PHIG PARTNERS
Public Health Infrastructure Grant

Environmental Public Health Training Needs Assessment

SUMMARY OF FINDINGS | 2024

astho™ National Network of Public Health Institutes PHAB neha

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EXECUTIVE SUMMARY

Introduction

As a recipient of funding through Public Health Infrastructure Grant (PHIG), the National Network of Public Health Institutes (NNPHI) is dedicated to assisting the 107 health departments that were awarded funds. NNPHI established the Technical Assistance (TA) Center within its organization and has partnered with other organizations to achieve these goals. The grant, rooted in principles of data-driven planning, partnership, and health equity, aims to prepare the U.S. for future health threats and improve outcomes across various public health areas.

The Kentucky Department of Public Health's solicitation for technical support through the National Network of Public Health Institutes (NNPHI) revealed significant gaps in environmental health expertise among new and existing staff. In response, NNPHI collaborated with the National Environmental Health Association (NEHA) to conduct a training needs assessment, which identified critical areas for improvement.

Training Needs Assessment Results

Critical training areas included climate change adaptation, hazard response, and scientific competencies, with a significant gap between their importance and current staff preparedness levels. Essential environmental public health skills, such as conducting inspections, investigations, compliance reviews, and risk assessments, were deemed highly relevant to job tasks, but staff preparedness in these areas was lacking. The workforce demonstrated room for improvement in their capacity to apply scientific reasoning when conducting exposure assessments and establishing clear links between environmental hazards and their potential health consequences.

Furthermore, communication and professional skills were emphasized as areas in need of enhanced training, including effectively disseminating environmental public health information, identifying community risks, educating the public, and developing mental health skills, conflict resolution, problem-solving, and verbal and written skills.

Lastly, the training needs assessment revealed a demand for role-specific, hands-on, and scenario-based training modules across various positions and regions. Flexible delivery methods, including in-person and virtual platforms, were preferred to accommodate diverse learning styles and geographical constraints.

Training Needs Recommendations

Key training program recommendations include:

- **Develop an introductory training program** to orient the incoming workforce to their core regulatory functions, as this is the highest priority need.
- **Develop a tiered training program** with specialized training in priority areas to standardize approaches and prepare the workforce for credentialing opportunities.
- **Create role-specific training modules** tailored to the unique challenges and responsibilities of environmental public health professionals across various positions and geographic regions.
- **Integrate practical, scenario-based learning experience**s to simulate real-world public health scenarios and enhance hands-on skills.
- **Leverage technology** to expand access to training resources and accommodate diverse learning styles and geographical constraints.
- **Secure adequate funding and explore innovative training methods** to ensure widespread participation and engagement.

By implementing these recommendations, the environmental public health workforce will be better prepared to address current and future public health challenges, ultimately improving community health outcomes.

INTRODUCTION TO THE PUBLIC HEALTH INFRASTRUCTURE GRANT

The Public Health Infrastructure Grant PHIG is a groundbreaking investment that supports critical public health infrastructure needs of health departments across the United States. Funding from this grant will help ensure that every U.S. community has the people, services, and systems needed to promote and protect health. The grant creates a foundation for the Centers for Disease Control and Prevention's (CDC) public health infrastructure work and provides flexibility so recipients can address their most pressing needs to create a stronger, more resilient public health system.

As of January 2024, the CDC awarded $4.35 billion through the OE22-2203: Strengthening U.S. Public Health Infrastructure, Workforce, and Data Systems grant to help U.S. health departments promote and protect health in their communities. This grant included $4.01 billion for health departments ($3.685 billion in fiscal year (FY) 2023 and $325 million in FY 2024) and $340 million for three national public health partners ($155 million in FY 2023 and $185 million in FY 2024). CDC expects to award more than $5 billion over the 5-year grant period.

The three strategies of this grant are **1) workforce, 2) foundational capabilities, and 3) data modernization**. Ultimately, this grant will lead to accelerated prevention, preparedness, and response to emerging health threats, and improved outcomes for other public health areas.

All work done as part of this grant is grounded in three key principles:

1. **Data and evidence drive planning and implementation.**
2. **Partnerships play a critical role in grant program success.**
3. **Resources are directed in a way that supports diversity and health equity.**

As a recipient of funding through PHIG, the National Network of Public Health Institutes (NNPHI) is dedicated to assisting the 107 health departments that were awarded funds. Their support includes offering training and technical assistance (TA), conducting program evaluations, and enhancing communication and coordination among recipients and the CDC. NNPHI established the TA Center within its organization to achieve these goals. Through this center, NNPHI collaborates with partners via subawards to deliver specialized technical support. The National Environmental Health Association (NEHA) is a key partner in this initiative, tasked with providing technical assistance focused on environmental public health concerns.

Technical Assistance Request

KENTUCKY REQUEST

The Kentucky Department of Public Health, recognizing a gap in training for both new and senior staff in environmental public health, sought assistance through the TA Center managed by NNPHI. They identified a disparity in staffs' level of education concerning environmental public health and a variation in the ability to apply policies and procedures and understand the scientific principles underlying them. This concern was echoed by other organizations in the environmental public health sector, highlighting a common challenge: some new staff lack a foundational background in environmental public health and experienced staff require refresher courses to remain current. Existing training programs have been insufficient in addressing these gaps. NNPHI and NEHA determined that initiating a training needs assessment was the essential first step to identify these challenges, determine key areas of focus, and explore viable solutions.

ENVIRONMENTAL PUBLIC HEALTH TRAINING NEEDS ASSESSMENT

Design and Dissemination

In partnership with NNPHI, NEHA created a training needs assessment to identify the fundamental needs of the environmental public health workforce across various jurisdictions in the country. The initial phase involved organizing a discussion group with representatives from selected health departments, such as Kentucky, Guam, and the Absentee Shawnee Tribe, along with members from NNPHI and NEHA. The purpose of this discussion group was to refine the scope of the training needs assessment and develop draft questions. Following this discussion group, a preliminary version of the training needs assessment was prepared and shared with the group to gather input and make necessary adjustments.

The training needs assessment was disseminated via the communication networks of NEHA. The assessment was promoted from January 2024 to March 2024 via NEHA-owned media channels, including social media (Facebook/Instagram, Twitter, LinkedIn), website, newsletter, and direct email to >7,000 NEHA members. Similarly, NNPHI used its communication channels to promote the training needs assessment. This effort resulted in a total of 485 responses, including 305 fully completed training needs assessments and 180 partial submissions. See Appendix A for the training needs assessment questions.

Training Needs Assessment Results

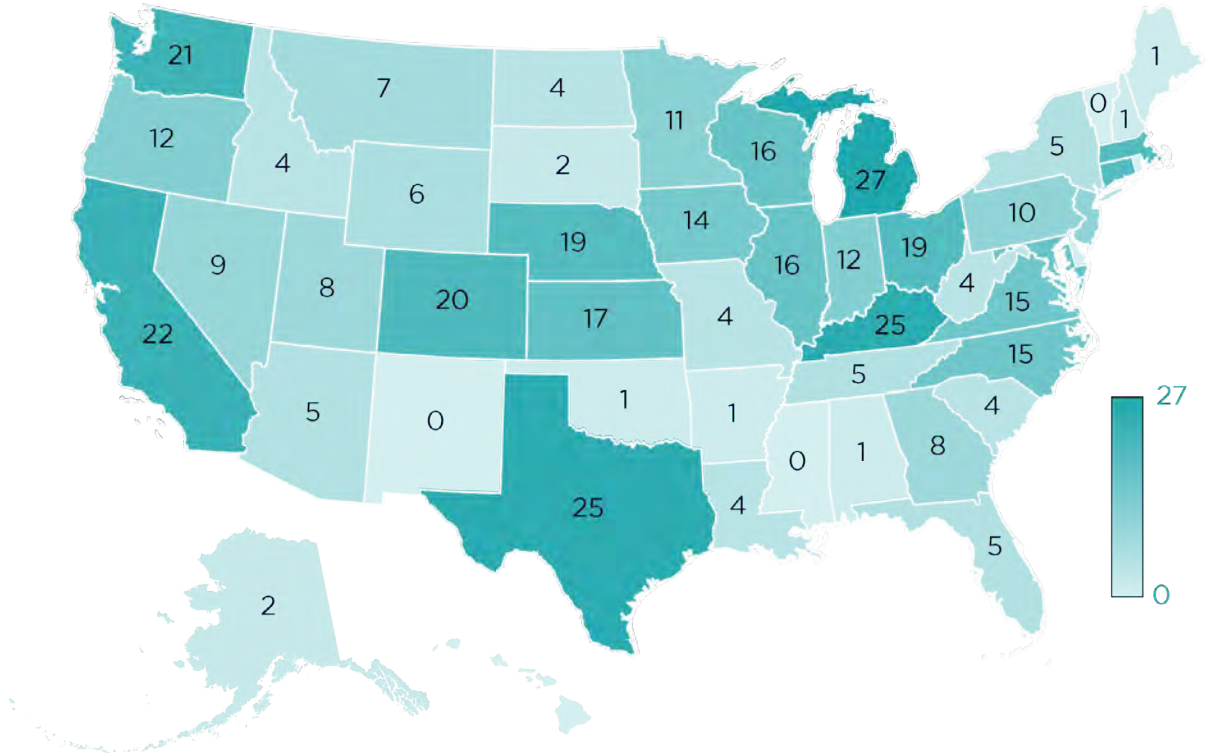
RESPONDENT AGENCY DEMOGRAPHICS

State Representation

Responses to the training needs assessment demonstrated a broad range of representation throughout the United States. Michigan had the highest count at 27, followed by Kentucky and Texas at 25 each. California had 22 and Washington had 21. Several states like Colorado, Connecticut, Illinois, Maryland, Massachusetts, Nebraska, and Ohio had counts ranging from 16 to 20. Many states, including Arizona, Florida, Georgia, Idaho, Indiana, Minnesota, New Jersey, Oregon, and Pennsylvania, had counts ranging from 5 to 14.

A noteworthy number of states and territories had a count of ≤4, such as Arkansas, Delaware, Louisiana, Maine, Mississippi, New Hampshire, North Dakota, Oklahoma, Rhode Island, South Dakota, and West Virginia, indicating limited reach. Several territories and states had no count, indicating no participation. These included American Samoa, Delaware, Guam, Hawaii, Mississippi, New Mexico, Puerto Rico, Rhode Island, Vermont, and the U.S. Virgin Islands. Figure 1 provides an overview of the geographical distribution of state coverage from the training needs assessment.

FIGURE 1. *State Representation in Training Needs Assessment (n = 477)*



Level of Service

Of the 485 responses, a significant portion of the training needs assessment participants (73%) came from local agencies. Contributions from state agencies constituted 13% of the total responses, with federal agencies providing 4%. A smaller share of the responses was from regional (1%) and tribal (3%) agencies. Responses from territories accounted for <1%. Additionally, 5% of the responses were categorized as other, which included academic, private, and international agencies, and agencies with multiple geographic focuses.

Type of Governance

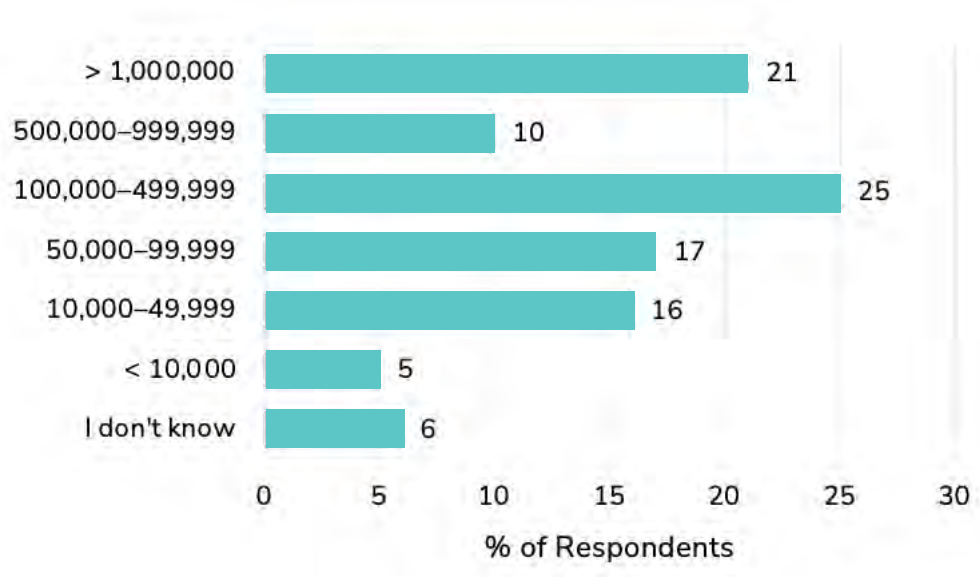
Governance structures in public health differ significantly across states, as does the relationship between state health agencies and regional/local health departments. Such variations in structure play a crucial role in how essential public health services are delivered. Based on the responses from 397 participants who answered the question regarding the type of governance in their public health agencies, the data unveiled a range of organizational frameworks:

- ***Centralized or Largely Centralized Structure:*** This model, where local health units are primarily led by state employees, was represented by 12% (46) of the training needs assessment participants, indicating a relatively small proportion of the governance structures fall into this category.
- ***Decentralized or Largely Decentralized Structure:*** The predominant model, with 65% (258) of the training needs assessment participants, indicates that local health units are mainly led by local government employees.
- ***Mixed Structure:*** Comprising 12% (49) of the training needs assessment participants, this model is characterized by a blend of leadership, where some local health units are led by state employees and others by local government employees, without a single predominant structure.
- ***Shared or Largely Shared Structure:*** This arrangement, with 11% (44) of participants, involves a flexible leadership dynamic where local health units could be led by either state or local government employees. Importantly, it specifies that fiscal decision-making power or the authority to issue public health orders lies with the level of government, not in charge of leadership. This structure emphasizes collaboration and shared authority between state and local levels.

Population Size of Jurisdiction

The training needs assessment data revealed a diverse range of population sizes served by respondent agencies (Figure 2). A smaller segment, 5% or 21 agencies, served populations of <10,000. Agencies serving 10,000–49,999 and 50,000–99,999 populations represented 16% (71 responses) and 17% (73 responses), respectively. The largest single category, with 25% or 110 responses, served populations ranging from 100,000–499,999, reflecting a substantial portion of agencies working with large communities. Those serving 500,000–999,999 and >1,000,000 people accounted for 10% (45 responses) and 21% (92 responses), respectively. Additionally, 6% (26) of respondents were unsure of the population size they serve.

FIGURE 2. *Population Size Served by Respondent Agencies (n = 438)*



Staff Size of Agency Environmental Public Health Workforce

The size of the environmental public health workforce across agencies varied widely, as indicated by responses from 437 participants. A significant number of agencies (41%, 181) had small teams of 1–10 individuals, while 19% of agencies (82) had teams of 11–25 members, demonstrating a trend towards smaller workforces. Mid-size teams of 26–49 were less common, representing 12% of agencies (51). Larger teams of 50–75 (5%, 24) and 76–100 (5%, 23) were even rarer. Notably, 13% of agencies (56) managed large workforces with >100 members. Additionally, 5% of respondents (20) were unsure of their workforce size. These findings illustrate a landscape where smaller teams predominate, yet a significant number of agencies with large workforces remain.

RESPONDENT DEMOGRAPHICS

Position Level, Role, and Years of Experience

The respondent data on position levels within their environmental public health agencies, based on 437 total responses, showed a diverse range of positions. Program directors or chiefs represented 17% of responses (73). Supervisors or managers made up 29% of responses (126). Field staff or nonsupervisory roles formed the largest category at 42% of the responses (184). Administrative roles accounted for a small fraction of responses at 2% (10), suggesting limited participation in the training needs assessment from this group. Additionally, 10% of responses (44) fell into the other category that spans leadership, managerial, and directorial roles; specialized and technical expertise; program coordination and development; fieldwork; consulting; education and training; and retired professionals transitioning or advising part-time.

Further, based on 437 total responses, the data showed a diverse range of roles. Environmental health professionals, specialists, health inspectors, and sanitarians emerged as the predominant group, accounting for 54% of responses (236). Environmental health supervisors, managers, and coordinators also represented a significant portion at 26% (116 responses). Health department directors and officers made up 5% of the response (21). Other roles such as health educators, engineers, state directors, and professional researchers/academics were less common, together totaling 4% of responses (13). A category for other leadership roles was indicated by 3% of the responses (11), and an additional 9% (41) identified roles not explicitly listed, including technical specialists, leaders, educators, legal experts, nuisance officers, planning and zoning directors, food safety trainer, public health administrators, environmental justice coordinators, and consultants.

On average, respondents (n = 431) averaged 15 years of experience working in environmental public health, ranging from 1 year to 58 years (median = 13 years, mode = 3 years).

CORE TRAINING CONTENT NEEDS

In this part of the training needs assessment, participants were given a list of key environmental public health topics. They were first instructed to assess the relevance of each topic for employee knowledge using a 4-point Likert scale:

1 - Not at all relevant (never required)
2 - Slightly relevant (necessary for occasional job tasks)
3 - Moderately relevant (necessary for approximately one half of job tasks)
4 - Very relevant (crucial for the majority of job tasks)

Following this assessment, respondents were asked to evaluate how prepared their jurisdiction's staff were to handle each topic, using another 4-point Likert scale:

1 - Not at all prepared (have hardly any or no education, experience, training, or resources)
2 - Slightly prepared (have some level of education, experience, training, or resources)
3 - Moderately prepared (have a sufficient amount of education, experience, training, or resources)
4 - Very prepared (have an outstanding level of education, experience, training, or resources).

Table 1 presents the ratings for each area. The mean relevance score was 2.52 and the mean preparedness score was 2.27. Those areas marked as highly relevant to job tasks (a weighted average of ≥2.0 indicating moderate to very relevant) but have poorly prepared staff (a weighted average of <2.0 indicating slightly or not at all prepared) are highlighted in green as critical training priorities. These areas included climate change and adaptation, hazmat response, health-related facilities, injury prevention, land use planning, mobile homes, outdoor air quality, pollution prevention, and radon control.

TABLE 1. *Core Environmental Public Health Area Ratings for Relevance and Preparedness (n = 414)*

Environmental Public Health Area	Relevance	Staff Preparedness
1. Body art (tattoo)	2.37	2.30
2. Campgrounds and recreational vehicles (RVs)	2.40	2.23
3. Children's camps	2.37	2.15
4. Climate change and adaptation	2.00	1.69
5. Collection of unused pharmaceuticals	1.65	1.61
6. Cosmetology businesses	1.57	1.47
7. Day care/early child development facilities	2.71	2.55
8. Emergency preparedness and response	3.12	2.90
9. Environmental justice/health disparities	2.43	2.11
10. Food safety and protection	3.66	3.49
11. Hazardous waste disposal	2.60	2.17

Environmental Public Health Area	Relevance	Staff Preparedness
12. Hazmat response	2.21	1.92
13. Health-related facilities	2.37	1.99
14. Healthy homes	2.42	2.12
15. Hotels/motels	2.62	2.44
16. Indoor air quality	2.44	2.10
17. Injury prevention	2.01	1.79
18. Land use planning	2.27	1.94
19. Lead prevention	2.67	2.43
20. Long-term care	1.86	1.79
21. Medical waste	1.89	1.74
22. Milk processing	1.69	1.52
23. Mobile homes	2.11	1.93
24. Noise pollution	1.72	1.59
25. Non-school institutions and licensed establishments	2.63	2.40
26. Occupational health	1.80	1.65
27. Onsite wastewater (e.g., septic systems)	3.22	2.99
28. Outdoor air quality	2.17	1.94
29. Poison control	1.74	1.60
30. Pollution prevention	2.26	1.94
31. Private or onsite drinking water/potable water	3.31	2.93
32. Public swimming pools	3.20	3.01
33. Radiation control	1.70	1.58
34. Radon control	2.13	1.99
35. Retail food	3.41	3.31
36. Other recreational water (e.g., beaches)	2.45	2.30
37. Salon and barber	1.50	1.45
38. School safety and inspection program	2.60	2.39
39. Smoke-free ordinances	2.20	2.12
40. Solid waste	2.51	2.22
41. Special events/mass gatherings	2.92	2.58
42. Tobacco retailers	1.66	1.59
43. Toxicology	1.86	1.64
44. Zoonoses, vectors, pests, and poisonous plants	2.80	2.53
45. General knowledge: Environmental health basics (e.g., general math and science skills and knowledge)	3.62	3.26
46. General knowledge: Technology	3.32	2.92
47. General knowledge: Jurisdiction, authority, and structure of environmental health agencies	3.47	2.96

Environmental Public Health Area	Relevance	Staff Preparedness
48. General knowledge: Legal and law (e.g., terminology, legal methods during inspections and investigations)	3.44	2.85
49. General knowledge: Roles and responsibility of environmental public health	3.53	2.99
50. General knowledge: Intersection of environmental health and public health	3.53	2.96
51. General knowledge: Environmental public health's role in health prevention and promotion	3.47	2.96
52. General knowledge: Outbreak response	3.40	2.89

Note. Cells highlighted in green were rated as critical training priorities by respondents.

Focusing exclusively on the job task relevance score, 14 areas were identified with an average rating of ≥3.0 (moderately to very relevant). See Table 2 for a detailed list of the primary environmental public health subjects deemed highly relevant to job tasks.

TABLE 2. *Most Relevant Environmental Public Health Areas (n = 414)*

Environmental Public Health Area	Relevance Rating
1. Food safety and protection	3.66
2. General knowledge: Environmental health basics (e.g., general math and science skills and knowledge)	3.62
3. General knowledge: Intersection of environmental health and public health	3.53
4. General knowledge: Roles and responsibility of environmental public health	3.53
5. General knowledge: Jurisdiction, authority, and structure of environmental health agencies	3.47
6. General knowledge: Environmental public health's role in health prevention and promotion	3.47
7. General knowledge: Legal and law (e.g., terminology, legal methods during inspections and investigations)	3.44
8. Retail food	3.41
9. General knowledge: Outbreak response	3.40
10. General knowledge: Technology	3.32
11. Private or onsite drinking water/potable water	2.17
12. Onsite wastewater (e.g., septic systems)	3.22
13. Public swimming pools	3.20
14. Emergency preparedness and response	3.12

Concentrating solely on the staff preparedness score, 21 areas were found with an average rating of ≤2.0 (not at all to slightly prepared). Table 3 provides the list of the environmental public health areas identified with inadequately prepared staff.

TABLE 3. *Environmental Public Health Areas With Lowest Staff Preparedness (n = 414)*

Environmental Public Health Area	Staff Preparedness Rating
1. Salon and barber	1.45
2. Cosmetology businesses	1.47
3. Milk processing	1.52
4. Radiation control	1.58
5. Noise pollution	1.59
6. Tobacco retailers	1.59
7. Poison control	1.60
8. Collection of unused pharmaceuticals	1.61
9. Toxicology	1.64
10. Occupational health	1.65
11. Climate change and adaptation	1.69
12. Medical waste	1.74
13. Injury prevention	1.79
14. Long-term care	1.79
15. Hazmat response	1.92
16. Mobile homes	1.93
17. Land use planning	1.94
18. Pollution prevention	1.94
19. Outcome air quality	1.94
20. Health-related facilities	1.99
21. Radon control	1.99

When asked what core content areas are missing from the list in Table 1, respondents offered the following content suggestions:

1. Communication and Interpersonal Skills

- De-escalation techniques
- Conflict resolution
- Communication with various partner
- Verbal and written communication skills
- Regulatory enforcement and compliance:
- Ability to enforce regulations

2. Training and Professional Development

- Problem-solving in real-life situations
- Confidence-building and professionalism for field inspectors
- Leadership, mentorship, coaching, and professional development opportunities

3. Specific Environmental Public Health Topics

- Housing/hoarding
- Waterborne illnesses
- Report writing, evidence collection, and data analysis
- Sanitary sciences and technology
- Industrial hygiene, nanotechnology, laboratory safety, and infection control
- Trauma-informed care
- Rabies control and animal handling
- Cultural awareness and equity in health practices
- Tanning regulations
- Environmental epidemiology
- Emerging trends in environmental health

4. Other Areas

- Plan review and interdepartmental relationships
- Safety in workplaces and inspections
- Leadership skills and psychology
- Change management concepts
- Ethics and personal skills
- Hazardous waste cleanup
- Environmental services and laundry
- Biosafety
- Hazardous materials handling and disposal
- Waste reduction strategies
- Cannabis regulations and safety requirements
- Data analytics for environmental public health assessment

ESSENTIAL ENVIRONMENTAL PUBLIC HEALTH SKILL NEEDS

In this section of the training needs assessment, respondents were asked to read the description of each essential environmental public health skill and estimate how relevant each skill was in terms of what staff should know and then estimate how prepared staff were to implement the skill using the 4-point Likert scales below for relevancy and preparedness. Table 4 includes the scores for each essential skill.

4-Point Likert Scale for Relevancy:

1 - Not at all relevant (never required)
2 - Slightly relevant (necessary for occasional job tasks)
3 - Moderately relevant (necessary for approximately one half of job tasks)
4 - Very relevant (crucial for the majority of job tasks)

4-Point Likert Scale for Staff Preparedness:

1 - Not at all prepared (have hardly any or no education, experience, training, or resources)
2 - Slightly prepared (have some level of education, experience, training, or resources)
3 - Moderately prepared (have a sufficient amount of education, experience, training, or resources)
4 - Very prepared (have an outstanding level of education, experience, training, or resources).

The data indicated that while most essential skills were deemed moderately to highly relevant, there was a notable gap in staff preparedness in these skills (Table 4).

TABLE 4. *Relevancy and Staff Preparedness for Essential Skills (n = 331)*

Environmental Public Health Area	Relevancy	Staff Preparedness
Steps to conduct inspections	3.89	3.43
Data mangement/surveillance	3.29	2.57
Conduct investigations	3.75	3.09
Conduct compliance reviews	3.53	2.88
Conduct risk assessments	3.45	2.68

When prompted to identify additional core skills needed, the responses reiterated some of the topics discussed earlier regarding essential content areas. Respondents placed a strong emphasis on the importance of effective communication, conflict resolution strategies, and various other interpersonal skills crucial for successful interactions and outcomes in the field. These skills can be grouped into key areas:

1. Communication and Interpersonal Skills:

- This category was by far the most mentioned across the responses, underscoring the need for effective communication in various contexts—whether in report writing, engaging with the public, or within teams. Specific mentions included the need for verbal and written communication skills, the ability to communicate complex concepts understandably, public speaking, and the use of body language.
- One person shared, "Perhaps there should be Environmental Public Health 201 to cover effective communication regarding "educational moments" during inspections, maintaining trust with all partners through respectful, accurate interactions and report writing, and how to use good active listening skills."

2. De-escalation and Conflict Resolution:

- Numerous comments underscored the significance of de-escalation techniques and conflict resolution, particularly in tense circumstances. As one respondent stated, "There should be components of training addressing de-escalation and situational awareness."
- This training area includes other mentions such as navigating challenging public interactions, enhancing customer service skills, developing leadership abilities, understanding psychological dynamics during inspections, and understanding change management concepts. These proficiencies are essential for inspectors who frequently encounter resistance or confront hostile environments during field inspections.

3. Writing Skills:

- Several responses specifically cited the importance of writing skills for environmental public health professionals. This includes report writing, documentation, and the ability to clearly articulate findings and recommendations in written form.
- As one respondent noted, "Report writing/documentation is a key component of our training; as well as verbal communication, which has been difficult to teach and help develop in our newer candidates that are unable to engage in conversation with operators, let alone document the violations they are observing, and the corrections needed to gain compliance."

4. **Professional Skills and Confidence Building:**
    - There was an expressed need for training aimed at fostering confidence and professionalism among new or young field inspectors. These training needs included understanding the broader scope of their roles, decision-making, and engagement techniques. This was emphasized by one respondent, "We have a lot of field inspectors who are overwhelmed when they get out in the field. First, the REHSs wear a lot of hats. Second, they are often young or new to field inspections and feel intimidated when they get out in the field. They need training that reinforces their confidence and helps to uplift their professionalism."

5. **Technical Skills and Knowledge:**
    - In addition to interpersonal skills, respondents recognized the need for specialized knowledge and technical skills in the field of environmental public health. This need included understanding inspection processes, hazard analysis, critical control points, environmental microbiology, epidemiology, and conducting epidemiological investigations, as well as the use of artificial intelligence (AI) in data analyses and reporting.
    - In the words of one respondent, "All Sanitarians (i.e., professionals with specific knowledge and skills in the field of Environmental Health) must know enough of the sanitary sciences and technology to recognize, assess and control any environmental risks to human health and well-being and to effectively communicate those risks, and their remedies, to the affected and/or responsible populations."

6. **Cultural Competency and Sensitivity:**
    - Several responses suggested the need for cultural competency training, indicating the importance of respectful and effective communication across diverse communities. This need encompassed awareness of cultural sensitivities such as "how to socialize with people of different cultures" and "awareness of specialty foods and preparations from other cultures" when conducting inspections or engaging with the public.

7. **Safety and Awareness:**
    - Personal safety and situational awareness during field inspections were mentioned, highlighting the need for training that prepares staff for potential hazards they could encounter in the field.

8. **Legal and Ethical Considerations:**
    - A few responses pointed out the importance of understanding legal implications and ethical considerations in environmental public health work, including evidence collection that could lead to enforcement actions. This may include areas such as ethics and implicit bias training.

9. Specialized Training Needs

- Some responses identified specific training needs, such as legal relevance, cannabis, food safety, climate and health, zoonotic diseases, land reuse, data analytics, and understanding public health and environmental agency divisions. These needs highlight the varied and specialized nature of environmental public health work. As one person explained, "The inspection role is expanding to cover so much more than typical training that includes program requirements." Moreover, another respondent highlighted the importance of navigating the grey areas in environmental public health: "It is important to teach there are gray areas in environmental public health; there is the code, the intent of the code, and a violation of the code. In practicing environmental public health, you must understand the continuum of codes, including the philosophy of your health officer and health administrator."

10. REHS and Other Certification:

- A few responses highlighted the importance of the Registered Environmental Health Specialist (REHS) certification in ensuring a well-trained and qualified workforce. One respondent suggested, "Requiring that sanitarians be [certified]. Many quality professional candidates are ready to work but get passed up for less educated friends of friends. Knowing that they can get training even if it takes their whole career. This is only possible because federal law does not require one to be a professional sanitarian. They make nurses be registered so why not sanitarians? I think counties in states that disagree with environmental health have taken advantage of this loophole and hire uneducated [staff] willing to not enforce federal rules and regulations."

- Another comment highlighted the challenges faced by REHS-certified individuals from out of state: " It is important to explore other contributing factors, such as strategies to reduce the hiring of inexperienced individuals in [my state] specifically. Should [the state] loosen restrictions on out-of-state REHS persons (those who relocated to [the state]) there would be less of a training burden. Currently, [my state] restricts REHS-experienced individuals from outside of the state. Addressing this bottleneck would help with training needs."

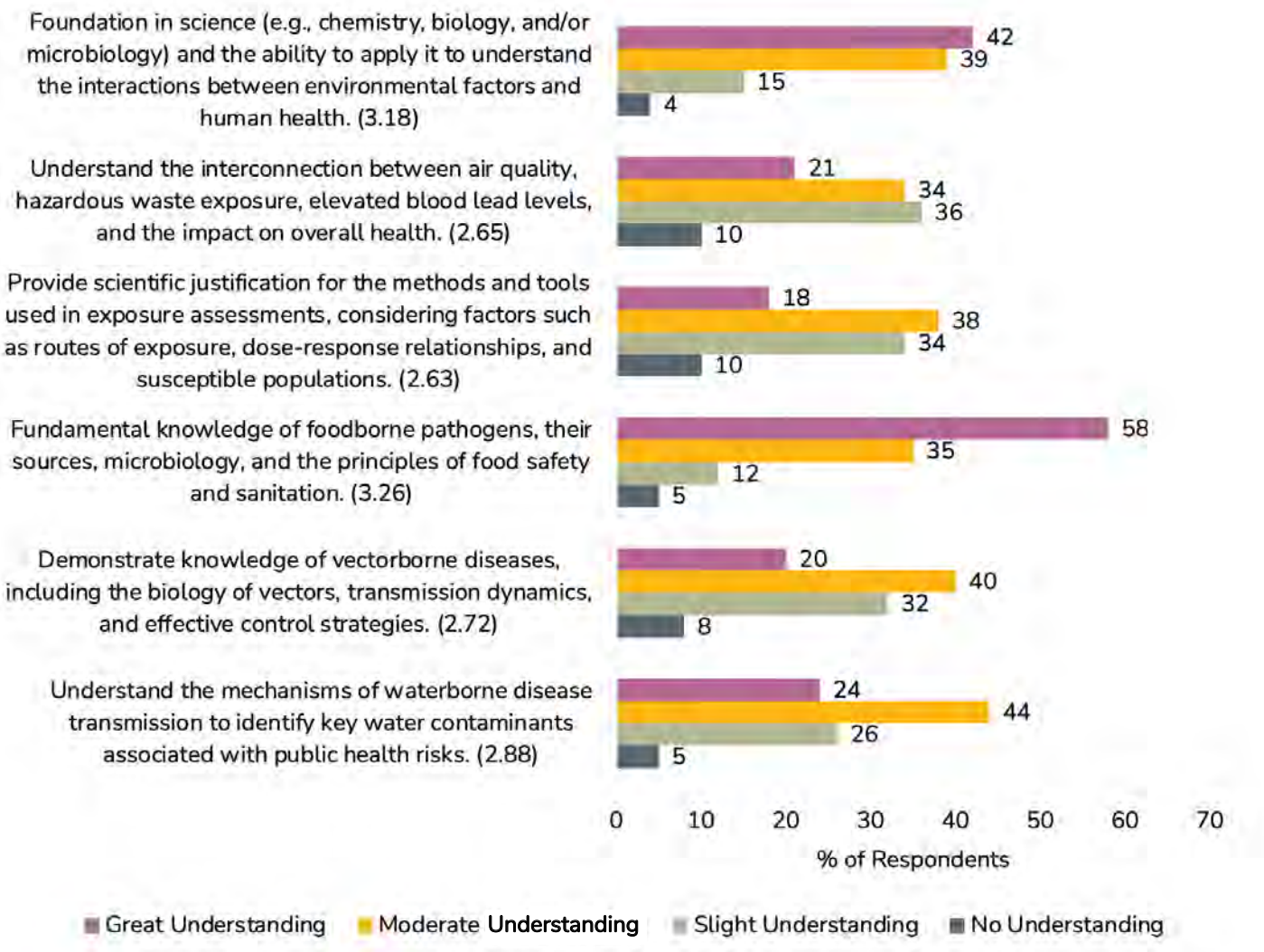
- A respondent noted that in their state, "Health Environmental Health Specialists must meet certain training certifications prior to being considered "independent" for field work and inspections."

The feedback from environmental public health professionals highlights the wide array of professional skills and competencies required in the field. From effective communication and interpersonal skills to specialized technical knowledge and cultural competency, these training needs reflect the complex and multifaceted nature of environmental public health work. Addressing these needs through comprehensive and targeted training programs that not only cover technical aspects but also foster the development of a broad range of professional skills is crucial for building a skilled, confident, and adaptable workforce capable of tackling the various challenges they face in protecting public health and the environment.

SCIENTIFIC COMPETENCIES NEEDS

In the training needs assessment, participants were asked to use a 4-point Likert scale to assess the comprehension levels of staff in their jurisdiction regarding key scientific concepts in environmental public health (Figure 3- *Note:* The weighted average for each principle is provided in parentheses). This scale ranged from 1 (indicating no comprehension) to 4 (reflecting extensive understanding). The results revealed that staff across jurisdictions demonstrate a basic knowledge of foodborne pathogens, their origins, microbiology, and the fundamentals of food safety and hygiene. This competency was followed by a solid grounding in basic sciences, including chemistry, biology, and microbiology, along with the capability to correlate these scientific principles with the interaction between environmental public health determinants and human health. Their ability to provide scientific justification in exposure assessments and to connect environmental hazards to health outcomes, however, showed room for growth.

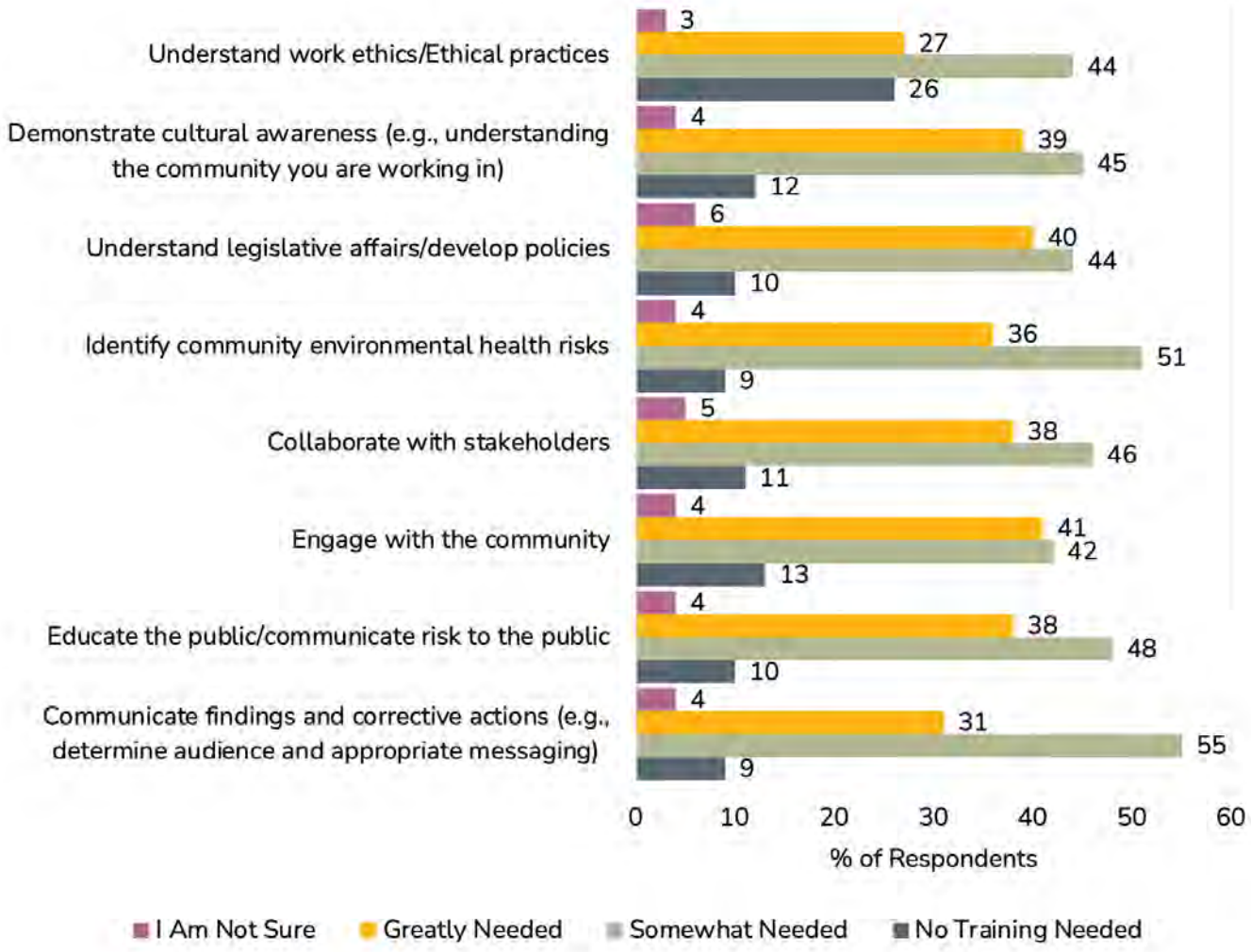
FIGURE 3. *Competencies in Scientific Principles (n = 325)*



COMMUNICATION AND PROFESSIONAL SKILL NEEDS

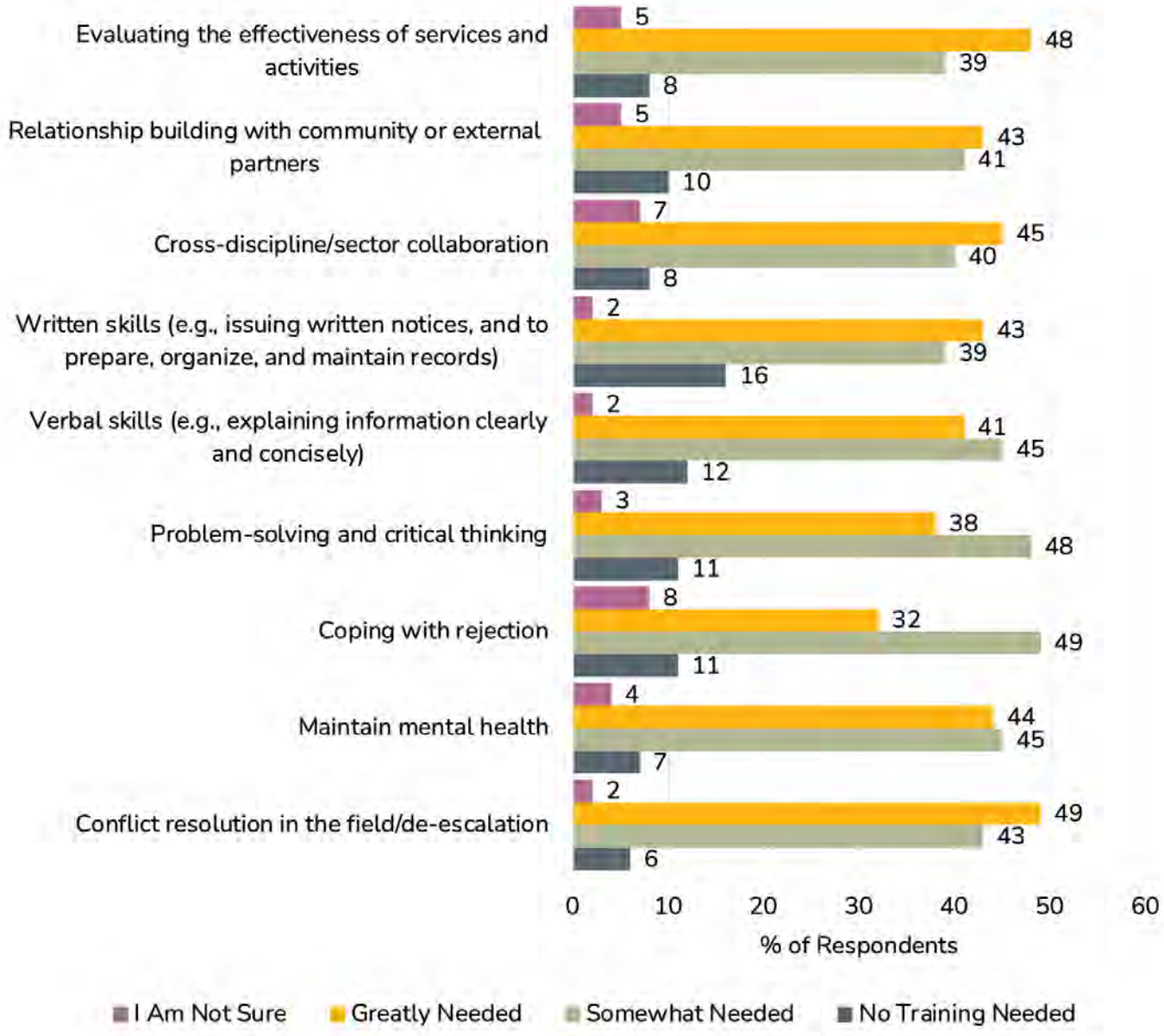
As previously mentioned, respondents highlighted communication and professional skills as crucial components for inclusion in training programs. To delve deeper into this area, the training needs assessment incorporated questions aimed at gauging the level of training required by staff on disseminating environmental public health information, in addition to their need for training in general communication and professional skills. Figure 4 shows the level of training needed across multiple aspects of communicating and sharing information. The findings indicated that training was mostly either somewhat or greatly needed for all items.

FIGURE 4. *Training Needs for Effective Information Sharing Skills (n = 310)*



Respondents further expressed a desire for comprehensive, evolving training programs that go beyond basic scientific knowledge to include skills like political adeptness. Suggestions also emphasized the importance of training that builds confidence and professionalism, particularly for field inspectors. Figure 5 illustrates a need for training in both general communication and professional skills, showing that training was primarily somewhat or greatly needed across all items.

FIGURE 5. *Training Needs for General Communication and Professional Skills (n = 311)*



CUSTOMIZATION OF TRAINING AND TRAINING DELIVERY PREFERENCES

Training Needs Based on Roles and Experience

To ascertain the preferred training methods and delivery formats, a series of questions were posed to respondents. First, most of the 300 respondents who answered (88%) recognized that training needs in their jurisdiction varied based on staff experience and roles. In comments, several key themes reflected these diverse needs:

1. **Variability in Staff Experience and Background:**
    - The diverse educational backgrounds and varying levels of experience among environmental public health professionals necessitate a tailored approach to training based on job responsibilities, identified skill gaps, and prior experience according to respondents. The comment, "needs vary based on staff positions," illustrates that a one-size-fits-all approach to training may not be effective.
    - Educational backgrounds varied, including staff with or without science degrees. As one person shared, "Some staff are hired with no background in environmental health or biology. This makes it difficult to teach why we cite violations and risk-based inspections."
    - Respondents reported a wide range of experience levels among staff, from newcomers to veterans with more than 20 years of service. There was a prevalent notion that job experience not only enriches understanding of roles but also improves proficiency in executing responsibilities. Additionally, it was conveyed in comments that seasoned personnel need specialized training tailored to their advanced expertise, while newer staff benefit most from foundational instruction.
    - One participant encapsulated this by stating, "Not all staff need training, and not all operate at the same level. Ideally, training is tailored (basic/intermediate/advanced)."
    - Another respondent noted, "While technical skills tend to be more developed with more experience, some of the other skills are needed regardless of the level of experience."

2. **Training Preferences:**
    - There was a preference for diverse training methods to cater to different learning styles and needs. For example, some individuals may prefer hands-on activities, while others may learn better through lectures or discussions. Additionally, some may favor self-paced learning, while others thrive in in-person, collaborative environments.
    - Respondents acknowledged the value of hands-on, practical experience for learning. One respondent stated, "Hands-on experience with a trainer is invaluable."

- However, a respondent noted that newer staff may prefer online learning but then struggle to apply the concepts to related situations: 'Staff do not understand the difference between best methods to learn and their preferred method of learning. Newer staff prefer online learning but cannot apply or extrapolate the taught concepts to other related situations."
- A progressive training approach was suggested, transitioning from fundamental topics for new hires to more specialized issues for seasoned employees. One respondent articulated this as follows, "For new employees, comprehensive training is crucial, but after 10+ years, basic training becomes less valuable. Spending hours or days in training is usually not beneficial for experienced staff. Focusing on specific issues for 15-30 minutes would be more practical than lengthy sessions covering familiar topics."
- Alongside training, alternative learning strategies were discussed, with one respondent suggesting, "As new inspectors are onboarded, more exposure and shadowing is needed to expose that new inspector to inspection styles."

3. Challenges With Consistency and Standardization:

- Respondents highlighted several challenges in maintaining consistent standards and practices across jurisdictions and among staff. As expressed by a respondent, "Although we do the same job, we often do not know why it is done in certain ways, thus resulting in different outcomes."
- Contractors face a unique challenge in this regard. One respondent described encountering situations where contractors express, "This isn't how it's done in another county. [Their] primary concern is that neighboring counties may not adhere to the same standards or procedures as us, making it challenging for contractors to navigate the varying rules they must remember for each county."
- A respondent pointed out the inconsistencies in training requirements and availability among various environmental health programs. They noted that while some programs, such as food safety/inspections, have rigorous state-mandated training regimens, other major programs like water supply and sewage disposal lack set training schedules or requirements. This leaves local health departments to develop their own staff training plans. This respondent mentioned, "The state entity that oversees water and sewage disposal does sometimes offer training sessions, but they are infrequent, not conveniently located, and/or fill up quickly due to staff turnover and the influx of new EH workers. We sometimes have to wait years before we can get someone into an official state training session, so we do the training ourselves. This is made difficult when experienced staff are leaving the field and those left behind have a much smaller knowledge base to share with brand new employees."

4. Impact of Staff Turnover and Recruitment Challenges:

- High turnover rates were an issue. A respondent highlighted the impact of the pandemic on staffing, stating, "Since COVID, we have experienced a high turnover of staff, and it is getting harder to fill positions with qualified staff." Another shared, "Several staff members were hired during the COVID pandemic and did not receive any in-person training and were unable to observe much field work due to emergency response efforts, therefore our newer staff are farther behind in experience and the older staff are taking on more tasks with less time to train."

- Recruiting qualified candidates posed challenges, as expressed by one individual: "We are challenged with finding qualified candidates, so we rely heavily on in-depth on-the-job training for less experienced new hires."

5. Technological and Interpersonal Skills:

- A gap in technological aptitude and interpersonal communication abilities across generations was noted. Younger employees tend to be more adept at using technology, yet there was a common belief that they require additional training on face-to-face interactions, managing challenging conversations, and direct engagement with others. A respondent pointed out, "Newer, younger staff lack verbal and written communication skills due to always having and using technology to spell and grammar check for them and due to texting rather than talking." Another person expressed, "Newer staff members have no real-world communication skills (i.e. talking to people in person, not just texting and emailing)."

6. Resource and Access Limitations:

- There was limited access to training opportunities, especially in rural areas or for departments with restricted budgets. One respondent explained, "We are a rural health jurisdiction and have had to change the minimum requirements so we can fill positions. We've called it "growing our own", taking local residents and then training them to meet the needs of the programs. It increases the training time and needs, but without this strategy, we would have more empty positions and work would go undone."

- Because of the low salary base in a jurisdiction, they are "unable to get [staff] with a college degree or previous background in environmental health or food service" and have to spend more time on providing staff with "the foundation on problem-solving and best practices when conducting food inspections."

- Respondents expressed a desire for enhanced accessibility to training, advocating for additional online courses to supplement the conventional, face-to-face training sessions. In one jurisdiction, there was a demand for increased "online training opportunities to supplement in-person sessions."

7. The Role of Specialization:

- Respondents noted that training needs differ between generalists and specialists. One respondent explained, “Despite our department’s small size, we operate as specialists rather than generalists. Consequently, we occasionally overlook violations or issues of concern that hold importance from a public health standpoint.” They further emphasized that staff in “highly specialized roles require specific training that might not apply to everyone.”
- Conversely, there’s a call for cross-training to foster a comprehensive understanding across various environmental public health domains, while still acknowledging the importance of specialization. A respondent emphasized the diverse roles and responsibilities of their staff noting, “Our staff are more generalized EH practitioners. They work in each field of EH, so depending on the individual, their training needs to be tailored to meet their specific needs.”
- Also stated by a respondent, finding the perfect candidate is rare. “We seldom encounter individuals who possess all the necessary background skills for the job, thus on-the-job training of staff from various disciplines is common.”

8. Performance-Based Categorization and Engagement:

- One respondent suggested categorizing inspectors based on their performance and skills, such as “I, II, III, or similar.” The respondent noted that “Because of the poor performers, lack of engagement of management in delegating duties, and allowing those who perform [less] well to be engaged in developing programs, great performers are leaving, there is lack of standardization and consistency, and lack of validation of great performers.” This comment highlights the need for recognizing and engaging high-performing staff in program development and leadership opportunities.

The diversity in staff experiences, backgrounds, and preferences necessitates a tailored approach to training that addresses individual skill gaps and learning styles. Consistency, standardization, high turnover rates, and recruitment difficulties emerged as significant hurdles. Addressing these multifaceted challenges requires a comprehensive strategy encompassing targeted training, mentorship, cross-training, and accessible learning opportunities.

Training Needs Based On Regional and Geographical Differences

In a subsequent question, participants were asked whether they believed regional variations could affect training requirements. Out of 299 responses, 80% replied yes, 11% replied no, and 9% were unsure. In the comments, several themes highlighted how regional differences impact training needs in environmental public health:

1. Rural Versus Urban Training Needs:

- Based on responses, rural areas often focused on specific issues like septic systems, private wells, and agricultural concerns, and lacked access, or awareness of broader training opportunities. The following quote underscored the unique challenges rural staff face as they "are more likely to deal with onsite sewage and private wells and deal with fewer institutional environmental health issues." However, the respondent also emphasized that regardless of their specific focus, "all need to know at least the basics."
- Another respondent remarked that "Rural areas typically have less employees covering more subject areas as a generalist. Rural areas typically have less ability for internal training."
- An insightful response captured the essence of the matter: "We are just south of the state capital, and even in our own county, the north half is more urban, and the south half is more rural. There can be a big difference in dealing with residents in each of these areas."
- Urban settings faced a wider range of specialized issues, such as food safety, shelter, public utilities, and crowded living conditions, and benefited from more targeted training programs. One respondent drew attention to the diverse needs of their area, which "covers both urban and suburban (rural at times) areas." They noted that the training requirements "vary greatly on the population and density" of each area.
- In contrast to urban areas, rural areas required more generalized training due to staff handling a broader range of issues with less specialization. One respondent explained, "We are an urban health department serving a complex urban environment with a diverse population and a significant percent of medically under-served population. This would be significantly different versus a similar socioeconomic mix in a very rural area."
- A respondent from a small state shared their unique challenge with "densely populated cities in the south, rural areas to the west, coastal areas to the east, and very remote areas to the north. The needs vary greatly based on where you live in [the] state."

2. Geographical and Environmental Variances:

- Respondents emphasized that various states and localities exhibited distinct regional characteristics, such as soil type, water levels, and industrial activities, which influenced regulatory priorities and local implementation. Urban areas focused on issues unique to dense population centers, such as noise pollution and lead contamination, requiring specialized training. As explained by one respondent, "Various programs are locally

implemented like land use planning, investigation, small-site-specific applications, and response (such as hazmat, air quality, solid waste, and environmental justice), while state programs focus on overarching initiatives, grants, and programs."

- One respondent noted that "Eastern Kansas has a different soil, water level, and different industries" than other parts of the state, and "the higher population also affects" the training needed.
- Another respondent illustrated the contrasting focus areas between urban and rural settings and used this example, "Urban areas typically don't require knowledge of septic inspections, while regions without beaches won't need training on beach inspections." Another shared, "One example is a rodent problem in a farming community or the country with large distances between neighbors is different than in a large town."

3. Resource Accessibility and Budget Constraints:

- Rural communities often had fewer resources and budget constraints, limiting access to training. In one state, "Training events organized by state agencies are often held in urban locations that are a significant driving distance for a large portion of the state. Since the state agencies only hold a couple of trainings a year, they are usually closer to areas with higher populations. This means that health departments in northern [areas] or the Upper Peninsula are often forced to travel very long distances or not attend trainings at all."
- In one county, training expenses are not covered, placing the financial responsibility on the employee for necessary license renewal training. "Consequently, many choose free or low-cost online training over the more expensive yet crucial subject-based training sessions or conferences."
- While urban areas might have more funding and resources for specialized training, they also faced challenges in meeting the diverse needs of a larger population. One respondent observed that "Larger urban jurisdictions have better access to resources and funding for training, competitive salaries to hire qualified staff, and have more capacity to dedicate time to training vs meeting mandates."
- In the largest urban area of one state, access to distinctive resources created unique challenges. This respondent explained, "Our facilities are more advanced and use new designs and technology that the regulations do not cover. We also have large socioeconomic ranges which create barriers for compliance."

4. Cultural and Socioeconomic Diversity:

- Based on the information provided in comments, training content should address the ethnically and socioeconomically diverse populations, with considerations for cultural competency and tailored community engagement strategies. As one respondent shared, "We have an ethnically and socio-economically diverse population, and our training needs reflect this." Another explained, "We work in an urban setting where we engage in conversations with people from many cultures." Conversely, a respondent noted that in their rural communities, "Cultural competency and health equity are less of an issue."

- Respondents noted that the pace of life, community engagement, and intrinsic beliefs varied between regions, affecting training needs and methods. One respondent reflected, "Our state is large and has many different communities of varying sizes and jurisdictions. The tribes need different support than the other offices. Rural areas need more training on all topics, while urban areas need more training for their specialties." Another commented, "We have to understand the differences between ourselves and many of the people we serve."

- Interagency cooperation and politics also played a role in training access and needs. In one area, "Bigger health departments reach out and will work with local health departments, however, unless certain shared services are "checked off" on the agreement, the Town doesn't receive that service. The disparity seen here is local health department staff focus heavily on their agendas instead of the community [needs]. Elected officials tend to align their intentions with those of town personnel, and local health department members also frequently serve on additional boards or committees, diverting crucial attention away from environmental and public [health concerns]."

5. Access to Training and Technological Solutions:

- There were challenges in physically accessing training sessions due to distance, particularly for rural staff, with a preference for in-person, hands-on training methods. For instance, as one person explained, "Rural staff are more isolated. It is harder to get resources, support, training, connections, and have a professional community."

- While the emergence of virtual training was perceived as a valuable option, respondents felt that it did not fully replace the need for in-person experiences, especially for hands-on field training. Even so, virtual training was a viable option for those who are "underfunded or understaffed." As a respondent stated, "This lack of resources can be damaging to ensuring staff receive adequate training."

6. Program Specificity and Cross-Disciplinary Training:

- There is a need for training to be tailored to the specific audience, considering the variety of programs and responsibilities within local jurisdictions.

- Cross-training was important, especially in rural areas where staff might need to cover a wide range of topics due to limited specialization. As described by one respondent, "Staff in small rural local health departments tend to be generalists. In larger urban local health departments, they often specialize in one aspect of EH such as food safety, indoor air quality, etc."

Overall, rural areas often faced specific challenges such as septic systems and agricultural concerns, with fewer employees covering a wider range of subjects and limited access to training, while urban settings delt with a broader array of specialized issues, benefiting from more targeted training programs tailored to their diverse population and density. Geographical and environmental variances, resource accessibility, budget constraints, cultural and socioeconomic

diversity, and access to training and technological solutions all played crucial roles in shaping the training landscape. To effectively address these diverse needs, training programs must be tailored to specific audiences, consider regional variations, and incorporate a mix of in-person and virtual learning opportunities.

PREFERRED DELIVERY AND TRAINING METHODS

The training needs assessment aimed to identify the preferred training methods and delivery formats across various environmental public health jurisdictions from a broad perspective. From the 300 respondents, in-person or classroom-style training emerged as the top preference (59%), with conference-based training favored by nearly one-half of the participants (49%). Self-study and podcasts were the least favored options. Interactive techniques received support from 46% of respondents, closely followed by blended learning, which 45% of respondents preferred. Furthermore, 43% of respondents showed a preference for modular learning. The responses showed a range of preferences for many training methods, indicating that most were either highly favored or considered somewhat favorable (Figure 6).

IN-PERSON/ CLASSROOM-STYLE

59%

CONFERENCE-BASED

49%

INTERACTIVE TECHNIQUES

46%

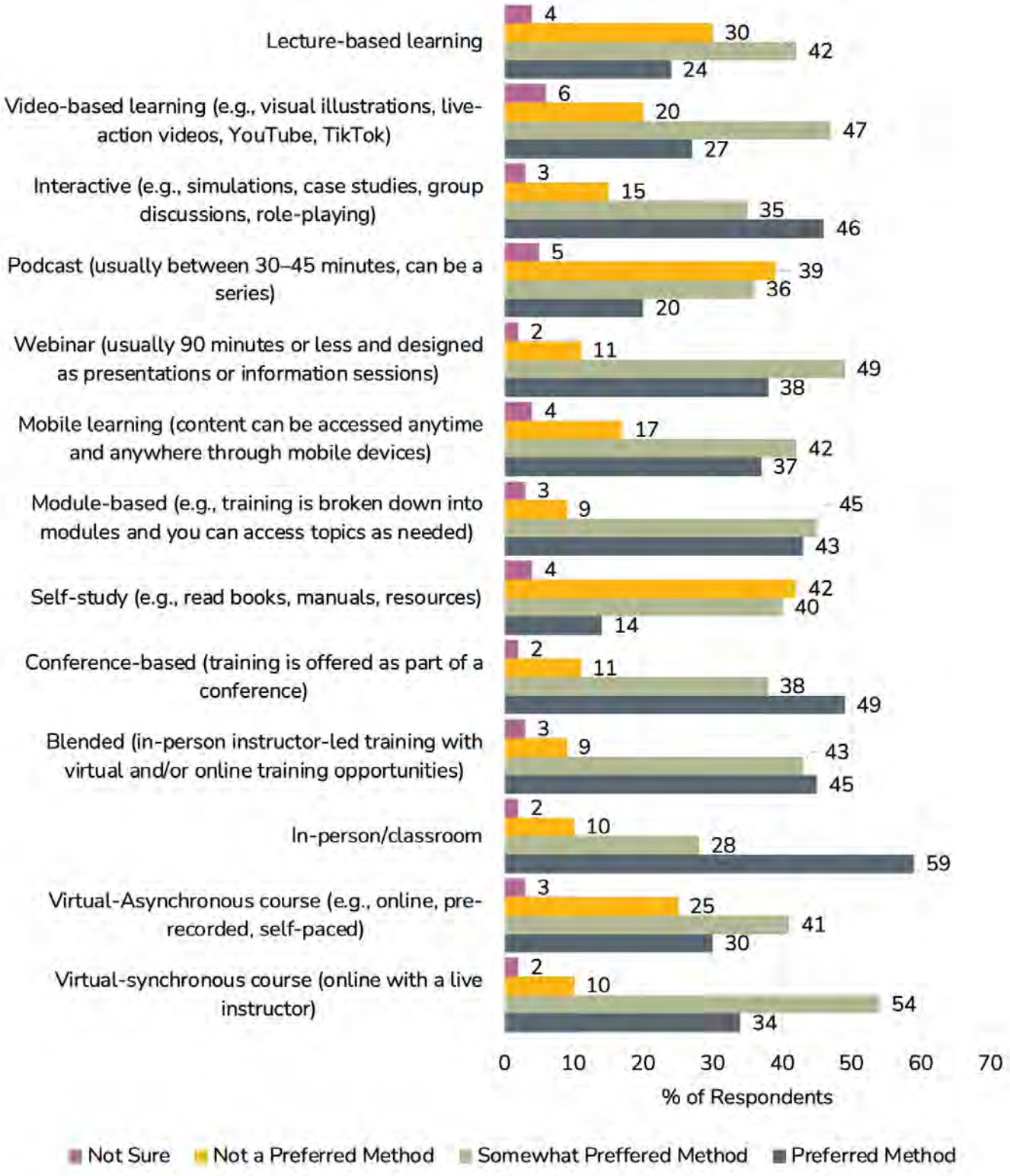
BLENDED LEARNING

45%

MODULAR LEARNING

43%

FIGURE 6. *Preferred Training Methods and Delivery (n = 300)*



Training Length by Method

A follow-up question prompted participants to choose the ideal duration for various training methods. Table 5 provides a detailed breakdown of these preferences. Notably, respondents were allowed to select multiple time lengths for each training approach.

- **In-person/classroom training** was highly favored for multiday (41%) and full-day (51%) sessions.
- **Conference-based training** was most popular in multiday format (55%) and full-day (46%) preferences.
- **Virtual-synchronous courses** (online with a live instructor) were most preferred for brief sessions of 1–3 hours (55%) or half-day (39%).
- **Virtual-asynchronous courses** (online, pre-recorded, self-paced) showed a significant preference for brief sessions of 1–3 hours (59%) and are also the most favored format for accessing small bits of information as needed (30%).
- **Blended learning**, combining in-person instruction with virtual opportunities, showed a relatively balanced preference across full-day (40%), half-day (40%), and brief sessions (28%), underscoring its versatility.
- **Module-based learning**, which allows learners to access topics as needed, was notably preferred for brief sessions of 1–3 hours (58%) and for small bits of information accessed as needed (31%), indicating a preference for flexibility in learning.
- **Mobile learning** was exceptionally favored for accessing small bits of information as needed (47%), emphasizing the value of convenience and on-the-go learning.

TABLE 5. *Preferred Training Length by Training Method*

Training Method	Multiday (%)	Full-day (%)	Half-day (%)	Brief 1–3 Hours (%)	Small Bits of Information (%)
In-person/classroom	41	51	33	20	3
Conference-based (training is offered as part of a conference)	55	46	20	19	4
Blended (in-person instructor-led training with virtual and/or online training opportunities before, during, and after)	33	40	39	28	6
Virtual-synchronous course (online with a live instructor)	20	22	39	55	10
Virtual-Asynchronous course (online, pre-recorded, self-paced)	14	12	23	59	30
Module-based (training is broken down into modules and you can access topics as needed)	17	13	25	58	31
Mobile learning (content can be accessed anytime and anywhere through mobile devices such as a tablet or mobile phone)	16	9	17	50	47

Overall, these preferences indicated a clear division between the desire for immersive, traditional learning sessions and the growing appeal of flexible, self-paced online formats that allow learners to control their pace and time of learning. The data suggest that while there was a strong preference for in-depth, in-person learning experiences, there was also a significant demand for brief, flexible learning options, especially in the virtual and module-based formats.

IDEAS FOR TRAINING INNOVATION

Respondents were asked whether they were familiar with or had engaged in innovative training platforms. The comments reflected a diverse range of experiences and preferences for training methods among environmental public health professionals. There was a clear appreciation for training methods that are engaging, interactive, and accommodating to different learning styles and needs. The following summarizes these comments:

1. **Interactive and Engaging Online Courses:**
   - "Statefoodsafety.com uses animation and good engagement that automates attention leading to better retention."
   - "Environmental Assessment Training Series program interactive video of inspection while enforcing Food Code knowledge, in addition to emphasizing differences between general routine, and Food Bourne Outbreak inspections, giving attention to Hazard Analysis and Critical Control Point issues."
   - "EdX is an amazing online, virtual asynchronous platform!"

2. **In-Person Engagement and Synchronous Online:**
   - "I have found that with all of the online and virtual training options that I prefer an in-person training. It helps me stay more focused, I feel like people ask more questions, and provides better networking opportunities."
   - "I took a Certified Pool Operator class which was on-line with a live instructor. It was definitely more doable for me as I did not have to travel or stay overnight in a hotel."
   - "I participated in a few FDA on-line trainings. I liked that they were live. I did not like they were so focused on time that there was very little time for talk/questions/chatter. I understand wanting to keep the class moving but the format did not allow for talking with fellow classmates."
   - "Participated in several virtual trainings. Ok, but I prefer in-person."

3. **Gamification and Language Learning Platforms:**
   - "Duolingo is a great training gaming-based platform."

4. **Flipped Classroom Approach:**
   - "I have used a flipped classroom approach where students do the prep work (usually reading the text or watching content) and then using the class time to discuss or work through an exercise."

5. **Virtual Collaboration Tools:**
   - "Mural - it's a platform that allows teams to interact virtually. Mural uses a visual work platform with the purpose-built for collaboration."

6. **Asynchronous, Module-Based Training:**
   - "I am leading a project with the Indian Health Service to create a module-based asynchronous REHS study platform for our staff to access at any time. It will be comprised of multiple components allowing the user to choose how they want to study."

7. **Peer-to-Peer Learning and Guest Speakers:**
   - In one local health department, they had a weekly training program. This course was held weekly for 1 hour every Friday, accessible via Zoom to trainees statewide. It covered a variety of topics like food safety, vectorborne diseases, and air quality. A detailed syllabus and resources were provided through a shared Google Drive, with each week dedicated to a new subject. Trainees were encouraged to prepare by reading selected book chapters and watching relevant videos. Nearly every week featured a guest speaker specializing in the week's topic. The course also included a monthly general session for open questions and sharing field experiences, alongside a light quiz each week to test knowledge.

8. **Interactive Photos and Scenarios:**
   - "In working through a FedTalent course, there is an interactive aspect. Scenarios are presented using photos. The student is able to pan around the photos. Key points have buttons with explanations about what is in the photograph and why is important."

9. **Virtual Reality Platforms:**
   - "Years ago, I took an Environmental Toxicology course that was presented in Second Life. It was a very interesting and (at the time) innovative training platform."

10. Filmed Inspections for Visual Learning:

- "I filmed an indoor swimming pool inspection allowing a visual for anyone who had never seen a pool mechanical room and any/ all equipment used at a swimming pool."

11. Other Suggestions for Innovation:

- There were requests for training that is accessible and affordable, either through free resources or funding from federal or state agencies, to eliminate financial obstacles.
- Respondents also expressed interest in credentialing opportunities that acknowledge on-the-job experience or technical training for individuals without science degrees. The concept of offering tiered training levels (e.g., EPH 101, 201, 301) with certification or recognition upon completion was positively received.
- The importance of prioritizing training within organizations and ensuring its relevance and value for both new and experienced employees was emphasized.

These innovative training ideas focused on engagement, interactivity, collaboration, and accessibility. They aim to improve knowledge retention, provide hands-on experience, and cater to different learning styles and preferences. By incorporating these novel elements into environmental public health training programs, organizations can create more effective and engaging learning experiences for their staff.

TRAINING PARTICIPATION BARRIERS

Training participation barriers can vary widely depending on the context, audience, and format of the training. These barriers can affect both the willingness and ability of individuals to engage in training programs. Common barriers cited most frequently by the 297 respondents who answered the question included:

- Lack of funding for travel (66%)
- Travel approvals (59%)
- Competing priorities within agency (52%)
- Lack of time to schedule and conduct a training (51%)
- Lack of relief staff (49%)
- Staff turnover (45%)
- Too much information delivered at once/information overload (33%)
- Outdated training content and/or methods (32%)
- Training topics unrelated to job tasks (26%)
- Lack of staff engagement (26%)

In the comments, respondents highlighted various challenges faced by environmental public health professionals regarding training participation and implementation. Key issues included:

1. **Support and Accessibility:**

   Many respondents noted a lack of relevant training availability and insufficient support from management or supervisors, who often prioritize workload over training and are resistant to approving a budget for training. As shared by one respondent, "Our state department generally puts on trainings. They are often not relevant and done by webinar." Another added, "Sometimes trainings don't seem relevant because agencies have different policies/procedures or don't have procedures in place." For some, their agencies only permit legally required training and others indicated their state had travel restrictions or made travel approval difficult to ascertain.

2. **Logistical and Financial Constraints:**

   Issues such as limited staffing, inadequate infrastructure, and insufficient state support hindered training efforts. Financial barriers included costs associated with travel, lack of budget for training, and no incentives for participation. Rural locations and distance to training venues also faced significant challenges. As explained in one comment, "Often we have funding for the webinar fees/training fees if virtual, but if held in person we do not have the funds to afford travel, meals, and lodging, so we are not allowed to attend. This really halts all opportunities for training at our rural department." For a tribal respondent, "The Indian Health Service Division of Environmental Health Services is nationwide. It breaks up into 3 "area units" and from there each area has districts and then field offices serving multiple communities. Our communities are often rural, making our assignment locations also rural. In-person training can be extremely costly to our staff."

3. **Leadership and Organizational Issues:**

   Concerns were raised regarding disparities in training opportunities within states, alongside complaints related to leadership and political matters. A comment from a respondent highlighted how the geographical location of in-person training can create unequal opportunities, "All in-person training takes place in one area of the state, so this leaves several parts of our state not able to attend. There should be multiple locations for training in the state to reach as many people as possible." For one respondent, their middle manager acted as a barrier, because of their "fear that subordinates would exceed manager knowledge and competency." Some jurisdictions encountered a challenge where environmental public health officials were elected rather than selected based on their qualifications and experience. As one respondent noted, "It's an elected jurisdiction, it may be a person elected with absolutely no experience, people vote for neighbors, not competencies."

4. **Content, Format Concerns, and Learning Transfer:**

   Respondents mentioned challenges with the immediate practical application of training material and content, outdated content, and training formats not conducive to learning. A

respondent pointed out a potential limitation in current training approaches, stating that "The format of training and demonstration of comprehension limits the ability for staff to apply information." Additionally, there exists a shortage of experienced personnel and mentorship opportunities. As explained by one respondent, "Person-to-person staff training is very important but difficult when veteran staff are overwhelmed with job duties due to increase in work, decrease in staff, high turnover, and longer work processing times due to data entry time and poor data management systems."

5. **Value Perception Issues:**

   A general issue was the perception of training, with some management viewing it as unproductive and staff not understanding its importance. Political factors and resistance to change also emerged as barriers. In one case a respondent shared their upper management commented that certain trainings are a "waste of time" and they are resistant to approving funding and budgeting for training.

6. **Staffing and Workload:**

   Chronic short staffing, high turnover rates, and excessive workloads have led to a perpetual cycle of training without retaining staff or training content. A respondent succinctly summarized, "Too much work, too few staff." This challenge is compounded by the vast field of environmental public health, requiring specialized training that might not be available. A respondent emphasized the significant impact of staff turnover on the effectiveness of training efforts, noting: "Staff retention is huge. While training may be successful, the average turnover rate per year is 20%. This puts a strain on senior team members always going back to 'square one' yearly. You can have a well-trained employee, but if they do not stay with your organization, it is like removing hot air from a hot air balloon - the whole team starts losing altitude."

Overall, the responses about training challenges highlighted a complex array of barriers to effective training in the field, emphasizing the need for more supportive, accessible, and relevant training solutions to meet the diverse needs of environmental public health professionals. Despite the challenges identified, many respondents expressed enthusiasm and appreciation for the efforts being made to improve and expand training opportunities in the field.

RECOMMENDATIONS

The recommendations derived from this training needs assessment call for a multifaceted approach to training development and delivery. This includes focusing on the most critical topics and skills, employing a combination of in-person and virtual training methods to accommodate various learning preferences, and ensuring training programs are accessible, particularly by providing financial support and leveraging innovative training platforms to overcome geographical and logistical barriers.

1. Develop Introductory Orientation:

ACTION: The single highest priority is to create and deliver an environmental public health introductory orientation course for new employees. This training would serve to provide an overview of the regulatory functions of an environmental health inspector, with emphasis on the essential tasks of retail food, onsite wastewater, recreational water, and other priority areas and skills identified from this assessment. This course would be relevant across jurisdictions and would serve to provide immediate relief to overworked and understaffed agencies.

PRIORITY: HIGH It is crucial to develop an introductory training course that provides a solid foundation in the fundamental skills and concepts necessary for environmental public health professionals. This foundational training should serve as a precursor upon which more advanced, specialized training can be built.

2. Tiered Training Modules:

ACTION: After completing the introductory training, advanced-level modules tailored to specific areas of expertise should be developed and offered. These would serve to standardize approaches across the United States and prepare the workforce for credentialing opportunities.

PRIORITY: HIGH These specialized trainings would cover topics such as climate and health, tattooing regulations, emergency response protocols, early childhood education guidelines, and hospitality industry standards, among other high-priority subjects, to equip professionals with the necessary skills and knowledge. By offering content that caters to various proficiency levels, the training program can effectively serve a broader audience, including those who are new to the field and those who already have some experience or expertise.

3. Develop Role-Specific Training Modules:

ACTION: Create tailored training programs for different roles within environmental public health, such as inspectors, managers, and directors. Each module should address specific skills and knowledge areas relevant to the job function.

PRIORITY: MEDIUM-HIGH This ensures that training is directly applicable to daily tasks and challenges faced by professionals in various roles, improving efficiency and effectiveness in public health practices.

4. Institute Hands-On, Scenario-Based Learning Experiences:

ACTION: Design and implement practical, scenario-based training exercises that simulate real-life environmental public health challenges. Incorporate these into both in-person and virtual training environments.

PRIORITY: HIGH Practical exercises enhance skill application and retention, better preparing professionals for fieldwork.

5. Expand Access to Training Through Virtual Platforms:

ACTION: Leverage technology to offer a mix of synchronous (live) and asynchronous (on-demand) virtual training sessions. This should include developing a digital library of training resources accessible to all environmental public health professionals.

PRIORITY: MEDIUM While in-person training is invaluable, virtual platforms offer flexibility and can significantly extend the reach of training programs, especially in geographically dispersed or resource-constrained areas.

6. Implement Regional Training Adaptations:

ACTION: Customize training content to address the specific environmental health challenges and regulatory landscapes of different regions. Engage local experts in the development and delivery of these tailored training programs.

PRIORITY: MEDIUM Regional customization ensures that training is relevant and directly applicable to the environmental and public health issues faced by professionals in their specific locales.

7. Secure Funding and Support for Training Initiatives:

ACTION: Seek funding and support from government, private, and philanthropic sources to subsidize training costs, making it accessible to all levels of professionals without financial burden. Advocate for policy changes that recognize the importance of ongoing professional development in environmental public health.

PRIORITY: HIGH Financial barriers are a significant obstacle to training participation; addressing this can greatly increase access and participation rates.

8. Incorporate Innovative Training Methods:

ACTION: Explore and integrate innovative training methods such as gamification, interactive videos, and flipped classroom models to enhance engagement and knowledge retention.

PRIORITY: HIGH Innovative approaches like gamification, interactive videos, and flipped classroom models can make the learning experience more engaging, immersive, and enjoyable. When learners are actively involved and interested in the content, they are more likely to stay motivated and committed to the learning process.

9. Facilitate Professional Development Pathways:

ACTION: Develop clear pathways for professional growth, career progression, and credentialing in environmental public health, recognizing both academic qualifications and on-the-job training.

PRIORITY: MEDIUM By outlining the steps needed for advancement, such as additional training, certifications, or academic qualifications, these pathways encourage environmental public health professionals to actively seek out learning opportunities and stay current with industry developments.

10. Prioritize Training Within Organizations:

ACTION: Encourage organizational leaders to prioritize training within their agencies, including allocating time and resources for staff participation.

PRIORITY: HIGH Leadership support is crucial for fostering a culture of continuous learning and ensuring that staff have the necessary skills to meet the evolving challenges of public health.

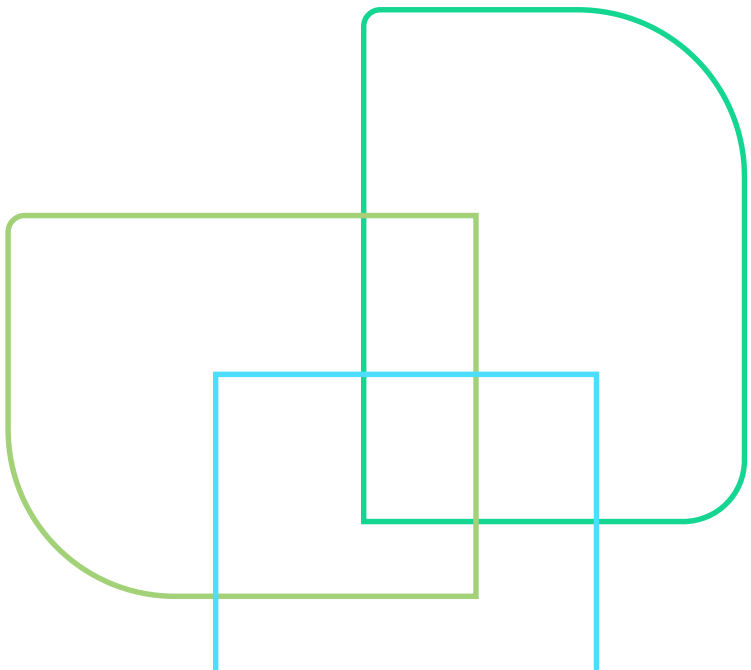
These recommendations are designed to address the core needs identified through the training needs assessment, offering strategic directions for enhancing the capacity and capabilities of the environmental public health workforce. By integrating these recommendations, the training program can be tailored to meet the complex and multifaceted needs of environmental public health professionals across different jurisdictions and experiences.

CONCLUSION

In conclusion, the training needs assessment, conducted in collaboration with NNPHI, provided critical insights into the current state and future directions of training within the field of environmental public health. This assessment has identified significant training needs across a variety of core environmental public health areas, highlighted the essential skills required for effective practice, and outlined the scientific competencies that are fundamental to the profession. Furthermore, it has shed light on preferred training delivery methods, underscored the barriers to training participation, and offered innovative ideas to enhance training engagement and effectiveness.

Key findings reveal a pronounced need for orientation training programs designed to equip individuals with the essential knowledge and competencies required to successfully join the environmental public health workforce. Further, there is a need for training that is tailored to the diverse roles and experiences of environmental public health professionals, emphasizing the importance of customized content that addresses the unique challenges and responsibilities of different positions within the field. The assessment also points to a strong preference for hands-on, practical training experiences that simulate real-life scenarios, thereby enhancing knowledge retention and application in the workplace.

Addressing these training needs and implementing the recommended strategies will require a concerted effort from all partners involved in environmental public health training. By doing so, we can equip our workforce with the knowledge and skills necessary to effectively respond to current and emerging public health threats, ultimately improving public health outcomes across communities. This report not only serves as a roadmap for enhancing environmental public health training but also as a call to action for continued investment in the professional development of the workforce.



APPENDIX A

Environmental Public Health Training Needs Assessment Questionnaire

Background Information

1. Please provide the city, state, and zip code of your organization:
    a. State_____
    b. City_____
    c. Zip_____

2. At which level does your agency provide services? (if they answer local or state, they would answer Q3. All others would skip to Q4)
    - Local (county/city/town/village/service unit/health district)
    - State
    - Region
    - Territory
    - Tribal
    - Federal/National
    - Other_____

3. Which best describes your governance?
    a. Centralized or largely centralized – Local health units are primarily led by employees of the state
    b. Decentralized or largely decentralized structure: Local health units are primarily led by employees of local governments
    c. Mixed structure: Some local health units are led by employees of the state and some are led by employees of local government. No single structure predominates
    d. Shared or largely shared structure: Local health units might be led by employees of the state or by employees of local government. If they are led by state employees, then local government has the authority to make fiscal decisions and/or issue public health orders; if they are led by local employees, then the state has authority

4. What is the population size of the jurisdiction where your agency provides services?
    a. Less than 10,000
    b. 10,000 – 49,999
    c. 50,000 – 99,999
    d. 100,000 – 499,999
    e. 500,000 – 999,999
    f. More than 1,000,000

5. What is the staff size of your organization's environmental public health workforce?
    a. 1-10
    b. 11-25
    c. 26-49
    d. 50-75
    e. 76-100
    f. 100+
    g. I don't know

6. Which best describes your current position level?
    a. Program Director/Chief
    b. Supervisor/Manager
    c. Field Staff/Non-supervisory
    d. Administrative
    e. Other (please specify)_____

7. Which title identifies your role best?
    a. Environmental Health Professional/Specialist/Health Inspector/Sanitarian
    b. Epidemiologist
    c. Environmental health supervisor/ manager/coordinator
    d. Health Department Director/Officer
    e. Health educator
    f. Engineer
    g. Policy specialist
    h. State Director
    i. Other Leadership Role
    j. Professional Researcher/Academic
    k. Other_____

8. How many years have you worked in environmental public health?

    _____years

Core Training Content

In this section, estimate how relevant the following content areas are to your jurisdiction in terms of what foundational knowledge (e.g., scientific principles, theories, terminology, etc.) to include in an Environmental Public Health training. Then indicate how prepared your jurisdiction and staff are in each area.

1 - Not At All Relevant (Never required)
2 - Slightly Relevant (Essential to occasional job duties)
3 - Moderately Relevant (Essential to complete approximately half of job duties)
4 - Very Relevant (Essential to completing a strong majority of job duties)

1 - Not at all prepared (Have received none or little education, experience, training, or resources)
2 - Slightly prepared (Have received some education, experience, training, or resources)
3 - Moderately prepared (Have received a sufficient level of education, experience, training, or resources)
4 - Very prepared (Have received an exceptional level of education, experience, training, or resources)

9. Review the list of environmental public health areas below. Rate the relevance of each core environmental health program for your jurisdiction to include in an Environmental Health Public Health training. Then rate how prepared your jurisdiction is to work in each area.

    1. Body Art (Tattoo)
    2. Campgrounds & RVs
    3. Children's Camps
    4. Climate Change and Adaptation
    5. Collection of Unused Pharmaceuticals
    6. Cosmetology Businesses
    7. Day Care/Early Child Development Facilities
    8. Emergency Preparedness and Response
    9. Environmental Justice/Health Disparities
    10. Food Safety and Protection
    11. Hazardous Waste Disposal
    12. Hazmat Response
    13. Health Related Facilities
    14. Healthy Homes
    15. Hotels/Motels
    16. Indoor Air Quality
    17. Injury Prevention
    18. Land Use Planning
    19. Lead Prevention
    20. Long-term care

21. Medical Waste
22. Milk Processing
23. Mobile Homes
24. Noise Pollution
25. Non-School Institutions and Licensed Establishments
26. Occupational Health
27. Outdoor Air Quality
28. Poison Control
29. Pollution Prevention
30. Private or Onsite Drinking Water/Potable water
31. Public Swimming Pools
32. Radiation Control
33. Radon Control
34. Retail food
35. Other Recreational Water (e.g., beaches)
36. Salon and Barber
37. School Safety and Inspection Program
38. Onsite Wastewater (e.g., Septic Systems)
39. Smoke-Free Ordinances
40. Solid Waste
41. Special Events/Mass Gatherings
42. Tobacco Retailers
43. Toxicology
44. Zoonoses, Vectors, Pests, and Poisonous Plants
45. General knowledge: Environmental Health Basics (e.g., general math and science skills and knowledge)
46. General knowledge: Technology
47. General knowledge: Jurisdiction, authority, and structure of environmental health agencies
48. General knowledge: Legal and law (e.g., terminology, legal methods during inspections and investigations)
49. General knowledge: Roles and responsibility of Environmental Public
50. General knowledge: Intersection of Environmental Health and Public Health
51. General knowledge: Environmental public health's role in health prevention and promotion
52. General knowledge: Outbreak response

10. Are there other CORE content areas that we are missing that should be covered in an Environmental Public Health 101 training?

Essential Environmental Public Health Skills

In this section, read the description of each essential environmental public health skill and estimate how relevant each is to include in an Environmental Public Health training. Then rate how prepared your staff is to implement each skill.

1 - Not At All Relevant (Never required)
2 - Slightly Relevant (Essential to occasional job duties)
3 - Moderately Relevant (Essential to complete approximately half of the job duties)
4 - Very Relevant (Essential to completing a strong majority of job duties)

1 - Not at all prepared (Have received none or little education, experience, training, or resources)
2 - Slightly prepared (Have received some education, experience, training, or resources)
3 - Moderately prepared (Have received a sufficient level of education, experience, training, or resources)
4 - Very prepared (Have received an exceptional level of education, experience, training, or resources)

11. Steps to Conduct Inspections may include:
    - Review regulations and standards for the type of inspection (e.g., food, recreational water, body art, healthy home, solid waste, etc.)
    - Prioritize inspections/Review prior facility inspections
    - Review steps to perform inspections of different facility types
    - Identify violations and corrective actions
    - Write inspection report
    - Respond to complaints
    - Enforcement

12. Data Management/ Surveillance may include:
    - Plan surveillance activities (e.g., define data objects, data sources, data needs, methodology)
    - Collect surveillance data (e.g., collect samples, interview people, pull existing data, etc.)
    - Manage data
    - Analyze data
    - Implement actions based on surveillance data (e.g., interpret results, inform stakeholders, share results, determine interventions)
    - Use data to inform and drive improvements
    - Conduct research studies
    - Maintain databases or electronic information systems for environmental health data

13. Conduct Investigations may include:
    - Review steps to perform different types of investigations (e.g., contaminated food, cosmetics, lead, blood product, etc.)

- Identify etiologic agent
- Identify persons at risk and the size/scope of the outbreak
- Identify mode of transmission
- Identify source
- Identify contributing factors and root causes/antecedents
- Sampling techniques
- Laboratory methodology
- Interview establishment staff
- Make recommendations and corrective actions, applying control measures
- Write an investigation report
- Verify risk abatement (e.g., review observations and test data, determine root causes, make recommendations, conduct recovery follow-up, and enforce legal actions)

14. Conduct Compliance Reviews may include:
    - Conduct plan review
    - Review HACCP plans
    - Evaluate variance requests
    - Determine permitting status

15. Conduct Risk Assessment may include:
    - Hazard identification
    - Identify public health risks
    - Exposure assessment
    - Respond to public health impacts

16. What other core skills should an Environmental Public Health training cover? (Open-ended)

Scientific Competencies

17. To what extent do staff in your jurisdiction understand the following scientific principles? (scale: No understanding to Great understanding)
    a. Staff understand the mechanisms of water-borne disease transmission to identify key water contaminants associated with public health risks.
    b. Staff can demonstrate a comprehensive knowledge of vector-borne diseases, including the biology of vectors, transmission dynamics, and effective control strategies.
    c. Staff possess fundamental knowledge of food-borne pathogens, their sources, microbiology, and the principles of food safety and sanitation.
    d. Staff can provide scientific justification for the methods and tools used in exposure assessments, considering factors such as routes of exposure, dose-response relationships, and susceptible populations.

e. Staff understand the interconnection between air quality, hazardous waste exposure, elevated blood lead levels, and the impact on overall health.
f. Staff have a foundation in general science including chemistry, biology, and/or microbiology, with the ability to apply these principles to understand the interactions between environmental factors and human health.

Communication and Professional Skills

18. To what extent do staff in your jurisdiction need training on how to provide and share environmental public health information? (matrix question: No training needed, Somewhat needed, Greatly needed, Not sure)
    a. Communicate findings and corrective actions (e.g. determine audience and appropriate messaging)
    b. Educate the public/Communicate risk to the public
    c. Engage with the community
    d. Collaborate with stakeholders
    e. Identify community environmental health risks
    f. Understand legislative affairs/Develop policies
    g. Demonstrate cultural awareness (e.g., understanding the community you are working in)
    h. Understand work ethics/Ethical practices

19. To what extent do staff in your jurisdiction need training on general communication and professional skills? (matrix question: No training needed, Somewhat needed, Greatly needed, Not sure)
    a. Conflict resolution in the field/De-escalation
    b. Maintain mental health
    c. Coping with rejection
    d. Problem solving and critical thinking
    e. Verbal skills (e.g., explaining clearly and concisely information)
    f. Written skills (e.g., issuing written notices, and to prepare, organize, and maintain records)
    g. Interview skills (e.g., to determine a suspected violation and to obtain evidence)
    h. Cross-discipline/sector collaboration
    i. Relationship building with community or external partners and stakeholders
    j. Evaluating the effectiveness of services and activities

Customization of Training

20. Do you think there are varying training needs in your jurisdiction based on staff experience and roles?
    a. Yes
    b. No
    c. I don't know

Please explain your answer.

21. Do you think there are regional differences that impact training needs (e.g., rural versus urban, territory, tribal)?
    a. Yes
    b. No
    c. I don't know

Please explain your answer.

Training Delivery Preferences

In this section, we want to what training formats you find most effective for staff in your jurisdiction and the ideal length of training needed for learning to take place.

22. Indicate which of the following are your preferred delivery and methods for training in your jurisdiction.

Training Method	Yes, this is a preferred method	Somewhat preferred method	Not a preferred method	Not sure
Virtual-synchronous course (online with a live instructor)				
Virtual-Asynchronous course (online, pre-recorded, self-paced)				
In-person/Classroom				
Blended (in-person instructor-led training with virtual and/or online training opportunities before, during, and after)				
Conference-based (training is offered as part of a conference)				
Self-study (e.g., read books, manuals, and resources)				
Module-based (e.g., training is broken down into modules and you can access topics as needed)				
Mobile learning (content can be accessed anytime and anywhere through mobile devices such as a tablet or mobile phone)				
Webinar (usually 90 minutes or less and are designed more as presentations or information sessions)				
Podcast (usually between 30-45 minutes, can be a series)				
Interactive (e.g., simulations, case studies, group discussions, role-playing, etc.)				
Video-based learning (e.g., visual illustrations, live-action videos, YouTube, TikTok, etc.)				
Lecture-based learning				

Comments:

23. Please suggest the optimal training length for each training method listed below.

Training Method	Multi-day	Full day	Half-Day	Brief (1-3 hours)	Small bits of information accessed as needed (e.g., 10-min video or presentation)
Virtual-synchronous course (online with a live instructor)					
Virtual-Asynchronous course (online, pre-recorded, self-paced)					
In-person/Classroom					
Blended (in-person instructor-led training with virtual and/or online training opportunities before, during, and after)					
Conference-based (training is offered as part of a conference)					
Module-based (e.g., training is broken down into modules and you can access topics as needed)					
Mobile learning (content can be accessed anytime and anywhere through mobile devices such as a tablet or mobile phone)					
Mobile learning (content can be accessed anytime and anywhere through mobile devices such as a tablet or mobile phone)					

Comments:

24. Are you aware of or have you participated in an innovative training platform? Tell us about it.

Training Challenges

25. What barriers to participation in training have you experienced within your jurisdiction? Select all that apply.
    a. Travel approvals
    b. Lack of relief staff
    c. Lack of staff engagement
    d. Lack of funding for training
    e. Staff turnover
    f. Lack of time
    g. Competing priorities within the agency
    h. Training is held at inconvenient times
    i. Staff resistance to change
    j. Difficulty adapting to remote learning
    k. Outdated training content and/or methods
    l. Lack of previous knowledge
    m. Staff don't understand the importance of training
    n. Course/training format was not conducive to learning
    o. Too much information delivered at once/Information overload
    p. Training topics unrelated to job tasks
    q. Unsupportive culture for training
    r. Poor feedback and support system for staff after the training back on the job
    s. Other_____

26. Highlight any other challenges that might impact the effectiveness of the training program in your jurisdiction.

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