



# Communication Research in Environmental Health Sciences: Environmental Health Literacy

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NIEHS Building 101, Rodbell Auditorium • Research Triangle Park

## Meeting Report

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The 2014 Partnerships for Environmental Public Health (PEPH) Annual Meeting, **Communication Research in Environmental Health Sciences: Environmental Health Literacy**, brought together more than 120 researchers, community leaders, and government representatives to advance the field of environmental health literacy (EHL). During the three-day event, participants shared innovative tools and strategies to increase EHL, worked together to define the parameters of EHL, highlighted the importance of communication research to environmental health sciences, identified EHL evaluation and validation tools, and proposed next steps to move the field forward.

The meeting was organized to foster dialogue and idea sharing. Attendees engaged in small group discussions after each of the four [meeting sessions](#). Poster presentations also stimulated conversations among meeting participants – 26 [posters](#) highlighted community-engaged research projects and efforts to increase and evaluate EHL. The meeting closed with a day of hands-on [workshops](#), which covered a range of topics, including introducing EHL to health care professionals and in the classroom, developing EHL evaluation metrics, promoting cultural communication, and using tools to engage communities in research.

The meeting focused on four key themes, described below, and led to a number of key recommendations.

### Defining Environmental Health Literacy

EHL is an emerging and evolving field that bridges theories from many disciplines. Most notably, EHL is rooted in concepts from health literacy and risk communication. While EHL and health literacy share many critical elements, an important and defining distinction is EHL's focus on preventing and reducing environmental exposures to improve public health. The goal for improving EHL is to enable people to take action to reduce, mitigate, or prevent environmental exposures that may lead to poor health.

EHL also shares many similarities with the field of risk communication. Successful strategies to communicate and educate the public about environmental risks can inform methods to raise EHL. Environmental literacy, environmental education, and safety culture are additional fields of influence.

As with many new fields, there are currently several ideas about what makes a person literate in environmental health sciences. At its most basic level, EHL is the understanding of the link between environmental exposures and health. However, there are multiple levels of environmental health literacy and this definition simply sets the foundation.

Building upon this definition, PEPH Program Lead, Liam O’Fallon, presented a new model to illustrate EHL as stages in increasing comprehension, application, and creation of knowledge. The EHL model is based on Bloom’s Taxonomy, a widely accepted model of educational attainment that uses a hierarchy to track student progress. Adapted from Bloom’s Taxonomy, the EHL model uses six action verbs – recognize, understand, apply, analyze, evaluate, and create – to define the progression of environmental health literacy. As the level of EHL increases, an individual moves from simply recognizing and understanding environmental health information to applying that knowledge to improve health.

Marti Lindsey, Ph.D., from the University of Arizona, talked about the key skills an individual needs to fully understand the link between health and the environment. EHL starts with obtaining environmental health information. Once a person identifies a source of information, a number of skills are required to process the message, including basic literacy, science and health literacy, graphic literacy, numeracy, and critical thinking skills to determine the credibility and validity of the information source and message.

Panelists also noted that many external influences shape how the public views environmental health. Symma Finn, Ph.D., NIEHS, discussed how cultural movements in the arts, literature, and film can expand the reach of a message and influence public perception of environmental risk. Similarly, because of changing communication modalities people now have greater access to credible and sensationalized health information alike. Katherine Rowan, Ph.D., from George Mason University, touched upon issues of science in the media, presenting a step-by-step model that scientists can use to ensure their environmental health message is accurately portrayed to the public.

Belief systems also influence how individuals perceive environmental health and should play a role in health messaging to specific populations. For example, Jamie Donatuto, Ph.D., and Larry Campbell, of the Swinomish Indian tribal community, discussed how the Western view of physical health does not incorporate many elements that are integral to Native American definitions of health, such as family, community, environment, and culture. To address these cultural differences, they developed a set of Indigenous Health Indicators specific to tribal communities. These health indicators allowed them to better evaluate and manage tribal environmental health risks and impacts.

Speakers emphasized the importance of viewing EHL in a larger context by examining how cultural influences, the media, and advances in technology and communication impact public perception of environmental health. Knowing your audience will inform which tools and approaches will work best when developing and delivering your environmental health message.

## Diverse Audiences

Individuals, communities, and professional groups have different needs when it comes to learning, understanding, and applying environmental health information. To develop EHL as a field and improve EHL in all aspects of society, researchers must examine it in the context of its different purposes and different recipients.

Effective health messages are personally and culturally relevant. At the community level, it is important to understand the beliefs, values, customs, knowledge, and experiences that shape perception of health and the environment. Formative research can be a valuable approach to gain insight into how a community views environmental health, determines the importance of issues, and identifies information sources.

Neasha Graves, from the University of North Carolina-Chapel Hill, described how conducting focus groups, interviews, and surveys helped her team learn that their target audience, young African American women, primarily get health information from electronic sources. In response, they revised their original communication plan and instead developed an interactive website to deliver their health message. Graves also noted the value of collaborating with community advisory boards (CABs) to better understand community concerns, values, and information needs.

In general, the public views health care professionals as trusted messengers of health information. A health care community that understands the link between health and the environment can translate research findings into information patients and families can use to improve their health. However, as several presenters noted, environmental influences on health may be overlooked during medical training or patient visits.

Speakers highlighted several unique considerations and approaches to increase EHL in the clinical setting. For example, Mark Miller, M.D., of the University of California-San Francisco Pediatric Environmental Health Specialty Unit, presented a toolkit designed to help pediatricians include preventative environmental health messages during well-child visits. The visually appealing toolkit contained simple and clear messages, making it easy to use by health care providers who are often pressed for time with patients. Even more, the toolkit was endorsed by the American Academy of Pediatrics, which made it an instantly credible resource to healthcare providers. Case studies, a familiar and relatable way of learning in the medical community, can also be a powerful approach to increase EHL among healthcare professionals. Train-the-trainer workshops were also noted as an effective way to expand the reach of a health message and build EHL among medical professionals.

EHL is also important in the occupational setting. At the individual level, messages should focus on prevention while raising awareness of environmental hazards in the workplace. At the organization level, increased EHL can result in a safer workplace environment by encouraging hazard removal, risk reduction, and safety culture. Mitchel Rosen, Ph.D., from Rutgers University, talked about effective training approaches to increase EHL in occupational settings, such as using case studies, demonstrations, field trips, hands-on activities, hazard and body mapping, and small group activities.

A key message emerging from each presentation was the importance of knowing your audience and understanding how they learn. This will dictate the approaches, tools, and technologies you use to build EHL.

## Tools & Technology

As a new field, tools and methods to raise awareness of and improve EHL are in development and continually evolving. Presenters showcased a range of tools and approaches – both old and new – that can be used.

The notion that there is no single or best way of learning was mentioned many times during the meeting. People see, hear, and interpret information in different ways. Recognizing that people have different styles of learning and developing communication approaches to meet varied needs is essential to increasing EHL.

Panelists highlighted many strategies to present information that appeals to people with different learning styles. Framing information using analogies or stories helps people relate to a message. Using call-out boxes to define key terms or concepts works well for verbal learners. For people who learn by doing, hands-on activities can increase an individual's ability to understand, retain, and apply environmental health information. Pictures, images, and maps help visual learners comprehend complex environmental health messages.

Maps were noted as a particularly useful tool to help audiences understand a local environmental health concern. Paul English, Ph.D., with the California Department of Public Health, talked about using maps to raise awareness and understanding of local level health data, such as breast cancer rates or air quality issues. He emphasized the value of involving the community in data collection, analysis, and display decisions as a way to increase EHL. For example, he worked with residents on an air quality study to map local assets and hazards and then used this community input to inform the placement of air monitors.

Working directly with community members to plan research projects and collect and interpret data can be a powerful approach to increase public understanding of environmental risks. This process, called citizen science, can build EHL by involving people in studying their environment and move them from being consumers to producers of information.

Sara Wylie, Ph.D., from Northeastern University, and Deborah Thomas, director of Shale Test, talked about a citizen science project to address local concerns about the possible health effects associated with the growing oil and gas industry. They worked with residents to map and understand community exposure to hydrogen sulfide (H<sub>2</sub>S), a neurotoxic gas frequently associated with oil and gas extraction. They developed a novel method of visualizing H<sub>2</sub>S exposure using strips of paper that change color when exposed to the gas. Wylie and Thomas overlaid the strips on community maps, allowing residents to visualize and contextualize their levels of exposure.

Wylie also described Public Lab, a citizen science initiative in which residents collect data using cameras and smartphones and then generate community maps using open source software. The method was used by Gulf Coast communities to create a public archive of maps documenting damage from the Deepwater

Horizon oil spill. This hands-on process increases understanding of local environmental health issues and builds community capacity to address them.

Visual media also provides an opportunity to engage community members and increase EHL. Alexandra Anderson, with Zero Breast Cancer and the Bay Area Breast Cancer for the Environment Research Center, encouraged adolescent girls to use photos as a way capture their views and perceptions of environmental health in their communities. This approach, called Photovoice, allows participants to document environmental health in their homes, schools, and neighborhoods. Photovoice can be particularly effective among youth, who are increasingly using photos as a way to communicate with their peers. Photographers can share their pictures with family, friends, neighbors, and decision makers, becoming advocates for healthier communities.

Panelists and meeting attendees discussed several challenges surrounding citizen science. They underscored the importance of protecting patient and participant privacy, especially when mapping exposure data or engaging youth or vulnerable populations in research projects. Working with Institutional Review Boards was noted as a challenging, but critical, way to ensure study participant confidentiality. Speakers also emphasized the need to develop low-cost and low-maintenance tools that residents can be trained to use. Training to increase basic science literacy is also needed for the public to participate in research. For a citizen science project to be successful, people need to understand the scientific process, how to use monitoring tools, and how to properly collect and interpret data.

While advances in technology and social media provide many new opportunities to build EHL, panelists also emphasized the value in simple and familiar forms of communication. Traditional print materials with clear and simple messages that reflect the target audience's background and values can be effective. The key is to select the tool or approach that will work best for the intended audience.

## **Next Steps & Moving the Field Forward**

As the meeting concluded, several clear steps surfaced as critical to advance the field and improving EHL.

Many called for increased use of communication research in environmental health sciences as a foundation for building EHL. Kami Silk, Ph.D., from Michigan State University, underscored the importance of communication research to analyze an audience, conduct formative research, design a message, and evaluate its impact. These are key steps to creating a culturally sensitive and evidence-based message tailored to a specific audience.

Gwen Collman, Ph.D., director of the NIEHS Division of Extramural Research and Training, also supported the use of communication research in environmental health sciences. Utilizing Bloom's Taxonomy, she paired each level of EHL with a research question or approach to consider when creating or evaluating a message.

Once a message is developed and delivered, research to evaluate its impact is critical to identify the elements of successful environmental health messaging. Some participants called for the development of a standard set of EHL evaluation metrics, while others advocated for contextual metrics that incorporate the unique characteristics of a particular population or community. Research to assess the validity of specific

messaging approaches across communities, populations, and cultures is also needed. Communication evaluation and validation remains an area in which the EHL field needs more input.

The benefit of taking a team approach to build EHL also emerged as an important theme. Engaging with a diverse network of partners is central to successful communication. For example, collaborating with CABs can help researchers gain community trust and better understand community concerns and values.

Because EHL is rooted in concepts from a range of disciplines, there are also opportunities to establish partnerships within the academic setting. Environmental health scientists can advance EHL by collaborating with scholars from departments/schools of communication, anthropology, sociology, psychology, education, and public health. Working with communication researchers was seen as particularly important. Such partnerships provide the range of expertise needed to build EHL and are critical to leverage and maximize resources when funding is limited.

Over the three-day event, the collaborative nature of the meeting provided many opportunities to forge new partnerships and discuss specific ways to advance EHL. Attendees left with new ideas, tools, and approaches to apply to their own work and a greater understanding of how to move the field forward.

The Institute benefited greatly from hearing first-hand about EHL challenges and successes, receiving direct feedback on the proposed EHL model and definition, and getting guidance on how to increase the use of communication research in environmental health sciences. The case studies shared by panelists and the thoughtful input from attendees will help NIEHS continue to provide direction and leadership to this emerging field.