
Strategic Options for CDC Support of the Local, State, and Tribal Environmental Public Health Workforce

A Report from the Office of Workforce and Career Development
to the National Center for Environmental Health/
Agency for Toxic Substances and Disease Registry

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Contents

Summary	3
1.0 Introduction and Background	6
1.1 NCEH/ATSDR Assumptions	6
1.2 Environmental Workforce Challenges for Discovery	6
1.3 Project Overview	6
1.4 Key Project Participants	7
1.5 Intent and Limitations	7
2.0 The Environmental Public Health Workforce Crisis	10
2.1 Documentation of the Crisis	10
2.2 External and Internal Opinions	12
3.0 What Can CDC Do To Support Environmental Public Health Workforce Development?	26
3.1 External Interview Responses	26
3.2 Internal Interview Responses	32
3.3 Options Based on the Literature Review	39
3.4 Options for Immediate Action — External Interviews	42
3.5 Options for Immediate Action — Internal Interviews	43
4.0 Discussion	45
Appendices	
A. Interviewees	49
B. Discussion Guides	53
C. Literature Synopses	55

“I see support for environmental health workforce development within a framework — imagine a continuum from left to right — starting with young people and moving through to those who are older. We need to intercede at every point in this continuum of environmental health careers. We should be working at the far left of the continuum to recruit kids, inspiring interest in these exciting careers that they should consider. We should be supporting schools in maintaining accredited academic programs in environmental health at the bachelor’s and master’s degree levels. We should mentor young people who are early in their careers and provide them with on-the-job-training. We should provide mid- and upper-management-level workers with leadership and mentoring programs. And we should work to bring retirees back into programs to work part-time and to teach others on the job or in universities to become the workers who can fill the gaps. At every one of these places, CDC has a role to play.”

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and Tribal Environmental Public Health Workforce**

**A Report from the Office of Workforce and Career Development
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Agency for Toxic Substances and Disease Registry**

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Summary

The *Strategic Options for CDC Support of the Local, State, and Tribal Environmental Public Health Workforce* project focuses on ways for the National Center for Environment Health/Agency for Toxic Substances and Disease Registry (NCEH/ATSDR) to support development and training of the U.S. environmental public health workforce. Leaders from CDC's Office of Workforce and Career Development (OWCD) and NCEH/ATSDR discussed environmental public health workforce challenges and agreed that research was needed regarding options for supporting state, local, and tribal workers. Discovery activities included a review of the most relevant literature and interviews with 21 public and privately based environmental health professionals. This report comprises five sections: an introduction containing the project's background and a description of the formulation of the report; a description of the workforce challenges facing environmental public health as described in the literature and during interviews with subject matter experts; options regarding CDC support based on the literature review and interviews; a discussion that summarizes the areas where overall agreement or disagreement exists regarding the options; and three appendices.

Information collected during this project demonstrates an ongoing and worsening shortage of qualified workers to accomplish the mission of environmental public health. Areas that create special workforce challenges in environmental public health include low salaries and limited career ladders; the cyclical nature of demand created by community economic conditions; private industry competition for well-trained and experienced workers; and a general lack of public understanding and value for the critically important services provided by sanitarians and environmental public health specialists. Turnover in the environmental public health workforce is high and frequently follows health department investments in worker training. No national standardized methodology is available for enumerating the environmental public health workforce (or any other part of the public health workforce); consequently, quantifying the problem accurately is difficult. Similarly, description of the preparation required is challenging because licensure, credentialing, and education-level requirements are not uniform for similar jobs performed across the country. Workers frequently describe lack of support from superiors and political pressures from the community as reasons for their low interest in pursuing middle- or upper-management positions in environmental public health departments. Areas commonly identified as needing improvement include training and education; marketing of the profession;

Strategic Options for CDC Support

recruitment, benefits, and retention; identification and monitoring of performance indicators; and broader leadership development.

Although project participants had varying opinions regarding certain topics, the majority expressed similar opinions regarding strategic options for CDC to undertake to aid development of the environmental public health workforce. Interviewees universally expressed the need for CDC's support of environmental public health leadership development at the local, state, tribal, and national levels. Interviewees also recommended that CDC increase its own role as a national leader in environmental public health, including in developing a comprehensive vision and strategy and in taking the lead in workforce development. Clear support exists for CDC to conduct and support research in developing standards (e.g., quality of service, community-level approaches, and best practices) and measurement methodology (e.g., enumeration and problem solving). The most valuable aspects of CDC training support are described as the reputation or brand of the agency, availability of expert consultants, and broad dissemination systems. Training needs described by interviewees included the flexibility for local modification of materials, locally available instruction, and increased offerings in communication, negotiation, conflict management, and leadership skills. Project participants look to CDC for assistance in raising public awareness of environmental public health as a valuable community service and viable career option for young people to consider. CDC is regarded as a critical link in funding environmental public health workforce development even when the actual amount of money is low. The presence of CDC funding is a value that helps programs raise additional funds to support their work. Data gathered during this project revealed wide support for internship-type activities to help new and potential workers develop technical and real-world skills.

Innovations and activities with shorter developmental timelines were also described in the literature and through interviews. These include the potential for successful recruiting among military personnel recently returning to the general workforce, modification of existing courses to broaden access and increase target audiences, assignment of federal personnel to local health departments, and ideas for marketing assistance. CDC interviewees also identified specific areas for infrastructure improvement that can help the agency provide workforce development and training.

This report's Discussion section also identifies areas where participants disagreed. For example, a discrepancy exists between what academics and national leaders voiced regarding the future direction for environmental public health and what occurs at the local level out of necessity or regulation. This disconnect can limit the effectiveness of CDC's workforce support and development efforts. Insightful approaches to this dilemma are described in the literature, including the recommendation that local inspectors be trained as public health consultants to augment their interactions with clients during routine inspection activities. Strengthening internal CDC collaboration and infrastructure were recommended as ways that the agency can increase its ability to provide support to the environmental public health workforce at state and local levels. These concerns are not unique to environmental services but are common problems throughout all public health practice. OWCD has been working to address these problems in

Strategic Options for CDC Support

multiple ways. For example, OWCD researchers study public health workforce-related recruitment, retention, and training and then collaborate across disciplines to identify best practices for resolving workforce-related challenges. Programs and services throughout OWCD are dedicated to training the public health workforce through internships, fellowships, training courses (both in the classroom and online), and collaboration with partner organizations. Although the approaches described by interviewees participating in this project and authors of the relevant literature might differ, the desired result is universally the same — strengthening and improving the environmental public health workforce.

1.0 INTRODUCTION AND BACKGROUND

The Office of Workforce and Career Development (OWCD) is the centralized location of cross-cutting training and professional development at the Centers for Disease Control and Prevention (CDC). Together, CDC's National Center for Environmental Health and the Agency for Toxic Substances and Disease Registry (NCEH/ATSDR) lead efforts in environmental health as well as prevention and control of negative health effects of toxic substances in the environment. In August 2006, leaders from OWCD and NCEH/ATSDR met to discuss environmental health workforce development challenges. Specifically, the discussion focused on how NCEH/ATSDR and OWCD might discover optimal ways for CDC to support environmental public health workforce development and training. That discussion and the resulting project, culminating in this report, target the non-CDC environmental public health workforce serving in state, local, and tribal health departments across the country. The developmental needs of CDC's environmental public health workforce are not addressed in this project.

1.1 NCEH/ATSDR Assumptions

During project initiation, NCEH/ATSDR leadership established certain assumptions on which the project team should base their work. First, NCEH/ATSDR should be forward thinking in their training and education of those who help protect and promote environmental health. In addition, NCEH/ATSDR should identify its role as the key player and funder in support of environmental public health workforce development. Insufficient numbers of environmental professionals, especially epidemiologists, are available to perform the work that is needed now, and lack of a pipeline to these careers will reduce the effectiveness of future environmental public health efforts.

1.2 Environmental Workforce Challenges for Discovery

The OWCD–NCEH/ATSDR discussion and the subsequent project resulted in the following overarching topics for discovery:

- Do gaps exist in the environmental public health workforce now and are such shortages expected to continue?
- What do professionals concerned about environmental health believe is creating this workforce challenge?
- What strategic activities within CDC might alleviate environmental health workforce shortages?
- In what ways can CDC have the greatest positive impact on state and local environmental public health workforce development?

1.3 Project Overview

NCEH/ATSDR and OWCD have identified options, presented in this report, for consideration in CDC's support of environmental public health workforce development. Although not a training plan per se, this report contains information that can serve as a resource to NCEH/ATSDR during their workforce development planning. Included here are key points discussed in selected supporting literature (16 publications) and ideas gained through interviews with 21 subject matter experts, including nine nonfederal employees and 12 U.S. Federal Government employees (Appendix A). Key points were identified through discussion questions (Appendix B) and literature synopses (Appendix C), and these points have been synthesized to form this report.

Strategic Options for CDC Support

An exhaustive inventory of CDC's existing environmental public health workforce development activities was not conducted, at the request of NCEH/ATSDR leadership, as part of this project because such a project had been completed recently. Therefore, discussions and literature review for this project focused on gaining perspective from expert opinions regarding existing and potential gaps in the environmental public health workforce and how CDC and NCEH/ATSDR in particular might make the most valuable contribution in addressing identified gaps. In addition, included in this report are ideas about maintaining a workforce capable of dealing with the emerging challenges of environmental public health and how CDC might best be positioned to provide leadership in workforce development and support.

1.4 Key Project Participants

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Maisha Mims, MPH

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NAI Personnel, Assigned to the Office of the Director, OWCD

C. Kay Smith-Akin, MEd

Health Communication Specialist

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1.5 Intent and Limitations

The project documented in this report was conducted by OWCD at the request of and in collaboration with NCEH/ATSDR. Begun in 2007 and conducted throughout the next 14 months, this project involved a review of the literature and interviews with federal and nonfederal subject matter experts to identify ideas for solving environmental public health workforce challenges — in particular how CDC can best support and develop such efforts. This resulting report is not a training plan per se but does contain information that can serve as a resource to NCEH/ATSDR during workforce development planning.

Strategic Options for CDC Support

This project was not conducted as scientific research, but all activities were accomplished according to professional practices. The resulting report was developed by using accepted standards and guidelines. A complete inventory of all NCEH/ATSDR workforce development activities was beyond the scope of this project and is not included in this report. Options presented here are not in priority order but listed in the order in which they were discovered through the literature review or interviews. No weight has been placed on any single point in the document; therefore, no rank ordering of options has been made. Not all of the interviewees regarded the problems in the same way, nor would they agree on possible approaches or solutions. No attempt was made to require participants to reach a consensus or to develop one single strategic plan. Because multiple comments with similar ideas were expressed by different sources, these ideas were combined and not repeated in the report. The options presented in the report do not reflect a unified national opinion but are included for consideration in support and development of the environmental public health workforce.

Project leadership made the decision to combine all responses and not identify interviewees individually. Although participants reviewed interview notes and agreed to have their comments used, project staff decided that (apart from selected quotations) the most useful and concise format combined points into overall themes. Of the total 21 interviewees, 10 were CDC employees. Throughout this report, their opinions and recommendations are referred to as *internal*. Nine of the 21 interviewees were not employees of any federal government agency or office. Another interviewee was employed by the U.S. Environmental Protection Agency, and one other person was assigned to CDC on an Interagency Personnel Agreement. Opinions and recommendations from these 11 interviewees are referred to as *external* throughout this report. (All interviewees are identified in Appendix A.) This project was conducted for use by NCEH/ATSDR personnel and neither the data gathered or the written report are intended for public dissemination.

The literature synopses and recommendation summaries included in this report are the project leader's interpretations of the interview and resource data. In the majority of cases, words were left as close as possible to those approved by interviewees, but minor changes were made to make them unidentifiable. Apart from the Discussion section of this report, which contains OWCD comments on comparisons and striking similarities of the data, the opinions presented are those of the interviewees and the authors of reviewed literature.

The opinions and activities of organizations and individual persons are represented in this report. OWCD writers have attempted to be consistent in reference to organizational entities. Specifically, references are made to CDC, NCEH, and ATSDR. The reader will note that sometimes these organizations are referred to individually (CDC) and sometimes in combination (NCEH/ATSDR). We acknowledge the CDC communication policy decision to refer to CDC and ATSDR as CDC only, but we also recognize that times exist when the differences in the programs or agencies are critical to the interviewee or an author's comment and when they are not. Any lack of consistency in referring to CDC, NCEH, and ATSDR was in an attempt to identify specific options for consideration in support of the environmental public health workforce.

Strategic Options for CDC Support

How the field of work featured in this report is labeled varies. Certain references in the literature call the work *environmental health*, and others refer to this work as *environmental public health*. For certain experts in the field, this is an important distinction and for others this terminology difference has less impact. This project was, for the most part, concerned with the workforce of the state and local health department environmental health programs. Therefore, the project leadership uses the terms in the following way:

- *environmental health* — the practice of environmental science in support of health wherever it occurs (i.e., in the private sector).
- *environmental public health* — the practice of environmental science conducted by state and local health departments in support of health.

2.0 THE ENVIRONMENTAL PUBLIC HEALTH WORKFORCE CRISIS

2.1 Documentation of the Crisis

A review of the professional literature (scientific peer-review publications and government documents) reveals repeating themes addressing the need for improvement regarding the environmental public health workforce. Included here are key points that identify the challenges facing environmental public health on state, local, and tribal levels. The most common areas are the need for increased training and education, marketing of the profession, recruitment and retention, identifying and monitoring indicators of performance, and leadership development. All of these areas have considerable impact on the ongoing needs of the environmental public health workforce. Source documents for these points have been synopsized, and the complete citations are available in Appendix C.

The number of U.S. public health workers has declined from 220 workers/100,000 population in 1980 to 158 workers/100,000 in 2000. According to the literature reviewed for this project, within 5–10 years, state and federal public health agencies might lose half of their workforce to retirement, the private sector, and other career opportunities. Workforce challenges can undermine the ability to protect the public's health. A comprehensive approach to the shortage is needed. Investments in capacity development will better position the public health community to respond rapidly to emerging threats, guide interventions, and inform policymakers and the public on the association between health and the environment. Responding to the U.S. shortage is not only a national problem but an international one because a domestic shortage leads to recruitment of public health professionals from other countries, exacerbating their shortages.

Environmental public health workers are the second most common among all public health professions, or 4.5% of the nation's public health workforce, with governmental public health agencies employing >20,000 in 1999. In addition to those employed in public health settings, environmental health practitioners often work in the private or nonprofit sectors. The field of environmental public health has expanded substantially during the past 50 years, but in certain circumstances, the environmental public health workforce has not kept up with skills or numbers of workers needed for such emerging responsibilities as natural disasters and terrorism response. Substantial workforce obstacles exist, including recruitment shortfalls, inability to retain qualified staff, impending retirements, inadequate training opportunities, low wages and benefits, and limited or no career advancement potential.

The same challenges in maintaining the staffing levels among the general public health workforce are also true of environmental public health. Strained state and local public budgets result in a reduced ability to hire new workers. Those who are employed in public jobs might receive noncompetitive salaries for high levels of responsibility and caseloads. Sometimes, environmental public health workers' enthusiasm is lacking because of low pay and minimal advancement opportunities. Potential workers can find higher paying jobs in the private sector for the same kind of work. A survey of CDC-funded states determined that the top five concerns, in order of importance, were personnel, funding, data sharing, partnership development, and training and expertise to facilitate environmental public health activities. State agency personnel

Strategic Options for CDC Support

are committed but are hampered by a lack of staff, resources, prescribed protocols, and inadequate interagency communication. One hypothesis is that the low pay and inadequate training of environmental health practitioners stem from the limited view of environmental health held by policymakers.

Environmental health programs are often severely understaffed and are continually seeking competent environmental health practitioners. The U.S. Department of Labor's Bureau of Labor Statistics reports that the environmental health workforce substantially declined during 1980–2004, from 235,000 employees to 30,934. The average age of state-level environmental health workers is 47 years. The average age of newly hired state-level environmental health workers is 40 years. Subsequently, 40%–50% of the environmental health workforce in state and local agencies will be eligible to retire within the next 5 years. Without an infusion of new workers into the system soon, the field faces large-scale losses of institutional knowledge. In the mid-1990s, the number of graduates of environmental health programs began to decline to approximately 300/year in 2003. The pipeline of new workers (at least from environmental health academic programs) is inadequate for meeting the demands of public health needs. Approximately 12,000 environmental health job vacancies have been predicted within the next 5–10 years.

2.1.1 Environmental Public Health Practice

Although enforcing environmental laws and regulations fulfills only one of the 10 Essential Environmental Public Health Services (available at <http://www.cdc.gov/nceh/ehs/envphps/default.htm>), local and state governments eager for revenues generated by inspections (e.g., restaurant, septic tank, and well-drilling permits) can direct environmental public health programs to dedicate their time and resources to this type of work. Much of environmental public health has shifted during the past two decades to a fee-for-service structure.

The 10 Essential Environmental Public Health Services can guide practitioners in systematically organizing and managing programs and activities. However, the essential services concept is not universally used in environmental public health. For example, a study by the University of Washington among environmental health staff in six northwestern states determined that <20% of the environmental public health workers knew about the 10 essential services and <50% of those workers practiced them. Typically, environmental public health professionals lack wide-ranging skills and instead specialize in one area (e.g., food or water safety). Practitioners should receive training that encompasses a full range of disciplines, a fact that is widely acknowledged; however, environmental public health programs rarely have adequate budgets to train or prepare their staff to integrate the 10 essential services into their operations.

2.1.2 Environmental Public Health's Image

The work of public health is not always readily apparent or visible in the community, unless an outbreak or health crisis occurs. The even more limited visibility of environmental public health workers hinders recruitment because potential applicants are unaware of positions or career potential. Advancement is often impossible in smaller organizational units until higher ranking staff are promoted, retire, or otherwise move on. Therefore, environmental public health positions often are a training ground for professionals who then leave for higher paying positions in other agencies or the private sector. Low salaries and lack of political or community support

Strategic Options for CDC Support

for environmental public health programs make recruiting well-trained leaders particularly challenging for remote or rural sites. Young people are often discouraged when they start working in environmental public health because their work is limited to inspections. The external conditions under which the profession often operates (e.g., lack of political support) can send a discouraging message to frontline workers. Environmental health programs are being asked to do too much, given the resources they have available, and workers find this difficult to accept.

2.1.3 Training and Education

Four of every five public health employees lack formal public health training (see Appendix C, Perlino 2006). Similar studies report that 90% of the environmental workforce does not hold a formal public health or environmental health degree (see Appendix C, Environmental Health Office [Multnomah County, Oregon] 2007). Academic professionals admit that although specialized education or certification is not required for entry into the environmental public health workforce, this approach should be considered. Workers often enter positions lacking communication skills and then have limited opportunity to learn those skills on the job. Education, training, and competence are critical in developing and sustaining a workforce that can anticipate, recognize, and respond effectively to new and existing environmental public health threats.

A challenge in continuing education for existing workers is that offerings are either too general or too specific to be useful. This can make attendance at future trainings less likely. In addition, Internet-based trainings are often ineffective because of a lack of computers or insufficient time for staff to participate during regular business hours. Traditional training methods are unable to incorporate learning into practice; therefore, their practical application to daily work is reduced substantially. Budget crises limit workers' ability to participate in educational opportunities or to attend conferences. In addition, workers often find that salary increases are not directly linked to education. This can reduce the motivation for workers to participate in further educational opportunities.

2.2 External and Internal Opinions

The opinions included here regarding the environmental public health workforce crisis were taken directly from comments made by both external subject matter experts (comprising both federal, but non-CDC, and nonfederal interviewees) and internal (i.e., NCEH/ATSDR) employees. (All interviewees are identified in Appendix A.) Each opinion reflects the interviewee's own words. In this section, no distinction has been made between opinions expressed by external interviewees and those made by internal interviewees; however, interviewees' opinions have been categorized, and similar opinions have been combined to avoid duplication.

Strategic Options for CDC Support

2.2.1 *The Environmental Public Health Worker Shortage*

“The shortage of qualified workers is the biggest environmental health issue we face. We are fighting a demographic tidal wave, which there is little we can do to change. There is a lot of baby-boomer natural attrition, which is amplified by budget cuts forcing early retirements. The amount of institutional knowledge that we are losing now (through normal or early retirement) is staggering. The problem is that program managers are trying to balance budgets, so they let the senior people go, and this is a short-term fix. It really creates a ‘brain drain’. We are being whipsawed on both ends of this issue because it is getting harder to interest young students in environmental health.”

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External and internal interviewees expressed the following opinions:

- Local and state health departments are experiencing a tremendous shortage of environmental health workers. In Texas, for example, things are so serious, they now are asking for USPHS Commissioned Officers to be assigned to health departments, but that is comparable to placing a bandage on a cancer.
- Environmental health programs are already understaffed. Reports cite as many as 50% of positions are vacant with no sign of being able to fill them. Anticipation of future declines in the number of workers will only make the situation worse.
- The shortage is not in the number of jobs. Public health programs are understaffed, including environmental public health programs. Those in certain parts of the country are understaffed by 50% or even more. Therefore, this is truly only part of the story, but this problem goes beyond funding.

2.2.2 *Stress on Local and State Program Budgets*

External and internal interviewees expressed the following opinions:

- Competing local demands create the situation where money is pulled away from public health, and in turn, less money is available to share with environmental health. Environmental health always seems to come in second in relation to well-child and immunization programs, for example.
- Workload variations make staffing especially difficult in environmental public health programs, but the regulatory obligations of these programs continue to increase. For example, new legislation bans serving trans fats in restaurants. Certain aspects of environmental public health services are cyclical (e.g., well and septic system permits). This cycle creates a workforce challenge when an economic recession usually means less building in communities, thus reducing the workload of environmental public health staff. Should programs let these staff go, knowing that they will be needed in future months? Without funding to cover such cyclical challenges, programs usually have no choice but to cut staff.

Strategic Options for CDC Support

- Part of the problem is that the total number of jobs at the state and local level is decreasing. These jobs are supported by taxes; therefore, a decline in that revenue means fewer jobs, especially at the local level.

2.2.3 Salary Size Matters

External and internal interviewees expressed the following opinions:

- The major problem in maintaining an adequate environmental public health workforce is the salary gap. Bachelor-degree graduates can work for private industry for \$60,000–80,000/year, and environmental public health is still only paying \$30,000–\$40,000/year. This represents a substantial gap, with no obvious way to reduce the discrepancy.
- Nurses, for example, are considered critical to public health programs; therefore, health departments are willing to pay them more to retain them. Although no one will say that environmental public health services are not critical to the community’s health, support is not available for increasing salaries to retain these workers. Consequently, the question is, “How do we increase the recognition of the value for environmental public health services?” A general lack of awareness exists regarding how valuable these careers really are.
- Budget is a big part of the problem. People point to low salaries as where the discussion starts and ends, but clearly, although money is part of it, the problem goes well beyond the lack of resources.
- States often struggle, especially in rural areas, because the average environmental public health worker salary of \$20,000–30,000/year does not appeal to a 4-year-degree graduate.
- Environmental public health jobs are available now, but a major problem with filling them is that the pay is too low and career paths are lacking, particularly among small local health departments.

2.2.4 Standards of Service

An external or internal interviewee expressed the following opinion:

- Having guidelines based on data would be helpful in answering the question of how many sanitarians are needed in a community. Questions about adequate staffing levels are reasonable, and although the answer varies, guidance would be helpful to programs that might not have sufficient resources to research the question from the ground up. In this area, a resource methodology would be valuable and should include a standardized way to assess what services are needed and then add up the hours needed to conduct that level of work.

2.2.5 Seeing the Bigger Picture

External and internal interviewees expressed the following opinions:

- A lot of bodies are out there working in the field of environmental health, but the roots of these programs lie in the sanitation movement of the early 1900s. At that time, the germ theory and hygiene practices had just been developed. Environmental health inspections progressed from observing basic hygiene and sanitation practices to making recommendations about corrective actions. In fact, infectious diseases were reduced dramatically, by as much as 75%, during that time — mostly because of the work of sanitarians. The inspect–correct–reinspect process was established in the early 1900s and has not varied much at the local level during all this time.
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Strategic Options for CDC Support

- The regulatory processes assigned to environmental public health programs by state and local governments have created an emphasis on enforcement rather than prevention. Even today, approximately 90% of funding related to environmental public health and protection goes into regulation-type programs at the state and local levels. Sanitarians in the health department are largely viewed as inspectors. They have reports showing the number of inspections — but so what? They are hired to do inspections; therefore, that is what they do. No one seems to know if this is making a difference in overall improvement of the environment or human health. Why is someone with a college degree needed to inspect? Meanwhile, emerging diseases include serious threats to people’s health (e.g., West Nile virus and hantavirus), yet we still do not know how it all fits together. What is needed is an understanding of how the environment fits with human health.
- Environmental public health leaders often struggle with seeing the big picture. A lot of information is available these days about climate change and so forth, but the situation might be made scarier than it needs to be. The risk of “crying wolf” (if the situation is not as bad as we say) might actually harm recruitment efforts in the long run. In other words, the public will look down on the profession as alarmist and one that does not use sound and reasonable science. Leaders in environmental public health need to be reasonable and logical in communication about emerging and reemerging threats. Public positions are under intense scrutiny, and the government is sometimes accused of using scare tactics. Balancing all of this is difficult.
- Global warming problems and how these are addressed by the institution of public health is the macro view of environmental public health and provides a context for the myriad possibilities for improving health in a community. A need exists for people in this field who can see that connection and have a vision for how to make a difference.
- Changing the name *environmental health* will not solve the recruiting problem. People have been waiting for a television show that will change public health’s image, but no show ever does. When references to public health practice are made in the entertainment industry, professionals complain that it is portrayed incorrectly. Supporting education and recruitment efforts in local communities might be more effective if young people are shown real-world examples of public health professionals.
- The field of environmental public health can do a better job of educating the general public. That is a tall order in light of the information explosion and overload of the American public. Even this cannot be the whole answer, however. The take-away message is that the public needs to understand the reason environmental public health workers care is because the environment directly affects the public’s health. The majority of people process information in the context of how it affects them directly. Not enough recognition exists regarding how thin that line of protection is between environmental hazards and the public. The perception of how well a health department can protect us is overrated (e.g., the idea that someone somewhere is protecting me). People sometimes think that because a U.S. Department of Agriculture stamp is placed on a piece of meat they purchase, every piece of meat has been inspected. This is far from reality.

Strategic Options for CDC Support

2.2.6 Challenges in Retention

External and internal interviewees expressed the following opinions:

- An innovative approach to credentialing that keeps workers in their jobs is having a trainee program. For example, a qualified applicant (i.e., holds a bachelor's degree that includes ≥ 45 credit hours in specific sciences) becomes a registered environmental health specialist trainee in the health department. The trainee works for 2 years under a supervisor and then takes the National Environmental Health Association (NEHA) exam to officially become a registered environmental health specialist. By using this methodology, the health department can be certain of an employee's skills, and the worker improves his or her career potential by obtaining certification.
- Other countries have adopted apprenticeship programs that successfully supply the employee pipeline. High-potential applicants are hired as trainees and are offered financial assistance to earn a degree in environmental public health. After graduation, the trainee becomes a full-time employee and works for a designated amount of time to repay the health department for the provided education.
- The "grow-it-up" process has been helpful in certain urban locations, but it might be less so in rural areas where applicant pools are limited and career paths are shorter.
- At all levels of environmental public health practice, career ladders and a budget that will help workers stay through improved salaries need to be established. The field of environmental public health cannot expect to catch up with the workforce shortage unless worker retention is improved.
- Anecdotal employee feedback in one state's health department survey indicated that the people working in environmental public health were satisfied with their profession, knew why they were there, and received the desired emotional paycheck. Then, the housing market problems hit. Now, staff are having to make difficult choices about leaving a profession they love. Although states might not have salary flexibility, they can look at other creative strategies to keep great workers — for example, looking into housing and educational low-cost loans or grants.
- A common problem occurs when smaller counties (with lower pay scales) put energy and money into training a new employee to fit their needs and then that person bolts after 2 years to work for industry or a larger locality that pays better. Consequently, the turnover rate might not look bad overall, but a lot more job-jumping exists among younger environmental health workers.
- How many jobs offer the opportunity to help people every day? Not a lot of jobs do that. People working in environmental public health want to stay. However, when support from management is lacking, their work is directly related to political agendas, and the general public is apathetic — all of this in addition to a low salary wears them out and they decide to leave. They burn out. The person with a science-related degree and already in a health department — that is the person to cultivate. Losing those who are 5–7 years into their careers is devastating.

Strategic Options for CDC Support

- Encourage workplace practices that support workers and improve conditions. Retention of good workers requires providing optimal working conditions and a reasonable salary. Health departments sometimes pay miserable salaries. The field of environmental public health does not do enough to look after its own staff. Local and state workers often use their own cars and pay for gas out of their own pockets when the government mileage rates do not keep pace with the true costs of vehicle use. In addition, workers often are not supported in going back to college; even when they pay for continuing education themselves, their new certifications are not recognized at the state and local levels.
- Apparently, environmental public health personnel in middle-management positions increasingly do not want to deal with the politics and other pressures involved in their jobs, and thus, few want to take upper-management or leadership positions. The leaders are leaving because of retirement and job-related pressures.

2.2.7 Challenges Inherent in Environmental Public Health

“A confounding factor in the workforce challenge is the diversity regarding who controls what in environmental health. For example, the fire department is always the lead responder in a fire, and everyone knows that they are in control. However, if the issue is water contamination, multiple agencies at the local, state, and federal levels might be involved and trying to control the situation.”

Beth A. Resnick, MPH

Research Associate

Johns Hopkins Bloomberg School of Public Health

Department of Health Policy and Management

and Associate Director

Centers for Excellence in Environmental Health Practice

and Environmental Public Health Tracking

Baltimore, Maryland

External and internal interviewees expressed the following opinions:

- One challenge with environmental health is that it is not a profession in and of itself, like nursing, but instead is a field of practice.
 - The definition of an environmental health specialist is extremely broad. It can mean different professions, education levels, roles, and employers. Part of what makes strategizing ways to augment the workforce difficult is that characterizing the profession is so difficult.
 - Certain states grant a single license for multiple types of environmental workers, whereas other states grant no license at all. The requirements are only detailed in a job description.
 - In reality, a sanitarian can be someone from any one of the biological sciences.
 - In certain ways, we are still paying the price for pulling environmental health out of public health years ago. This separation of the fields of health and prevention from the environment resulted in pulling certain workers with advanced degrees out of public health. The effect was that the field of public health had fewer workers with degrees. Those good people felt abandoned by the field of environmental health.
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Strategic Options for CDC Support

- Environmental public health is more isolated than other parts of public health, perhaps because workers are out in the field doing their work. However, it might also demonstrate that they do not need or seek interaction with other public health personnel and programs. This isolation only serves to make the shortages less well known.

“To get people interested and involved in environmental health, we need to educate the public on the importance of our field. We have not done a very good job in this area. In the 1900s, human life expectancy in the United States increased by 30 years. If you asked the average person on the street why, chances are they would tell you it is because of advances in the medical sciences. However, medical advances have only added about 5 years to the increase. The other 25 years are related to environmental health improvements such as safe water, food, air, and shelter, along with immunology. Environmental health is invisible until the system fails. Then, the publicity we get is all negative One of the things I have noticed is that the workforce problems at local environmental public health departments have not gotten better over the years. Since I worked at the local level 14 years ago, in many cases, [the problems] have actually gotten worse. The pressing issue continues to be that workforce turnover rates are off the chart because of poor salaries, morale, and a lot of pressure. [The health department I worked at was] under unbelievable pressure to violate state regulations and issue permits to unsuitable sites. We had to deal with verbal abuse, slander, and even death threats — all while making very low salaries. Having good professional people and paying them well makes a difference.”

Michael Herring, MPH, REHS, CAPT, USPHS
Environmental Health Scientist
Environmental Health Services Branch
Division of Emergency and Environmental Health
Services
NCEH

2.2.8 Challenges Related to Academic Preparation

External and internal interviewees expressed the following opinions:

- In higher education, the actual practice of environmental public health is not the focus. For example, certain environmental health programs in schools of public health seem to be putting more emphasis into research on threats to the environment and less in the day-to-day practice of environmental public health, which is the bread and butter of the field.
- In universities and colleges, professors are sometimes there just to publish or perform research. They are not there to teach. This is a tremendous problem for environmental public health students.
- The danger is increasing of losing bachelor-level programs specific to environmental health where a practicum is required. Graduates with practice-related experience are ready to go to work in programs and are often the first choice for being hired for environmental public health positions.
- “Bean counters” are considering closing accredited environmental health programs at the bachelor-degree level because fewer students are enrolling. Characterizing environmental health to be more appealing to young people is imperative so that they choose it as a career path.

Strategic Options for CDC Support

2.2.9 Privatization

External and internal interviewees expressed the following opinions:

- Privatizing environmental public health is difficult because of the regulatory responsibilities that must be performed by a government representative. Although contractors can do inspections, they cannot be entirely responsible for enforcing regulations; therefore, government agencies would have to conduct their work on the basis of a contractor's inspection. This can be done, but it is likely to be less desirable and more expensive. Contracting services might seem cheaper in the short-term, but the increased costs are still present in higher salaries for workers and will ultimately be passed along to the client. For example, permits on septic inspections increased from \$200 to \$800 for clients in one community's privatization experience. Programs using privatization still remain, but they have to move more government employees into contract management. Ultimately, no savings are realized.
- In regard to the question of why these jobs should not be outsourced to the private sector, the private sector is not interested enough in the environmental public health responsibility to be systems thinkers. This is more than using the checklist method to get the job done. The private sector is not vested in the public health of a community or in the bigger picture of prevention.
- Outsourcing might be part of the answer in some parts of the country, but it is a short-sighted approach. As activities are contracted out and the program grows, then privatization cannot be maintained. It is a house of cards.

2.2.10 Competition for Workers

External and internal interviewees expressed the following opinions:

- The larger utilities frequently “scarf up” the good candidates for environmental public health jobs, and smaller utilities cannot offer competitive salary levels.
 - All of public health has retention and recruitment trouble because government cannot compete with private industry in regard to salary. Environmental public health suffers from the same problem. Eventually, services end up decreasing. Although the programs still exist, fewer activities are available, especially education services. Regulated industries might have taken up some of the work because they are increasingly mandated to police their own work.
 - Preparedness and terrorism response has drained staff from other parts of public health, including environmental public health.
 - Hiring graduates of accredited programs is often difficult because of the competition with other prospective employers. Environmental public health programs hire the best they can and train them in the necessary scientific background.
 - This problem is not unique to environmental public health. Reviewing any other part of the public health workforce in relation to the gap in supply and demand — all will demonstrate that biologic and chemical terrorism and emergency response are taking attention and money from other parts of public health. HIV/AIDS did the same thing 20 years ago, and public health still does not seem to have learned that huge amounts of money and attention at this developmental stage cannot be maintained to keep new programs functional and effective.
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Strategic Options for CDC Support

- Public health as an employer is not as nimble as is needed to match demand and need for a workforce. In comparison, hospitals are much quicker to adapt and recruit accordingly. The same problem is demonstrated in public health nursing because nurses are pulled away from public health and into inpatient care settings.

2.2.11 Marketing and Public Perception

External and internal interviewees expressed the following opinions:

- Environmental public health is often less visible than other services — the public is less likely to see restaurant inspectors or those checking for plague by collecting rodent specimens than they are to see the vaccination nurse in the clinic.
- Trying to sell public health like laundry soap is not recommended, but the field does have an image problem. Forensic science programs at the college level are reporting substantial increases in enrollees. Linking this increase with popular television shows and public court coverage is unavoidable. However, having prospective students go below the surface and look at those who do crime investigation for a living is important. Criminal investigation careers involve long hours, low pay, high risks, and grisly work, but although reality does not match the glamour portrayed on television, these academic programs are still attracting students. Global warming, pandemic influenza response, and potential terrorist threats are all real and make interesting topics that can bring students to the field of environmental public health, but young peoples' altruism and interest have not been tapped.
- The problem is the term *environmental public health*. The majority of people do not know what that really means. Even though they might recognize safe-water processes and restaurant inspections as environmental public health activities, people do not see anyone doing these jobs unless it is pointed out to them. The only time these activities are really noticed is when something goes wrong — not the majority of the time when water, food, and air are being protected.
- Normally, people do not connect interesting jobs with environmental public health because the message has not been communicated well. If prospective students knew what environmental public health workers really do on a daily basis, they would gravitate to it as a career choice. Increased recognition can solve the pipeline problem.
- Anecdotal evidence demonstrates that when programs are doing well, activities are prevention-oriented (“ . . . the water is safe to drink, yet again today . . . ”), and the only time the public hears about them is when things go wrong.
- *Sanitarian* is not a sexy term — it will not make people stop to look at a booth at a career fair.

2.2.12 Supply and Demand — The Pool of Applicants

External and internal interviewees expressed the following opinions:

- Not enough generalists, as opposed to specialists, are coming out of the education system. Both are needed. Generalists are in short supply at the bachelor's degree level, and they will be needed even more in the future to protect the public's health. This will only get worse in the next 10 years as the current generation retires. No influx of new workers is available to replace these retirees.
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Strategic Options for CDC Support

- Some states do not have credentialing requirements, and the county hires whomever they can. Local officials hiring friends who are looking for a job is common.
- Job announcements are published, but local job openings typically only net 15–20 applications. If even one of those applicants has the right qualifications, the program is lucky.
- Communities where an environmental health internship program has been implemented report that a shortage of qualified candidates for jobs no longer exists.
- First, we must acknowledge that the gaps are in the workforce versus the gaps being in the funding.
- In terms of the aging workforce overall, environmental public health is not likely to be any different than any other part of the country's employers. A substantial portion of the population is graying (aging), and this will affect the supply of environmental public health workers in the future, too.
- Approximately 300 students graduate from accredited environmental health programs every year, and approximately half of them go into the private sector. However, the need for new workers is in the thousands annually. The current supply of graduates from accredited environmental health programs cannot meet the demands for workers in public health departments.
- Substantial numbers of workers at the local level are near retirement age, and many are not formally trained in either environmental public health or public health overall. The supply of new, formally trained workers in environmental public health will not meet the gap left by the aging and undertrained workforce who are departing. The gap will be obvious by 2012 and will likely be filled with undertrained personnel.
- Data indicate that accredited undergraduate environmental health academic programs have fewer graduates. This is probably not related to master's of public health programs. Less is known about the impact of technical school graduates since the majority of environmental public health jobs probably require a bachelor-level degree.

2.2.13 Hiring on the Basis of Core Competencies

External and internal interviewees expressed the following opinions:

- An understanding of required competencies can help rural areas concentrate on hiring people with good problem-solving and communication skills who also have a willingness to learn the science of environmental public health. Those people do a good job of picking up the science if leadership skills already exist. Technical skill with no communication skill will not be as good as the other way around. Having both skill sets is ideal but that is rare.
 - Without dismissing the importance of the science competencies, we must recognize that the core communication competencies are not built into academic programs yet. Academic program staff need to be convinced to build other skills into their curricula, including those skills related to problem solving, interpersonal relationships, and negotiation.
 - Environmental public health workers are recruited from different kinds of degree programs; therefore, employers look especially for communication, critical thinking, and collaborative skills. These overarching skills are the ones they recruit for and not the technical skills. These environmental public health programs maintain that they can teach technical skills to those with appropriate backgrounds.
 - Personable people are needed in environmental public health programs as well as workers with the hard science skills.
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Strategic Options for CDC Support

- During development of the core competencies in environmental public health (see Appendix C, American Public Health Association et al. 2001), we discovered that the most important of these skills turns out to be those that are nontechnical. Having workers with these other nontechnical skills is critically important. Oral communication, conflict resolution, leadership, and critical thinking are examples.
- The 10 Essential Environmental Public Health Services (developed on the basis of the Essential Public Health Services) describe what is needed in the field. This forms the basis for what became the environmental health performance standards. The performance standards help assess the program’s capacity to perform the essential environmental health services and ultimately provide guidance for people in identifying environmental health problems and implementing strategies to inform, educate, and mobilize the community and to measure accomplishment relative to human health and quality of the environment — both natural and built.
- Managers need the foresight to match a worker’s skills with the job needed. In hiring, finding people with a passion for these concerns and helping them find a way to make a difference is critical. People can be taught about septic tanks, but communication skills are valuable and might not be something that can be taught or learned through training.

2.2.14 The Danger of Settling for Less

External and internal interviewees expressed the following opinions:

- The gaps will be filled — they must be. But will the appropriately trained workers be there to hire? When states send people off for training, the question must be asked, “Who is training them?” If the employee has bad habits, will on-the-job training teach them better work habits? Will this kind of on-the-job training pass along the lack of understanding about the importance and significance of environmental public health? Fewer qualified people and a lack of available formal training is going to occur. Justifying the need for environmental public health is needed at the local level.
- Certain states do not even require a college degree to work in environmental public health at the state or local levels. This is scary because environmental public health focuses on the basic tenants of life, the things we need to survive — food, water, air, and shelter.

2.2.15 A Passion for Public Health

“Environmental health seems to lack the passion of some of the other professional fields. Similar fields such as ecology and environmental protection may also pay low salaries, but they do not have the turnover problems environmental public health experiences. This may be due to the passion for the field. That being said, I think passion only gets you so far because of the high cost of living. Environmental public health programs should be giving employees a good professional title to be proud of, respect for what they contribute to public health, a good salary, and a career ladder they can count on. We have not truly defined environmental health. We have to build the profession from within on how we define environmental health.”

Robert G. Blake, REHS, MPH

Chief

Environmental Health Services Branch

*Division of Emergency and Environmental Health
Services*

NCEH

Strategic Options for CDC Support

External and internal interviewees expressed the following opinions:

- When people get into environmental public health, they are motivated by the mission of the work and not just the money. Other rewards are important to them. They get inside the program and love the work. They do not do this just because the job is there, but later, challenges might develop because the salaries cannot compete. We must recognize that sometimes the stars are recruited away from public health by private industry. Local health departments are never going to have salaries that compete with the private sector, but they will always have the mission.
- Salary is one of the most important concerns but not the only concern. Leaders in the field should get out and talk to university and community college students about environmental public health careers. If a person is passionate about this field, they might be content with a living wage in a small community.

2.2.16 Diversity in Workforce Culture

“Tribes are becoming increasingly interested and active in addressing environmental concerns related to health and the environment. Unfortunately, they don’t always have the resources for personnel and programmatic activities that are on scale or equivalent to state agency funding. However, they offer a world view of environmental protection that is holistic in nature and are committed to addressing health concerns related to environmental impacts. What tribes also hold in their favor is the ability to work closely with their tribal communities so that capacity-building and local empowerment activities have been demonstrated and effective.”

Annabelle M. Allison
*Environmental Health Scientist
and Tribal Affairs Liaison
Office of Policy, Planning, and Evaluation
NCEH/ATSDR*

An external or internal interviewee expressed the following opinion:

- Registered environmental health specialists are really analytical and concerned about details — with a lot of black and white thinking. They have self-selected into a regulatory world. These are wonderful characteristics but not what we need now in environmental public health. The process of achieving registered environmental health specialist status can be rigid. Oftentimes, job interviews are based on technical skills rather than overarching communication and style topics. Environmental public health program managers might have inadvertently eliminated candidates, particularly from diverse cultures, because they only heard what they asked for during interviews.

“As a big picture issue, we need much more diversity in the environmental public health workforce. We are proud of the diversity of our environmental health team today. There must be a strategic plan to increase comfort and approach recruitment in a different way We need to help people understand the value that culture brings to the workforce.”

Lila Wickham, RN, MS

Manager

Multnomah County Environmental Health

Portland, Oregon

2.2.17 Career Paths

External and internal interviewees expressed the following opinions:

- What is unique to environmental public health is that an established and obvious career path does not exist for this work. For example, where to recruit nurses is obvious — a nursing school. A distinct career path exists. In contrast, the path to being an environmental public health frontline worker, leading to a leadership role, is fuzzy. The career paths are too diverse. For example, a leader in an environmental public health program has a background as a high school biology teacher or another earlier career choice that did not feel right or did not work for that person. Then, they discover environmental public health and find their place.
- A tremendous focus has been placed on accredited environmental health academic programs, and a continued decline in these programs has made keeping them all alive difficult. The field should be looking at other academic programs that have sound environmental health sciences, too. These other programs can promote environmental public health careers now. That might be a temporary fix, but small colleges might have sound environmental health science or related programs that can make for good recruiting. States with fewer academic resources nearby or smaller budgets have this on their radar screen that enables hometown recruitment. If the closest accredited environmental health program is in another state, then that might be too far away.
- Just as many new graduates with environmental health training probably exist, but fewer government jobs do. For example, as many as 50–60 students might graduate with bachelor’s-level training in environmental health in one year from one school alone, but these new graduates are more likely to be hired by industry than by public health.

Strategic Options for CDC Support

“In my story, I lucked into environmental health during veterinary medical school when I was inspired by an environmental epidemiologist. I was then fortunate to have an internship at the state health office and I was hooked. I am not unique. Most of our workforce has a rich and varied science background, [and they] seem to have had chance encounters that brought them into contact with environmental health programs. Our workforce comes from all over. What I hear from our staff is that we need help promoting environmental health, so we continue to draw from a rich array of backgrounds. We need health economists to show decision makers the value of preventative services and the need for a professional environmental public health response team. We need the marketers to help people see the real work and not take these services for granted. We need to remind people that those core environmental public health services keep people from getting sick We need accomplished, common sense leaders who can make situational and strategic decisions.”

Lisa Conti, DVM, MPH, Diplomat ACVPM

Director

Division of Environmental Health

Florida Department of Health

Tallahassee, Florida

- Private industry might be pulling some people away, but a huge number of private environmental firms are not pulling away all of the environmental public health workforce. If more students in general go into the field, the uniqueness of the environmental public health jobs will attract more workers. Consider the choices available to a new graduate with interest and skills in science. Only a limited number of sanitarian jobs are available, and they do not pay well. Far more science teacher jobs are available with higher pay and more career opportunities.

“In terms of the public health workforce, I am ecumenical. I am a nurse, but I get to public health through the infrastructure, which is by its very nature multidisciplinary. I don’t want to pin public health jobs to any single profession as long as the entirety of the service has those multiple professions present. Much of public health could be done by any one of several different professions. I think that a public health service with some of a variety of related professions is ideal. It is in that interaction that we get the best of the workforce.”

Kristine M. Gebbie, DrPH, RN

*Elizabeth Standish Gill Professor of Nursing
and Director*

Center for Health Policy

Columbia University School of Nursing

New York, New York

3.0 WHAT CAN CDC DO TO SUPPORT ENVIRONMENTAL PUBLIC HEALTH WORKFORCE DEVELOPMENT?

3.1 External Interview Responses

“The supply of new, formally trained workers will not meet the demands of the aging and undertrained workforce in environmental health. The gap will be obvious by 2012 and will likely be filled with undertrained personnel. The gaps will be filled — they must be — but will the appropriately trained workers be available to hire? [In light of this], it is crucial for us to know what it is that are we doing [in environmental public health]. If we are in it to make a difference, then we need to measure differently. So, instead of just inspecting more and more, we need to look strategically at the highest areas of violation [need] and do inspections in the areas most likely to have prevention impacts.”

**Patrick O. Bohan, MSEH, MS, PhD, RS
CAPT, USPHS (Retired)**

*Assistant Professor
Department of Environmental Health Science
East Central University
Ada, Oklahoma*

The following summary points are from interviews with non-U.S. Federal Government subject matter experts. The opinions included here were taken directly from interviewees’ responses to the question, “What can CDC do to support development of the environmental public health workforce?” Each recommendation reflects the interviewee’s own words. Their responses have been categorized, and similar recommendations have been combined to avoid duplication.

3.1.1 Supporting Local Leadership Development

External interviewees recommended the following actions:

- Continue the Environmental Public Health Leadership Institute (EPHLI) because it supports and develops leaders (20–35/year) within the profession, brings people together from all backgrounds, and makes possible the participants’ looking beyond their own situations to assist one another. EPHLI is a tremendous idea in both concept and practice and should be increased in scope. It is valuable to local providers as well as the entire field of environmental health because it identifies people with leadership potential and helps them voice more global views — teaching them to look strategically at their own profession.
- Explore areas for improving EPHLI by
 - creating more formal local or regional networks of alumni (peers) who can collaborate in solving environmental problems;
 - increasing the number of mentors and leaders who work with EPHLI;
 - coordinating EPHLI’s administration and funding (approximately \$20,000/year in 2008) with other national leadership development activities supported by CDC;
 - developing the concept of community-level leadership training (possibly coordinated at the national level) to target those who need the training most; and
 - extending the reach of the program, possibly through webinars (i.e., online seminars).

Strategic Options for CDC Support

- Support education among local decision makers related to the purpose and value of environmental public health. People with health education skills, although not grounded in traditional environmental public health technology, can be in a unique position to provide important service to the field. One approach is to hire people with these skills even though they have not been involved in environmental public health. Environmental public health professionals are often passionate, but as a group, they are not necessarily advocates. The best answer is to find those already in environmental public health who can acquire leadership skills. They can be armed with critical thinking skills that propel them to act as advocates. CDC might not be able to play a part in this, but it would be a tremendous step forward for the field.

3.1.2 Providing National Leadership That Includes Workforce Development

External interviewees recommended the following actions:

- Take a leadership role in developing a comprehensive vision and strategy for environmental public health, including support of the environmental public health workforce, and then implement that vision and strategy. No other public or private program is doing this with a view of the overall situation. This is where CDC can have a major impact. All interviewees expressed a desire for growth of federal support from CDC in the environmental public health area. From a state perspective, CDC leadership is viewed as “standing tall” and confronting environmental public health challenges head-on.
 - Demonstrate leadership. Where is environmental health leadership coming from? Who outside of CDC can do this?
 - Encourage teaching and support of core skills in public health within educational institutions. Government support for development of the public health workforce nationwide is needed. The Health Resources and Services Administration has focused on training related to primary and personal healthcare but has not taken the lead in public health workforce development, including environmental public health. CDC can play that key national leadership role in public health workforce development.
 - Interact with the new administration in Washington to ensure that environmental health is placed into any national healthcare priorities list as the preventive medical model.
 - Work to improve environmental public health practice. NCEH/ATSDR should have staff assigned to do this. Improving environmental public health practice is identified in the national strategy, but no staff or resources appear to be assigned to implement that strategy. Without a competent workforce, the other essential public health practices cannot be accomplished. NCEH had an environmental public health workforce development plan, but that plan has not been highlighted lately. This should be followed up.
 - Examine the workforce problem carefully and act strategically. Environmental public health needs this leadership, and CDC should take it on in a serious manner. CDC is always in a hurry and sometimes misses important elements. CDC should think ahead and get people together in one room to agree on national approaches.
 - Identify people who can articulate environmental public health concerns to decision makers. Environmental public health workers are typically scientists who are not interested in policy or politics. Environmental public health has to do a better job of getting people to be better advocates for the field.
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Strategic Options for CDC Support

3.1.3 **Conducting and Supporting Research in Standards' Development and Measurement Methodology**

External interviewees recommended the following actions:

- Support development of the environmental public health workforce by helping programs address fundamental research questions that involve, for example,
 - frameworks and models that clarify critical questions;
 - environmental health problem-solving methodology;
 - environmental public health workforce enumeration;
 - standards for quality of service levels in different environmental public health specialties;
 - community-level approaches to environmental public health workforce development; and
 - best or model practices in environmental public health.
- Engage and invest in the National Association of County and City Health Officials (NACCHO) and the Association of State and Territorial Health Officials (ASTHO) census activities to get a more accurate count of environmental health workers.

“One way in which CDC can help is to publish a standard for quality service levels in a variety of environmental health specialties. For example, the number of sanitarians needed for food protection in a community per population for a quality service level might be 10 sanitarians/100,000 population (or whatever the right number might be). We all hope that local areas will do the right thing, but without resources, communities are cutting programs so low that even regulatory programs can't be done properly. For example, although a community can still claim a food inspection program, it can't be done well if sanitarians are responsible for inspecting 800 restaurants. It's just not possible to do a quality job with that kind of workload.”

Gerald Barron, MPH

Associate Professor

Department of Health Policy and Management

University of Pittsburgh

Graduate School of Public Health

and former Deputy Director

Allegheny County Health Department

Pittsburgh, Pennsylvania

3.1.4 **Using Training Methodologies (Form and Format) Tailored to the Needs of the Local Workforce**

External interviewees recommended the following actions:

- Support onsite training with local volunteer support to help with logistics. Trainees report learning better from in-person sessions as opposed to distance-based technologies. In addition, because the majority of staff prefer to learn in or close to their own workplace, regional trainings and conferences are probably more effective than national. Time away from the office for training is difficult, and travel funds are scarce, especially for smaller health departments.
 - Modify existing or older courses for specific audiences (e.g., tribal environmental health workers) and tailor trainings to participants' involvement in environmental health (e.g., environmental protection specialists, healthcare providers, or community members).
 - Ensure participatory planning (e.g., developing the agenda collaboratively between professional educators and the intended audience) and interaction during training. Both are highly effective methods for enhancing learning.
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Strategic Options for CDC Support

- Create training that allows learners to explore their political and managerial concerns as well as the science. For example, after a specialist addresses the scientific facts, a professional educator can facilitate a more practical discussion among the trainees to enhance their learning.
- Provide technical information that states can use to train others within their own jurisdictions.
- Include networking opportunities in addition to formal training experiences at workshops, conferences, and meetings, which will provide the greatest learning value to participants.
- Gather real-world examples of what has worked well in selected communities and share those examples through partner Internet sites or listservs.

3.1.5 Concentrating CDC's Efforts on the Skills and Training Topics Most Needed

An external interviewee recommended the following action:

- Address the most helpful topics, which include
 - leadership skills,
 - partnership development,
 - conflict management,
 - clear and concise writing skills,
 - diplomacy,
 - flexibility (e.g., nimbleness),
 - cultural competency,
 - collaboration,
 - individual citizen and community involvement, and
 - CDC goals.

3.1.6 Supporting and Participating in Recruiting New People Into the Workforce (Pipeline) and Increasing Marketing Efforts

External interviewees recommended the following actions:

- Raise awareness of career opportunities in environmental public health.
- Develop strategies for making this career choice more exciting to young people.
- Identify recruitment and retention success stories and showcase them.
- Develop and implement an aggressive marketing campaign for environmental public health concerns, including workforce recruitment.
- Support the needed cultural shift, targeting legislators to increase resources, targeting universities for research priorities, and welcoming people from any background into environmental public health to keep a broad base.
- Use CDC's risk communication and visibility as support and as a leadership example.

3.1.7 Supporting Programs in Higher Education

External interviewees recommended the following actions:

- Help students by reinitiating the federal funding program to pay for part of their tuition and by sponsoring internships.
 - Support newly accredited bachelor degree programs in environmental health and help coordinate geographic coverage by graduates of those programs.
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Strategic Options for CDC Support

- Support faculty development by recommending new requirements for schools of public health and by informing faculty about community-based participatory research and teaching opportunities.
- Emphasize the importance of associations between academic and minority institutions (including minority academic institutions) because those connections do not always exist. A diversity of opinions and ideas regarding solutions is critically important to the success of interventions.

3.1.8 Augmenting the Workforce

External interviewees recommended the following actions:

- Continue to include as one of its goals the recruiting of American Indians/Alaska Natives (AI/ANs) into federal career positions. This will demonstrate the agency's intent on building trust and creating forums for effective collaboration and communication. Encouraging a tribal community to overcome its distrust of federal government is challenging, largely because of past interactions that reduced or eliminated Indian populations and cultural heritage. Having AI/AN professionals in the government structure can help create mutual understanding and can work toward collaborative associations that serve tribal environmental health needs.
- Revisit the idea of a national environmental health service corps as an on-call group to help during public health emergencies (e.g., a program similar to the Epidemic Intelligence Service [EIS] but with a focus on environmental health) and consider conducting this in association with accredited environmental health education programs.
- Explore the area of recruiting retirees into environmental health.

3.1.9 Providing Subject Matter Experts

External interviewees recommended the following actions:

- Provide expert consultation in new areas faced by environmental public health workers and provide help in framing future work expectations to enable the greatest impact.
- Help strengthen local programs by increasing understanding of how prevention and response programs affect health outcomes.
- Provide data analysts, epidemiologists, and risk communicators to work directly with environmental health program personnel.
- Use CDC's most valuable asset — its branding — because any training with "CDC" on the label is highly prized by the environmental health workforce.
- Develop more strategic approaches for support. Staff in NCEH/ATSDR are fully capable of identifying creative approaches, but simply responding to individual requests for help is not enough. CDC should be providing technical assistance to multiregional areas instead of individual communities.

3.1.10 Sharing More Information and Materials

External interviewees recommended the following actions:

- Support CDC's partners in publicizing information on what is already available and place all information related to training, technical materials, and so forth, in one easily accessible recourse center.
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Strategic Options for CDC Support

- Update the NCEH/ATSDR Internet site and provide links to such resources as outreach materials and information about the divisions and service provided.
- Continue to provide programs with incentives and to develop supporting materials.

3.1.11 Providing More Funding

External interviewees recommended the following actions:

- Fund development of training modules to teach the skills identified in the Environmental Public Health Competencies.
- Fund an environmental public health position in every state to develop partnerships and to provide technical assistance for local programs.
- Recruit, hire, train, and support staff in each state to work in environmental public health (e.g., as in the sexually transmitted disease prevention programs).
- Fund and support student internships within local health departments.
- Provide paid internship programs for students with limited financial resources (especially for racial/ethnic or cultural minorities). The environmental health field should understand the value that cultural diversity brings to the workforce, which is not necessarily the same as ethnic diversity.
- Fund development of mentoring programs at state and local levels.
- Fund environmental public health programs to share their information and materials.
- Fund capacity-building activities at the national, state, and local levels.
- Provide more staff and funding to demonstrate CDC's commitment. CDC only funds part of what is needed to support the environmental public health workforce. Cutbacks have occurred in the federal budget, but CDC's support should not happen in a piecemeal way. Enumeration is needed and gaps should be identified throughout the country. CDC should first apply support to strengthen those communities with the fewest resources. CDC should begin by targeting ways to build infrastructure. The capacity-building grants and EPHLI are good, but these efforts provide scattered support. A unified plan is needed for maximizing this support. For example, where are all of the EPHLI graduates now? What ongoing programs received previous capacity-building grants? Where are accredited college and university programs? Where on the map do no or few resources exist? CDC should identify these areas and then concentrate support there.

3.1.12 Ensuring Quality and Planning for the Future

External interviewees recommended the following actions:

- Develop a vision for CDC of what the future of environmental public health should resemble. What can CDC do to create a demand so that accredited workers come to environmental public health? How can accredited workers be identified? A new model is needed that incorporates performance standards. CDC's plan regarding revitalizing environmental public health was supposed to do that. However, a closer look at CDC reveals multiple branches comprising internationally recognized experts. What is needed is a national program to improve the system and not just respond to scientifically specific questions. The interests in NCEH/ATSDR are too narrow, and because money is attached, no motivation to change exists.

Strategic Options for CDC Support

- Require performance standards that include regional or strategic coalition considerations. When performance standards are complete and broadly disseminated, the field of environmental public health can then collect data. Those data will provide evidence regarding where gaps in the workforce exist and help CDC focus resources on specific targets. Two recent NCEH requests for proposals for capacity building did not include any regional or strategic coalition requirements. If CDC agrees that performance standards are a priority, every grant should require this type of assessment.
- Support further development and use of behavioral science in environmental public health. A broad appreciation of behavioral science does not yet exist in environmental public health. The physical science and the environmental public health workforce discount the behavioral science and the contribution it can make.

3.2 Internal Interview Responses

The following are summary points from interviews with NCEH/ATSDR staff. The opinions included here were taken directly from interviewees' responses to the question, "What can CDC do to support development of the environmental public health workforce?" Each opinion reflects the interviewee's own words. Their responses have been categorized, and similar opinions have been combined to avoid duplication.

3.2.1 Supporting Local Leadership Development

Internal interviewees recommended the following actions:

- Set criteria for environmental public health leadership positions. Local leadership positions are often filled from among those in technical positions who might lack the ingenuity and drive to tackle emerging needs within the community.
- Increase support for EPHLI. This economical program only costs \$20,000/year to educate 30–35 people. CDC should explore ways to extend the reach of the program. New ways to market the program should be investigated, including use of webinars.
- Encourage use of EPHLI graduates' skills. In different regions of the country, environmental public health leaders have asked these graduates to help them with complex problems and to train their staff in solving problems by using systems thinking. More should be done in this area.

3.2.2 Providing National Leadership That Includes Workforce Development

Internal interviewees recommended the following actions:

- Lead the way in developing a future plan for environmental public health, which has been likened to urban sprawl — reaching out to more and more new areas but not concentrating on building the field soundly and strategically. However, we can plan better for the future.
- Work with the new administration in Washington, DC, to ensure environmental public health is placed into any national healthcare program as a true preventive medical model.

Strategic Options for CDC Support

- Recognize the potential for healthcare reform and develop a preventative medicine approach. Under the new administration, this might appear at first to be costly, but environmental public health prevents problems and thus reduces illness-related costs in the long term. The field needs a position when the healthcare reform debate starts. Environmental public health, as a part of the preventive healthcare system, saves people from pain and suffering and saves money.

3.2.3 *Conducting and Supporting Research in Standards Development and Measurement Methodology*

Internal interviewees recommended the following actions:

- Support an accurate census of the environmental public health workforce, which we do not have now. We have the NACCHO profile and an ASTHO survey, but those might include substantial double counting or undercounting. No occupation code or common title is available for use in national workforce statistical surveys. The federal government should support an enumeration of the public health workforce, including environmental public health.
- Support, through NCEH/ATSDR, development of better environmentally induced disease burden data for populations. These data will allow better design of public health interventions. The majority of interventions are based on individual community experience and the presence of completed exposure pathways. Intervention development addresses the exposure pathway, mitigation of contamination, and preventive measures against future exposures and health effects; however, interventions can be improved on a national scope with the data guiding this effort.

3.2.4 *Using Training Methodologies (Form and Format) Tailored to the Needs of the Local Workforce*

Internal interviewees recommended the following actions:

- Increase availability of online training and develop a learning management system to track participants.
- Consider bringing the idea of home-study courses into the realm of environmental public health or public health overall, because staff entering local programs often do not have any substantive training. Other disciplines do this, and the home-study concept can benefit the environmental public health profession as well as help individual practitioners.

3.2.5 *Concentrating Efforts on the Skills and Training Topics Most Needed*

Internal interviewees recommended the following actions:

- Institute a training academy similar to the one operated in the 1970s. In that program, newly hired local and state environmental public health practitioners were brought to CDC to study environmental health science and the larger public health system. This idea should be resurrected to provide distance learning and training that acquaints newly hired environmental public health staff who do not have the requisite background with fundamental principles.

Strategic Options for CDC Support

- Encourage training of new entrants in the field on all aspects of environmental public health during their first month and before being placed in any specialty work. This will help address the shortage of qualified entry-level staff because it will give them a broader knowledge of environmental health and public health. Sometimes, especially in urban areas, new employees are placed immediately into specialty slots, and they do not have an appreciation for the breadth of environmental public health.
- Create a budget that is stable and realistic in regard to meeting the training demands from Indian country. The Office of Tribal Affairs (OTA) does not have a budget line item for training and outreach. Using the knowledge and expertise of NCEH/ATSDR staff, as well as other federal agency experts, to serve as instructors can also be helpful. The best approach will be to build upon existing NCEH/ATSDR courses and tailor them to meet the needs of tribal programs.

3.2.6 Supporting and Participating in Recruiting New People Into the Workforce (Pipeline) and Increasing Marketing Efforts

Internal interviewees recommended the following actions:

- Examine marketing efforts and motivation factors for pursuing careers in environmental public health, compared with other allied professions (e.g., nursing). This information can provide valuable clues. Approximately 5 years ago, nurses collaborated with foundations and researchers to draw more attention to their workforce woes. Before their efforts, nursing schools were severely underenrolled. After the past 5 years of active marketing of the profession, so many more young people want to be a part of nursing, a surplus of applicants now exists.
 - Support marketing efforts to bring positive attention to the work of environmental public health programs in an entertaining way. Another example is the whole forensic science movement (e.g., the *CSI* television series and subsequent spin-offs). Because of the public interest, often fueled by television series, enrollments in colleges and university programs related to forensic science has increased substantially. This can also be done for environmental public health. *The Life of Grime* is a television series in London in which they follow environmental health officers at work and at home. The show has human interest as well as health aspects and has been continued by popular demand. Getting visibility through a popular television show can turn the tide for environmental public health workforce needs.
 - Investigate new and creative ways to develop an early interest in environmental public health careers. Examples are promoting environmental public health as a middle and high school option of study and career days for high school students that are sponsored by universities (e.g., Eastern Kentucky University Day where 240 high school students were invited to participate and become acquainted with environmental public health).
 - Ensure that the new NCEH/ATSDR apprenticeship program, Collegiate Leaders in Environmental Health, contains environmental public health training and practical experience.
 - Examine the dropout rates of medicine, pharmacy, and forensic science professional development programs to see if those students might be attracted into environmental health studies.
 - Promote careers in environmental public health among retiring military service personnel.
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Strategic Options for CDC Support

3.2.7 Supporting Programs in Higher Education

Internal interviewees recommended the following actions:

- Increase CDC's impact on the teaching of environmental medicine in medical schools. Funds are needed to support programs that engage professional medical associations related to primary-care practice or medical school consortiums to systemically improve environmental medicine education in medical schools. A request for proposals from CDC might generate as many as 6–10 applications with the goal of creating such a new program.
- Incorporate environmental health education into the scope of the cooperative agreement between CDC's National Center for Health Marketing and the American Association of Medical Colleges (AAMC). AAMC focuses on getting more preventive medicine content into medical school teaching, and environmental health is one aspect of preventive medicine that can be beneficial to the field of environmental public health.
- Support, through NCEH/ATSDR, an effort to go beyond continuing education, curricula design, and content development for medical schools and on to reaching students in the earlier phases of their medical training. Medical school curricula will not be easy to change, but adding more environmental medicine and toxicology content into existing course work (e.g., basic science or pharmacology) will be a step forward. Even if the curricula are not changed, adding to and expanding the existing environmental health content will be helpful. By integrating environmental medicine concepts early in clinical training programs, more physicians will emerge from medical school knowing the basic principles and practices of environmental medicine.
- Be involved through a major push at the college level to develop environmental health programs. New priorities in environmental health include terrorism and disaster response and global warming. A highly trained and competent workforce is needed to deal with these emerging problems, along with the historical challenges (e.g., food and water safety) that have always been the responsibility of environmental public health. The United States now has 32 accredited schools of environmental health, but for years, only 20 programs were available for interested students. However, schools are now starting to close these programs because of state-level budget cuts and the limited size of the environmental health academic programs.
- Support local apprenticeship programs because they not only supply a steady flow of new potential employees but also provide for more predictability in enrollment for the schools offering environmental health degrees. Certain programs have closed their doors because of declining enrollment, and college deans have to make difficult decisions in this regard.

3.2.8 Augmenting the Workforce

Internal interviewees recommended the following actions:

- Continue recruiting AI/ANs into federal career positions. This targeted recruitment demonstrates the agency's intent on building trust and creating forums for effective collaboration and communication. Tribal communities find that overcoming their distrust of the federal government is challenging, largely because of past interactions that reduced or eliminated Indian populations and cultural values. Having AI/AN professionals in the government structure can help create mutual understanding and collaborative relationships that serve the environmental health needs of tribes.

Strategic Options for CDC Support

- Consider federalizing environmental health jobs. This has been successfully demonstrated in Texas through U.S. Public Health Service Uniform Services Corps (Commissioned Corps).

3.2.9 Providing Funds

Internal interviewees recommended the following actions:

- Fund higher education in environmental public health. Traditionally, environmental health academic programs are limited in size, and they are likely to be cut when budgets tighten. Although the funding provided by NCEH to the Association for Environmental Health Academic Programs (AEHAP) is relatively small, it makes a big difference. For example, some of the funding is used for student recruitment grants, and every program that has received a grant has experienced growth. If the schools apply for an innovative recruitment grant, the growth they experience can help them better confront threats of budget cuts.
- Support internships in local programs. One local health department started with three or four summer interns. Over the years, this has expanded to include 20 summer staff, including interns working on such projects as a West Nile virus/mosquito control program, swimming pool inspections, and a radon-sampling program. Internships are a valuable tool in educating and recruiting new workers into the field.
- Support OTA in their development of short- and long-term strategies, which will address the goals for working effectively with tribes across the United States. OTA also needs a consistent and realistic budget for both the immediate and distant future. Investing time and resources in OTA is in the best interest of NCEH/ATSDR so that they can gain trust throughout Indian country.
- Support AEHAP programs.

3.2.10 Developing CDC's Own Workforce

An internal interviewee recommended the following action:

- Implement an orientation program for CDC's own workers. A substantial number of CDC's program administrators have never been directly involved in day-to-day environmental public health activities at the local level. Going on rotation around the country might be one way these administrators can better understand the needs of state and local programs.

3.2.11 Developing Strategic Partnerships

Internal interviewees recommended the following actions:

- Be clear about the agency's goals and mission while being respectful of communities' environmental health concerns. The agency can conduct public health assessments, perform health consultations, and provide technical assistance, but directly linking an exposure with health symptoms is not always possible. Realistic goals and expectations have to be established early for successful collaboration to occur.
- Encourage EPHLI graduates to use their newly found knowledge to assist in solving national problems and in developing new approaches. This can extend the reach of national environmental public health even when no growth is occurring in the federal government budget or staff size.

Strategic Options for CDC Support

- Support training and outreach to tribes for the overall goal of building capacity and local empowerment. For example, if a tribe requests assistance from ATSDR for conducting a fish-consumption survey, ATSDR is unable to go out to the tribe's community and conduct the survey per se because of limitations on what ATSDR can do. However, if enough tribes request training on how to conduct fish-consumption surveys, the possibilities for providing assistance — in the form of training — becomes feasible. A survey tool or questionnaire is only as good as the questions that it poses. Through the appropriate expertise, training opportunities to demonstrate survey design can be created and implemented to ensure that the necessary information for decision-making is collected. Passing the skills and tools on to tribal professionals so that they can apply this knowledge is a viable goal for NCEH/ATSDR. Facilitating tribal professionals in conducting their own surveys is much more valuable because these tribal professionals become recognized for their expertise within their own communities. This allows more time for data collection and analysis, because outsiders conducting surveys have to take time and effort to build trust and mutual understanding within the tribal communities. NCEH/ATSDR also benefits because they are using their knowledge base to further environmental health, and they become a trusted source for training, education, and collaboration.

3.2.12 Fostering Intra-Agency Collaboration

An internal interviewee recommended the following action:

- Improve rapport and create more opportunities for collaboration between OTA and the three NCEH divisions. Historically, OTA resided in ATSDR's Division of Health Consultation and Assessment, but with the recent merger of NCEH and ATSDR, this office now serves both organizations. NCEH has considerable knowledge and expertise, and enhancing collaboration between them and OTA will enable more effectiveness in meeting the environmental health needs of tribes.

3.2.13 Identifying Needed Help

- NCEH/ATSDR program leaders who were interviewed for this project were asked to identify what kind of help or support they believed they needed most but were not receiving at the time of the interview. Their responses, in terms of needs, are summarized as follows:

More Funds To Support EPHLI — EPHLI is hailed by participants and local and state programs as a considerable benefit to environmental public health practice. However, costs to continue operating EPHLI at the same level are increasing, and substantially more can be done if the program is expanded.

More Support for Environmental Health Students To Choose Public Sector Jobs — The new internship program sponsored by NCEH/ATSDR, Collegiate Leaders in Environmental Health, is exciting, but accredited environmental health programs are not being included in marketing and recruiting efforts. Clearly, the program is intended to attract newcomers to environmental health, and this is important. Supporting partner organizations (e.g., AEHAP) is also critical in encouraging students to choose careers in environmental public health sectors, because half of their graduates are taking jobs in the private sector.

Strategic Options for CDC Support

Funding from the Coordinating Office for Terrorism Preparedness and Emergency Response (COTPER) To Support Environmental Emergency Response Training — Since the terrorist attacks on September 11, 2001, and Hurricane Katrina in 2005, demand for environmental public health emergency response training has been extremely high. Every disaster response in recent years has demonstrated the critical nature of environmental health. The floodgates of demand for training have opened, but NCEH/ATSDR has not received any money from COTPER to support training efforts that are under way or to provide for future courses.

Writer Services To Support Training Activities — Approximately 1,500–2,000 people have applied for CDC-sponsored electronic courses since they were made available on NEHA's Internet site. This is a way to reach those who cannot travel to out-of-state training sites or national conferences. Even when access to important research is available, composing content for reports and training documents in a timely fashion is challenging. Courses are waiting to be updated to match electronic venues, but professional writers are needed to assist with these tasks.

Faster and Cheaper Production Assistance — CDC's Division of Creative Services uses expensive cameras to do simple broadcasts, and that expensive equipment is not needed for the present work (e.g., Internet streaming). Although Creative Services has tried hard to be flexible in meeting requests, thinking that is ahead of the technologic curve is needed.

Graphic Support for Development of Visual Aids — Access to CDC's Division of Creative Services is not as fast as needed to support development of training and communication visual aids (i.e., drawings, relevant photographs, and simple-to-detailed animation) and new types of media. This is a critical need for supporting NCEH/ATSDR products, especially those intended for low-literacy populations.

Decentralized Production — More support is needed in production assistance. All CDC graphic and writing assistance for producing education and training materials is centralized within the National Center for Health Marketing, but managing production at the center or division level should cost less. First, however, funds for equipment, additional software, and online design will be needed.

More Support for Formative Evaluation — Formative evaluation is a valuable part of effectively developing education programs, but this only happens if individual programs have funds to support it. If these key activities are funded and support is centralized, products and services can be developed with more background research on audience knowledge, attitudes, motivations, and behaviors. CDC is a science-based organization and should recognize that this lack of formative research is critical if audience needs are to be met effectively.

More Support for Program Evaluation — Support systems are not fully in place to evaluate the impact of educational products. Although plans exist to evaluate training activities, universal support is needed for this effort, and products should all be designed with evaluation in mind.

More Funding for Workforce Development in Environmental Public Health — Considerably more can be done if staffing and funds are adequate for all NCEH/ATSDR divisions.

3.3 Options Based on the Literature Review

The project team reviewed 16 reports from the scientific literature and in-house CDC publications; they based their selection on information related to workforce development needs specifically related to environmental public health. After reviewing each article, the team prepared an abstract of the primary content, summarized key points from the article, and identified ideas most relevant to CDC's role in supporting environmental public health workforce development. Those ideas, which describe important options for CDC to consider, are categorized and summarized as follows:

3.3.1 *Monitoring, Evaluating, and Improving Programs and Organizations*

The following recommendations are derived from the literature review:

- Apply the 10 Essential Environmental Public Health Services as a means of evaluating existing programs, including identifying program gaps.
- Support creation of community services outreach teams tasked with addressing any essential services gaps.
- Assist environmental health agencies in using the 10 essential services framework to address capacity challenges (e.g., inadequate resources and equipment, lack of political support for environmental health activities, ill-defined organizational infrastructures for environmental health programs, and a growing loss of leadership because of attrition).
- Support increased use and development of a nationwide environmental public health tracking network capable of linking hazardous environmental exposures and health outcomes (see Appendix C, Litt 2007).
- Support enhancement of state infrastructure and resources to support tracking activities (see Appendix C, Litt 2007).
- Provide support in improving the environmental public health workforce through promotion and development of enumeration methods and performance standards.
- Continue to participate in efforts to identify core competencies, best practices, and essential services of environmental public health practitioners.
- Develop a model approach, easily adoptable by state and local health departments, by identifying standard cluster definitions and adapting existing documents to establish standardized protocols for all facets of noncommunicable disease cluster investigations.
- Issue guidance that explains how noncommunicable disease cluster investigation protocols are implemented and form a federal advisory group to assist with difficult cluster-investigation requests (see Appendix C, Juzych et al. 2007).
- Develop materials to help the public better understand noncommunicable disease cluster challenges and issue national policy statements to better inform the public about environmental hazards and disease links (see Appendix C, Juzych et al. 2007).
- Conduct evaluations and use the data for budget justifications and requests.

3.3.2 *Meeting Training and Technical Assistance Needs*

The following recommendations are derived from the literature review:

- Support development of increased technical competency in the environmental public health workforce in such areas as biostatistics, environmental and occupational health, the social and behavioral aspects of health and disease, and prevention practice.

Strategic Options for CDC Support

- Enhance environmental public health workforce competency by increasing the number of online courses and other distance-learning mechanisms (e.g., satellite conferences and live online forums).
- Enhance both student training and that of the existing workforce by developing curricula on new and emerging roles in environmental public health.
- Support national conferences, including videoconferences, to introduce CDC's environmental public health strategy to its stakeholders.
- Strengthen the roles of the state, local, and national environmental programs and professionals to anticipate, identify, and respond to adverse environmental exposures and the consequences of these exposures on human health.
- Provide environmental health specialists, sanitarians, and other environmental health professionals and practitioners with access to topical, relevant scientific information and consultation.

3.3.3 Developing Resources

The following recommendations are derived from the literature review:

- Support health departments in developing and sharing innovative ways to leverage existing resources.
- Increase core financial support for the public health infrastructure (staffing and budgets) to correct for insufficient financial and salary support at the federal, state, and local levels.
- Engage in a renewed federal resource investment to ensure that public health is able to fulfill all of its responsibilities.
- Offer local environmental public health agencies a 3-year CDC Essential Services Capacity-Building Initiative grant.
- Expand funding and technical assistance to support state, tribal, territorial, and local agencies and organizations in addressing contemporary, new, and reemerging environmental concerns and threats.

3.3.4 Developing Future Leaders

The following recommendations are derived from the literature review:

- Continue supporting and developing existing leadership programs (e.g., EPHLI).
- Create a core of leaders in environmental public health at the federal, state, tribal, territorial, and local levels.

3.3.5 Marketing the Profession and Recruiting and Retaining Professionals

The following recommendations are derived from the literature review:

- Attract, inform, and recruit former uniformed services members (e.g., retired military and U.S. Coast Guard personnel) into environmental public health positions through career fairs, presentations, brochures, and job postings on the Internet (e.g., on the NEHA Internet site).
- Support health department capacity to recruit, train, and strengthen the environmental public health workforce by encouraging expansion of efforts and supporting innovations that address recruitment and retention challenges, especially among minority populations.

Strategic Options for CDC Support

- Develop a comprehensive internship program that successfully provides students with applicable job skills to enter the environmental health workforce and that provides them with substantive information about environmental health career opportunities.
- Support education of elementary, middle, and high school students about environmental health problems and encourage values that support a healthy planet, because they are the next generation of professionals.
- Increase public awareness of the value of hiring graduates of accredited environmental public health programs.
- Visit academic institutions to highlight the public health influence of the profession and opportunities for students to pursue this rewarding line of work.
- Enhance recruitment of the best and brightest students at the local level by improving public knowledge of environmental health at the national level.
- Increase federal efforts to recruit and retain public health professionals.
- Create, enhance, or better publicize federal student loan repayment and scholarship programs to serve as incentives for recruitment and retention and to attract health professionals to underserved communities.
- Develop a national environmental health service corps.
- Expand investment in internship and fellowship programs in environmental public health to provide incoming professionals with real-world experience.
- Create a workforce development manual that provides tools and instructions for health departments to use in developing and implementing a postsecondary environmental health internship program.

3.3.6 Strengthening Programs and Supporting Strategic Planning

The following recommendations are derived from the literature review:

- Recommend and assist in use of the 10 Essential Environmental Public Health Services in developing strategic workplans for future environmental health activities.
- Assist local practitioners in developing hypotheses regarding environmental hazard risk factors and in targeting intervention investments (e.g., screening, awareness building, and communication)
- Support the workforce development goals established in CDC's environmental public health revitalization strategy.

3.3.7 Collaborating with Other Entities and Building Networks

The following recommendations are derived from the literature review:

- Support stronger communication and interaction between state and local environmental public health agencies.
 - Support collaboration among practitioners and academic institutions to improve environmental public health training opportunities.
 - Correlate environmental public health activities with the 10 Essential Environmental Public Health Services to ascertain strengths and weaknesses and areas of collaboration with other professions in public health.
 - Encourage an increase in the number of partnerships among environmental public health practitioners at the federal, state, and local levels.
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Strategic Options for CDC Support

- Encourage multidisciplinary expertise and collaboration in designing and tracking indicators that will be useful for policy-related environmental public health concerns.
- Work across jurisdictions to aid local environmental public health agencies that have limited capacity and resources.
- Encourage contracts and formal agreements between county health departments and local colleges and universities.
- Encourage strategic partnerships (interagency/intra-agency) and collaboration to address environmental public health workforce challenges.
- Promote use of CDC's Internet-based environmental public health listserv.

3.4 Options for Immediate Action — External Interviews

The following are interview responses from nine persons who are not U.S. Federal Government employees when asked, “Are there things that could be done to alleviate the shortage of environmental public health workers — any activities that might be implemented quickly with a minimum new effort?” These statements refer to the actions that respondents believe should be taken. In certain instances, CDC is intended as the organization that should implement the suggestion. However, if CDC is not specifically identified in the statement, the respondent intended this to be a broader recommendation that should be considered by leaders in the field of environmental public health. Each opinion reflects the interviewee's own words. Their responses have been categorized, and similar opinions have been combined to avoid duplication.

3.4.1 *Training and Supporting the Troops (Local Staff)*

External interviewees recommended the following immediate actions:

- CDC can play a valuable role by providing state, local, and tribal environmental public health programs with information on how to address two of the 10 Essential Environmental Public Health Services,
 - monitoring environmental and health status to identify and solve community environmental health problems, and
 - evaluating the effectiveness, accessibility, and quality of personal- and population-based environmental health services.In essence, CDC can teach local program staff how to use the data already in their file cabinets.
 - Another benefit might be for CDC to assist programs in moving to computerized systems. Then, local health departments can work with CDC to develop computer-based solutions that can be demonstrated and provided to other local environmental health programs.
 - Diagnosis and investigation are important parts of environmental public health. CDC can assist local providers by formulating training in implementing two of the 10 Essential Environmental Public Health Services,
 - monitoring environmental and health status to identify and solve community environmental health problems, and
 - diagnosing and investigating environmental health problems and health hazards in the community.
 - Recognition of core competencies has been successful in developing practical, hands-on training that truly addresses the needs of local environmental public health workers.
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Strategic Options for CDC Support

- A morale boost might help. For example, awards should be offered that make environmental public health workers feel needed and valued — this kind of recognition might contribute to their willingness to stay in a particular job.

3.4.2 Marketing

External interviewees recommended the following immediate actions:

- CDC can assist local programs in developing and implementing marketing strategies. People can be groomed to do environmental public health work and to make a successful career, but they might not have a formal education in environmental health or not be on an environmental health track in school or work. Applicants for jobs in environmental public health are often food workers who have a passion about quality and see this as an opportunity for themselves and to make a difference in the world. We need to market environmental public health to those people who are trying to figure out what they want to do in their careers. Reaching them with this message is important.
- Substantial media work is done on the local level. The media have even attempted to produce a local television documentary, “A Day in the Life of an Environmental Health Specialist.” Local areas find collaborating on projects like this difficult because of the confidentiality of their clients. However, CDC can support this kind of project in a way that protects the confidentiality of clients but still humanizes the work.

3.4.3 Tapping Workforce Resources

External interviewees recommended the following immediate actions:

- Second careers are an important source of competent workers and should be looked at more seriously.
- The suggestion has been made that retired military personnel might already have the skills to do environmental public health work and that they can be an effective source for recruiting. Apparently, retired military personnel are sometimes, in fact, interested but they will not do this work for a salary as low as \$30,000/year. Also, selected jobs require registered sanitarian status, and retired military personnel probably do not have that credential. Therefore, they need to study, get the credential, and then settle for a salary lower than their expectations.
- Certain community colleges have developed programs in environmental science that provide students preparation for technical positions in health departments. A possible approach for small rural counties might be to hire people with associate-level degrees to get them started and later help them earn 4-year degrees and credentialing.
- Talking with high school students about environmental health is important. Recruitment activities might begin with college students as early as junior and senior year; therefore, having them at least consider environmental public health work before that time is critical. A longer pipeline might allow time for potential recruits to take science courses, thus leading to a longer term solution.

3.5 Options for Immediate Action — Internal Interviews

The following represent responses from U.S. Federal Government employees when asked, “Are there things that could be done to alleviate the shortage of environmental public health workers — any activities that might be implemented quickly with minimal new effort?” These responses

Strategic Options for CDC Support

refer to the actions that should be taken by the federal government and for the most part relate specifically to activities and personnel of NCEH/ATSDR. Each opinion reflects the interviewee's own words. Their responses have been categorized, and similar opinions have been combined to avoid duplication.

3.5.1 Training and Supporting the Troops (Local Staff)

Internal interviewees recommended the following immediate actions:

- Modify existing or older courses to support more specific audiences (e.g., tribal environmental health workers) and tailor these trainings to participants' specific involvement in environmental health (e.g., environmental professionals, healthcare providers, or community members).
- Develop job aids (e.g., flash cards and posters) to assist those conducting local environmental health activities. Distribute these job aids during conferences, trainings, and site visits.
- Develop more webinars, update online resources, and increase "Best of" examples to enhance environmental health training materials.
- Send environmental public health specialists into local communities to lead workshops for their service providers.

3.5.2 Augmenting the Workforce

An internal interviewee recommended the following immediate action:

- Assist partner organizations experiencing staffing shortages. Explore temporary detail or part-time assignments of CDC personnel to assist with day-to-day tasks and projects. Provide this same opportunity as an assignment to interns at CDC.

4.0 DISCUSSION

The challenges for discovery in this project involved four central questions,

1. Do gaps exist in the environmental public health workforce now and are such shortages expected to continue?
2. What do professionals concerned about environmental health believe is creating this workforce challenge?
3. What strategic activities within CDC might alleviate environmental health workforce shortages?
4. In what ways can CDC have the greatest positive impact on state and local environmental public health workforce development?

In regard to the first question, participants and the scientific literature were uniformly in agreement that serious shortages exist in the environmental public health workforce now that will only become worse in the future. Without accurate workforce enumeration methods, this cannot be defined with data, but the anecdotal evidence clearly supports the claim that the workforce shortage in environmental public health is dire.

Environmental public health experts interviewed as part of this project expressed their opinions about the reasons for the environmental public health workforce shortages, and the most common are as follows:

- Workforce challenges are exacerbated by restricted state and local budgets, resulting in low wages and short career ladders.
- The field of environmental public health is misunderstood, undervalued, or even invisible in the community. The result is that not enough potential workers consider environmental public health a viable career choice.
- An already stretched environmental public health workforce will grow even smaller as substantial numbers of workers reach retirement age.
- The number of new professionally prepared workers entering the workforce is far smaller than the number retiring or leaving the field for other reasons.
- A highly trained and competent workforce is needed to respond to the new and emerging threats of biologic and chemical terrorism, natural and human-made disasters, and global warming, as well as to the ever-expanding traditional challenges for environmental public health workers of food and water safety and environmental toxins.

NCEH/ATSDR has professional and skilled workforce development teams who provide innovative programs and materials responsive to environmental public health needs. Although conducting an inventory of those activities and services was beyond the scope of this project, information from interviews with staff illustrates the dedication and excellence within NCEH/ATSDR. In addition, OWCD has myriad activities that can support or assist NCEH/ATSDR in developing the environmental public health workforce. Certain challenges represented in this report are exacerbated by lack of data to describe adequately the gaps and needs in environmental health workforce development. Recognizing that this is a problem

Strategic Options for CDC Support

throughout public health, OWCD has developed and is implementing a public health workforce research agenda. This agenda includes workforce research into assessing and forecasting trends, analyzing diversity, evaluating efficiency and performance, and assessing the impact of incentives. The resulting research will be applicable to the entire public health workforce, and thus, much of the research conducted as part of this agenda will be applicable to the environmental health workforce as well. In addition, OWCD directly provides workforce development activities that could benefit the environmental public health workforce. For example, EPHLI sprang from the original Public Health Leadership Development Institute developed by professionals now working in OWCD. The leadership of the original institute consulted with environmental public health professionals during development of EPHLI and continue to serve as advisors. More ways for collaboration between these two national programs should be explored. Model programs (e.g., the National Laboratory Training Network) have been designed within OWCD, and a more detailed exploration can provide NCEH/ATSDR with ideas and processes to benefit environmental health workforce development. OWCD — and its predecessor, the Epidemiology Program Office — has managed the highly acclaimed EIS program and other fellowships and internships for >50 years. Specialized environmental public health has been a part of the program participants' experience, and OWCD data reveal that the number of environmental public health assignments for fellows and interns both within CDC and in the field has increased consistently across time. For example, during 2004–2008, the number of OWCD interns and fellows assigned to NCEH/ATSDR increased from six to 18. Recognizing the current and predicted workforce shortages throughout public health, OWCD has acted proactively to develop the interest and skill level of young people still considering career choices. OWCD's Career Paths programs stimulate interest in public health and enhance development of science-, math-, and epidemiology-related skills among middle and high school students and teachers. One Career Path program, the Science Ambassadors, invites middle and high school science teachers nationwide to compete for the chance to collaborate with CDC scientists on epidemiology-based lesson plans, which will engage students by bringing activities regarding public health concerns into the classroom. Although environmental health is often a part of OWCD's training programs, enhanced collaboration between OWCD and NCEH/ATSDR will benefit the 21st Century environmental public health workforce.

Data gathered for this project from the literature and interviews demonstrated remarkable consistency among the recommendations for CDC action. Such recommendations for CDC intervention and support were frequently identical, and contradictions were rare. The activities of this project did not involve forming a consensus, but the majority of sources identified similar ways for CDC to support workforce development. The following are the most common ideas related to CDC support for environmental public health workforce development:

- CDC training, technical support, and funding are highly valued.
- Workers need to have people skills (e.g., communication, negotiation, community organizing, networking, and conflict management) in addition to their technical skills. CDC is viewed as an important source of support for this training.
- Development of new leaders is especially important, and CDC is regarded as a critical source of public health leadership training and support.

Strategic Options for CDC Support

- Workforce development, especially recruitment, can be enhanced by effective marketing strategies and internship programs. CDC is recognized as a leading source of assistance in these areas.
- Accurate enumeration, specific performance standards, and detailed professional competencies are crucially important to workforce development. CDC's involvement in development and implementation of these processes is critical.
- Strong national leadership throughout the field of environmental public health benefits workforce development. CDC is acknowledged as having the greatest leadership potential in environmental public health.

Despite the substantial commonality among the recommendations, differences also exist. An important example is the frequent discrepancy between what academics and national leaders voice regarding the future direction for environmental public health and what occurs at the local level. Researchers and leaders might see the potential of the field in one way, but the local service providers are mandated to perform work that is entirely different. Much of environmental public health has shifted during the past two decades to a fee-for-service structure. Local programs are confronted by the overarching vision that the field must be engaged in the health effects of environmental change, the built environment, and resource conservation. In contrast, and most persuasively, local programs are required to meet local regulations and quotas for routine inspections. These inspections are not only mandated, but they are a major source of revenue for public health programs. In certain cases, the revenue from inspections is spread across all public health programs and not used specifically for environmental public health services.

This financial dilemma might not be new or unique, but it requires careful consideration and negotiation. Local programs cannot benefit from CDC's outreach efforts if their needs and obligations are not considered. Federally designed training and workforce development activities that do not recognize local needs might be considered less useful. That being said, interview participants also stressed the need for environmental public health to attack the challenges of the 21st Century and to make additional contributions to the health and wellbeing of populations and communities. Consequently, even when important information or training on new problems or approaches must be delivered, local realities (e.g., related to regulations or funding strategies involving inspections) must be acknowledged, or the federal support might be viewed as being out of touch or irrelevant. This is a complicated and difficult barrier to training and workforce development support, but it must be managed. CDC must find a compromise between developing a position for future environmental public health activities that make a difference in the public's health and simultaneously demonstrate an understanding of the demands on the local systems. Insightful approaches to this dilemma are described in the literature, including the recommendation that local inspectors be trained in the role of public health consultants to augment their interactions with clients. Restaurant managers and home builders might develop greater respect and value for inspectors that they regard as allies providing them with helpful information and support in addition to a list of violations. Although implementing a change in the role of the inspector needs to happen at the local level, CDC can provide valuable support and guidance from a national perspective.

Strategic Options for CDC Support

NCEH and ATSDR have differences in terms of mission and mandates. For example, ATSDR has a mandate to provide education to health professionals that includes information on diagnosis and treatment of injury or disease among persons exposed to hazardous substances. ATSDR is also mandated to disseminate environmental health information. For example, Section 110 of Public Law 99-499, Superfund Amendments and Reauthorization Act of 1986 (SARA), directs that the Administrator of ATSDR shall “assemble, develop as necessary, and distribute to the States, and upon request to medical colleges, physicians, and other health professionals, appropriate educational materials (including short courses) on the medical surveillance, screening, and methods of diagnosis and treatment of injury and disease related to exposure to hazardous substances . . . through such means as the Administrator of ATSDR deems appropriate.” NCEH “plans, directs, and coordinates a national program to maintain and improve the health of the American people by promoting a healthy environment and by preventing premature death and avoidable illness and disability caused by noninfectious, nonoccupational environmental and related factors.” Therefore, ATSDR’s approach might differ from NCEH’s, making one overall national plan impractical. However, opportunities abound for collaboration and sharing between the two entities and for maximizing resources. Although sharing fiscal resources might be inappropriate, both have valuable programs and materials that can be beneficial to the other, and such collaboration will benefit all entities.

Participants often acknowledged CDC’s previous planning efforts related to environmental public health and specifically workforce development. They also expressed concern that plans might not have gone far enough to combat the rising urgency in the workforce situation. In addition, participants articulated disappointment that critical parts of plans had not been followed. Even though one unified training and workforce development plan for all of NCEH and ATSDR might not be advisable, experts encourage CDC to relate actions to a comprehensive planning process with monitored objectives. Because resources are likely to be a continuing challenge, CDC should think strategically about all efforts toward workforce support.

Each participant was asked to describe the environmental public health workforce in an ideal world where training and support meet all needs. The following list creates a vision of where participants in this project believe environmental public health workforce development should be in the future:

- The community values and acknowledges the importance of environmental public health services and engages in planning and support.
 - The workforce is clearly and accurately enumerated so that changes and future needs are identified.
 - Standard resource methodologies are used to predict and measure optimal staffing levels.
 - Adequate numbers of qualified personnel are available at all levels.
 - All workers are trained in the overall aspects of public health and environmental public health.
 - All workers are assessed regularly and determined to be achieving competencies and performing essential functions.
 - Workforce numbers are maintained at optimal levels through improved recruitment and retention (e.g., job satisfaction).
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Strategic Options for CDC Support

- Leadership positions are filled by personnel with excellent technical and managerial capabilities.
- The workforce is adaptable to emerging needs in environmental public health.
- Personal- and population-based environmental health services are evaluated regularly for effectiveness, accessibility, and quality.

APPENDIX A

INTERVIEWEES

The following persons were interviewed for this report (listed in alphabetical order):

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Strategic Options for CDC Support

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Strategic Options for CDC Support

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Manager

*Research and Development
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Governmental Affairs Radon Program

National Environmental Health Association

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Division of Environmental Hazards and Health Effects

NCEH

Ken Sharp, REHS

Director

Division of Environmental Health

Iowa Department of Public Health

Des Moines, Iowa

Brian Tencza

Team Lead

Environmental Medicine and Educational Services Branch

Division of Toxicology and Environmental Medicine

ATSDR

Lila Wickham, RN, MS

Manager

Multnomah County Environmental Health

Portland, Oregon

Strategic Options for CDC Support

Sharon O. Williams-Fleetwood, PhD

Deputy Director

Division of Health Assessment and Consultation

ATSDR

G. David Williamson, PhD, MS, MS

Director

Division of Health Studies

ATSDR

APPENDIX B

DISCUSSION GUIDES

Twenty-one persons participated in the project through an interview process. Of the total, 12 interviewees were U.S. Federal Government employees and included 10 CDC employees, one U.S. Environmental Protection Agency deputy administrator, and one person serving on an Interagency Personnel Agreement with CDC. The other nine interviewees were nonfederal employees and included state or local environmental public health professionals, academicians, and representatives from professional organizations. Each interview lasted 60–90 minutes and was conducted by project personnel. Discussions for federal personnel all followed the same format and explored ongoing workforce development activities, identified areas for program expansion, and included questions regarding needed assistance for increased efficiency and effectiveness. All discussions with nonfederal interviewees also followed the same format; however, during those interviews, the areas explored were the current and expected gaps in the environmental public health workforce, reasons for those gaps, and strategic roles for CDC in ameliorating the workforce shortages and limitations. Discussion guides (i.e., interview questions) for both federal and nonfederal interviewees are described in the following two sections.

Federal Personnel

What do you think that you do best related to training in NCEH/ATSDR? What is the best service you provide? Should you do more of that?

What would you do if you could improve one thing with no limitations? What would it be and what would be the impact?

If you could imagine a world where the training you provide is perfect and meets all needs, what would it look like? What would be there then that isn't there now?

What are areas where you need help and are not getting it?

Are there some activities that you might implement quickly with a minimum new effort?

What are the critical environmental health workforce shortages anticipated?

What should NCEH/ATSDR's role be in working to eliminate or reduce that shortage?

Who else should we talk to inside of CDC and outside? Here is our draft list of names. What do you think about these as sources of information?

What else should we be reviewing in the literature (professional peer review and practice materials) that would help us to understand the issues in the future environmental health workforce development?

Strategic Options for CDC Support

Nonfederal Personnel

How would you describe your role in environmental health? What is your relationship to the development of the environmental health workforce?

Although environmental health responsibilities at the state and local level seem to be increasing, there is evidence that the number of new specialists in this field is decreasing. Have you seen this in your work? If so, what are the critical environmental health workforce shortages anticipated? If there is currently a shortage of workers, then what has been the effect on environmental health services?

If you think that there is a shortage of environmental health workers, then what do you think accounts for this gap between supply and demand?

Are there things that could be done to alleviate this shortage? Are there some activities that might be implemented quickly with a minimum new effort?

What would be the most helpful strategy to reverse this trend or change the ratio of workers to demands? What should CDC's role be in this effort?

Do you have suggestions for other people I should contact or information in the literature (professional peer-reviewed and practice materials) that would help us to understand the issues in the future environmental health workforce development?

APPENDIX C
LITERATURE SYNOPSES

Strategic Options for CDC Support

American Public Health Association and the Centers for Disease Control and Prevention/National Center for Environmental Health. Environmental Health Competency Project: Recommendations for Core Competencies for Local Environmental Health Practitioners. Washington, DC: American Public Health Association; 2001. Available at: http://www.apha.org/NR/rdonlyres/50581D31-E13B-4424-8895-5545A3265C19/0/Env_Comp_Booklet.pdf. Accessed December 10, 2008.

Abstract

Through funding from CDC's National Center for Environmental Health, the American Public Health Association assembled representatives from 13 national environmental health organizations for a 2-day meeting in February 2000. At this meeting, the Environmental Health Competency Project, the participants identified and defined core competencies for local-level environmental health practitioners to aid in strengthening capacity to protect the public's health. These experienced health professionals developed 14 core competencies that are combined into three principal roles — assessment, management, and communication.

Key Points

- A competency is defined as a cluster of related knowledge, skills, and attitudes that (1) affect a major part of one's job (a role or responsibility); (2) correlate with performance on the job; (3) can be measured against selected accepted standards; and (4) can be improved through training and development.
- A basic assumption of this project is that environmental health practitioners have the technical competency to do their jobs.
- Discussion was extensive regarding cultural sensitivity as a competency. All participants believe that problems related to cultural diversity are key to being effective, and although not an explicit competency, cultural sensitivity is considered part of all that is done in environmental health and protection.
- The following 14 core competencies should serve as the primary functions of environmental health programs:
 - Assessment** — information gathering; data analysis and interpretation; and evaluation.
 - Management** — problem solving; economic and political matters; organizational knowledge and behavior; project management; computer and information technology; reporting, documentation, and record-keeping; and collaboration.
 - Communication** — education; communications; conflict resolution; and marketing.

How CDC Can Help

- Develop platforms for speaking about competencies at conferences, meetings, and other educational and networking opportunities.
 - Identify funding to allow work to continue toward implementation of core competencies at the local environmental health level.
 - Review past efforts and understand why other competency efforts have succeeded or failed.
 - Identify a mechanism to find and disseminate training programs and products.
 - Set the standard that the core competencies will be used at the federal and state level when hiring, recruiting, and training employees.
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Strategic Options for CDC Support

Association of State and Territorial Health Officials (ASTHO), Reichardt A, Lewis M. 2007 State Public Health Workforce Survey Results. Arlington, VA: ASTHO; 2008. Available at: <http://www.astho.org/pubs/WorkforceReport.pdf>. Accessed January 29, 2009.

Supported by a grant from CDC, the 2007 survey revisited data from the 2003 workforce survey to determine if changes had occurred in public health workforce trends and addressed the question of whether any new trends were emerging or any strategies being used or explored that might mitigate workforce shortages. The 2007 survey was developed by a working group comprising practitioners and subject-matter experts from state, local, academia, nonprofit, and federal public health organizations. The survey examined six areas of state health agency workforce characteristics: demographics and trends during 2003–2006, workforce planning, recruitment, retention, retirement, and workforce shortages.

Key Points

- The average age of a public health worker in state government is 47 years, an increase of approximately 1.08 years, compared with survey respondents in 2003; the average age of new hires in state health agencies is 40 years.
- 20% of the average state health agency's workforce will be eligible to retire within 3 years.
- States have identified severe shortages in nurses, nutritionists, dietitians, public health physicians, and social workers.
- The majority of states continue to be affected by shortages in other public health classifications, including epidemiologists, laboratorians, and environmental health workers.
- Barriers directly affecting public health workforce shortages include
 - budget constraints,
 - lack of competitive wages for public health career-track employees,
 - lack of interest in public health careers by recent college graduates,
 - lack of visibility of public health careers, and
 - bureaucratic processes in the selection and hiring of qualified candidates that is often affected by broad state-based employment practices.
- The workforce shortages often result in gaps in both leadership and institutional knowledge at state health agencies.
- Other strategies (e.g., rehiring retirees and succession planning) are being used to alleviate the impact of retirement on state public health.

How CDC Can Help

- Communicate the public health workforce crisis to a wider audience.
 - Advocate for increased resources for state and local public health agencies to further develop their workforce activities.
 - Study public health workforce needs through quantitative research and enumeration.
 - Actively replenish the pool of available workers by marketing public health careers and highlighting the benefits of working in public health.
 - Improve the competitiveness of compensation in public health sectors.
 - Build partnerships within and outside the public health system.
 - Foster innovative strategies to counter the workforce shortage.
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Strategic Options for CDC Support

Centers for Disease Control and Prevention (CDC). A National Strategy To Revitalize Environmental Public Health Services. Atlanta, GA: US Department of Health and Human Services, CDC; 2003. Available at: <http://www.cdc.gov/nceh/ehs/Docs/NationalStrategy2003.pdf>. Accessed September 25, 2008.

Abstract

The strategic plan is intended to enhance and revitalize environmental public health services through carefully planned goals and objectives that address major environmental concerns. This strategy is needed to prepare for possible environmental threats or terrorism because the workforce must be able to anticipate, recognize, and respond to these challenges. The desired outcome of the strategy's goals and objectives is delivery of high-quality services and an ability to meet emerging needs. To implement workforce development goals, employees' scopes of work should be defined, and the size, composition, performance standards, and competencies of the workforce should be determined.

Key Points

- The field of environmental public health has expanded substantially during the past 50 years.
- Forward-thinking leadership is necessary to build enduring partnerships among federal agencies with an environmental public health mandate and officials in state, tribal, territorial, and local programs.
- A culture of indifference exists among environmental public health practitioners because of low pay scales, minimal advancement opportunities, and higher compensation opportunities in the private sector.
- Environmental public health workers often learn needed skills on the job, then move into the private sector at substantially higher salaries.
- Staff often enter positions lacking communication skills and then have little opportunity to learn those skills on the job.
- The environmental health workforce has a high percentage of employees who will retire within the next 5–10 years, making the shortage even more acute.
- Specialized education or certification is not required for entry into the environmental public health workforce but should be.
- No formal competencies define performance or direct training approaches.

How CDC Can Help

- Develop a national environmental health service corps or a fellowship program in addition to the Environmental Public Leadership Institute to accomplish this mission.
 - Provide support in developing an environmental public health workforce through performance standards, training, recruitment, and retention activities.
 - Expand funding and technical assistance to support state, tribal, territorial, and local agencies and organizations for addressing ongoing, new, and reemerging environmental problems.
 - Support national conferences, including videoconferences, to introduce CDC's environmental public health strategy to its stakeholders.
 - Promote use of CDC's Internet-based environmental public health listserv.
 - Develop technical competencies in such areas as biostatistics, environmental and occupational health, social and behavioral aspects of health and disease, and prevention practice.
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Strategic Options for CDC Support

Berg R. Profiles in leadership, part II: the 15 faces of environmental health leadership. J Environ Health 2007;69(6):57–75.

Abstract

The article profiles 15 leaders in environmental health from federal agencies, trade associations, local health departments, and private industry. These 15 professionals addressed the challenges they face daily regarding the environmental health workforce.

Key Points

- Environmental health departments should provide more services than just inspections and work more interactively with the communities they serve.
- The external conditions under which the profession often operates (e.g., lack of political support) can send a discouraging message to frontline workers.
- Budget crises limit workers' ability to attend educational opportunities and conferences.
- A disconnect exists between the importance of the work performed, the nature of the work performed, and the passion exhibited for that work.
- An increased national interest in emergency preparedness provides a great opportunity for environmental public health professionals to become more involved.
- Environmental public health professionals need to increase involvement in policy activities.
- Environmental health programs are being asked to do too much, given the resources they have available; workers find this difficult to accept.
- Young people are discouraged when they start working in public health because they often have only one responsibility — inspections.

How CDC Can Help

- Conduct research in workforce gaps.
 - Create student internship or training programs that include tuition for a bachelor's or master's degree and CDC-sponsored field training as a health officer in a health department.
 - Create mentoring programs to assist workers in transitioning from technical work to managerial and leadership responsibilities.
 - Implement the Protocol for Assessing Community Excellence in Environmental Health (PACE-EH).
 - Create a compendium of stories regarding environmental public health achievements.
 - Build a corps of retired military personnel trained to work in local health departments.
 - Develop an environmental health service corps modeled after the Epidemic Intelligence Service and built on a common problem-solving methodology.
 - Develop generic environmental public health training courses and technical assistance tools that local agencies can customize to address local or regional concerns.
 - Ensure open communication between CDC and local agencies so that staff can exchange information on needs and accomplishments.
 - Create emergency-response training courses specifically geared toward the role of environmental health practitioners.
 - Create training modules to assist users in developing particular competencies.
 - Promote the idea that environmental health professionals are high-end consultants and not merely inspectors.
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Strategic Options for CDC Support

Dreyling E, Dederick EJ, Chari R, et al. Tracking health and the environment: a pilot test of environmental public health indicators. *J Environ Health* 2007;70(5):9–16, 38, 40.

Abstract

This study demonstrated how existing environmental health data can be used to create meaningful indicator measures for environmentally related diseases and for prioritizing and guiding interventions. The authors tracked selected health indicators by risk ratios throughout New Jersey and analyzed demographic (white males versus white females), temporal (1986–1996), and geographic data. By using environmental health data, they concluded that, for two air toxins (benzene and 1,3 butadiene), the magnitude of the risk for experiencing cancer was higher for persons residing in New Jersey than for those residing elsewhere. They also determined that the temporal results for leukemia indicated that rates decreased gradually for both sexes. Regarding obesity and urban sprawl indicators in New Jersey, they concluded that during 2000, the proportion of residents expected to be overweight or obese ranged from 53% to 76%. However, the final results concluded that a consistent association does not exist between these indicators.

Key Points

- The increased use and further development of environmental health tracking methods are necessary for establishing a nationwide network capable of linking exposures and health outcomes.
- Analyzing indicators spatially, temporally, and as they relate to each other can provide critical assistance to state and local public health agencies trying to create and prioritize interventions and to researchers seeking better understanding of environmentally related diseases.
- Indicator information can aid evaluation of the impact of government regulations and policy responses on harmful emissions.
- Indicators combining environmental monitoring and public health tracking data can be valuable tools for examining temporal and geographic trends in disease incidence.
- Indicator information is essential for quantification of environmental hazards, exposures, and health outcomes and for identifying priority areas for intervention.

How CDC Can Help

- Foster multidisciplinary expertise and collaboration in designing and tracking disease indicators.
- Increase use and development of disease indicators and establish a nationwide environmental public health tracking network capable of linking environmental exposures and health outcomes.
- Assist in developing hypotheses regarding risk factors and such intervention investments as screening, awareness building, and communication with regulators regarding pollution sources.

Strategic Options for CDC Support

Environmental Health Office (Multnomah County, Oregon). Workforce Development: Post-Secondary Internship Program. Portland, OR: Multnomah County Health Department; 2007. Available at: http://www.mchealthinspect.org/documents/workforce_development.pdf. Accessed September 23, 2008.

Abstract

Funded by the CDC Capacity Building grant in 2004, the Multnomah County Internship program provides students with an outcome-based experience that integrates academic theory and environmental health skill practice into effective learning. The program improves workforce development by mobilizing educational partnerships with local academic institutions to develop environmental health internship and training opportunities. Program activities include curriculum development, involving interns in real-life investigations, and evaluating participant performance. The program has produced qualified candidates for the future environmental health workforce. Part of the program included creation of a workforce development manual that highlights important components of a postsecondary internship program in environmental health and serves as a resource for other health departments considering this strategy.

Key Points

- 40%–50% of the environmental health workforce will be eligible to retire in the next 5 years.
- Approximately 90% of the current workforce has no academic degree in public health or environmental health.
- Decades of high employee turnover have resulted in a workforce that is inexperienced, inadequately trained, and in need of emerging leaders to fill roles rapidly being vacated because of retirements.
- Extensive emergency response training is needed in regard to both natural and human-made threats.
- Environmental health programs are often severely understaffed and are continually seeking competent environmental health practitioners.
- The U.S. Department of Labor's Bureau of Labor Statistics reports that the environmental health workforce substantially declined during 1980–2004, from 235,000 employees to 30,934.

How CDC Can Help

- Support state and local health departments' capacity to recruit, train, and strengthen their environmental health workforce.
- Encourage collaboration between state and local health departments and colleges and universities to encourage more academic training in environmental health.
- Develop a comprehensive internship program that provides students with applicable job skills for entering the environmental health workforce and that provides them with substantive information about environmental health career opportunities.
- Educate elementary, middle, and high school students about environmental health concerns and encourage values that support a healthy planet.

Strategic Options for CDC Support

Herring ME. Developing the environmental health workforce. *J Environ Health* 2006;68(10):56–7.

Abstract

Herring explores the role of CDC’s Environmental Health Services Branch (EHSB) in addressing gaps in the workforce. EHSB has established dedicated activities and programs to help address the problem (e.g., the Association of Environmental Health Academic Programs, the Environmental Public Health Leadership Institute, the Environmental Health Workforce Development Consortium, capacity-building projects, the Environmental Health Competency Project, and EHSB information resources). These activities and programs aid development of a stronger and more competent environmental health workforce; however, given nationwide workforce challenges, EHSB’s activities and programs require more support and enhancement to combat the growing deficit.

Key Points

- Approximately 40%–50% of the environmental health workforce will be eligible to retire within the next 5 years.
- 90% of the environmental workforce does not hold a formal public health or environmental health degree.
- Decades of high turnover have resulted in a workforce that is inexperienced, inadequately trained, and in need of leaders to fill positions rapidly being vacated through retirement.
- Extensive emergency response training is needed in regard to natural and human-made disasters.
- State and local programs are already severely understaffed and are continually seeking competent environmental health practitioners.
- Education, training, and competence are critical in developing and sustaining a workforce that can effectively anticipate, recognize, and respond to new and existing environmental public health threats.

How CDC Can Help

- Work to strengthen national-, state-, and local-level programs and the roles of professionals in anticipating, identifying, and responding to adverse environmental exposures and the impact of such exposures on public health.
- Provide enhanced access to up-to-date, scientifically sound information, consultation, and technical assistance for environmental health specialists, sanitarians, program managers, and other environmental health practitioners nationwide.
- Support the workforce development goals established in CDC’s revitalization strategy (see <http://www.cdc.gov/nceh/ehs/Docs/NationalStrategy2003.pdf>).
- Provide environmental health specialists with improved training tools to enhance their knowledge and skills.

Strategic Options for CDC Support

Herring ME. Facts about the environmental health workforce shortage and the impact of accredited EH degree programs. Presented at Building the Diverse Environmental Health Workforce of the 21st Century: A Workshop for Minority Serving Institutions, Houston, Texas, April 16–18, 2008. Available at: <http://www.aehap.org/MSIWorkshopproceedings08.pdf>. Accessed October 27, 2008.

Abstract

Herring's presentation addresses the growing shortage of competent environmental health workers and the ways in which CDC is developing this specialized workforce through the Association of Environmental Health Academic Programs (AEHAP). Herring provides statistics on the aging workforce and vacancy rates, as derived from the 2000 Health Resources and Services Administration's Public Health Workforce Enumeration and the Association of State and Territorial Health Officers' 2007 State Public Health Workforce Survey. Finally, the presentation addresses CDC's cooperative agreement with AEHAP regarding its objectives for each agreement.

Key Points

- 40%–50% of the environmental health workforce in state and local agencies will be eligible to retire within the next 5 years.
- 90% of the environmental workforce does not hold a formal public health or environmental health degree.
- 12,000 environmental health job vacancies are probable within the next 5–10 years.
- The average age of state-level environmental health workers is 47 years.
- The average age of newly hired state-level environmental health workers is 40 years.

How CDC Can Help

- Enhance recruitment of the best and brightest students by improving the public's knowledge of environmental health goals and responsibilities.
- Enhance workforce competency by increasing the number of online courses and other distance-learning mechanisms.
- Enhance training for students and the existing environmental health workforce by developing modules on new and emerging roles in this profession.
- Increase public awareness regarding the value of hiring graduates of accredited environmental health programs.
- Build capacity in state and local programs by supporting research and fostering leadership.
- Create new and improve existing strategic partnerships.
- Provide support in development of the environmental health workforce through ongoing enumeration, enhanced performance standards, training, recruitment, and retention activities.
- Expand efforts to improve recruitment and retention of competent, effective, and certified environmental health practitioners with a special emphasis on racial/ethnic minorities.

Strategic Options for CDC Support

Juzych NS, Resnick B, Streeter R, et al. Adequacy of state capacity to address noncommunicable disease clusters in the era of environmental public health tracking. Am J Public Health 2007;97(Suppl 1):S163–9.

Abstract

This study built on previous studies recommending establishment of a national environmental network to track noncommunicable disease clusters (NCCs) and exposures, provide an early warning system for environmental health threats, establish federal investigative response capability, and build links between community health practitioners and researchers. Because states often lack chronic disease epidemiologists and statisticians, clerical support, and access to medical libraries, this study performed a review of (1) the responsibilities and authorities for addressing NCC investigations, (2) the scope of NCC work conducted, and (3) what states need to enhance their capacity for performing NCC investigations. The authors examined each state's Internet site and gathered feedback from state leaders to define the strengths and limitations of each state's program and to develop recommendations.

Key Points

- Thirty-seven states completed the online survey; all reported addressing cancer clusters, and 30 reported investigating other NCCs.
- Only 26 of the state agencies' sites listed an NCC investigator, and only 12 mentioned a dedicated NCC response team.
- All of the survey respondents indicated that citizen reports were an impetus for NCC investigations, yet state-level investigative capacity was inconsistent and disjointed.
- State agency personnel were committed but were hampered by a lack of personnel, resources, prescribed protocols, and inadequate interagency communication.
- No consistent identifiable job title or agency division has responsibility and authority for addressing suspected NCCs throughout the 50 states.
- NCC investigators hold degrees in medicine (MDs) and public health (PhDs and DrPHs) and vary from statisticians and epidemiologists to master- and bachelor-level program coordinators.
- The federal agency role in NCC investigations was not well-understood and opinions varied from state to state.

How CDC Can Help

- Strengthen investigative programs by providing support to (1) encourage inter- and intra-agency collaboration, (2) address NCC investigation challenges, (3) enhance access to technical assistance and training, and (4) help increase staffing and budgets.
- Develop an NCC model approach for state programs that includes standard definitions and protocols for all facets of investigations.
- Issue guidance explaining how standard protocols should be implemented and form a federal advisory group to assist with difficult NCC investigation requirements.
- Develop materials to help the general public understand investigation challenges and issue national policy statements to better inform the public about environmental-related disease links.

Strategic Options for CDC Support

Litt JS, Wismann A, Resnick B, Dawson RS, Hano M, Burke TA. Advancing health and environmental disease tracking: a 5-year follow-up study. *Am J Public Health* 2007;97:456–63.

Abstract

This study explored the extent to which environmental public health tracking (EPHT) has progressed since the release of the 2000 Pew Environmental Health Commission report examining the nation's EPHT infrastructure. The authors used a telephone survey of state practitioners to assess EPHT trends and changes in state-level capacities and activities. The study reports on new and enhanced federal-state partnerships; improved surveillance, data analysis, and communication capacities; and enhanced support for tracking personnel. In addition, results indicate that CDC's support of EPHT has strengthened the national environmental public health infrastructure and capacity to track environmental hazards, exposures, and health outcomes. The study also concluded that improved funding, data access, and translation of data to prevention activities are critical to sustaining progress in EPHT and for developing the evidence base necessary for assessing longer term effects and efficacy of EPHT and related environmental health improvements.

Key Points

- Investments in public health capacity will better position the public health community to respond rapidly to emerging threats, guide interventions, and inform policymakers and the public on the association between health and the environment.
- The majority of states reported that their capacity for epidemiologic investigations was bolstered by trainees and assignees.
- Only 25% of the respondents reported that they were able to hire temporary workers for data collection without exceeding state-imposed personnel caps.
- The need for staff was greatest in the areas of epidemiology and data analysis.
- The majority of respondents reported having adequate capacity to support biomonitoring activities (59%), data linkage studies (61%), geocoding requirements (61%), and statistical analyses (63%).
- EPHT appropriations are <10% of the \$275 million/year recommended by the Pew Commission.
- In order of importance, the top five priority needs of respondents from CDC-funded states were personnel, funding, data sharing, partnership development, and training and expertise to facilitate EPHT activities.
- In contrast, the top five needs identified by respondents from non-CDC-funded states, in order of importance, were funding, personnel, training and expertise, personnel recruitment, and political will.

How CDC Can Help

- Support enhancement of state infrastructure and resources to support tracking activities.
- Encourage an increase in the number of partnerships among public health practitioners at the federal, state, and local levels.
- Develop and share innovative ways to leverage existing resources.

Strategic Options for CDC Support

Osaki CS, Hinchey D, Harris J. Using 10-essential-services training to revive, refocus, and strengthen your environmental health programs. *J Environ Health* 2007;70(1):12–5, 63.

Abstract

A previous report by CDC's National Center for Environmental Health used the 10 Essential Environmental Public Health Services as a basis for its six goals for revitalizing environmental health in the 21st century; however, studies indicate that environmental health practitioners rarely are aware of these services. This article outlines the programs that have used the 10-essential-services training, which resulted in practitioners' awareness and knowledge of development, value, and use of essential services. The article also addresses workforce development challenges, training successes (including examples), and marketing and distribution of the 10 Essential Environmental Public Health Services.

Key Points

- The 10 Essential Environmental Public Health Services can guide practitioners in systematically organizing and managing programs and activities.
- The environmental health workforce faces such challenges as a lack of trained personnel, insufficient political support, and placement of environmental health services in agencies outside of traditional local, state, or regional jurisdictions.
- Environmental health units rarely have adequately trained or prepared their staff to integrate the 10 Essential Environmental Public Health Services into their operations.
- A 2002 study by the University of Washington among environmental health staff in six northwestern states determined that <20% of the environmental health workers knew about the 10 Essential Environmental Public Health Services, and <50% practiced these services.
- Health departments often do not send their staff to professional trainings or association meetings because of restrictions on budget, travel, or temporary staff replacements.
- Low salaries and lack of political or community support for environmental health programs make recruiting well-trained leaders particularly challenging for remote or rural sites.
- Regardless of content, the traditional training methods are unable to incorporate learning into practice, thereby reducing their practical application to daily work.
- An unintended benefit of these trainings has been interest by public health practitioners outside the environmental health field (e.g., community health nurses and health educators).

How CDC Can Help

- Apply the 10 Essential Environmental Public Health Services as a means of evaluating existing programs and identifying program gaps.
- Use program evaluation data for budget justifications and requests.
- Use the essential services in developing strategic workplans and activities.
- Correlate environmental health activities with the essential services to ascertain strengths and weaknesses and areas of collaboration with other public health professions.
- Use the essential services framework to assist health departments in addressing capacity challenges (e.g., inadequate resources and equipment, lack of political support for environmental health activities, ill-defined organizational infrastructures for environmental health programs, and a growing loss of trained leadership).

Strategic Options for CDC Support

Perlino CM. Public Health Workforce Shortage: Left Unchecked, Will We Be Protected? Issue Brief. Washington, DC: American Public Health Association; 2006. Available at: <http://www.apha.org/NR/rdonlyres/8B9EBDF5-8BE8-482D-A779-7F637456A7C3/0/workforcebrief.pdf>. Accessed September 24, 2008.

Abstract

Public health professionals not only have to face ongoing and potential health threats but also the sharp decline in personnel numbers and resources. The most severe shortages are in epidemiology, nursing, laboratory science, and environmental health; however, the public's health does not have to be jeopardized, because evidence-based solutions exist to address workforce shortages in recruitment, retention, and diversity. In-depth examination of the public health workforce crisis demonstrates that a series of policy and legislative solutions can be implemented (e.g., increasing federal funding, internships, and leadership development programs).

Key Points

- Workforce challenges can undermine our ability to protect the public's health.
- The number of U.S. public health workers has declined from 220 workers/100,000 population in 1980 to 158 workers/100,000 in 2000.
- Within years, state and federal public health agencies might lose half of their workforce to retirement, the private sector, and other career opportunities.
- Four out of every five public health employees lack formal public health training.
- Environmental public health workers are the second most common among all public health professions, or 4.5% of the nation's public health workforce, with governmental public health agencies employing >20,000 in 1999.
- In addition to those employed in public health settings, environmental health practitioners often work in the private or nonprofit sectors.
- Responding to the U.S. shortage is not only a national problem but an international one because a domestic shortage leads to recruitment of public health professionals from other countries, exacerbating their shortages.
- Budget constraints result in both limited numbers of positions and staff receiving noncompetitive salaries for high levels of responsibility and caseloads.
- Public health is not always readily apparent or visible in the community, unless an outbreak or health crisis occurs.
- A comprehensive approach to the shortage is needed.

How CDC Can Help

- Increase federal efforts to recruit and retain public health professionals.
 - Expand internship and fellowship programs in public health professions.
 - Increase investment in training initiatives to provide incoming public health professionals with real-world experience.
 - Increase core financial support for the public health infrastructure.
 - Recommend to Congress renewed federal investment in public health.
 - Provide more leadership development.
 - Encourage student loan repayment programs that serve as incentives for recruitment, retention, and placement of health professionals for underserved communities.
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Strategic Options for CDC Support

Resnick B, Zablotsky J, Farrow O, et al. Enhancing the Maryland environmental public health workforce: a collaborative approach. *J Environ Health* 2007;70:32–6, 63.

Abstract

The report outlines the Maryland governmental structure and its impact on the state's environmental public health infrastructure. Maryland's counties are divided into commissioner, charter, and code counties, each with its own laws and regulations that have substantial implications for local environmental health operations. Key challenges include recruitment, retention, retirement, advancement, compensation, training, and communication, all of which affect the decline and deterioration of the state's environmental workforce. Progress and advancements are recognized, including the positive aspects of the environmental services infrastructure.

Key Points

- Substantial workforce obstacles exist, including recruitment shortfalls, inability to retain qualified staff, impending retirements, inadequate training opportunities, insufficient compensation, and an absence of a robust career advancement pathway.
- According to the Institute of Medicine's 1988 report, *The Future of Public Health*, the removal of environmental health authority from public health agencies has led to fragmented responsibility, lack of coordination, and inadequate attention to the public health dimensions of environmental challenges.
- The limited visibility of environmental public health workers hinders recruitment because potential applicants are unaware of state and local positions.
- Environmental health positions often are a training ground for professionals who then leave for higher paying positions in other agencies or the private sector.
- Advancement is often impossible in smaller organizational units until higher ranking staff are promoted, retire, or otherwise move on.
- Large-scale losses of institutional knowledge are expected without a training pipeline for new and midcareer professionals.
- Counties often indicated that salary increases are not directly linked to educational advancement.
- Practitioners should receive appropriate training encompassing a full range of disciplines.
- Trainings offered are either too general or too specific to be useful, which makes attendance at future trainings less likely.
- Internet-based trainings are often ineffective because of a lack of computers or insufficient time for staff to actively participate.
- Maryland is collaborating with academic institutions on training priorities in such areas as investigation of groundwater contamination, food microbiology, and effective writing skills.

How CDC Can Help

- Support stronger communication and interaction among federal, state, and local agencies.
- Support collaboration among practitioners and academic institutions to improve environmental public health training opportunities.
- Support innovative ways to address recruitment and retention challenges.
- Have key leaders speak at academic institutions to highlight the profession and opportunities for students to pursue environmental health careers.

Strategic Options for CDC Support

Schulman LG, Fulop M, Wickham L. Building capacity of environmental health services at the local and national levels with the 10-essential-services framework. J Environ Health 2007;70(1):17–20, 63.

Abstract

This article highlights a case study from the Oregon Multnomah County Environmental Health Department (MCEH) in which the 10 Essential Environmental Public Health Services framework is used to (1) assess the strengths and weaknesses of environmental health programs and services, (2) implement organizational changes to align department programs with the 10 Essential Environmental Public Health Services, and (3) expand program capacity to create a comprehensive program benchmarked against the 10 Essential Environmental Public Health Services. The article also describes the lessons learned from an assessment and capacity-building program by using the 10 Essential Environmental Public Health Services.

Key Points

- MCEH targeted funding and resources that would help them address identified gaps.
- The increase in capacity helps MCEH inform, educate, and work with diverse communities by (1) providing staffing resources to create educational materials (e.g., curricula, brochures, fact sheets, and posters) and (2) participating in outreach events (e.g., workshops, health fairs, and conferences).
- The internship program improved recruitment and training and strengthened the environmental health workforce.
- 22% of the program's interns have been hired for environmental health positions after graduation.
- The internship creates an awareness among college students and interest in the environmental health field that did not exist before the program.
- Funding shifts, both locally and nationally, continue to negatively affect local environmental health agencies' strategic planning.

How CDC Can Help

- Offer local environmental health agencies a 3-year Essential Services Capacity-Building Initiative Grant.
- Document, package, and disseminate products as resources for other jurisdictions with similar environmental health problems.
- Create a workforce development manual that provides the tools and instructions to develop and implement a postsecondary environmental health internship program.
- Create community services outreach teams tasked with addressing unmet 10 Essential Environmental Public Health Services gaps.

Strategic Options for CDC Support

Sine R. Workforce “crisis” in environmental health. CDC Connects. July 19, 2007.

Available at:

<http://intranet.cdc.gov/ecp/insidestory/story.asp?contenttype=article&chronicalID=0900f3ee801d2dc8>. Accessed September 24, 2008.

Abstract

Not enough young professionals are making a career in environmental health at the local public health level. Environmental health is undergoing revitalization by implementing the 10 Essential Environmental Public Health Services and a national strategy to upgrade environmental public health services begun by CDC in 2003. Success of these efforts will be accomplished by training the next wave of leaders in adequate and purposeful environmental health services.

Key Points

- The environmental health workforce crisis goes beyond a shortage of personnel; it also involves a dearth of leadership, training, and education.
- The environmental health workforce is not prepared for such emerging responsibilities as natural disasters and terrorism response.
- In the mid-1990s, the number of graduates of environmental health programs began to decline to approximately 300 a year in 2003.
- Typically, environmental health professionals lack wide-ranging skills and instead specialize in one area (e.g., food or water safety).
- During a crisis, having broadly trained and experienced generalists is critical for meeting the population’s needs for safe water, food, sanitation, and shelter.
- The low pay and inadequate training of environmental health practitioners stem from the limited view of environmental health held by certain policymakers.
- Environmental health has shifted during the past two decades to a fee-for-service structure.
- Cash-strapped local and state governments are hungry for the revenues generated by restaurant, septic tank, and well-drilling permits; consequently, agencies often dedicate their resources to these types of inspections.
- Enforcing environmental laws and regulations fulfills only one of the 10 Essential Environmental Public Health Services.
- Practitioners should take a more systematic approach to prevention, including monitoring environmental health, diagnosing and solving problems, and educating and empowering community leaders and the general public.
- CDC has multiple program areas that are responsible for recruitment, retention, and training the next generation of leaders.

How CDC Can Help

- Continue supporting and developing such programs as the Environmental Public Health Leadership Institute.
- Attract former military into environmental health service careers.
- Promote application of performance standards throughout the environmental health service workforce.
- Continue to participate in efforts to identify core competencies, best practices, and the 10 Essential Environmental Public Health Services practitioners.

Strategic Options for CDC Support

Uniformed Services Environmental Public Health Careers Work Group. Career Resource Guide for Uniformed Services Environmental Health Practitioners. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2007. Available at: http://www.cdc.gov/nceh/ehs/Docs/career_resource_guide.pdf. Accessed November 14, 2008.

Abstract

This report serves as a resource guide for uniformed services members who are retiring or entering nonmilitary careers after active duty. In addition to the U.S. Army, Navy, Marines, and Air Force, the uniformed services also include the U.S. Coast Guard, the U.S. Public Health Service, and the National Oceanic and Atmospheric Administration. The working group members examined career advancement opportunities in the environmental public health field, and the report includes discussion regarding how uniformed services members can benefit from these jobs as well as be a benefit to the agencies they serve.

Key Points

- Approximately 7,000 active duty environmental health practitioners are employed in the U.S. uniformed services.
- The majority of environmental health practitioners in the uniformed services are in the armed forces.
- Environmental health practitioners in the armed forces are not only well-trained in environmental health science, they often have developed strong leadership skills from their years of military experience.
- Unfortunately, only limited information exists to encourage and assist these highly trained and skilled professionals in learning about and obtaining employment in environmental public health after they retire or otherwise leave active duty service.
- Uniformed services personnel can bring much-needed diversity to environmental public health practice.
- The geographic mobility typical of active duty service members might make them more willing to take job vacancies in states and regions with the greatest need.
- Working in environmental public health programs is one way that former uniformed services members can continue to serve the United States in a critical capacity.
- Educational benefits provided to uniformed services personnel through the GI Bill and other opportunities are an enticement to pursue continuing environmental health education, including graduation from accredited environmental health academic programs.
- Uniformed services personnel are often well-trained in terrorism preparedness and response; thus, they can meet the substantial need for staff trained in this area that exists at state and local environmental health agencies throughout the nation.

How CDC Can Help

- Inform and recruit uniformed services members through career fairs, presentations, and brochures.
- Continue to work with the National Environmental Health Association (NEHA) in encouraging state and local programs interested in hiring former military environmental health practitioners to post job openings on the NEHA Internet site.