportunities and resources to fuel the development of this field now and sustain it in the future.

Acknowledgements

NIEHS wishes to thank everyone who took time to respond to the Request for Information. Your input is valuable to NIEHS, because your feedback insures that the institute uses its limited resources wisely.

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