Chapter 5:
Education and Training

Chapter Contents

Chapter 5: Education and Training

Introduction

By supporting training and education activities, PEPH programs help ensure that grantees are able to disseminate environmental public health knowledge and skills to partners and community members. Armed with knowledge and skills, these trainees become ambassadors who can make different choices personally and can raise awareness of environmental public health issues and solutions among the community.

The target audience is an important consideration for any education or training projects. Involving members of the target audience in the development and conduct of training programs can help ensure that the programs incorporate their learning styles and preferences, thereby resulting in better retention and potential use of the information.

PEPH grantees typically conduct three broad types of training programs, each with a specific target audience that participates in these trainings. The logic model activities, outputs. and impacts in this chapter include examples from the following programs: [33]

Community Outreach and Engagement Facility Cores: Many programs at NIEHS require the inclusion of outreach, translation, and/or engagement facility cores. Examples include the Environmental Health Sciences Core Centers, the Centers for Children's Environmental Health and Disease Prevention Research, the Superfund Research Program, and the Breast Cancer and Environmental Health Research Program. Such facility cores often fund grantees to translate the latest environmental health science research into tools and resources for a variety of audiences – and some of their work includes training and education programs.

Worker Training Programs: NIEHS has a long history of conducting education and training programs in occupational settings. The Worker Education and Training Program (WETP) supports the development of curricula and initiation of training programs throughout the country to help employers meet Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), Department of Transportation (DOT), and Department of Energy (DOE) requirements. The ultimate goals of the WETP are to protect workers from environmental and occupational hazards, such as chemical, biological, and radiological wastes and substances. This program encourages innovation for training difficult-to-reach populations by addressing issues such as literacy, appropriate adult education techniques, training quality improvement, and other areas not addressed directly by the private sector. WETP has a long history of conducting evaluations of its funded education and training activities, and many of the metrics and examples in this chapter are from WETP grantees.

> Other common activities of facility cores are addressed in **Chapter 4: Products and Dissemination** and **Chapter 6: Capacity Building**.

[33] More information about all of these programs can be found at: National Intitute of Environmental Health Sciences (NIEHS). 2010. Programs: Partnerships for Environmental Public Health. Available: *https://www.niehs.nih.gov/research/supported/translational/peph* [accessed 19 January 2021].

WETP grantees provide training that increases literacy and life skills, improves job safety and worker well-being, and addresses the needs and requests of workers themselves. The target audiences for these trainings are workers. For purposes of this discussion, we consider workers to include all levels of an organization's staff, including frontline, hands-on staff, foremen, middle managers, and senior management. In many instances, senior management benefits from training that helps them understand the challenges staff face, as well as the structural and policy changes they can support to facilitate safer workplaces for staff.

Health care and public health professionals are considered a subset of workers. Specialized training for health care and public health professionals may include first responder training on blood borne pathogens, nurse training on conducting environmental assessments, environmental health grand round series for physicians, or training for community health workers on asthma triggers. Health care professionals are recognized leaders and trusted sources of health information; as such, it is important that their environmental health knowledge and communication skills be sufficient to protect their own health, as well as to protect the health of the communities they serve.

Science Education Programs: Science education programs provide training for students and teachers in a classroom setting. These training opportunities are available at all levels of education, from elementary school to graduate school. For example, the Short Term Educational Experiences for Research (STEER) in the Environmental Health Sciences program is designed to attract talented high school students and undergraduates to research opportunities in the environmental health sciences. In addition to attracting talented students, professional development programs are created for teachers to enhance their knowledge and capacity to increase the awareness of environmental health concepts among students.

Within science education programs, grantees may offer trainings for a variety of audiences, including community partners, researchers, scientists, policymakers, health care professionals, teachers, students in grades K-12, undergraduates, and graduate students, as well as workers from every level of an organization. We provide examples of possible PEPH training programs in Exhibit 5.1.

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For more information about Science Education Programs, check the following sources:

Highlights from NIEHS' Environmental Health Science Education:
https://www.niehs.nih.gov/research/supported/translational/ehsic/highlights

Environmental Health Perspectives Science Education Program

Environmental Health Sciences as an Integrative Context for Learning

Exhibit 5.1 Examples of possible PEPH trainings

Workers

- Organizing occupational training for skilled laborers in safety and health issues or new skills (e.g., annual hazardous material handling refresher).

- Holding trainings oriented toward the needs of unskilled workers to allow them to enter into environmental health and remediation fields of work.

- Planning trainings aimed at addressing issues, such as how to prevent and respond to threats to workers from new and emerging materials (e.g., nano materials, new hazardous materials, radiation, or dirty bombs).

Students

- Training doctoral students in interaction with community members via webinar.

- Developing easy-to-implement environmentally focused curricula.

- Conducting workshops at academic conferences.

- Conducting classroom activities.

- Organizing science fairs.

- Developing class projects.

- Conducting science camps while schools are not in session.

Researchers and Scientists

- Training researchers in outreach methods and techniques.

- Helping researchers learn how to identify what works for the target audience.

- Training researchers in techniques to gain understanding of audiences.

- Conducting train-the-trainer meetings to teach researchers how to train others to conduct surveys and interviews, facilitate focus groups, communicate with lay audiences, collect patient data, collect environmental exposure data, etc.

Community Partners

- Educating partners on science topics relevant to the study.

- Teaching partners about the Institutional Review Board (IRB) process.

- Offering technical workshops to bring partners together to develop recommendations, materials, and education tools.

- Providing opportunities to learn budgeting and financial management.

- Training partners to collect and analyze data.

- Communicating environmental health information.

Education and Training Logic Model

The logic model in Figure 5.1 provides a framework for evaluating education and training within PEPH programs. This model identifies potential activities, outputs, and impacts of successful education and training programs. This chapter provides grantees with a tool to brainstorm other activities, outputs, and impacts that are applicable to their specific projects. This model contains three major components:

- Activities are actions that use available inputs to create and maintain education and training projects.
- Outputs are the direct products of education and training activities.
- Impacts are benefits or changes resulting from the activities and outputs. Ultimate or long-term impacts are also examined in the Evaluation chapter (see Chapter7, Principles of Evaluation).

Figure 5.1 Education and Training Logic Model With Examples of Activities, Outputs, and Impacts

Activity 1	Activity 2	Activity 3	Activity 4
Identify training needs	Develop and test programs and materials	Conduct training programs	Revise approach, program, or materials as needed

Output 1	Output 2	Output 3
Training curricula or programs	Training materials	Trained individuals

Impact 1	Impact 2	Impact 3
Knowledge of issue	Secondary information transfer	Safer workplace

Sources of Data

Grantees may find the following sources of data to be helpful in tracking achievements related to training and education:

- Activity logs
- Contact logs
- Participant lists
- Feedback forms
- Meeting agendas
- Telephone logs
- Communication strategies and plans

- Budgets
- Group discussions
- Surveys
- Interviews
- Meeting notes
- Email exchanges
- Internet web logs

For a more comprehensive list of data sources, see **Chapter 7: Principles of Evaluation**.

Activities

Regardless of the type of training grantees conduct for their target audience, they will likely incorporate some of the activities described below. Activities, in the framework of an education and training logic model, are actions that are based on available inputs to create and maintain education and training programs. Four types of activities for education and training are presented here:

Activity 1: Identify training needs

Activity 2: Develop and test programs and materials

Activity 3: Conduct training programs

Activity 4: Revise approach, program, or materials as needed

Activity 1: Identify training needs

Activity 1	**Activity 2**	**Activity 3**	**Activity 4**
Identify training needs	Develop and test programs and materials	Conduct training programs	Revise approach, program, or materials as needed
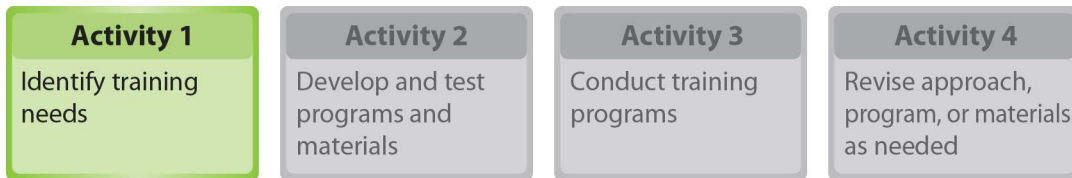
Grantees typically conduct training programs as a service to their communities. As such, the training programs are designed to meet the specific needs of a target audience. Grantees may want to identify the target audience or audiences for the training programs and then work with representatives from the target audience to identify and prioritize training needs. This can include both current and anticipated training needs. Gatherings such as the NIEHS Worker Education and Training Program (WETP) annual meeting can help establish training priorities and goals, and they can increase information sharing between partners and community members. Grantees can also conduct a formal training needs assessment by surveying partners.

Example Metrics for Activity 1: Identify training needs

- Description of intended target audience for the training.
  - Language, literacy and education levels.
  - Cultural sensitivities.
  - Barriers that might keep trainees from adhering to training messages.
  - Special needs.
  - Relevant background that might influence beliefs and values derived from preliminary interactions.
- Description of training needs identified.
- Description of methods used to identify training needs.
- Number of participants who helped to establish education and training priorities.
- Description of contributions made by each partner.
- Description of goals and objectives of the training program.

Metrics in Action 5.1: The **Society for Occupational and Environmental Health (SOEH)*** is a science-based forum for leaders in academia, management, organized labor, and government. SOEH's mission is to establish evidence-based positions on public policy issues related to improving occupational and environmental health. In order to accomplish this, SOEH first worked with partners to establish education and training partnerships and priorities. Partners included: NIEHS, the Association of Occupational and Environmental Clinics (AOEC), the Urban Public Health Program of Hunter College of the City University of New York, the New York City Department of Health and Mental Hygiene, and the School of Public Health of the University of Medicine and Dentistry of New Jersey. These partners identified mold-related health concerns as a major training need.
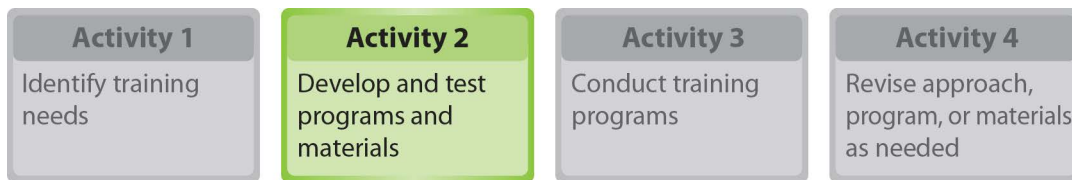
In response, the society staff convened a series of national workshops addressing mold in 2004. The workshops were designed to: 1) develop a consensus document on the state of knowledge pertaining to health effects of mold exposure on workers, 2) discuss approaches and training techniques for protecting workers and communities, and 3) develop strategies to disseminate the results of the workshops to diverse audiences. More than 60 experts from governmental agencies, industrial hygiene firms, abatement contractors, labor unions, universities, and trade associations attended the workshops. At the end of the workshops, the group had developed important guidelines for use by training organizations to protect and train workers engaged in maintenance and remediation work with mold.

Metrics for identifying training needs:

- Description of training needs identified: *Mold-related health concerns for those working with mold remediation.*

- Description of goals and objectives of the training program: *Develop a consensus document on the state of knowledge pertaining to health effects of mold exposure on workers; discuss approaches and training techniques for protecting workers and communities; develop strategies to disseminate the results of the workshops to diverse audiences.*

*The SOEH website is no longer accessible.

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Activity 2: Develop and test programs and materials

Activity 1	Activity 2	Activity 3	Activity 4
Identify training needs	Develop and test programs and materials	Conduct training programs	Revise approach, program, or materials as needed

Another important task is to work with partners to identify key goals and objectives of the training program, and to develop education and training strategies and materials. Grantees can keep in mind the level of engagement, literacy, and education of the target audience while developing programs and materials. Adult audiences typically learn more when trainers use a variety of lecture, interactive, hands-on, and experiential activities in training programs. Finally, target audiences can test the programs and materials, and grantees can revise and adapt them as needed to ensure that the content, reading level, and language are appropriate to the target audience.

Grantees may want to incorporate principles of adult learning and literacy into their education and training programs. Guidance documents that provide helpful information about adult learning and literacy principles include:

Final Version of the Minimum Health and Safety Training Criteria: *Guidance for Hazardous Waste Operations and Emergency Response* **(HAZWOPER)** Supporting and All-Hazards Disaster Prevention, Preparedness, and Response
http://tools.niehs.nih.gov/wetp/index.cfm?ID=142

Adult Learning Guide
http://wcwpds.wisc.edu/mandatedreporter/adult_learning.pdf

The Right To Understand: Linking Literacy to Health and Safety Training
https://www.niehs.nih.gov/careers/hazmat/about_wetp

Many other training materials are available on the WETP website:
http://tools.niehs.nih.gov/wetp/index.cfm?id=25

A quick search of the internet will also provide other sources.

Activities that grantees might conduct while developing and testing training programs and materials include:

- Gather data on the target audience (language, literacy, and education levels, and other relevant background) that might influence beliefs and values.
- Involve the target audience in the development process.
- Determine levels of comprehension.
- Identify preferred training methods of target audiences.
  - Determine the primary sources audiences use to obtain information (e.g., peers, television, church, or radio).
  - Interact with schools and community organizations to determine learning styles and levels of literacy.
  - Survey belief and value systems.
- Develop (or adapt) curricula.
- Develop (or adapt) materials.
- Involve audience in development.
- Identify and train trainers.
- Test and refine materials with target audiences.
- Revise program or materials as needed.

> For more activities, see also the NIEHS Worker Education and Training Program Online Curricula Catalogue:
> http://tools.niehs.nih.gov/wetp/index.cfm?id=603

Example Metrics for Activity 2: Develop and test programs and materials

- Number of training programs developed.
- Number of training materials developed.
- Description of goals and objectives of training programs.
- Description of training program activities.
- Description of outreach activities to involve and educate the community in the research process.
- Number and description of testing activities.
- Description of results of testing activities.
- Description of changes made to program as a result of testing.
- Number of trainers identified and trained.
- Description of format of training programs (e.g., web-based training classes, certified peer recognition programs, annual workshops at conferences, resource manuals, training websites, validation tools, or guides for conducting research).
- Description of team-building and facilitation skills learned by partners to facilitate implementation of education and training programs.
- Description of tools, techniques, and strategies used to determine the accessibility of education and training materials (e.g., classroom, online, workshops, or handouts in public forums).
- If conducting a WETP program, description of adherence to Final Version of the Minimum Health and Safety Training Criteria: Guidance for Hazardous Waste Operations and Emergency Response (HAZWOPER) Supporting and All-Hazards Disaster Prevention, Preparedness, and Response Training (https://tools.niehs.nih.gov/wetp/index.cfm?ID=142), or the Clearinghouse website (https://tools.niehs.nih.gov/wetp).
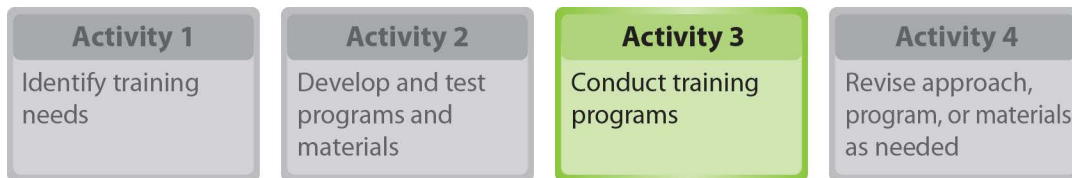
Metrics in Action 5.2: In 2005, the **American Federation of State, County, and Municipal Employees (AFSCME)** provided hazardous materials training to several hundred school custodial workers in Tucson, Arizona. The goal of the training was to teach the janitorial staff the knowledge and skills necessary to address any hazardous waste accidents within the school setting. Because the school custodial staff in Tucson is primarily Hispanic, AFSCME developed bilingual educational and training materials and curricula. It also offered the custodial workers the option of taking the class with a Spanish-speaking instructor or an English-speaking instructor who also spoke Spanish. AFSCME worked with members of the target population to develop and test the training materials. The testers provided valuable feedback about the language, and AFSCME changed several examples in the training materials to reflect the specific conditions the custodial workers might experience in the schools.

Metrics for developing and testing programs and materials:

- Description of goals and objectives of training programs: *The goal of the training was to teach the janitorial staff the knowledge and skills necessary to address any hazardous waste accidents within the school setting.*

- Description of changes made to program as a result of testing: *AFSCME changed several examples in the training materials to reflect the specific conditions the custodial workers might experience in the schools.*

Activity 3: Conduct training programs

Activity 1	Activity 2	Activity 3	Activity 4
Identify training needs	Develop and test programs and materials	Conduct training programs	Revise approach, program, or materials as needed

Conducting a training involves a variety of preparatory and implementation activities. Some key activities grantees will likely accomplish prior to the training include:

- Arranging for facilities that are convenient for members of the target audience.

- Scheduling dates and time that work for members of the target audience.

- Publicizing the trainings in places the target audience will see or hear.

- Producing or obtaining training materials (copies, booklets, binders, markers, etc.).

In conducting training programs, grantees may want to consider how to incorporate the following aspects of a successful training:

- **Location:** Grantees can foster goodwill and trust among partners, as well as improve attendance at the training, by conducting the training in a location convenient for the target audience.

- **Timing:** Trainings offered at times the target audience can attend may increase participation. Some audiences may need trainings during work hours, while others may prefer to have trainings in the evenings.

- **Advance notice of training dates and topics:** Provide adequate notice about training opportunities so that participants can make time for the training in their schedules.

- **Setting:** Conduct the training in a room that enhances the experience. A windowless conference room is often less preferable than a room with windows and some architectural interest. Room setup options include chairs with no tables, rows of tables facing all one direction, round tables, U-shaped tables, etc. Each of these setup options sends a different message to the audience about the level of participation that is expected.

- **Teaching style:** Adapt the teaching style to the training to fit the audience and topic. Incorporate opportunities for lecture, hands-on training, small group discussions, risk mapping, peer trainers, and role play, as well as time for discussions among the participants. Many audiences appreciate being treated as experts and given time to present their views on the topic.

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Example Metrics for Activity 3: Conduct training programs

- Dates and locations of education or training sessions.

- Number of participants at education or training sessions.

- Number of contact hours with trainees.

- Number and types of partners who participate in implementing the education and training curricula.

- Assessment of whether characteristics of the actual trainees matched the intended target audience (e.g., were those who attended or were trained part of the intended audience?).

- Results of surveys of participants about their satisfaction with training in regard to:

  – Location.

  – Physical characteristics of meeting space (room setup, food, etc.).

  – Sufficient advance notification of the meeting.

  – Time and length of the educational or training sessions.

  – Clarity of educational and training materials.

  – Level of participation in the meetings.

  – Clarity of information in the materials and the materials and the presentations.

  – Responsiveness of the trainers to questions.

Metrics in Action 5.3: The NIEHS **Minority Worker Training Program (MWTP)** has successfully trained underserved, unemployed, and unskilled workers to protect themselves and their peers from environmental and occupational exposures. This environmental career-oriented program includes training in exposure safety, life skills relevant to worker needs, and occupational skills. The main goal of the program is to increase the number of underrepresented minorities in the construction and environmental remediation industries. The different programs provide:

- Job training, including literacy, life skills, environmental preparation, and other related courses and construction-skills training.

- Environmental worker training, including hazardous waste, asbestos, and lead abatement training.

- Safety and health training.

In particular, the Brownfields and MWT programs have achieved great success in the area of environmental justice by moving underserved and underrepresented workers into long-term employment in the environmental restoration and hazardous material fields, as well as most recently in the area of green jobs such as energy retrofitting and solar panel installation. As of 2011, the program has successfully trained more than 8,400 students and employed approximately 70% of those students in jobs directly related to their training, with ongoing career opportunities offered through local apprenticeship and community college programs.

Metrics for conducting training programs:

- Number of participants at education or training sessions: *8,400 minority workers have participated in Brownfields and MWT programs.*

- Results of surveys of participants about their satisfaction with training: *XX of students reported being very satisfied or extremely satisfied with the training.*

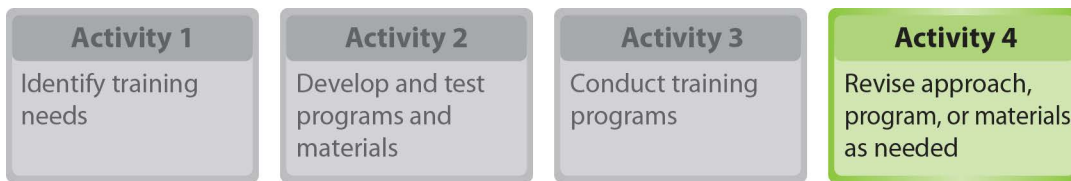For more information about NIEHS MWTP, visit:
https://www.niehs.nih.gov/careers/hazmat [accessed 19 January 2021].

Metrics in Action 5.4: NIEHS Worker Education and Training Program (WETP) grantees, such as the **Western Region Universities Consortium (WRUC)**, must file an annual progress report that includes training attendance numbers, descriptions of curricula and strategies, and assessments of the effectiveness of all trainings conducted. For example, during the grant period from August 2008 to April 2009, the WRUC trained 1,889 multicultural workers in 124 courses, for a total of 21,184 contact hours. The courses covered a wide range of topics, including hazardous waste sites, emergency response, hazardous materials transportation, and hazard communication courses, as well as other occupation-specific topics. WRUC offered courses throughout EPA Regions IX and X, as well as in the Pacific Islands, on Native American reservations, and for maquiladora workers in Nogales, Sonora, Mexico.

Potential metrics for attendance and participation at educational and training events:

- Number of participants at education or training sessions: *From August 2008 to April 2009, the WRUC trained 1,889 multicultural workers in 124 courses.*

- Number of contact hours with trainees: *WRUC provided 21,184 contact hours with trainees.*

Activity 4: Revise approach, program or materials as needed

Activity 1	Activity 2	Activity 3	**Activity 4**
Identify training needs	Develop and test programs and materials	Conduct training programs	Revise approach, program, or materials as needed

Revising training approaches, programs, or materials often involves input from participants. Grantees can assess participants' improvements in knowledge, skills, and behaviors, as well as their satisfaction with the training. Examples of strategies grantees can use to collect this information from training participants include:

- Asking participants to fill out evaluation forms immediately after an education or training experience.

- Evaluating the performance of trainers or educators to improve future trainings.

- Meeting with trainees and students after some time has passed to get feedback.

Revisions to training programs may include any aspect, including the setting, materials, examples, format, hands-on components, location, room set-up, instructors, etc.

Example Metrics for Activity 4: Revise approach, program, or materials as needed

- Number and description of methods used to assess participants' satisfaction with training.

- Number and description of revisions or adaptations made to training programs as a result of participant feedback.

- Description of strategies used to communicate changes to program as a result of assessments (e.g., handouts or a website).

- Retention and attendance numbers and trends to assess whether revisions are making a difference.

The Worker Education and Training Program has more than 20 years of experience evaluating training and education programs. It has developed many materials that provide more information about evaluation methods. These materials are available on the WETP website at: https://tools.niehs.nih.gov/wetp/index.cfm?id=92.

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Metrics in Action 5.5: The Hazardous Materials Training and Research Institute (HMTRI) developed the Community and College Consortium for Health and Safety Training (CCCHST), which provides training components for both the EPA Hazardous Waste Worker Training Program and the DOE Worker Training Program. The curriculum uses a train-the-trainer model to conduct worker education training.

As the program evolved, workers' needs changed as they became interested in learning about other topic areas. Participants used the end-of-class surveys to provide more information about additional training topics. HMTRI used this feedback to develop new courses and materials. New training modules include: CPR/AED and first aid training, forklift training, quality assurance and inspector safety awareness, building inspector training, hazard awareness, chainsaw safety, wet debris removal, asbestos awareness, and respirator awareness courses. HMTRI changed the structure of the course so that participants take the general course, as well as two elective components to ensure that trainees get the basic information together with specialized information that meets their individualized needs.

Metrics for revising approach, program or materials as needed:

- Number and description of methods used to assess participants' satisfaction with training: *Participants complete a training evaluation after each training component that assesses satisfaction with the trainer, the material, and the location, and asks for feedback on additional training needs.*

- Number and description of revisions or adaptations made to training programs as a result of participant feedback: *Nine new training modules were created to address trainees' requests for additional topic areas.*
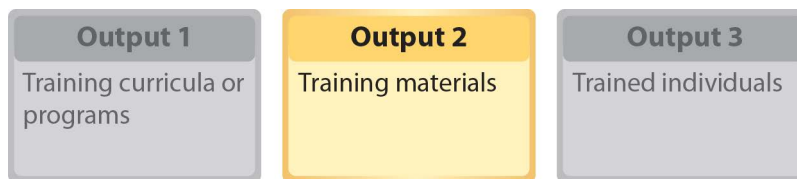
Outputs

Outputs are the results of the efforts of the PEPH grantees to provide training and education opportunities. In this section, we discuss three key outputs of PEPH programs:

> Output 1: Training curricula or programs
>
> Output 2: Training materials
>
> Output 3: Trained individuals

Output 1: Training curricula or programs

Output 1	Output 2	Output 3
Training curricula or programs	Training materials	Trained individuals

A common output of education and training programs is a formal curriculum. A curriculum typically includes:

- Defined goals and objectives.
- Specific topic areas for discussion.
- Prescribed session formats, schedule, and number of contact hours.
- Training for teachers.
- Evaluation opportunities.

The formal curriculum may take the form of a series of power points, a binder with training materials,[34] or other formal documentation of the content of the training program. Grantees can reproduce or share these products with others as needed.

> ### Example Metrics for Output 1: Training curricula or programs
>
> - Description of formal curriculum or training program.
> - Number of curriculum or training programs developed.
> - Number and types of curricula distributed, including syllabi, manuals, handouts, presentations, websites.

Metrics in Action 5.6: The **Baylor College of Medicine** partnered with the Harris County Department of Education to develop the Environment as a Context for Opportunities in Schools (ECOS) curricula. ECOS is a school-based program used in more than 10 elementary schools in the Houston Independent School District. ECOS aims to develop and evaluate a scalable model for integrating science content across the elementary school curriculum using environmental themes that are relevant to students. Specific program objectives are:

1. To collaboratively design, implement and evaluate an instructional program in elementary schools that integrates science, health, reading, language arts, and mathematics.

2. To improve teacher practice through summer and school-year professional development over multiple years.

3. To support school-wide reform of teaching and learning.

ECOS provides more than 60 teachers annually with intensive year-round professional development designed to support their efforts to integrate reading, language arts, and mathematics with environmental health science themes. Teachers receive materials for their classrooms, and stipends for training and evaluation data collection. Materials include activity guides, teacher guides, storybooks to read with students, and a mini magazine that provides additional ideas to connect class activities to other areas. ECOS serves as the primary hands-on element of the science curriculum and has posted free lessons available for download in order to share the material with others.

Metrics for revising approach, program, or materials as needed:

• Description of formal curriculum or training program: *The Baylor College of Medicine and the Harris County Department of Education developed the ECOS curriculum to provide teachers with the knowledge and skills they need to incorporate environmental health lessons into standard science curricula.*

• Number and types of curricula distributed, including syllabi, manuals, handouts, presentations, and websites: *All curricula are available as in-person trainings, as well as through free downloads from the ECOS website.*

Output 2: Training materials

Output 1	**Output 2**	Output 3
Training curricula or programs	Training materials	Trained individuals
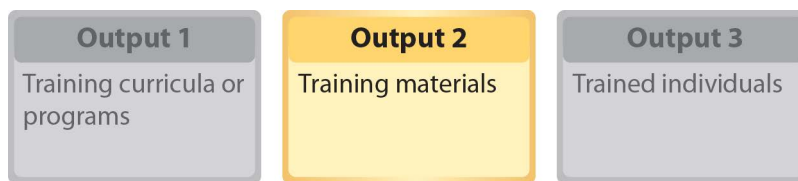
Grantees may also develop materials to use in conjunction with an education or training program. Training materials can help emphasize a specific point within a training, and they can provide participants with items they can consult at a later date. These materials may include handouts, summary sheets, training guides, quick-reference cards, and web-based electronic materials. Training materials may also include promotional items such as magnets, pens, and bags.

Booklets, such as "*Protecting Yourself While Helping Others*,"[35] developed by the NIEHS Hurricane Response Worker Education and Training Program, provide a point of reference containing relevant information and can be widely disseminated. More than 50,000 copies of the booklet were distributed, in three languages, along the gulf coast after Hurricanes Katrina and Rita. Training materials can help partners engage and translate valuable scientific information for the target audience in an entertaining and interactive way. Such materials can be an effective tool to reach many individuals, and all can be measured as outputs.

The use of "new media" approaches (e.g., blogs, podcasts, and cellphone applications) can also be an effective way to reinforce or refresh participants, and they too can be measured (see Chapter 4: Products and Dissemination). New media can be highly effective in disseminating materials, but it is important to remember the characteristics of the target audience in PEPH programs. Not all audiences have telephones, cellphones, or access to computers or the internet.

> **Example Metrics for Output 2: Training materials**
>
> • Number and description of training materials developed.
>
> • Number of training materials distributed.
>
> • Description of strategies used to distribute training materials.

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[35] Hazardous Materials Training and Research Institute (HMTRI). 2005. Protecting Yourself While Helping Others. Available: http://www.elcosh.org/record/document/927/d000883.pdf [accessed 19 January 2021].

Metrics in Action 5.7: The **Community Outreach and Education Core (COEC)** at Wayne State University created the Healthy Homes = Healthy Kids Train-the-Trainer Program in collaboration with the Detroit Head Start program and the EPA. The program provides parents and other caregivers with the information and training they need to create a hazard-free indoor environment for children. Parents and caregivers participate in workshops where they learn about house-based health and safety risks through hands-on training. The program also provides a variety of fact sheets and posters in English, Spanish, and Arabic that describe common indoor environmental hazards and prevention strategies for participants to take home and consult. Training participants can use the materials to learn more about exposure, as well as pass on this information to other parents and caregivers.
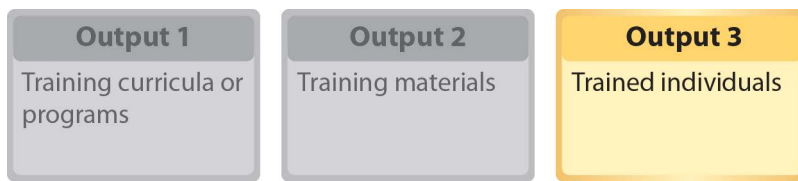
Before and after the workshop, researchers measure knowledge gained by participants. Researchers also conduct follow-up surveys to gauge the effectiveness of the program and to assess participants' use of the skills in their daily lives.

Metrics for training materials:

- Number and description of training materials developed: *Fact sheets and posters in English, Spanish, and Arabic that describe common indoor environmental hazards and prevention strategies.*

- Description of strategies used to distribute training materials: *Materials are distributed during parent and caregiver training workshops.*

For more information about the Wayne State University COEC, visit:
https://www.cec.wayne.edu/communityoutreach.php [accessed 19 January 2021].

Output 3: Trained individuals

Output 1	Output 2	**Output 3**
Training curricula or programs	Training materials	Trained individuals

PEPH education and training programs increase the number of people with the knowledge and skills to address environmental public health issues. This knowledge includes understanding the issue itself, as well as the potential challenges and solutions associated with the issue. In addition to receiving training to address environmental public health issues, these individuals also have the potential to become trainers themselves.

Evidence that participants fully understand information from education and training programs is an important, if elusive, component of PEPH work. For example, one approach for measuring full comprehension of material requires the following of the participants: [36]

- Tuning in (exposure to the material, listening).

- Maintaining interest in the subject of the training (students/trainees who stay until the end of activities).

- Comprehending the content.

- Generating related knowledge and ideas about environmental health.

- Acquiring relevant skills.

- Agreeing with the communication's position, which might require an attitude change.

- Storing this new position or attitude in memory.

Example Metrics for Output 3: Trained individuals

- Number of participants who attend training events.

- Assessments of participant knowledge gained using surveys, quizzes, tests, or other forms of feedback.

- Awareness and identification of environmental public health issues as a result of training.

- Description of behavior changes as a result of training.

- Number of participants who become trainers.

[36] Backer TE, Rogers E, Sopory P. 1992. Health Communication, Designing Health Communication Campaigns: What Works? Thousand Oaks, CA: Sage Publications, Inc.

Metrics in Action 5.8: The **Laborers International Union of North America (LIUNA)** Training provides instructional development training to affiliate training instructors engaged in training construction craft laborers to work on hazardous waste cleanup. This three-part training provides new instructors with the skills and tools needed to begin the transition into their new profession. The first portion consists of 40 hours of training that focuses on principles of adult learning, instructional strategies, activity-based learning, elements of trade teaching, use of the LIUNA Training curriculum, and management of the learning environment. Training is highly interactive with instructors presenting material in front of the classroom a minimum of once per day. The final presentation is videotaped for review and peer feedback.

After the initial 40-hour course, the instructors participate in 16 hours of online learning. The topics in the online learning modules reinforce the classroom learning, familiarize instructors with technologies that can be used in the classroom, and develop a network among the instructors that serves as a source of support, information sharing, and communication.

Finally, the new instructors attend a 16-hour refresher course that takes place approximately six weeks after their initial 40-hour training. The refresher provides an opportunity for the instructors to reflect on and share their experiences in putting theory into practice. Instructors also participate in a viewing of their final presentation from the 40-hour training and a structured feedback session. Individual consultations with the training facilitator provide an opportunity for the instructors to examine their progress from the initial training and chart a course for further development at their training fund.

Metrics for trained individuals:

- Number of participants who attend training events: *19 trainees participated in the full training program in 2010.*

- Assessments of participant knowledge gained using surveys, quizzes, tests, or other forms of feedback: *Through the use of quizzes, written assessments, performance assessments, group discussions, and facilitator feedback, trainers are able to evaluate participants' incorporation of the knowledge and skills into their own training techniques.*

For more information about LIUNA, visit: https://www.liunatraining.org [accessed 19 January 2021].

Impacts

Impacts are benefits or changes resulting from the activities and outputs. The education and training logic model example in this Manual identifies three examples of impacts:

Impact 1: Knowledge of issue

Impact 2: Secondary information transfer

Impact 3: Safer workplace

Impacts are more difficult to measure than activities and outputs, in part, because it often takes several years for substantive changes to occur. When thinking about the impacts a project might be able to achieve and how to measure those impacts, it can be helpful to think in terms of short-term and long-term impacts. Short-term impacts are typically those changes that would be expected to see in the first few years of a project. Long-term impacts might not be seen for five or more years. It is helpful for grantees to identify intended impacts so that they can identify measures that will help document their progress in achieving impacts.

For additional information on long-term impacts, see **Chapter 7: Principles of Evaluation**.

Grantees also may be hesitant to claim credit for impacts because other organizations or other contextual factors may have contributed to the changes. While grantees may not be able to claim sole credit for these impacts, it is important to be able to track these broader changes and to document the contributions made by the project to achieving these impacts.

Although there are challenges associated with measuring impacts, tracking progress toward these goals helps grantees stay on track, demonstrate success, and identify areas for improvement. Most importantly, the ultimate goal of education and training is to produce outcomes and impacts that lead to improvements in health through a reduction in environmental health hazards.[37]

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[37] See also, Silka L. 2000. Evaluation as a strategy for documenting the strengths of community-based participatory research in: Successful Models of Community-Based Participatory Research, 29-31 March 2000: Final Report, Washington, DC. 49-54. (O'Fallon LR, Tyson FL, Dearry A, eds). Available: *https://www.hud.gov/sites/documents/DOC_12485.PDF* [accessed 19 January 2021].

Impact 1: Knowledge of issue

Impact 1	**Impact 2**	**Impact 3**
Knowledge of issue	Secondary information transfer	Safer workplace
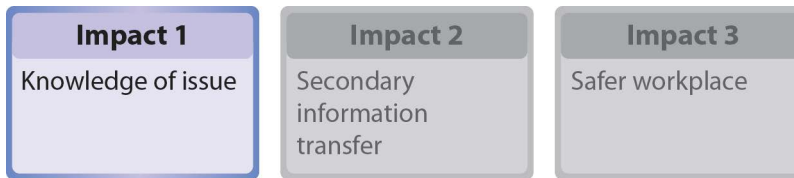
Increased knowledge of environmental public health issues can be manifested in several ways. It might mean improved scientific literacy within the community, increased knowledge of environmental health risk and prevention strategies, or increased knowledge of public health or worker safety messages. Increased knowledge of a specific environmental public health issue can also lead to increased awareness of program research and increased participation of targeted populations and young students in science and environmental health.

With increased knowledge, partners, participants, communities, and decision-makers can better identify and contemplate environmental health concerns related to the community. They are also better able to understand the relevance of scientific findings and create engaged communities within target audiences around issues relevant to them.

Strategies for measuring knowledge include:

- Using quizzes and surveys in formal and informal settings.

- Tracking changes in behavior using observations, self-reports, or outcome data, such as number of worker injuries or student engagement in activities.

- Tracking changes in content of classroom projects: presentations, journals, etc.

Example Metrics for Impact 1: Knowledge of issue

- Results from surveys, tests, quizzes, participant testimonials, or letters of support from program participants.

- Assessments of retention of information (answers to questions remain stable over time).

- Changes in policy and structure that support behavior change, as well as changes in subsequent behavior.

Metrics in Action 5.9: The **Fox Chase Cancer Center and Mount Sinai School of Medicine** work together on the **Breast Cancer and the Environment Research Center's (BCERC) Community Outreach and Translation Core (COTC)**, which is funded to ensure that the views and concerns of the breast cancer advocacy community are heard and that research findings are disseminated to the public. Goals of the COTC include:

- Engaging children and their parents in the activities of the COTC for the duration of the five-year study. Participants only need to see study staff once per year, so the COTC aims to bridge the distance between study visits and maintain interest in the study by offering participants unique opportunities for fun and education.

- Actively involving research participants in the research process. In one project, COTC attempted to increase the value of knowledge by distributing "Young Scientists' Club" membership binders. The children can use the binders to store their fact sheets and newsletters. They can also track their study progress using special Growing Up Healthy stickers, mailed to them upon completion of each study component.

The Mount Sinai COTC also offered science and health education workshops and a targeted newsletter to African American and Latina girls. The workshops and newsletter spurred interest in the science behind environmental health risks. After participating in the program, minority youth in East Harlem became more involved in the research and in community engagement efforts surrounding environmental health issues. They took the knowledge they had gained by participating in the Growing Up Healthy activities and applied that knowledge and skills to other areas.

Metrics for knowledge of issue:

- Results from surveys, tests, quizzes, participant testimonials, or letters of support from program participants: *XXX young girls completed follow-up surveys six months after the Growing Up Healthy program and of these; XX% were still able to recall key facts from the program.*

- Changes in policy and structure that support behavior change, as well as changes in subsequent behavior: *Participants in the Growing Up Healthy program continued to participate in and contribute to other research projects.*

Impact 2: Secondary information transfer

Impact 1	**Impact 2**	Impact 3
Knowledge of issue	Secondary information transfer	Safer workplace
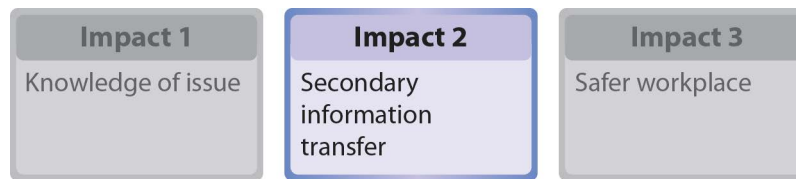
Secondary information transfer is when a participant applies the knowledge or skills gained through training in another setting. Secondary information transfer can occur through word of mouth as trainees/students relay the messages they learned directly to others or when training participants direct others to education/training websites or other resources. Secondary information transfer in schools, workplaces, or social settings extends the impact of PEPH activities by broadening the audience that hears the environmental public health messages. This transfer of information can be an effective vehicle for disseminating information about environmental public health issues.

Strategies for measuring secondary information transfer include:

- Conducting surveys to assess trainees' use of the knowledge and skills obtained during training.

- Recording comments from trainers and educators.

- Recording anecdotes from participants or "third parties" who are recipients of secondary information.

- Talking to training participants (formally or informally) to see how they plan to use the information they have learned.

- Observing and recording participants sharing information with others.

Example Metrics for Impact 2: Secondary information transfer

- Description of ways messages are relayed to others (e.g., trainees give the message to others or community organizations adopt the message as their own to include in project literature).

- Description of secondary transfer from participant evaluations of education and training or other methods of follow-up with students and trainees.

- Description of the adoption of curricula in non-PEPH activities.

- Number and description of endorsements of education/training principles by third-party organizations.

- Number of times messages, documents, media tools, and/or curricula are referenced by third parties.

Impact 3: Safer workplace

Impact 1	Impact 2	**Impact 3**
Knowledge of issue	Secondary information transfer	Safer workplace
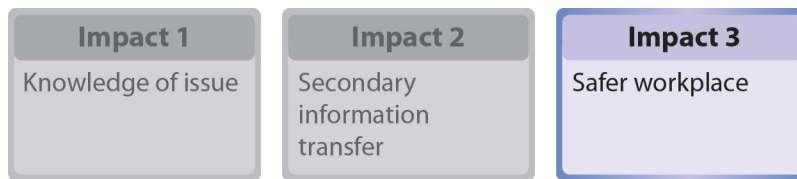
The goal of all NIEHS worker training programs is a safer work environment. As mentioned earlier in the chapter, workplace training programs provide training for all levels of employees. Managers and other organizational leaders can facilitate safer workplaces by adopting policies that promote safe workplaces, by obtaining tools and other infrastructure that help create safe workplaces, by practicing safe workplace procedures themselves, and by supporting safer workplaces in general. Managers and other leaders are generally at the top of a hierarchy of controls that must be in place in order to support behavior change among employees. By incorporating key safety messages into their daily lives, workers make decisions that affect their safety and the safety of others. Because the WETP has done so much work to identify metrics for worker education and training programs, we have included a safer workplace as an impact. Grantees are encouraged to identify and develop metrics that relate to their specific target audiences.

Strategies for assessing safer workplace behaviors include:
- Documenting changes to processes, products, and policies that facilitate safe work environments.

- Tracking training participants after worker safety training and asking them about their work environment and work behaviors.

- Collecting stories and testimonials from workers and supervisors.

- Observing employee behavior.

- Creating an employee safety committee.

Example Metrics for Impact 3: Safer workplace

- Results from post-training interviews or surveys.

- Results from reports of number of illnesses and injuries sustained in a workplace that resulted in lost work days.

- Number of stop-work orders issued in a workplace.

- Number and descriptions of reports of unsafe working conditions by workers.

- Records of workspace monitoring.

- Description of worker training that includes information such as access to material safety data sheets for hazardous materials in the workplace.

- Description of requests for personal protective equipment and counts of equipment provided.

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Metrics in Action 5.10: The **Center for Construction Research and Training (CPWR)** conducts a 16-hour Permit-Required Confined Space Entry course across the country in an effort to develop a national corps of confined space instructors. It ensures widespread availability of courses by establishing trainers in multiple locations, trades, and sectors, including trade unions.

Metric for safer workplace:

- Number and descriptions of reports of unsafe working conditions by workers: *A trainer reported the following anecdote from a participant in the training:*

- *"As a welding apprentice, I take work assignments from my foreman. The foreman assigned me the task of welding inside a steel vessel. Although a technician monitored for oxygen at the ground-level opening of the vessel, he didn't take oxygen samples at any other heights inside the vessel. Based on my experience in the training program, I knew that I couldn't work in the vessel until samples had been taken at multiple heights, so I refused the assignment until further samples at other levels could be obtained. After explaining the issue to the foreman, the foreman instructed the technician to take additional measures. The technician discovered oxygen levels were only 16% inside the vessel, and since welding and grinding would have also used oxygen, I was able to stay safe in the workplace by waiting to continue with the assignment until the oxygen levels had improved."*

Metrics in Action 5.11: The **SEIU Education and Support Fund** provides a Hazardous Waste Worker Training Program that is designed to prevent acute and chronic injury and illness among workers who are exposed to hazardous materials in emergency situations. The training is provided mostly to members of the Service Employees International Union (SEIU), including hospital workers and public-sector blue-collar road maintenance workers.

Metric for safer workplace:

- Reports of unsafe working conditions by workers and actions taken: *The program reported the following anecdote as an example of how participants in the training had applied the knowledge and skills learned in the program to their jobs:*

  "In 2005, staff at a medical center in Northern California spilled idamycin, a chemotherapy drug. Initially, the department called housekeeping. However, personnel that had completed the SEIU Education and Support Fund's Hazardous Waste Worker Training Program recognized that it was a hazardous substance and should be treated with care. The trained personnel closed off the area and called for experts to assess the situation."

For more information, visit: *https://www.niehs.nih.gov/careers/hazmat/about_wetp* [accessed 19 January 2021].

Summary of Education and Training Metrics

Example Metrics for Activity 1: Identify training needs

- Description of intended target audience for the training.

  - Language, literacy, and education levels.

  - Cultural sensitivities.

  - Barriers that might keep trainees from adhering to training messages.

  - Special needs.

  - Relevant background that might influence beliefs and values derived from preliminary interactions.

- Description of training needs identified.

- Description of methods used to identify training needs.

- Number of participants who helped to establish education and training priorities.

- Description of contributions made by each partner.

- Description of goals and objectives of the training program.

Example Metrics for Activity 2: Develop and test programs and materials

- Number of training programs developed.

- Number of training materials developed.

- Description of goals and objectives of training programs.

- Description of training program activities.

- Description of outreach activities to involve and educate the community in the research process.

- Number and description of testing activities.

- Description of results of testing activities.

- Description of changes made to program as a result of testing.

- Number of trainers identified and trained.

- Description of format of training programs (e.g., web-based training classes, certified peer recognition programs, annual workshops at conferences, resource manuals, training websites, validation tools, or guides for conducting research).

- Description of team-building and facilitation skills learned by partners to facilitate implementation of education and training programs.

- Descriptions of tools, techniques, and strategies used to determine the accessibility of education and training materials (e.g., classroom, online, workshops, or handouts in public forums).

- If conducting a WETP program, description of adherence to Final Version of the Minimum Health and Safety Training Criteria: Guidance for Hazardous Waste Operations and Emergency Response (HAZWOPER) Supporting and All-Hazards Disaster Prevention, Preparedness, and Education and Training: Summary of Metrics Examples Page 187 Response Training (https://tools.niehs.nih.gov/wetp/index.cfm?ID=142) [accessed 19 January 2021]. or the Clearinghouse website (https://tools.niehs.nih.gov/wetp) [accessed 19 January 2021].

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Example Metrics for Activity 3: Conduct training programs

- Dates and locations of education or training sessions.

- Number of participants at education or training sessions.

- Number of contact hours with trainees.

- Number and types of partners who participate in implementing the education and training curricula.

- Assessment of whether characteristics of the actual trainees matched the intended target audience (e.g., were those who attended or were trained part of the intended audience?).

- Results of surveys of participants about their satisfaction with training in regard to:

  – Location.

  – Physical characteristics of meeting space (room setup, food, etc.).

  – Sufficient advance notification of the meeting.

  – Time and length of the educational or training sessions.

  – Clarity of educational and training materials.

  – Level of participation in the meetings.

  – Clarity of information in the materials and the presentations.

  – Responsiveness of the trainers to questions.

Example Metrics for Activity 4: Revise approach, program, or materials as needed

- Number and description of methods used to assess participants' satisfaction with training.

- Number and description of revisions or adaptations made to training programs as a result of participant feedback.

- Description of strategies used to communicate changes to program as a result of assessments (e.g., handouts or a website).

- Retention and attendance numbers and trends to indicate revisions are making a difference.

Example Metrics for Output 1: Training curricula or programs

- Description of formal curriculum or training program.

- Number of curriculum or training programs developed.

- Number and types of curricula distributed, including syllabi, manuals, handouts, presentations, websites.

Example Metrics for Output 2: Training materials

- Number and description of training materials developed.

- Number of training materials distributed.

- Description of strategies used to distribute training materials.

Example Metrics for Output 3: Trained individuals

- Numbers of participants who attend training events.

- Assessments of participant knowledge gained using surveys, quizzes, tests, or other forms of feedback.

- Awareness and identification of environmental public health issues as a result of training.

- Description of behavior changes as a result of training.

- Number of participants who become trainers.

Example Metrics for Impact 1: Knowledge of issue

- Results from surveys, tests, quizzes, participant testimonials, or letters of support from program participants.

- Assessments of retention of information (answers to questions remain stable over time).

- Changes in policy and structure that support behavior change, as well as changes in subsequent behavior.

Example Metrics for Impact 2: Secondary information transfer

- Description of ways messages are relayed to others (e.g., trainees give the message to others, or community organizations adopt the message as their own to include in project literature).

- Description of secondary transfer from participant evaluations of education and training or other methods of follow-up with students and trainees.

- Description of the adoption of curricula in non-PEPH activities.

- Number and descriptions of endorsements of education/training principles by third-party organizations.

- Number of times messages, documents, media tools, and/or curricula are referenced by third parties.

Example Metrics for Impact 3: Safer workplace

- Results from post-training interviews or surveys.

- Results from reports of number of illnesses and injuries sustained in a workplace that resulted in lost work days.

- Number of stop-work orders issued in a workplace.

- Number and description of reports of unsafe working conditions by workers.

- Records of workspace monitoring.

- Description of worker training that includes information such as access to material safety data sheets for hazardous materials in the workplace.

- Description of requests for personal protective equipment and counts of equipment provided.

EDUCATION AND TRAINING