



Exploring the Benefits and Value of Public Health Department Internships for Environmental Health Students

Abstract Internships are an essential component of preparing prospective college graduates for entering the practice-based field of environmental health (EH). EH professionals continually encounter events or hazards of high complexity and impact, and many experienced EH professionals are expected to retire within the next several years. Efforts are needed to ensure a supply of highly qualified and prepared graduates is available to sustain and strengthen the EH workforce. The National Environmental Public Health Internship Program (NEPHIP) addresses this need by supporting health department internships for EH students of academic programs accredited by the National Environmental Health Science and Protection Accreditation Council. We conducted an assessment to examine former NEPHIP intern and mentor experiences and perspectives on 1) how well the internships prepared interns for careers in EH and 2) to what extent the internships provided value to the host health department. Overall, the internships appeared to provide EH students with a well-rounded professional and practice-based experience, while health departments benefited from hosting interns with a foundational knowledge and college education in EH. Promoting the value of public health department EH internships could encourage more students and graduates to seek internship or employment opportunities with health departments, ultimately strengthening the EH workforce.

Introduction

Internships are a cornerstone of the academic journey. They are an integral experience for instilling prospective college graduates with a firsthand perspective on the realities of a practice-based field or profession. For environmental health (EH) students, this experiential opportunity allows the chance to ground the theory obtained in the classroom by applying it in real-life situations, which is identified as essential for preparing graduates to enter the workforce (Adams et al., 2001). Internships

can be mutually beneficial to the student intern and host public health departments. While EH students gain valuable practical experience, host health departments can receive a motivated student eager to contribute to the department's important work and play an integral role in preparing future EH professionals to enter the workforce (Krinn, 1996).

The importance of the internship is underpinned by a continual need for ensuring the EH workforce is equipped and prepared to address emerging issues and challenges.

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Health department EH programs are tasked with responding to events or hazards of high complexity and impact, requiring professionals to have:

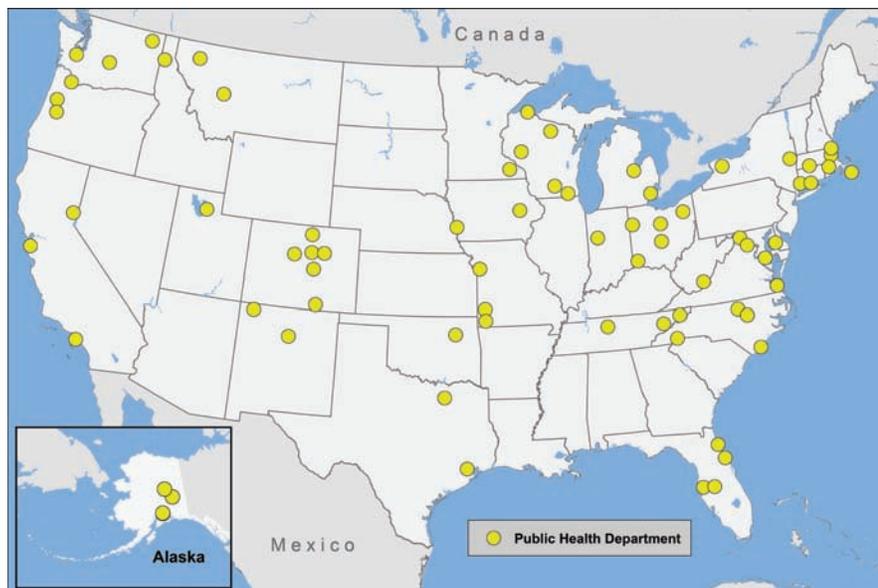
- science and practice-based academic preparation;
- increased capacity to generate, analyze, and use data;
- access to rapidly evolving technologies; and
- opportunities to develop leadership capabilities (Brooks et al., 2019; Gerding et al., 2020).

Compounding these needs, approximately one fourth of the local and state health department workforce, including EH professionals, is expected to retire in the next several years (Bogaert et al., 2019; Gerding et al., 2019; Robin, Castrucci, McGinty, Edmiston, & Bogaert, 2019). Preparing and encouraging the next generation of EH professionals to consider employment with public health departments is paramount to sustaining a sufficient and robust EH workforce and ensuring the nation's public health.

The Centers for Disease Control and Prevention (CDC) partnered with the National Environmental Health Association to offer the National Environmental Public Health

FIGURE 1

Public Health Departments That Participated in the National Environmental Public Health Internship Program, 2015–2019



Internship Program (NEPHIP). NEPHIP supports state, tribal, and local health department internships for EH students of academic programs accredited by the National Environmental Health Science and Protection Accreditation Council (EHAC). The program connects EH students and health departments for internships to introduce interns to experiences common at public health departments. Host health departments receive an EH intern eager to contribute and gain field experience; host departments also develop familiarity with the academic preparation of students from EHAC-accredited academic programs.

In the 5 years since its inception in 2015, NEPHIP has supported 101 internships for EH students at 76 different health departments in 28 states (Figure 1). Host health departments provide an intern with a mentor who advises and interacts with the intern on a regular basis. We conducted an assessment to examine former NEPHIP intern and mentor experiences and ask about their perspectives on how well the internships prepared interns for careers in EH and to what extent the internships provided value to the host health department. In this article, we present the assessment results and describe the potential benefits and impact of health department in-

ternships for developing and strengthening the EH workforce.

Methods

In October 2019, we disseminated a web-based survey to former NEPHIP mentors ($n = 51$) and interns ($n = 61$) who participated in the program between 2016 and 2018. This range of years was considered ideal for gathering recent insight and outcomes resulting from participation in the program. We used the REDCap (Research Electronic Data Capture) web-based software platform hosted at CDC to administer the survey and collect the study data (Harris et al., 2009, 2019).

The survey collected common information from both mentors and interns (e.g., year of participation in the program and governmental level of the host health department) and was programmed with skip logic directing the respondent to mentor- and intern-specific items. Interns responded to survey items primarily about the internship experience and employment disposition, while the survey items for mentors pertained to the potential advantages of hosting the intern and post-internship recruitment and employment. Mentors who hosted more than one intern responded only once to the majority of survey

items and then answered questions pertaining to each individual intern with regard to their post-internship employment at the host health department.

The survey design drew from instruments developed to assess the EH workforce and practice (Gerding et al., 2019) and fellowship programs supported by the CDC Division of Scientific Education and Professional Development (Centers for Disease Control and Prevention, 2017). To maximize survey response rates, respondents received up to five e-mail messages, including an introductory message, survey invitation, and three reminder messages (Dillman, 2007). We downloaded survey responses into an Excel spreadsheet and prepared the data for analysis using R statistical software. Qualitative analysis of various open-text survey items supplied further details and context on particular responses, including those regarding intern projects. In accordance with the Paperwork Reduction Act, the survey and collection of information received Office of Management and Budget approval (OMB# 0920-1163).

Results

The survey response rate was 39% ($n = 20$) for mentors and 54% ($n = 33$) for interns. Intern respondents were hosted by health departments at the local ($n = 23$), state ($n = 8$), and tribal ($n = 2$) levels. Overall, the health departments' population sizes served varied with more responses from interns hosted by departments serving populations $<100,000$ (58%, $n = 19$) than those serving populations $\geq 100,000$ (42%, $n = 14$). At the time of participation in the program, the majority of the interns were juniors (40%, $n = 13$), followed by graduate students (30%, $n = 10$), seniors (27%, $n = 9$), and one sophomore (3%, $n = 1$).

The majority of interns participated in 2018 (42%, $n = 14$) and 2016 (33%, $n = 11$) with the fewest in 2017 (24%, $n = 8$). Approximately one half of the mentors participated in 2018 (52%, $n = 13$), followed by 2017 (36%, $n = 9$) and 2016 (12%, $n = 3$). Five mentors participated in two different years, which resulted in a total of 25 responses regarding the year of participation.

Interns reported working in approximately 40 different EH programs or services. We report the 10 most common programs in Table 1. Food safety and protection (85%), onsite wastewater (70%), and public swimming

pools (64%) were among the most common. On average, interns hosted by local health departments reported experience in 12 different programs or services, interns at the state level reported 5, and interns at a tribal health department reported 14. Interns engaged in various EH program functions and activities. The most common activities were performing inspections (85%) and educating the public (76%). One third (33%) of the interns reported involvement in developing and establishing policies and outbreak investigation or emergency response. Providing training (21%) was the least common function (Table 1).

In addition to day-to-day services and activities, interns completed complex projects that addressed challenging issues faced by host health departments. The scope of the projects and their topics appeared to span a range of EH programs areas and functions, illustrated by the selection of intern project descriptions shown in Table 2. Problem solving and critical thinking, data collection and analysis, and risk communication were the most common skills or competency areas where almost three fourths (70%) of the interns gained experience (Table 3).

Following participation in NEPHIP, 82% of the interns were more or somewhat more likely to pursue a position in the field of EH, whereas 67% indicated they were more or somewhat more likely to pursue a position with a public health department (Figure 2). Furthermore, 17 interns reported current employment in the field of EH; of these, 71% ($n = 12$) were employed at a public health department. Among those not currently employed in EH ($n = 16$), eight were either still finishing their college education or pursuing graduate degrees, and one was in the process of hiring into a position with a local health department (data not shown).

The majority of those currently in the field of EH were employed by state health departments ($n = 8$), followed by local health departments ($n = 4$). Almost one half of these interns stated that the internship played a large role in preparing them for their first job (47%, $n = 8$) or somewhat prepared them (47%, $n = 8$), and one stated that the internship had played only a small role. One intern was employed by the hosting NEPHIP health department and 10 interns (30%) reported that they received a job offer from their host health department. Nearly three fourths of

TABLE 1

Percentage of Interns Working in Common Environmental Health Programs and Functions ($n = 33$)

	# (%)
Program	
Food safety and protection	28 (85)
Onsite wastewater	23 (70)
Public swimming pools	21 (64)
Rabies prevention	17 (52)
Private or onsite drinking water	16 (48)
Vector control	15 (45)
Emergency preparedness and response	13 (39)
Health-related facilities	12 (36)
Healthy homes	12 (36)
Hotels/motels	12 (36)
Function	
Perform inspections	28 (85)
Educate the public	25 (76)
Maintain databases or electronic information systems	20 (61)
Engage in partnerships with the community, stakeholders, or other agencies	19 (58)
Respond to complaints	18 (55)
Issue permits or licenses	17 (52)
Conduct disease or hazard surveillance	15 (45)
Conduct research or in-depth studies	12 (36)
Develop and establish policies	11 (33)
Investigate disease outbreaks or respond to emergencies	11 (33)
Provide training (e.g., food handler courses)	7 (21)

the interns remained in contact with their mentor (73%, $n = 24$).

Table 4 presents mentor perspectives on some of the advantages and challenges to hiring NEPHIP interns after their participation in the program. Most mentors indicated that the advantages of hiring NEPHIP interns included their foundational EH knowledge (80%) and formal education in EH (65%). Aside from limited job vacancies, health department location and interns pursuing further education were reported as primary challenges to hiring former interns. A seemingly low percentage of mentors (25%) reported challenges related to competitiveness of salaries offered. Mentors also described benefits relating to the varied perspectives interns had and insights they provided on current EH practice and technology, contributions, and

support of the department's work. Mentors appreciated having opportunities to mentor, develop, and prepare future EH professionals.

Discussion

Internships are a pivotal point in a prospective professional's academic career. Opportunities to experience the current realities of a field, along with applying theory and knowledge gained in the classroom, are essential to preparing EH professionals for the practice (Shalauta, Burke, Gordon, Stern, & Tran, 1999). Internships in public health departments can provide EH students this essential experience.

For example, interns participating in NEPHIP gained experience in a broad range of EH programs. While a high percentage of interns gained experience in the traditional EH program areas (e.g., food safety, onsite

TABLE 2

Selection of Environmental Health Intern Project Descriptions

Project Description
Collected data from homes served by septic systems to determine if the homes could be integrated into the municipal sewer system.
Developed an educational curriculum to promote air quality awareness and provided necessary resources to public health employees, teachers, and volunteers.
Researched fertilizer laws and best land use practices to create community educational outreach materials on how homeowners can help decrease fertilizer runoff.
Used GIS to map the distribution of arsenic in drinking water, determined areas of high concentrations of naturally occurring arsenic, and investigated the relationship between arsenic concentration and private well depth.
Designed a web page for farmers markets that included all the procedures and policies on safe food preparation and selling food.
Organized and mapped multihousing violation data to identify locations to target for housing inspections and lead surveillance, and for focus by the asthma coalition

TABLE 3

Percentage of Interns Gaining Experience in Various Professional Activities and Competency Areas (n = 33)

Professional Activity and Competency Area	# (%)
Problem solving and critical thinking	23 (70)
Collecting and analyzing data	23 (70)
Communicating risk to the public	23 (70)
Collaborating with other governmental agencies and staff	19 (58)
Participating in community-based initiatives or events	19 (58)
Evaluating the effectiveness of services and activities	14 (42)
Decision making that influences program planning	13 (39)

wastewater, and public swimming pools), opportunities were available in other program areas such as rabies prevention, emergency preparedness and response, as well as those within health-related facilities. The breadth of EH work highlights the importance of prospective EH professionals possessing knowledge and technical skills in various areas of EH.

Interns also engaged in various EH functions and competencies. Many performed inspections and educated the public, which are readily recognized responsibilities of EH professionals. Interns also had opportunities, however, to work with databases and electronic information, conduct research, and participate in outbreak investigations and emergency response. The breadth of experi-

ences provided by host health departments could have contributed to the high percentage of interns indicating their internships prepared them for their first job in EH.

Strengthened professional attributes and competencies are an important outcome of an internship. Strong skills and abilities in areas such as data analysis and problem solving are important for the public health workforce, and EH workforce skill gaps in these areas reinforce the need for professional development opportunities and training (Heidari, Chapple-McGruder, Whitehead, Castrucci & Dyjack, 2019; National Consortium for Public Health Workforce Development, 2017). Almost two thirds of the NEPHIP interns had an opportunity to gain experience in these professional activities and competency areas.

Internships are a chance for both the intern and mentor or host site to “test the waters.” NEPHIP interns get a glimpse of working at a public health department, potentially enticing them to seek employment at either their assigned department or another one. Host health departments have an opportunity to observe and develop familiarity with the intern and consider them for possible future employment, which could have been a factor in the host departments offering employment opportunities to almost one third (30%) of the interns. Following completion of their internships, most interns reported being more or somewhat more likely to pursue employment in the field of EH or at a public health department. This trend was reflected in similar numbers of interns who reported post-internship employment in EH or in public health departments. The internship experience likely played a role in the relatively high percentage of interns returning to EH and public health departments for post-internship employment.

Possessing a foundational EH knowledge and college education in EH were the most commonly identified advantages to hiring a NEPHIP intern. Students of EHAC-accredited academic programs complete college course work and preparation relevant to and matching current needs of the EH profession (Silverman & Silverman, 2003). Our study results suggest that mentors realized the value of this formal education and recruitment of EH graduates. Enhanced efforts to recruit graduates of EHAC-accredited programs could strengthen the public health department workforce and supply a cadre of professionals specifically educated in EH and well prepared to enter the practice.

Among the challenges to hiring NEPHIP interns, the ability to offer competitive salaries was somewhat surprisingly reported as the least common. Dissatisfaction with salary and limited opportunities for career progression, however, typically are cited as challenges for recruiting and retaining EH professionals (Marion, Murphy, & Zimeri, 2017; Silverman & Silverman, 2003; Zontek, DuVernois, & Ogle, 2009). As Marion and coauthors (2017) explained, “until there are more significant investments in state and local EH agencies and their workforces, graduating EHAC students examining compensation and career advancement

will seek opportunities in the private sector.” Aside from job vacancies, mentors indicated hiring challenges because of lack of interest in relocating, potentially to areas with a higher cost of living.

A few 2019 studies indicate that roughly one half of the EH workforce reported opportunities for career progression, while about three quarters of the EH and public health workforce reported having opportunities to apply their expertise and demonstrate leadership skills (Bogaert et al., 2019; Gerding et al., 2019; Robin et al., 2019). This finding could represent an evolving work setting that could increasingly support career advancement and provide leadership opportunities. Related to these topics, most interns reported engaging in activities such as problem solving and critical thinking, collecting and analyzing data, and risk communication. Competencies such as these are present in the scientific and technical curriculum of EHAC-accredited programs (Marion & Murphy, 2016). Highlighting the potential ability to apply and strengthen professional competencies acquired in the academic setting might encourage more EH students to seek internships or employment with public health departments.

Our study included a small sample of interns and mentors selected through a competitive process to participate in a formal internship program with specific eligibility criteria and requirements. Additionally, NEPHIP interns receive a stipend to cover relocation and living expenses, a financial support that might not be offered through other health department internships. Therefore, the criteria and aspects of the NEPHIP internship experience are likely not uniformly applicable and might not be indicative of other health department internships. Furthermore, EHAC-accredited academic programs are not available in every state and many public health departments might not have opportunities to recruit students and graduates from these programs. Although the study results are not generalizable, they give insight into the potential value and benefits of health department internships for EH students.

Conclusion

Overall, participation in NEPHIP provided EH students with a wide range of opportuni-

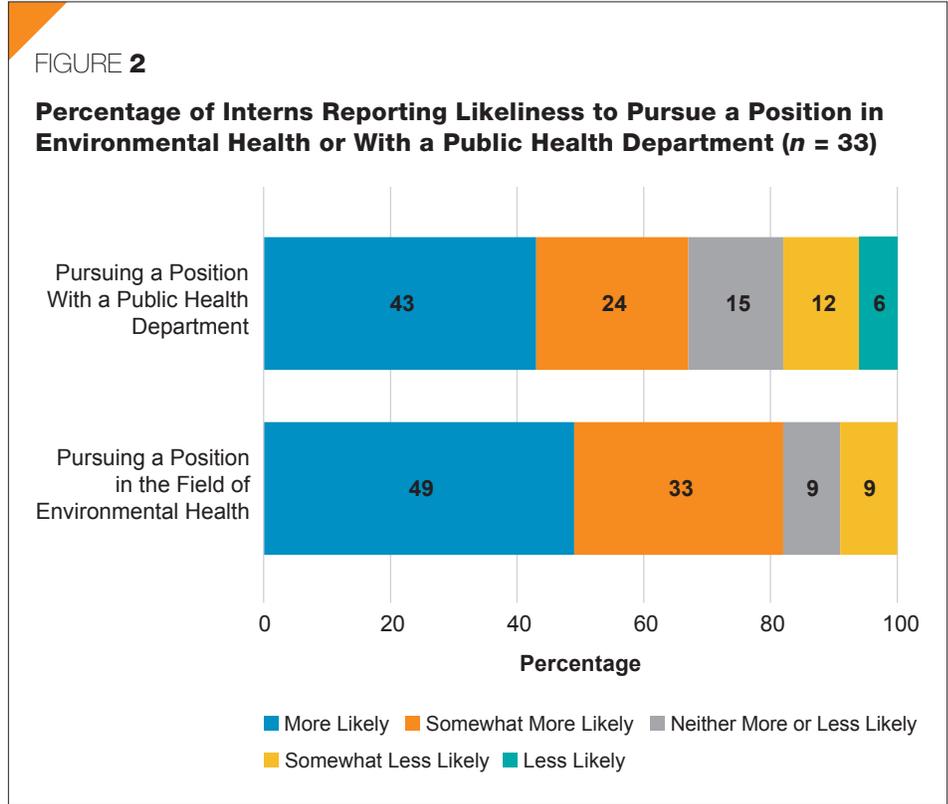


TABLE 4
Percentage of Mentors Indicating Advantages and Challenges of Hiring Interns (n = 20)

	# (%)
Advantage	
Possess a foundation of environmental health knowledge	16 (80)
Have received college education in environmental health	13 (65)
Possess public health experience within federal, state, or local government, nonprofit organizations, or academic institutions	12 (60)
Familiarity with their contributions, skills, and/or work style	11 (55)
Would require less (or no) time to train	10 (50)
No advantages to hiring NEPHIP interns over other comparable candidates who did not participate in NEPHIP	0 (0)
Challenge	
No vacancies for their skill and experience level	12 (60)
Not interested in living in the location	12 (60)
Intern pursuing further education	9 (45)
Cannot match the higher salaries of other agencies or organizations	5 (25)

NEPHIP = National Environmental Public Health Internship Program.

ties for a well-rounded professional and practice-based experience. Health departments benefited from hosting interns who possess

a foundational knowledge and college education in the contemporary scientific and technical aspects of the EH practice. Health

department internship experiences could increase student interests in pursuing positions in the field of EH and post-internship employment with public health departments. A need remains, however, to further analyze and understand salaries and aspects of career progression. In-depth analysis and comparative studies of salaries and further research to examine critical factors for recruitment and retention are necessary to strengthen the EH profession and workforce. Regardless, public health department internships have the potential for providing EH students

exposure and experience in many facets of the EH practice. Promoting the value of public health department EH internships could encourage more students and graduates to seek internship or employment opportunities with health departments, ultimately strengthening the EH workforce. 🐼

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