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ABOUT THE COVER



The *Food Code* from the Food and Drug Administration (FDA) is a set of science-based food safety guidelines that serve as the basis for jurisdictional food codes that regulate

retail food service in the U.S. This month's cover article, "A Collaborative Approach to National *Food Code* Adoption," highlights the multipronged approach undertaken by the Retail Food Safety Regulatory Association Collaborative to support adoption of the FDA *Food Code*. Furthermore, the Direct From CDC/Environmental Health Services column in this issue spotlights other tools and resources provided by the Collaborative to drive food safety.

See pages 22 and 38.

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► PRESIDENT'S MESSAGE



Tom Butts, MSc, REHS

Environmental Health— Everywhere and Nowhere

I have been in countless conversations over the past dozen or more years about all of the great work environmental health professionals do and how—time after time—the public health community and the public at large do not recognize our practice and the contributions made in our important efforts. In late June, this conversation was again the case at the California Environmental Health Association's Annual Education Symposium in Sacramento. Both speakers and participants expressed their frustration about the lack of awareness about environmental health programs, skills, abilities, and scope of expertise. We work hard to recognize our peers but the lack of system-wide recognition for environmental health professionals beyond our own circle seems very limited. Stories were shared from across the country about a lack of understanding of our work, even among public health agency leaders at various levels of the governmental public health system.

This problem is not new as it was one of several issues called out in a U.S. Department of Health and Human Services/Centers for Disease Control and Prevention (CDC) document published in November 2000—*Healthy People 2010*. This report published objectives for improving the nation's health. In response, the Division of Emergency and Environmental Health Services within the National Center for Environmental Health formed a steering committee that spearheaded a process that was responsible for developing and implementing the final strategy.

The strategy was developed through the participation of an External Partners Working Group made up of 31 members who

*I encourage each of
you to get active in
making our work
more well-known.*

represented the environmental public health and protection practice community; special populations; academia; advocacy groups; and representatives of other centers, institutes, and offices within CDC, as well as the Agency for Toxic Substances and Disease Registry. Included in this group was Mel Knight, NEHA past president (2011–2012), and Doug Farquhar, our current director of Government Affairs. The draft strategy was then reviewed by more than 100 additional environmental health and public health experts and advocacy organizations.

CDC (2003) published *A National Strategy to Revitalize Environmental Public Health Services*, which was intended to be a working document that would be modified over time. The intention was to identify needed resources, organize and implement activities described in the strategic plan, and create a timeline for the accomplishment of objectives.

The strategy was to be a starting point for rejuvenating the environmental health system at the federal, state, tribal, territorial, and local levels in the U.S. (Buchanan, 2006). The goals of the strategy were to:

- Build capacity
- Support research

- Foster leadership
- Communicate and market
- Develop the workforce
- Create strategic partnerships

In 2008, an assessment of the environmental health practice in Maryland identified challenges that closely aligned with the goals from the 2003 strategy document. Unfortunately, it is remarkably similar to what many local environmental health programs are experiencing today. The article identified issues such as funding structure vulnerabilities, workforce and recruitment challenges, poor compensation especially when compared to education requirements, and limitations in legal support (Resnik et al., 2008).

So here we stand over two decades after this need was identified and the same challenges—impacted by a series of environmental public health events, most recently a worldwide pandemic—remain. Why were past efforts less than successful? From my perspective, we need a unified approach to address this issue that will engage federal, state, and local governments; our terrific industry partners; academia; and other nonprofit environmental public health organizations.

Is this our time to stand quietly by? No chance!

A number of years ago, as an environmental health director, I worked with the environmental health staff to estimate their contacts with community members and then compared those estimates to other public health programs. The conclusion was that the environmental health workforce (the second largest part of the public health workforce) has

more contact with community members than any other part of the public health system. On a given day, an environmental health professional could have face-to-face contact with dozens of community members (e.g., regulated communities, peers in public health, city and county planning staff, elected and appointed officials, community members).

So how can we all become more active as ambassadors of environmental health? How can we work to address the lack of public recognition and understanding of the important roles and functions environmental health plays in disease prevention, hazard reduction, and a variety of work that improves community health outcomes? We need to seek opportunities to make our work more visible through improving internal (e.g., leaders and public information officers within health departments) and external (e.g., the public, other government departments, elected officials) recognition and visibility in any way we can.

NEHA has taken some important steps with an actively engaged marketing and communication team working to move the bar. One tool now available for peer-to-peer recognition is our members-only online Community platform and a second is the Swipe Right for Environmental Health campaign recently piloted in Ohio.

On Community (<https://community.neha.org>), I found this contribution from Charles Treser, principal lecturer at the University of Washington:

I think one of the reasons that EPH [environmental public health] tends to

be invisible is how broad our mandate is. No other profession covers everything from air quality to zoonotic diseases. And the list of program areas has been expanding almost exponentially as new science discoveries, emerging technologies, and changing conditions (like climate change) reveal new health risks.

So, while people can identify with the food inspectors, the onsite sewage inspector, the industrial hygienists, etc., they don't see these, and we seldom point out that these are all part of the mandate of EPH. The one thing that unifies our profession is risk—any environmental factor or condition that poses a risk to human life, health, or safety is the province of EPH.

Treser identified many of the challenges we face and I hope that the marketing and communication effort we have undertaken will provide tools and support to confront this challenge. The conversation on the platform that followed was insightful and shows this challenge is one many of us identify with.

Treser went on to suggest that by “highlighting human health risk as the common theme of all the many aspects of our profession, I think we can help the public and our policymakers better understand the critical importance of the environmental health professional to their own health and well-being.”

The Swipe Right for Environmental Health campaign—launched as a pilot in Ohio during May and June 2023 and to be advertised again in September 2023—was developed in

response to concerns we heard from our members about how invisible and undervalued they felt as a profession. In response, we developed an advertising campaign to raise the visibility and appreciation of our important workforce among decision makers and the public. The advertising targeted decision makers at and around the Ohio Statehouse. The ads featured three environmental health professionals from Ohio and urge viewers to support environmental health. You can view the campaign and ads at www.neha.org/swipe-right.

I encourage each of you to get active in making our work more well-known. ✨

Thomas J. Butts

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▶ SPECIAL REPORT

Federal Meat and Poultry Inspection Duties and Requirements—Part 4: Food Defense, Product Sampling, Rules of Practice, and Summary

Roger W. Amery, CP-FS

Abstract This 4-part series aims to inform environmental health specialists of the duties and requirements for federal meat and poultry inspectors and the companies they regulate. Part 1 provided general attributes of U.S. Department of Agriculture Food Safety and Inspection Service inspection personnel and regulated companies (Amery, 2023a). Part 2 covered the computer-based system used to communicate results of inspection tasks, the marks of inspection, and slaughter inspection duties and company responsibilities (Amery, 2023b). Part 3 covered the duties performed by consumer safety inspectors who monitor food safety systems. These duties include monitoring of Sanitation Standard Operating Procedures, hazard analysis critical control point (HACCP) procedures, reinspection, labeling issues, and company allergen controls (Amery, 2023c). Part 4 will discuss the verification of company food defenses, laboratory sampling of products, and the Rules of Practice. A summary of the 4-part series is also provided.

Introduction and Overview

At prescribed frequencies, consumer safety inspectors (CSIs) collect product samples, medium washes, and swabs, then send them to U.S. Department of Agriculture (USDA) Food Safety and Inspection Service (FSIS) laboratories for analysis of pathogens related to the product types. At slaughter companies, samples are taken by FSIS inspectors to test for antimicrobials and residual chemical abuse by livestock suppliers. The Rules of Practice are used to address numerous noncompliances.

This 4-part series has provided a treatise for environmental health specialists on the duties and policies of FSIS inspectors for the protection of public health. To round out the series, part 4 discusses verification of company food

defenses, laboratory sampling, and the Rules of Practice. Furthermore, a summary and conclusions from the series are provided.

Food Defense Verification

Food defense is the voluntary action that companies can take to ensure that intentional contamination does not take place. Threats of intentional contamination could be from outside or inside companies. Companies are encouraged but not required to have written and tested procedures for food defense. FSIS inspectors complete a computerized survey 4 times a year regarding the written food defense procedures of companies. If FSIS inspectors find vulnerabilities that could result in intentional contamination, they meet with the companies and explain the

findings. These meetings are documented on memoranda of interview and not on non-compliance records because there are no regulations regarding food defense.

Mandatory Zero Tolerance

Due to contamination from pathogens in feces, ingesta (i.e., material such as food and drink taken into the body by way of the digestive tract), and milk, FSIS has mandated that companies inspect red meat carcasses from the carcass rail inspection to the final wash with zero tolerance for those contaminants. This requirement applies also to head meat, cheek meat, and weasands (i.e., esophagi) that are inspected separately from carcasses. Companies should have effective controls in place, which are monitored by FSIS to ensure that zero tolerance is maintained (U.S. Department of Agriculture [USDA], 2019).

Microbiological Sampling

Generic *E. coli* Sampling

FSIS requires companies that slaughter livestock to test for *E. coli* biotype 1 to verify that the slaughter process is under control (Contamination With Microorganisms, 2023; Subpart K—Post Mortem Inspection, 2023a). Carcasses are to be totally free of all fecal material; *E. coli* is a good indicator of undetectable fecal material. CSIs are to check the slaughter company activities and records regarding *E. coli* testing. The establishments are to have written procedures showing that the chilled carcasses are selected randomly and from what sites on the carcasses the samples are taken.

Testing frequencies (i.e., tests per carcasses produced) are determined according to spe-

cies slaughtered. Companies slaughtering more than one species must test the species with the largest volume slaughtered. Laboratories that conduct the analyses must use analytical methods approved by a recognized scientific body. Results are recorded and charted in terms of CFU per surface area. If needed, FSIS takes corrective actions based on the results.

Pathogen Reduction Performance Standards: Sampling to Test for Acceptable Levels of *Salmonella*

At the regulated companies, FSIS sampling is conducted to test for acceptable levels of *Salmonella* in red meat and *Salmonella* and *Campylobacter* in poultry (Contamination With Microorganisms, 2023; Subpart K—Post Mortem Inspection, 2023b). These standards are based on nationwide microbiological data collection surveys on these classes of products. The Office of Public Health Science (OPHS) within FSIS determines which companies are to be tested and the frequency of testing based on previous company performance data.

The number of samples taken for each sample set depends on the product class. Only a specified number of the samples, listed in the regulations, can test positive for *Salmonella*. If the first set passes, no more samples are taken at that time. If the first set fails, the company must take immediate corrective action, and then a second sample set is taken. If the second set of samples shows failure, the company is to reassess their hazard analysis critical control point (HACCP) program and take corrective action before a third set is taken. If the third set of samples fails, FSIS acts according to its Rules of Practice (2023).

Directed Microbiological Sampling

At a frequency determined by OPHS, CSIs and public health veterinarians (PHVs) are directed to collect and process specific product samples produced by the companies and express mail the samples to FSIS laboratories. These samples could be raw ground beef to test for *E. coli* O157:H7 and other pathogenic *E. coli*, or final, finished, and packaged ready-to-eat, fully cooked products to test for *Salmonella* and/or *Listeria monocytogenes*.

Occasionally, CSIs and PHVs are directed to collect product or sponge samples of beef, pork, and poultry carcasses for national base-

line studies and/or for verifying the effectiveness of the food safety systems. The companies are to hold the product lots that the sampled product represent in case of positive results. In the event of a positive result, the affected product is disposed of or reconditioned by the company. Then that same product is on test-and-hold restriction until five compliant results occur, after which the plant may produce the product without testing.

Samples Taken for *Listeria monocytogenes* Control Verification

L. monocytogenes is an environmental pathogen that can contaminate ready-to-eat products after the pathogens have been addressed at a previous lethality step (e.g., usually the cooking step). If ready-to-eat products have cooled and remain exposed until packaged and the surrounding environment contains *L. monocytogenes*, the ready-to-eat product could be contaminated—but it gets packaged and dispensed into commerce. As a result, the consumer unknowingly consumes the contaminated product (without cooking and therefore killing the *L. monocytogenes*) because the product is labeled as ready-to-eat.

This concern led to FSIS requirements that detail procedures companies must implement in the food safety system to address this issue (Requirements for Specific Classes of Products, 2023). Essentially, companies choose from among three alternatives:

- Alternative 1: Use of both post-lethality treatment and an antimicrobial process or agent.
- Alternative 2: Use of either the post-lethality treatment or an antimicrobial process or agent.
- Alternative 3: Use of sanitation measures only.

The companies choosing alternative 2 or alternative 3 must have provisions in writing for product hold-and-test procedures and actions to take on positive results of product and swab samples. Companies choosing alternative 3 and producing deli or hot dog products have the greatest risk for *L. monocytogenes* contamination. Alternative 3 is the least safe of the alternatives. Therefore, FSIS requires FSIS-directed product sampling at companies that use sanitation measures only.

Companies are not under regulation to follow these alternatives if they cook the product inside cooking bags and the products are

then cooled, packaged, labeled, and shipped while remaining inside the bags. In this manner, the product never contacts other food contact surfaces that could be contaminated by *L. monocytogenes*. The bags are opened only after purchase by the consumer.

If a company continually fails tests for *L. monocytogenes*, an enforcement investigation and analysis officer (EIAO) could be sent to the company to perform an assessment that could result in the recommendation of intensified verification testing (IVT) for *L. monocytogenes*. Then, EIAOs enter the company unannounced shortly after the company has executed the corrective actions for remedy of the *L. monocytogenes* contamination. The IVT is conducted to ensure that the company's corrective actions are effective in preventing contamination by *L. monocytogenes* of ready-to-eat products.

National Antimicrobial Resistance Monitoring System

The National Antimicrobial Resistance Monitoring System for Enteric Bacteria (NARMS) is a national surveillance system to monitor antimicrobial enteric bacteria that could enter the human food chain (Centers for Disease Control and Prevention, 2023). When directed by the Public Health Inspection System (PHIS), a PHV schedules a time to collect a sample of ceca contents from the cecum/large intestine of freshly killed livestock. This sample is sent to a FSIS laboratory for analysis of *Salmonella*, generic *E. coli*, *Campylobacter*, and enterococcus species.

NARMS is a collaborative effort of FSIS, the Food and Drug Administration (FDA), and the Centers for Disease Control and Prevention. In addition to monitoring antimicrobial susceptibility, microbiological and epidemiological research is conducted to better understand antimicrobial resistance. The results of these samples are nonregulatory, and as such, companies do not hold the carcasses and offal, and the results are not provided to PHVs or the companies.

Chemical Sampling

National Residue Program: Residue Sampling of Carcasses

The National Residue Program is a collaborative effort with FDA, the U.S. Environmental Protection Agency, and FSIS (USDA,

2022). PHVs are directed by PHIS to randomly select a carcass and excise choice tissues such as kidneys, livers, or muscles. When FSIS collects a sample, the slaughter company provides the address of where the animal originated. Pending the results of testing, the company is to hold the carcass and offal.

The choice tissues are sent to an FSIS laboratory for testing of potential illegal injections or feeding of the livestock with antibiotics or hormones by the farm animal producers. The illegal chemicals could have detrimental effects on the consumers of meat and poultry products. If the laboratory results are negative for illegal chemicals, the carcass and offal are released, and there is no violation against the farm animal producer. If the choice tissues show a laboratory result of an illegal chemical or drug, the carcass and offal are condemned, the producer is warned and placed on a list of residue violators, and the livestock from that producer is closely monitored by slaughter companies and FSIS.

Food inspectors on the slaughter line can segregate for veterinary disposition a carcass that appears diseased and possibly unfit for human consumption. If a PHV is suspicious that this pathology is due to illegal residues of hormones or antibiotics, the PHV will collect a kidney and run a kidney inhibition swab (KIS) test, which is a screening test for antibiotics and hormones. If the KIS test is negative, then there is no potential violation, and the carcass and offal are released. If the KIS test shows a positive result, then the kidney, liver, and muscle tissues are excised from that carcass. These tissues are sent to an FSIS laboratory to determine if the positive KIS test is the result of an illegal use of antibiotics or hormones.

Rules of Practice

A regulatory control action is when CSIs retain product, reject equipment or areas, or stop production. A withholding action is when FSIS refuses the mark of inspection (e.g., branding, packaging materials with inspection legends) to be applied to products. Whenever FSIS inspectors or EIAOs determine that an enforcement action is required against a company, it is completed in accordance with FSIS regulations (Rules of Practice, 2023).

Parts 500.2 through 500.7 of the Rules of Practice give more detail about the reasons

for FSIS to take such enforcement actions, how companies can appeal the actions, how establishments might come into abeyance (i.e., suspension), conditions for withdrawal of inspection rights, and refusals of grant of inspection to establishments that are found unacceptable. Part 500.8 describes conditions for rescinding product labels. Whenever enforcement actions leading to a suspension are taken, case files are created. If companies have committed a potential crime, the case files are provided to the Office of Program Evaluation Enforcement and Review within FSIS, where the matters are investigated for possible criminal prosecution.

Technical Support

FSIS inspection is a team effort. Whenever FSIS inspectors have urgent issues and need assistance or guidance, there are knowledgeable supervisors to contact for advice and support. Those supervisors can contact upper management for further assistance. For questions about technical concerns, FSIS inspectors can contact askFSIS (www.fsis.usda.gov/contact-us/askfsis) online or call 1-800-233-3935. Sometimes the technical questions can lead to changes in national policy.

Part 4 Summary

Companies are encouraged to have written procedures on food defense against threats of potential contamination. CSIs check for vulnerabilities and, if vulnerabilities are found, CSIs meet with the companies and document the meeting using a memorandum of interview. Zero tolerance is monitored by FSIS and is mandated to prevent fecal, ingesta, and milk contamination of carcasses and offal in slaughter companies.

In addition, FSIS requires companies that slaughter livestock to conduct testing for generic *E. coli* to determine if their processes are under control. The Pathogen Reduction Performance Standards require companies to test for acceptable levels of *Salmonella* and *Campylobacter*. At a frequency determined by OPHS, FSIS is directed to collect ground beef samples to test for pathogenic *E. coli* as well as fully cooked products for *Salmonella* and/or *L. monocytogenes*.

When directed, FSIS collects aseptic products or sponge samples of carcasses for national baseline studies and/or to verify food safety effectiveness. Antimicrobial enteric

samples are taken as part of the NARMS program to better understand antimicrobial resistance. The National Residue Program requires FSIS to select carcasses and remove choice tissues to test for potential illegal injections of antibiotics or hormones into the livestock. The Rules of Practice given in the regulations describe actions to be taken to bring noncompliant companies either into compliance or complete closing.

Series Summary and Conclusion

FSIS inspects regulated companies from the time livestock first enter the slaughter companies to the point where the derived food products are shipped to consignees. Nonfederally inspected warehouses, stores, and even consumers are contacted by FSIS regarding FSIS-regulated products, indicating a large range of inspection responsibilities. FSIS uses utensils and organoleptic measures to determine food safety of carcasses and carcass parts in slaughter companies. Observations are made, data are reviewed, records are checked, microbiological and chemical samples are taken and analyzed, and product labels and written food safety systems are scrutinized. Actions are taken accordingly, and documentation is created to protect public health in regulated companies that produce meat and poultry products.

Of note, this series is not all-inclusive or comprehensive. For example, it does not include egg inspection, pet food, canning, cooking/cooling times, and temperature controls.

Professionals in a food safety career in another government agency will note that there can be considerable differences between their agency policies and the policies implemented by FSIS. For example, the author is not aware of any government food inspection agency—other than state agriculture agencies—where government regulators have permanent offices inside the companies they regulate. The FSIS education requirements might also be a surprise to food safety inspectors in other government agencies.

The author has noticed little mention of federal meat and poultry inspection in the *Journal of Environmental Health*. The aim of this 4-part series, therefore, is to inform environmental health specialists of the duties and requirements of federal meat and poultry inspectors. This series fills an information gap about public health protection—

from antemortem inspections of live animals used for food to retail inspections of meat and poultry. ❁

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Disclaimer: The information and conclusions of this special report are those of the author

and do not necessarily represent the official position of USDA or FSIS. Further, the interpretation of the regulations used to support this special report may not reflect the actual interpretation set forth by USDA and FSIS.

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Needs Assessment of Environmental Health Professionals in Montana: A Post-COVID-19 Perspective

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Abstract We designed a cross-sectional study for environmental health (EH) professionals in Montana as a follow-up to a needs assessment conducted in 2020 by the Montana Public Health Workforce Development Group. A 57-question survey was developed to deepen the understanding of the profession regarding demographics, work status and position, education and licensure, work prior to and during the COVID-19 pandemic, professional preparation and continuing education, job satisfaction, recruitment and retention, and emerging issues. The survey was administered electronically in 2022 to all health departments in Montana and had a 74% response rate. The results revealed that most EH professionals in Montana are predominately White. Respondents reported being adequately trained but highlighted that additional training would be beneficial. Job-related stress, staffing levels, and salary levels were identified as areas of concern. Furthermore, respondents reported that they are otherwise fulfilled by the purposeful nature of their jobs. Our study was successful in capturing an updated view of the challenges facing EH professionals in Montana. Using these findings, the Montana Environmental Health Association and the Montana Public Health Training Center are developing training solutions for these professionals.

Introduction

The field of environmental health (EH) has advanced considerably, evolving from practices rooted in ancient civilizations such as the Egyptians, Minoans, Greeks, and Romans (Duffy, 1992; see Supplemental for a background of the profession at www.neha.org/jeh-supplementals). While many of the duties and expectations remain the same today, EH has become more complex and specialized, which has resulted in a struggle to define and categorize this workforce as job responsibili-

ties can be vastly encompassing (McCormick, 2020). Today, the EH professional must possess expertise in multiple areas including drinking water quality, wastewater management, healthy homes, food safety, vectors and public health pests, and emerging issues (Brooks et al., 2019; National Environmental Health Science and Protection Accreditation Council [EHAC], 2019). Moreover, the evolution of technology and information dissemination has led to ever-expanding responsibilities (Gerding et al., 2020).

The COVID-19 pandemic created additional demands and significantly exacerbated the stresses and strains on the profession in unforeseen ways. Two rapid national needs assessment surveys were administered by the National Environmental Health Association (NEHA, 2020a, 2020b) during the pandemic. Despite efforts to begin the process of developing a deeper understanding of the changing landscape for EH professionals, there remains a lack of research to comprehensively identify and characterize the scope, impact, conditions, and current and future needs of the profession (McCormick, 2020).

The last comprehensive national study of EH professionals was completed more than 50 years ago (Brooks et al., 2019). While EH professionals in Montana (also referred to as sanitarians) face challenges and concerns similar to those reported nationally, they are faced with responsibilities for a vast geographic area that includes 147,000 mi². The remote and rural characteristics of towns, cities, and residents across the state are further complicated by the decentralized nature of public health in Montana.

Similar to their national counterparts, EH professionals in Montana in rural areas commonly face a lack of public health personnel, resources, and training; some EH employees have no specific public health training or experience and must learn on the job (Denison, 2020; Rosenblatt et al., 2002). Health departments are hampered by staffing shortages, unexpected retirements brought on by the COVID-19 pandemic, low pay, and

increased workload. With the backlash from the public and a perceived increase in political involvement in public health, many EH professionals feel more stress and thus have an increased desire to leave the workforce (Montana Public Health Workforce Development Group, 2020). In addition, there exists a short supply of graduates who choose to enter the field. Montana State University (MSU) recently developed a bachelor's level environmental health program that is accredited by the National Environmental Health Sciences and Protection Accreditation Council (EHAC, 2020).

In 2020, a public health workforce assessment survey was completed by the Montana Public Health Workforce Development Group (MPHWDG, 2020), which is made up of professionals from the Montana Public Health Association (MPHA), Montana Public Health Training Center, Montana Department of Public Health and Human Services, and Montana Environmental Health Association (MEHA). The assessment classified needs into three tiers of general categories: 1) policy development and program management, 2) communication skills, and 3) cultural competency. The assessment was designed to obtain a deeper understanding of the current conditions and needs of EH professionals practicing in Montana, with the hope of addressing current needs and future challenges while learning what recruiting and retention strategies are preferred to grow the workforce.

EH respondents reported feeling that their level of skill and familiarity with public health concepts were between “not much” and “a little” for tiers 1–3. This finding suggests that the EH workforce could benefit from various trainings and continuing education efforts to fill gaps in needed knowledge, skills, and abilities. Results also suggest that education and recruitment to the profession should begin at the high school level (MPHWDG, 2020), which would provide an introduction and early exposure to the field of public health for college-bound students. MSU and the University of Montana School of Public Health are working to develop ways to increase the number of students entering the public health field.

In April and October 2020, a national needs assessment of EH professionals was conducted in response to the ongoing COVID-19 pandemic (NEHA, 2020a, 2020b).

Results from the initial assessment revealed that 60% of EH professionals at local health departments were involved with COVID-19 responses in addition to their usual responsibilities. Respondents prioritized needs for COVID-19 cleaning and disinfection, personal protective equipment (PPE), and safe food guidance (NEHA, 2020a). The follow-up assessment in October (NEHA, 2020b) revealed that high-priority needs included increased staffing and personnel, more PPE, more consistent and high-quality COVID-19 information, and more technical support and guidance from the Centers for Disease Control and Prevention.

Based on a subset of data from the 2020 workforce study survey conducted by MPHWDG, it was determined that a separate survey that focused on the needs of EH professionals in Montana would be useful to identify the effect of COVID-19 on the workforce. This separate survey would also garner ideas for sustaining and growing the profession given recent challenges such as the COVID-19 pandemic. Our effort included a needs assessment survey developed to identify and characterize needs and gaps in information associated with EH practice, conditions, concerns, priorities, influences of the pandemic, and strategies for growing the workforce.

We sought to answer the following questions through the needs assessment:

- What are the key characteristics of the current workforce?
- Is the workforce adequately trained, staffed, and paid?
- How has the COVID-19 pandemic affected the workforce?
- Are current social and political forces affecting the workforce?
- What are the recommendations to support growth of the workforce?
- What strategies might improve working conditions for the workforce?

Methods

The needs assessment survey was designed to focus on the needs, circumstances, internal and external forces, and conditions of the EH workforce in Montana, with an emphasis on improving recruitment and retention. A 57-question survey was developed. Questions were designed to identify and classify the work-related duties prior to COVID-19, levels of satisfaction, and how these duties

changed because of COVID-19. Another area of interest was the qualification and training methods preferred by EH professionals, as well as projected needs for the future.

Survey domains included demographics, work status and position, education and licensure, work prior to COVID-19, practice in times of COVID-19, professional preparation and continuing education, job satisfaction, recruitment and retention, and emerging issues. Of the 57 questions, 36 were quantitative and 21 were qualitative. Question structures included single or multiple choice, completion, and open-ended questions (see Supplemental Survey).

The completed survey was approved by the institutional review board (IRB) of the University of Montana under the exempt category in accordance with federal regulations. After IRB review, a Qualtrics link to the survey was sent in 2022 to all public health departments across Montana for distribution to EH employees. The invitation and survey instructions informed participants of the purpose of the needs assessment and that participation was voluntary. It also stated that anonymity would be assured and results would be aggregated.

Completed surveys were downloaded from Qualtrics into an Excel spreadsheet for coding and analysis. The analysis was carried out using Minitab 20 and included frequencies, descriptive statistics, and correlations. Comparison of proportions was carried out using chi-square goodness of fit test when suitable sample counts and proportions were available.

Results

There were 100 completed or partially completed surveys received from 135 respondents (74% response rate). We propose that variability in the number of responses to each question occurred based on the comfort level of participants, perceived anonymity, time, and personal choice.

Demographics

Of the 100 participants surveyed, 58% self-identified as female. The largest age groups were 30–39 years and 50–59 years, at approximately 25% each. Only 1% of respondents identified as younger than 25 years and 7% identified as younger than 30 years. The majority of participants self-identified as

White (92%). The next largest self-identified race was Native American (4%; Table 1).

Most respondents reported their employment as full-time (84%), with 10% reporting part-time status. Further, 3% reported being retired, 2% provided contract services, and 1% indicated they were temporary employees. Over one half (54%) were field staff, close to one third (29%) were supervisors or managers, and 6% were directors or chiefs (Table 2).

Workforce Makeup

Close to one half of respondents (45%) had the title of sanitarian, while 37% were classified as EH specialists (EHS), 3% were EH technicians, and 1% were laboratory technicians or analysts (Table 2). Approximately 13% fell into the “other” category, which included lead sanitarian, teen pregnancy prevention, safety/security officer, emergency management, EH director, manager, EH and GIS specialist, deputy EHS director, professor, and administrator. Furthermore, approximately 35% of respondents reported that they held more than one title or position at the same organization. Of the respondents, 40% reported being in their current position <5 years and 7% reported being in their current position for >30 years.

Salary Range and Satisfaction

There was a wide range of salary distribution, with 45% of respondents reporting annual salaries between \$45,000 and \$65,000. Approximately 6% earned <\$25,000, while only 1% earned between \$95,000 and \$100,000. A total of 30% of respondents reported being satisfied with their current salary. A larger proportion (49%) reported that they were not satisfied with their current salary (Table 3). One respondent reported that they would have preferred annual pay increases that matched inflation. Overall, nearly 60% reported that they were not paid enough (Table 3).

Education and Licensure

Most respondents (52%) had earned a bachelor’s degree, 30% had earned a master’s degree, and 9% had earned a doctorate degree. Overall, one third (33%) studied sciences such as biology or chemistry; 21% studied environmental sciences; and 15% studied public health, community health, and/or health promotion (Table 4).

TABLE 1

Demographics of Environmental Health Professionals in Montana (N = 100)

| Demographic | # (%) |
|---|---------|
| Gender | |
| Female | 58 (58) |
| Male | 42 (42) |
| Race | |
| Native American or Alaska Natives | 4 (4) |
| Asian | 2 (2) |
| Black or African American | 0 |
| Hawaiian Native or other Pacific Islander | 1 (1) |
| White, not Hispanic | 92 (92) |
| Mixed race | 0 |
| Prefer not to say | 1 (1) |
| Other | 0 |
| Age (years) | |
| <25 | 1 (1) |
| 25–29 | 6 (6) |
| 30–39 | 24 (24) |
| 40–49 | 16 (16) |
| 50–59 | 25 (25) |
| 60–65 | 15 (15) |
| >65 | 13 (13) |

Of the respondents earning post-secondary degrees or certificates, 23% earned degrees from MSU and 7% earned degrees from the University of Montana, Missoula. Of the respondents, 9% were graduates of an EHAC-accredited program (Table 4). Furthermore, 93% of respondents were professionally licensed, with 61% reporting being registered sanitarians and 20% being registered EH specialists (Table 4).

Scope of Work

Most respondents (86%) worked in public health departments. Only 3% worked in emergency preparedness. Within the EH field, the primary activities performed included commercial and school food safety (35%), land use/subdivisions (15%), wastewater (14%), and drinking water (6%). Further, <2% dealt with solid and hazardous waste, pools/spas/

TABLE 2

Workforce Makeup of Environmental Health Professionals in Montana (n = 91)

| Demographic | # (%) |
|----------------------------------|---------|
| Employee status | |
| Full-time | 76 (84) |
| Part-time | 9 (10) |
| Seasonal | 0 |
| Temporary | 1 (1) |
| Contract service | 2 (2) |
| Prefer not to say | 0 |
| Other | 3 (3) |
| Position level | |
| Field staff | 49 (54) |
| Supervisor or manager | 26 (29) |
| Director or chief | 6 (6) |
| Prefer not to say | 0 |
| Other | 10 (11) |
| Job title | |
| Environmental health specialist | 34 (37) |
| Environmental health technician | 3 (3) |
| Environmental scientist | 1 (1) |
| Epidemiologist | 0 |
| Inspector | 0 |
| Laboratory technician or analyst | 1 (1) |
| Sanitarian | 41 (45) |
| Other | 12 (13) |

recreational waters, communicable diseases, and body art/tattoos/body piercings. Of the respondents, one quarter (25%) reported that they were assigned to practice in multiple areas, while 94% reported that they were involved in many EH-related activities and areas within the organization (Table 5).

Familiarity With Public Health Concepts

In response to questions about familiarity with various public health concepts, most respondents reported having “a little” in almost all categories. For cross-jurisdictional sharing of public health services, 71% of respondents reported having a little or not

TABLE 3

Salary Range and Level of Satisfaction With Salary for Environmental Health Professionals in Montana (n = 91)

| | # (%) |
|-----------------------|---------|
| Salary range (\$) | |
| 25,000–30,000 | 5 (6) |
| 30,000–35,000 | 4 (4) |
| 35,000–40,000 | 3 (3) |
| 40,000–45,000 | 8 (9) |
| 45,000–50,000 | 13 (14) |
| 50,000–55,000 | 12 (13) |
| 55,000–60,000 | 7 (8) |
| 60,000–65,000 | 10 (11) |
| 65,000–70,000 | 6 (7) |
| 70,000–75,000 | 8 (9) |
| 75,000–80,000 | 3 (3) |
| 80,000–85,000 | 2 (2) |
| 85,000–90,000 | 4 (4) |
| 90,000–95,000 | 1 (1) |
| 95,000–100,000 | 5 (6) |
| 100,000–110,000 | 0 |
| 110,000–120,000 | 0 |
| 120,000–130,000 | 0 |
| >130,000 | 0 |
| Satisfied with salary | |
| No | 45 (49) |
| Yes | 27 (30) |
| Prefer not to say | 10 (11) |
| Other | 9 (10) |

much familiarity, while 10% reported no familiarity. For the category of fostering a culture of quality improvement, 81% of respondents reported that they were very familiar or had a little familiarity and 3% reported no familiarity. For public health and primary care integration, only 5% of respondents were very familiar, 77% had a little or not much familiarity, and 18% had no familiarity. For performance management, most respondents (65%) seemed to have a little or not much familiarity and 30% reported a lot of familiarity (Table 6).

For evidenced-based public health practices, 16% of respondents reported that they

TABLE 4

Education and Licensure of Environmental Health Professionals in Montana

| | # (%) |
|---|---------|
| Highest level of education (n = 86) | |
| High school diploma/GED | 4 (5) |
| Associate degree | 3 (3) |
| Bachelor's degree | 46 (54) |
| Master's degree | 25 (29) |
| Doctoral degree | 8 (9) |
| Other | 0 |
| Subject area studied (n = 202) | |
| Business or business administration | 12 (6) |
| Environmental science | 43 (21) |
| Mathematics | 16 (8) |
| Nursing | 2 (1) |
| Nutrition | 11 (5) |
| Public health, community health, health promotion | 31 (15) |
| Science (biology, chemistry, etc.) | 67 (33) |
| Social work | 5 (2) |
| Other | 15 (7) |
| Program accredited by the National Environmental Health Science and Protection Accreditation Council (n = 88) | |
| No | 46 (52) |
| Yes | 8 (9) |
| Not sure | 34 (39) |
| Professionally licensed (n = 88) | |
| No | 6 (7) |
| Yes | 82 (93) |
| Type of professional license (n = 116) | |
| Dietician/nutritionist | 1 (1) |
| Doctor | 0 |
| Nursing | 1 (1) |
| Registered environmental health specialist | 23 (20) |
| Registered sanitarian | 71 (61) |
| Other | 20 (17) |

had a lot of familiarity, 74% reported a little or not much familiarity, and 10% reported no familiarity. Concerning Health in All Policies concepts, 63% of respondents reported having not much or no familiarity, only 10% were

TABLE 5

Workforce Identification of Environmental Health Professionals in Montana

| | # (%) |
|---|---------|
| Current public health department (n = 73) | |
| Administration/support staff | 0 |
| Chronic disease prevention | 0 |
| Communicable disease/immunization | 0 |
| Environmental health | 63 (86) |
| Emergency preparedness | 2 (3) |
| Epidemiology | 0 |
| Finance (including grant writing or grant reporting) | 0 |
| Home visits | 0 |
| Maternal and child health (non-nutrition) | 0 |
| Nutrition/WIC/breastfeeding support | 0 |
| Other | 8 (11) |
| Primary environmental health activity practice area (n = 72) | |
| Body art/tattoos/body piercing | 0 |
| Commercial and school food safety | 25 (35) |
| Drinking water | 4 (6) |
| Emergency response | 0 |
| Infectious disease | 1 (1) |
| Land use/subdivision | 11 (15) |
| Pools/spas/recreational waters | 1 (1) |
| Public lodging | 0 |
| Public nuisance complaint response | 1 (1) |
| Solid/hazardous waste | 1 (1) |
| Trailer courts/campgrounds | 0 |
| Wastewater (sewage) | 10 (14) |
| Other | 18 (25) |
| Practice in multiple environmental health areas (n = 72) | |
| No | 2 (3) |
| Not very often | 3 (4) |
| Sometimes | 5 (7) |
| Yes | 60 (83) |
| Prefer not to say | 2 (3) |
| Other | 0 |
| <i>Note.</i> WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. | |

very familiar, and 27% had little familiarity. Multisectoral collaboration was almost evenly divided, with slightly more than one half (54%) of respondents having a little or a lot of familiarity and 47% reporting not much or no familiarity. Lastly, the Public Health 5.0 Principles were also almost evenly split, with under one half (44%) of respondents having a little or a lot of familiarity, whereas 56% reported not much or no familiarity (Table 6).

Duties

The job duties routinely performed by respondents were often broad, encompassing, and crossed specialty areas. Of the 73 responses to duties routinely performed, 22% had duties concentrated in a single area. All others (88%) had duties that spanned more than one specialty within the EH field. Some respondents made qualifying statements such as, “Almost too many to name. The breadth of the EH fields and tasks in my daily/weekly [schedule] are stunning,” and “All of those mentioned.” In addition to the routinely performed tasks, a similar number of respondents (84%) reported doing tasks not considered routine, including tasks related to COVID-19.

When asked about the aspects of their job they found difficult, responses included being overworked or feeling symptoms of burnout (19%), being understaffed or having high turnover (15%), difficulties dealing with the public (19%), issues related to COVID-19 (12%), people being unaware of what EH professionals do (10%), dealing with managers (9%), low pay (7%), regulations and the lack of consistency and enforcement (8%), being constantly interrupted and lack of private working areas (5%), and a general lack of support (3%).

Over one half of respondents (53%) reported feeling moderately stressed and 31% reported feeling severely stressed. Approximately one half (47%) of respondents reported the availability of work-related stress relief programs, while 44% said none existed. Further, 34% of respondents reported being helped by stress-reducing interventions, although most did not report being helped (53%).

Practice During the COVID-19 Pandemic

In response to how their duties changed due to COVID-19, 17% of respondents reported that their routine duties were pushed aside

TABLE 6

Familiarity of Environmental Health Professionals in Montana With Public Health Concepts (n = 73)

| Public Health Concept | None # (%) | Not Much # (%) | A Little # (%) | A Lot # (%) |
|--|------------|----------------|----------------|-------------|
| Cross-jurisdictional sharing of public health services | 7 (10) | 14 (19) | 38 (52) | 14 (19) |
| Evidence-based public health practice | 7 (10) | 21 (29) | 33 (45) | 12 (16) |
| Fostering a culture of quality improvement | 2 (3) | 12 (17) | 35 (48) | 24 (33) |
| Health in All Policies | 20 (27) | 26 (36) | 20 (27) | 7 (10) |
| Multisectoral collaboration | 16 (22) | 18 (25) | 29 (40) | 10 (14) |
| Performance management | 4 (5) | 13 (18) | 34 (47) | 22 (30) |
| Public Health 5.0 Principles | 19 (26) | 22 (30) | 24 (33) | 8 (11) |
| Public health and primary care integration | 13 (18) | 30 (41) | 26 (36) | 4 (5) |

Note. Bolded values indicate the highest number and percentage for each concept.

to address issues related to the pandemic. A similar number reported that they became contact tracers, with an equal amount (15%) responsible for compliance, plan reviews, inspection, complaints, and enforcement related to COVID-19. Some respondents were transitioned to virtual inspections (8%) or remote work (11%), while others enforced mask mandates (9%), operated vaccine clinics (6%), reviewed social distance and viral reduction plans for businesses (8%), and/or were liaisons to the fire authority (1%). Some respondents noted an increase in conflict with the public (5%), loss of staff (5%), and pandemic-related complaints particularly from food establishments (3%). When asked if their department prepared them for these changes, 45% of respondents said yes, whereas 43% said they had no preparation. Further, one quarter of the respondents (25%) felt that the added duties were distributed unevenly.

More than one half of respondents (52%) were still able to complete their job duties, while 39% reported that stress from the COVID-19 pandemic limited their ability to complete their job duties. Some factors that increased stress were the volume of work and feeling symptoms of burnout (40%), being short-staffed (16%), hostility coming from the public (16%), personal and economic stress (16%), and limited time in the field to do work and the political environment (4% each). Of particular concern was the fallout from the

pandemic and the backlash against public health employees and scientists from the public and the legislature. One respondent stated that “COVID-19 has destroyed public health,” and another added that, “the profession lost respect, employees, and public confidence.”

Professional Preparation and Continuing Education

Less than one half of respondents (43%) reported that their education prepared or mostly prepared them for their position. Conversely, 9% said their education did not prepare them for their position. Most respondents (83%) reported receiving on-the-job training and 85% reported taking classes and/or earning certifications related to their position.

While most respondents (92%) said they were aware of professional organizations related to their work, almost all (89%) were already members of ≥1 professional organizations: 62% in MEHA and 28% in NEHA, with the remaining percentage in other organizations. Except for contractors and retirees, all respondents reported that their department supported professional development in some way and the majority (97%) reported that the organizations were at least somewhat helpful as it related to their position.

Job Satisfaction

Despite the challenges associated with the COVID-19 pandemic, 92% of respondents reported being satisfied or somewhat satisfied

in their current position. Only 8% said they were not satisfied. Of the changes they would like to see, 37% of the respondents stated an increase in pay would be desired; 18% would like to see an increase in staff to help with their workloads and that of their coworkers; 14% would like to see improvements in management or administration, human resources, and elected officials; and 8% would prefer a more defined or focused job description, as they felt their duties were too broad and encompassing.

Most respondents (66%) felt they were able to meet their personal or family obligations. In comparison, one third (33%) noted they were experiencing stress in the form of feeling worn out, mentally and physically exhausted, financially stressed, needing a more balanced lifestyle, feeling guilty if they contemplated retirement or leaving, and relying on other family members to fill in when they could not meet family needs.

Most respondents (77%) felt their organization was not adequately staffed and a similar number (73%) said they were aware of hiring needs within their organization. To make their position more satisfying, respondents indicated they would like an increase in pay (37%) and indicated they needed more help (25%), flexibility (16%), and support (13%). Furthermore, respondents indicated a need for better interaction with management (6%), more input from county attorneys (5%), and more time off (5%). Other suggestions included affordable housing; advancement opportunities; company transportation; reduction of the negativity associated with the field; better recordkeeping systems, computers, and resources; proper office space; in-person meetings; and more outreach events.

Despite the stress associated with their jobs and the highlighted needs, almost all respondents (97%) expressed positive feelings about their position. Most expressed a love for their job outright, feeling satisfied as they work with and help the public, businesses, and coworkers. They enjoyed the outcome of their work and being challenged and reported feeling fulfilled by their jobs. They also reported enjoying working in the field and protecting the public. Only a few respondents cited autonomy or flexibility related to their jobs as positive attributes of their work.

Some negative feelings related to the job that respondents reported included low pay (14%), conflicts with the public (14%), hav-

ing to defend their jobs from attacks (20%), and a hostile office environment (13%). Other concerns that respondents mentioned were dealing with unclear and unenforced regulations (10%), lacking support or feeling undervalued and underappreciated (10%), feeling overworked (10%), experiencing conflicts with management and lawmakers (4%), dealing with too much politics in public health (8%), and feeling stressed (10%). A few respondents reported negative feelings stemming from insecurity, inexperience, and the dangers associated with their job (1%); that they could not afford to live where they worked (1%), and that their work of reporting and compiling cases was not followed through by the county attorney's office (5%).

Retention and Recruitment

Of the respondents, 23% indicated that they were not planning to retire; however, 60% reported thinking about it. Some were unsure when they might retire (23%), 9% said they may retire in 1–2 years, 14% in 2–5 years, and 11% thought they would retire within 6–10 years.

Having the option to retire was one of the major reasons people contemplated leaving (30%). Other factors included better pay (29%), the desire for reduced stress or to meet family needs (13%), to leave a hostile and unsupportive environment (13%), to have more flexibility (5%), or out of general frustration (2%). Additional reasons (3%) reported included poor management, current workload, career advancement, or job change. Currently, 91% of respondents say their employer offers retirement benefits and most (89%) participate in the plans.

When asked about recruitment, 18% of respondents thought that websites such as Indeed.com were effective at reaching qualified candidates. Others reported that they thought social media and word of mouth (13% each) were effective, while websites operated by EH organizations such as MEHA (10%) and NEHA (8%) were thought to be helpful. A few respondents thought that job boards of other organizations or job postings in journals were good options for recruitment.

Consistent with previous responses, 21% of respondents felt higher salaries would be effective tools for retention within the EH profession. Other suggestions included more

flexible work schedules (15%), increased support from management (15%), respect and support from the public (15%), improved state funding for the department (12%), more comprehensive insurance plans (10%), and better retirement benefits (9%).

Emerging Issues

Respondents felt the EH databases (17%) and ArcGIS (14%) were key areas where EH professionals need skills to meet future needs in EH and public health. Additionally, addressing racial equity, cultural competence, and social justice issues were priority areas for 17% of respondents. Learning data apps and change management were reported as important by 11% of respondents. Big data was identified by 8% of respondents as a future issue. Other future areas identified included emotional intelligence (8%), using remote sensors (5%), and wearable technology (2%).

Across the board, respondents were open to various methods for training and education. They cited online classes (22%) and in-person workshops (20%) as the preferred methods for training and education on emerging issues. Others reported attending MEHA annual conferences (19%), in-person seminars (18%), in-office service learning (13%), and NEHA (6%) as other forums for training.

Discussion

Due to the high response rate (74%), our needs assessment represents the opinions held by many EH professionals across Montana, and the results provide additional insight into the practices and challenges associated with the COVID-19 pandemic in Montana. The results also provide information about characteristics, concerns, and perceptions of the EH workforce in Montana. Modern EH professionals must practice in considerably more complex conditions, environments, and expectations than in past times (Gerding et al., 2020; McCormick, 2020). Results reveal that while most EH professionals in Montana self-identify as White, the balance of self-identified gender is comparable to national numbers. While professionals report being adequately trained, there is a need for more training. Consistent throughout our results are concerns about low staffing levels and low salaries, even though many EH professionals report some level of satisfaction with their job.

Stress Within the Profession

Stress levels are of concern: we found that 84% of EH professionals reported feeling moderately or severely stressed. This finding is consistent, with a significantly higher proportion (p -value $< .05$), compared with prior findings in the NEHA (2020b) needs assessment that found 74% of respondents were emotionally exhausted and 54% felt symptoms of burnout. Global stress levels were elevated due to the pandemic. Gamonal-Limcaoco et al. (2022) evaluated 1,091 adults in 41 countries using the Perceived Stress Scale (PSS-10) and found that 76% of those surveyed experienced increased worry due to the pandemic. Stress levels were reported at 19.1 on the scale of 0–40, which indicates moderate stress due to perceived susceptibility to COVID-19. Women had higher levels of stress compared with men: 18.3 and 15.6, respectively. The highest stress levels of 20.4 and 20.7 were among younger age groups of people <30 years and students, respectively.

Prasad et al. (2021) conducted a cross-sectional study of healthcare workers in the U.S. and found that 60% were afraid of exposure to COVID-19, 38% reported anxiety and depression, 43% experienced work overload, and 49% reported feeling symptoms of burnout. Approximately 30% of these healthcare workers reported high stress due to at least one factor related to COVID-19 using a stress scale of 4–16. The average overall stress score was 9.52, with the highest score of 10.51 among nursing assistants. Social workers and medical assistants were next highest at 10.04 and 10.11, respectively. While no additional studies evaluating stress levels were identified, it is clear that the COVID-19 pandemic adversely affected professionals working in the health and allied health fields.

Educational Background and Needs

We found that 46% of EH professionals in Montana have a bachelor's degree, 27% have a master's degree, and 8% have a doctoral degree. In contrast, Gerding et al. (2019) reported that 72% of EH professionals nationally have a bachelor's degree, 31% have a master's degree, and only 2% have a doctoral degree. In a national needs assessment of public health professionals, Sellers et al. (2015) found that 75% have a bachelor's degree, 38% have a master's degree, and 9% have a doctoral degree. In Montana, the dif-

ferences in proportions of EH professionals who have a bachelor's degree were significantly lower (p -value $< .05$) compared with the other two studies.

The lower percentages of EH professionals in Montana who have bachelor's and master's degrees might be directly related to the shortage of qualified personnel. Furthermore, Gerding et al. (2019) reported that 22% of EH professionals with a bachelor's degree in EH had graduated from EHAC-accredited programs. Our study found a significantly lower proportion (p -value $< .05$) in Montana, with only 8% of respondents having matriculated from an EHAC-accredited program. Moreover, Gerding et al. (2019) found that only 17% of respondents who held a bachelor's degree studied EH; an equal amount had studied environmental science. By comparison, our study found that 31% of EH professionals in Montana had studied environmental health, environmental science, community health, or health promotion.

We found that slightly less than one half (43%) of EH professionals reported feeling that their education prepared or mostly prepared them for their jobs, with 83% reporting that they continued to learn on the job. A prior survey of 51 EH professionals nationally indicated that respondents felt an estimated 10% of new hire candidates were not qualified for the job (Environmental Health & Equity Collaborative [EHEC], 2021). Furthermore, 80% also felt there was a low-level supply of qualified EH candidates.

Specifically, 50% of those surveyed reported that new hires were somewhat competent in emergency preparedness, disease prevention, and indoor air quality. Their results also reported, however, that new hires were not prepared to manage onsite sewage systems, public swimming pools, lead prevention, day care and early child development facilities, body art, campgrounds, recreational vehicles, soils, public drinking water systems, recreational waters, and healthy homes. Additionally, 40% reported that many new hires were not proficient in assessment and analysis, community engagement, conflict resolution, cross-sector resolution, ArcGIS, organizational behavior, risk communication, systems thinking, and toxicology.

The study by EHEC (2021) also found that EH professionals need to be competent in climate change, customer service, data man-

agement, epidemiology, statistics, health risk assessment, hotel and tourist establishment inspections, outbreak investigations, public accommodations, septic tank pumping contractors, jails and prisons, cosmetics manufacturing, and migrant labor camp inspections. Our sample reported 12 primary areas of practice that included food safety, drinking water quality, wastewater, solid and hazardous waste, pools/spas/recreational waters, body art/tattoo/body piercing, public lodging, trailer courts and campgrounds, land use/subdivisions, infectious disease, emergency response, and public nuisance complaint response. We also identified emerging areas that included database management, big data, data apps, ArcGIS, racial equity and cultural competence, social justice, emotional intelligence, remote sensing, and wearable technology. Thus, the evolution of EH practice requires an ever-expanding skill set (Gerding et al., 2020).

Demographics of the Profession

Our survey results indicate that salaries ranged from \$25,000–\$100,000, with 45% earning between \$45,000 and \$65,000 and only 7% earning $> \$80,000$. In comparison, Gerding et al. (2019) found the salary range for EH professionals to be from $< \$25,000$ to $> \$145,000$. Nonsupervisory personnel salaries ranged between \$35,000 and \$54,999. Our findings show that EH professionals in Montana earn less for the same services provided compared with EH professionals nationally.

Self-identified gender is more balanced in Montana, with 58% self-identifying as female. This finding is significantly lower (p -value $> .05$) than the 72% reported by Gerding et al. (2019). The racial makeup of EH professionals in Montana appears to be significantly more homogeneous (p -value $< .05$), though, with 94% self-identifying as White. Nationally, Gerding et al. (2019) reported that 86% of EH professional self-identified as White. Similarly, Sellers et al. (2015) found that 70% of their study sample self-identified as White. Further, a study of rural locations in Alabama found that 45% of EH professional self-identify as White (Wu et al., 2017). This comparison is a rural setting that is similar to Montana; however, the U.S. Census Bureau (2022) reports that the population of Alabama is 69% White, and the population of Montana is 89% White.

Overall, our findings show that EH professionals in Montana are slightly older than their national counterparts. In Montana, EH professionals have a similar but different age distribution than those reported nationally by Gerding et al. (2019). Our findings indicate that 64% of EH professionals are between 30 and 59 years and only 7% are <30 years. Conversely, Gerding et al. (2019) reported that 23% of national EH professionals are <26 years. We also had 13% of respondents report being >65 years, compared with 3% for the same nationally reported age group (Gerding et al., 2019). These proportions are significantly different (p -value < .05).

Challenges Faced by the Profession

The COVID-19 pandemic has significantly affected public health overall. EH professionals, like all of public health, have been tested by this crisis over the past few years. The U.S. public health system has suffered for some time with chronic underfunding, workforce shortages, and outdated infrastructure (DeSalvo et al., 2021). The pandemic exacerbated longstanding challenges and brought attention to racial and socioeconomic inequities such as lack of access to healthcare, lack of quality care, and adverse health outcomes for disadvantaged groups (DeSalvo et al., 2021). Between 2008 and 2016, it is estimated that more than 2,000 EH positions were lost due to the Great Recession and associated budget cutbacks (Gerding et al., 2019) and 56,000 positions overall were lost in public health (Gadarian et al., 2021). The EH profession has never recovered despite the ever-increasing need. The pandemic precipitated gaps in quality information; distrust in public health leaders; and politicization of resources, guidance, operations, and leadership (DeSalvo et al., 2021).

Nearly one fifth of EH professionals in Montana reported that their routine duties were subordinated to COVID-19 priorities, and 84% reported performing nonroutine job duties. Most respondents (77%) reported their organization being understaffed to meet current needs. Similarly, the needs assessment conducted by NEHA (2020b) found that EH professionals were fully engaged in the pandemic response and reported being emotionally exhausted by feeling understaffed.

In Montana, EH professionals reported that they conducted contact tracing, enforced mask mandates, operated vaccine clinics,

reviewed social distancing and viral reduction plans, carried out public education, participated in conflict resolution, and performed their usual work duties. Nearly 40% reported that their stress level was so high that they could not complete all the duties of their job and they were feeling symptoms of burnout. Key factors that created increased stress included hostility from the public, being short-staffed, unmet personal and economic needs, working remotely, having limited time in the field, and the politicization of the public health response. Furthermore, EH professionals felt that there was a significant backlash from the state legislature against public health during the pandemic, which resulted in less authority and support for local health department operations.

Political Challenges

The Montana legislature passed a law in April 2021 that prohibits health departments from closing establishments or creating mandates that are perceived to hurt business (Houghton, 2022). Mask mandates could no longer be enforced, and businesses could not be closed due to public health threats (Montana Public Radio, 2021). House Bill 121 effectively removed 100 years of basic, preventive public health measures that were aimed at stopping the spread of disease in public places during times of crisis (An Act Revising Laws Related to Local Boards of Health, 2021; Montana Public Radio, 2021).

House Bill 121 created increased control over local health departments. Now, local health departments are governed by community boards that can block or amend informed recommendations from health departments for managing public health emergencies. Montana was 1 of 26 states that moved to roll back powers of local health departments (Houghton, 2022). Furthermore, House Bill 702 blocks business owners from restricting service to those without proof of vaccination and does not allow discrimination against those who chose not to get vaccinated (An Act Prohibiting Discrimination, 2021; Houghton, 2022).

Social and political forces have strained public health to new limits in recent years and were acutely exacerbated by the COVID-19 pandemic. DeSalvo et al. (2021) reported that 50 states and 9 territories delivered public health services through a variety of struc-

tural models with highly variable funding levels. For example, New Mexico provided funding at \$140 per capita, compared with Missouri at \$7 per capita. Alaska spends the most for public health, at \$449 per person (United Health Foundation, 2023).

Gadarian et al. (2021) found that partisanship played a central role in individual and community responses to the pandemic. Nearly one third of all health departments had opted out of accreditation because of a lack of adequate funding and personnel (DeSalvo et al., 2021). The lack of funding at the state and local level, aging infrastructure, partisanship, and conflicting messages amounted to an uneven response to the pandemic across communities (DeSalvo et al., 2021; Gadarian et al., 2021).

Two of the greatest challenges in public health during the pandemic were the misinformation and partisanship that led to community distrust of science and public health, which resulted in loss of authority through revised public health policy. More than one half of U.S. states, including Montana, have passed legislation that diminished powers of public health departments (Montana Public Radio, 2021). We found that EH professionals in Montana wanted more support from the public, community leadership, and the state legislature.

Job Conditions and Satisfaction

Improving the work conditions and experiences for EH professionals in Montana would have a positive impact on the workforce and the delivery of services. Recommendations for improvement include greater funding for public health, higher salaries, increased staff, reasonable workloads, narrower job descriptions, more flexibility, technical and non-technical training, professional development, career advancement opportunities, improved management and leadership, and greater support from elected officials. These recommendations could have a positive effect on public health in Montana.

Despite the stresses and strains on EH professionals in Montana, we found that 97% reported they loved their jobs and felt their work was meaningful. Furthermore, 92% reported that they were satisfied or somewhat satisfied in their current position, even though 60% were thinking about leaving public health for a variety of reasons. Nationally, Sellers et al. (2015) reported that 79% of public health

workers were satisfied or somewhat satisfied with their position, 65% were satisfied or somewhat satisfied with their organization or agency, and 48% were satisfied or somewhat satisfied with salaries. There is an overwhelming call for more training in a wide variety of areas to improve the knowledge, skills, and abilities of EH professionals, as well as training for stress reduction and coping (Gerding et al., 2020; MPHWDG, 2020; NEHA, 2020a, 2020b; Sellers et al., 2015). Many of the concerns seen in the greater public health profession (DeSalvo et al., 2021) echo concerns shared by EH professionals in Montana.

Recommendations for the Profession

DeSalvo et al. (2021) recommended major restructuring and redesigning of public health delivery in the U.S. Some areas needing change include transforming funding to increase flexibility and adaptation to crisis, affirming the mandate for public health that residents expect, promoting structural alignment among all public health agencies, investing in leadership and workforce development, modernizing technology capabilities, and supporting public and private partnerships and community engagement. Likewise, Gerding et al. (2020) provided a similar list of recommendations that included improving effective leadership, workforce development, equipment and technology, information systems and data, and garnering support through partnerships and collaborations. Additionally, Frieden (2013) identified the role of the government in public health as being responsive to the needs of the people; to free, open, and promote truthful information; to protect the people from harm of injury, illness, and disease; and to implement societal interventions when individuals are unable to protect themselves. We support the recommendations of DeSalvo et al. (2021) and Gerding et al. (2020), and we agree with the stated role of government by Frieden (2013).

To grow the EH profession in Montana, respondents recommended nothing particularly novel. On the national stage, the Understanding the Needs, Challenges, Opportunities, Vision, and Emerging Roles in Environmental Health (UNCOVER EH) initiative (Brooks et al., 2019; Gerding et al., 2019) provided more specific recommendations and direction. Experts continue to assert that EH is poorly understood among the public and lacks the visibility that much of public health enjoys (Brooks et al., 2019). Further, Brooks et al. (2019) identified three essential needs to grow the EH profession: 1) uniform training such as academic preparation, professional credentialing, and strategic national training; 2) partnerships such as nontraditional partnerships, joint leadership programs, and translational science partnerships; and 3) research such as strategic research initiatives and integration of existing programs.

Limitations

Our study has a number of limitations. First, self-report surveys can be influenced by recall and response bias. Such biases can have a differential effect toward or away from our ability to answer research questions. Secondly, we chose to deliver the survey to EH professionals using local health departments as the major way to disseminate and invite participation in the study. While the majority of EH professionals in Montana work in local health departments or at the state level, we may have excluded those EH professional who work in other fields. Lastly, our approach to survey completion was dependent on the access to and use of electronic tools including the internet, computers, and Qualtrics. We assumed that that all EH professionals in Montana had access to the internet and computers and were capable of completing an online survey, which might not have been the case for all EH professionals.

Conclusion

Our needs assessment was successful in capturing an updated view of the challenges facing EH professionals in Montana. The workforce self-identifies as mostly White and is somewhat gender balanced, a little older, and underpaid compared with their national counterparts. It is also clear that stress levels are very high among EH professionals. There exists a workforce shortage of well-trained EH professionals to fill open positions in Montana. More broadly, many of the same challenges and needs identified in Montana are reported nationally.

EH is a complex and broad specialty within public health and training is urgently needed in many areas to address current needs and evolving threats. The COVID-19 pandemic has exacerbated existing issues and stressed health departments and agencies, which has hindered their ability to deliver effective services.

The politicization around the pandemic has further damaged the credibility of science and public health leaders and led to new policies restricting the powers of public health professionals to protect the communities they serve. EH professionals worked on the front lines of the pandemic and many experienced backlash from the public. The rapidly changing economic, political, social, and environmental forces and conditions in the U.S. and across the globe make it difficult to create uniform practices and sustainable funding to consistently meet public health needs. These changes are redefining the scope and depth of public health and the work provided by EH professionals. ❁

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► SPECIAL REPORT



A Collaborative Approach to National Food Code Adoption

Abstract The Food and Drug Administration *Food Code* is a set of science-based food safety guidelines that serve as the basis for jurisdictional food codes that regulate retail food service in the U.S. Uniform adoption of the *Food Code* has benefits for government, industry, and the public. Compliance with code provisions helps reduce risk of foodborne illness in retail establishments. Only 18 states, however, have adopted the most recent edition of the *Food Code* (Food and Drug Administration, 2023). The Retail Food Safety Regulatory Association Collaborative (Collaborative) has undertaken a multipronged approach that leverages the resources and strengths of its six organizations to support adoption of the *Food Code*. Through these approaches, the Collaborative aims to provide the tools, resources, and support needed to navigate the sometimes complex nature of adoption. This special report provides a summary of the different activities and approaches of the Collaborative to support national *Food Code* adoption.

Introduction

The vital work of retail food safety professionals happens in a rapidly evolving landscape of technological advancement, emerging trends, and globalization—a dynamic terrain that requires up-to-date, evidence-based regulations to navigate. Adding to this complexity, the protection of retail food and the safeguarding of retail food establishments does not fall under federal authority in the U.S. Instead, several thousand state, local, tribal, and territorial (SLTT) jurisdictions have primary responsibility for the regulation or oversight of retail-level food operations (U.S. Department of Health and Human Services, 2017). Each of these jurisdictions has the autonomy to create legislation and policies, resulting in a

patchwork of regulations that sometimes conflict and might not be based on the best available science. Inconsistency in regulations also means that additional time, resources, and coordination are needed to effectively implement retail food protection programs at both regulatory and industry levels. This inconsistency puts the public at risk for foodborne illness. The Food and Drug Administration (FDA) *Food Code* offers a solution to the current regulatory landscape by providing SLTT jurisdictions with a uniform and standardized framework of evidence-based regulations that they can implement to reduce the risk of foodborne illness.

Research indicates that states that have adopted specific provisions of the *Food Code*

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related to norovirus prevention (e.g., prohibition of bare-hand contact) have lower norovirus outbreak rates than states that have not adopted those specific provisions (Kambhampati et al., 2016). Additionally, research shows that norovirus outbreaks are smaller in retail establishments that have implemented specific *Food Code* provisions (e.g., kitchen manager certification) than in establishments that have not (Hoover et al., 2020). Although these data are limited to norovirus outbreaks and specific *Food Code* provisions, they strengthen the evidence of the importance of *Food Code* adoption to food safety.

The *Food Code* is a model code that provides a scientifically sound technical and legal basis for regulating the retail segment of the food industry. The *Food Code* is neither federal law nor regulation and is not preemptive. Rather, it represents the best advice from FDA for a uniform system of regulations to ensure that food at retail is safe and properly protected and presented. Jurisdictions may choose to adopt all, part, or none of the *Food Code*.

Jurisdictions that have adopted the *Food Code* most commonly adopt either by reference or section-by-section. Adoption by reference refers to a legal approach that involves adopting the *Food Code* by name, rather than as individual regulations. Often, jurisdictions that have adopted by reference automati-

cally adopt the newest edition of the *Food Code* when it is released. Jurisdictions with a section-by-section approach have adopted sections of the *Food Code* individually and must enact a full legislative process to adopt newer editions of the *Food Code*. The process to adopt newer editions of the *Food Code* varies from jurisdiction to jurisdiction and both approaches allow for the adoption of the *Food Code* in its entirety or in parts.

FDA revises the *Food Code* in a full edition every 4 years and a supplement to the full edition in the intervening 2 years; the revision process includes a strategic review of the recommendations made by representatives in the food industry, government, academia, and consumer organizations as a part of the Conference for Food Protection Biennial Meeting (Conference for Food Protection, 2023). While 49 states have adopted some edition of the FDA *Food Code*, only 34 states have adopted one of the two most recent editions and 18 of those 34 states currently use the most recent edition (FDA, 2023).

Complete and uniform adoption of the *Food Code* facilitates the standardization of inspections across jurisdictional lines. Training programs and standard operating procedures can vary from jurisdiction to jurisdiction to comply with inconsistent regulations, which makes compliance particularly difficult for retailers with operations in multiple jurisdictions (FDA, 2020). In a 2020 survey of key industry representatives, respondents reported it was overwhelming to keep up with code requirements across multiple jurisdictions (Mandernach et al., 2023). Furthermore, 85% of respondents felt uniform adoption of the *Food Code* throughout the U.S. would be beneficial. These findings indicate support for uniform adoption of the *Food Code* among industry members.

Initial surveying of U.S. states indicates a majority are considering adopting a newer edition of the *Food Code* (Nutt et al., 2022). Many states, however, face significant barriers to updating their regulations. The top three barriers to adopting a newer edition of the *Food Code* identified in the survey include:

1. Lack of staff knowledge in state regulatory agencies about the adoption process.
2. Lengthy and time-consuming adoption processes that compete with other operational priorities.
3. Resistance by legislators and administrations.

Challenges also include a lack of buy-in from key partners, resistance to change, pushback from affected groups and poor communication between regulators and industry members, limited staff capacity, and limited resources (Retail Food Safety Regulatory Association Collaborative, 2020).

To support jurisdictions in overcoming these challenges and barriers, the Retail Food Safety Regulatory Association Collaborative (Collaborative) has undertaken a multi-pronged approach to *Food Code* adoption that leverages the resources and strengths of the organizations that make up the Collaborative. The Collaborative includes the Association of Food and Drug Officials, Centers for Disease Control and Prevention, Conference for Food Protection, FDA, National Association of County and City Health Officials, and National Environmental Health Association.

Members of the Collaborative work together to reduce the incidence of food-borne illness. Increasing the number of jurisdictions that have adopted the most recent edition of the FDA *Food Code* is one of the Collaborative's primary objectives. The Collaborative's *Food Code* adoption activities include several projects that provide access to information, tools, resources, contacts, and sound reasoning to support *Food Code* adoption. The projects highlighted in this special report represent a subset of numerous projects undertaken by the Collaborative and include tools and collections of information that can be leveraged by regulatory programs to aid in the *Food Code* adoption process in their jurisdiction.

The Collaborative's *Food Code* Adoption Activities and Projects

***Food Code* Adoption Toolkit**

To address identified barriers to *Food Code* adoption, the Collaborative has created the *Food Code* Adoption Toolkit. The Toolkit is a resource for SLTT jurisdictions and decision makers to learn about the *Food Code*, how it is implemented around the country, and the importance of using current, evidence-based standards to safeguard food. Contents include:

- Resources for understanding the *Food Code* and its benefits.
- Answers to common questions and summaries of changes from one edition of the *Food Code* to the next.

- Statements and letters of support for uniform adoption of the *Food Code* from national associations, members of the retail food industry, regulatory jurisdictions, and Collaborative partners.
- Scientific studies that support *Food Code* adoption.
- Support for jurisdictions including training, industry education materials, and lessons learned from peers about *Food Code* adoption.

The Toolkit is a living resource that is periodically updated with new materials. The contents were informed by the results of a survey sent to 221 SLTT retail food regulatory jurisdictions that assessed each jurisdiction's *Food Code* adoption processes, challenges, and successes (Retail Food Safety Regulatory Association Collaborative, 2021). The Toolkit aids food safety professionals and decision makers at all levels in implementing holistic adoption of the *Food Code*.

Targeted Approaches to Adoption

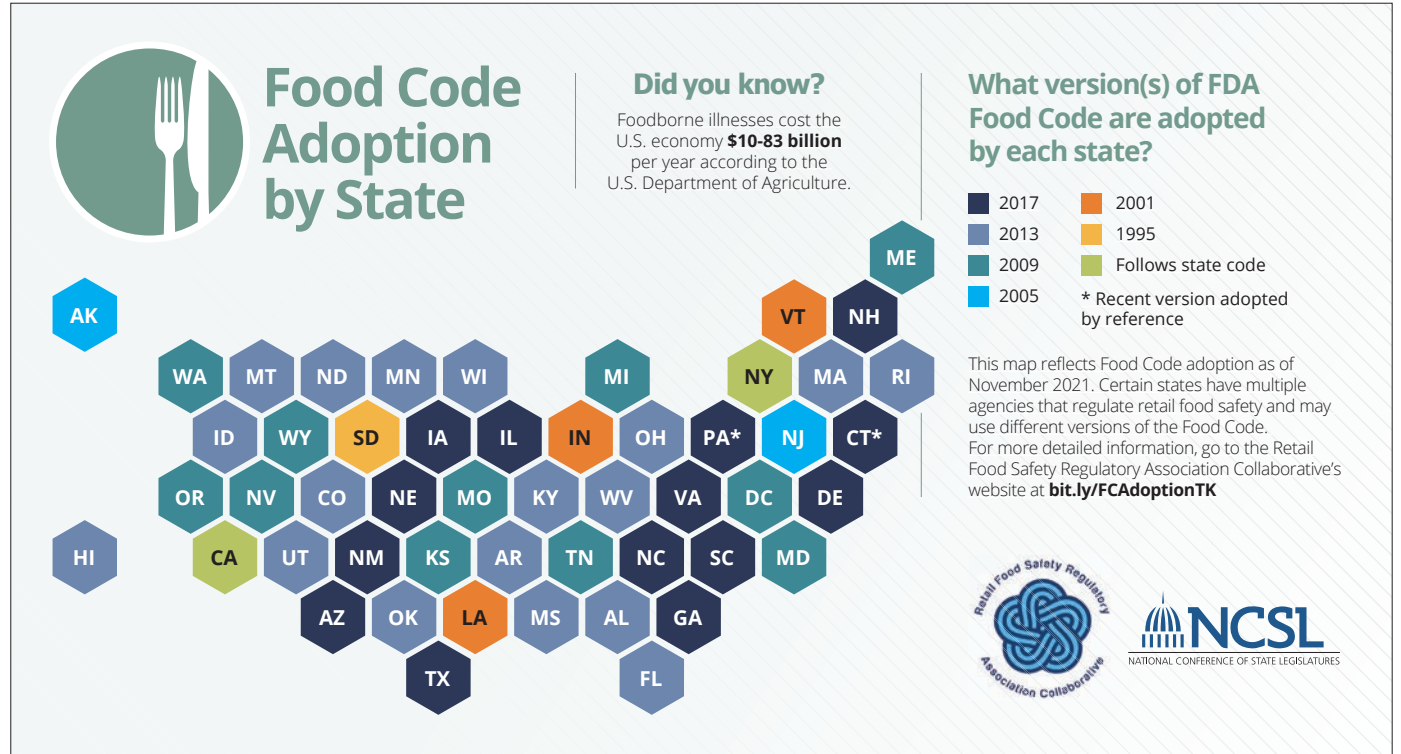
Specific Strategies for States

Each state and jurisdiction has a unique constellation of legislative processes, retail food safety regulation, and regulatory authority and responsibility that make a singular path to *Food Code* adoption impossible. Adoption of the latest edition of the *Food Code* is beneficial for all states; however, individual approaches tailored to each state's unique circumstances could be the most effective method to achieve this goal. Under this methodology, the Collaborative is providing direct support—along with assistance and governmental insight from partner organizations—to South Dakota, a state working with the 1995 edition of the *Food Code*.

Collaborative representatives, alongside FDA Retail Food Specialists, have been meeting with partners in South Dakota to understand the history of the state's food safety regulations and specific legislative processes for *Food Code* adoption. A comparison of the 1995 edition of the *Food Code* to the current 2017 edition was conducted by Collaborative representatives. This comparison revealed several key revisions to the 2017 *Food Code* based on scientific advancements and new knowledge. Adoption of the 2017 *Food Code* could significantly and positively impact South Dakota public health. For example,

FIGURE 1

Postcard Mailed to State Legislators That Shows Adoption Status of the Food and Drug Administration (FDA) Food Code by State With Information About the Importance of Adoption and Food Safety



Note. Postcard reprinted with permission from the National Conference of State Legislatures.

communities in South Dakota might be at higher risk of a norovirus outbreak because the 1995 *Food Code* does not require a written cleanup procedure for vomit or diarrhea accidents in food service. Norovirus is the leading cause of illness and outbreaks from contaminated food in the U.S. (Centers for Disease Control and Prevention, 2023).

This methodology for adoption support is still underway; results and findings will be used to improve future targeted approaches and further inform the development and content of the Toolkit. Future Toolkit development likely will include the addition of tools and resources specific to legislators.

Specific Initiatives for Decision Makers

To raise awareness and support among decision makers, a postcard that highlighted the benefits of *Food Code* adoption was developed and distributed to legislators across the U.S. (Retail Food Safety Regulatory Association Collabora-

tive, 2022; Figure 1). The postcard contained information on key food safety concerns and simplified data on each state's current status of *Food Code* adoption. The postcard was sent to more than 1,500 state legislators in winter 2021 and set the stage for discussions around *Food Code* adoption in states across the country. This initiative emphasized the differences in *Food Code* edition adoption around the U.S. and sparked discussions between decision makers and both Collaborative members and regulatory program administrators.

Data Collection Projects

The Collaborative has undertaken several data collection projects in an effort to advance understanding of the complex landscape of *Food Code* adoption, retail food safety regulation (including statutes and regulatory authorities), challenges and barriers facing SLTT jurisdictions, and other factors that affect *Food Code* adoption.

The *Food Code* Adoption Map displays official statutory or regulatory citations that authorize the use of a specific *Food Code* for retail food safety in each state. The *Food Code* can be adopted either by the state legislature or a state agency. This map is part of the *Food Code* Adoption Toolkit and is a powerful tool to understand how states compare with each other.

Additionally, surveys have been conducted to develop a fuller picture of needs, nuances of regulatory authority, and barriers to *Food Code* adoption within states. Individuals surveyed include program managers from all 50 state food programs who have responsibility for retail food safety; also surveyed were senior corporate or franchise food safety leaders in the restaurant, grocery, and convenience store segments. The results of these surveys will be used by the Collaborative to identify further needs and inform future strategies to advance *Food Code* adoption.

The Role of Retail Food Specialists

FDA Retail Food Specialists provide support to SLTT jurisdictions in their efforts to adopt the *Food Code*. These Specialists have comprehensive knowledge of the *Food Code* that allows them to provide active support through every step of the adoption process.

Specialists provide wide-ranging and comprehensive support activities, serve as subject matter experts, and can coordinate with other key players—including members of the Collaborative—in the adoption process. These Specialists can:

- Connect jurisdictions with other jurisdictions that have gone through a similar adoption process or have overcome challenges, thus facilitating mentorship, sharing of best practices, and giving firsthand advice on the adoption process.
- Guide jurisdictions in obtaining buy-in from key partners involved in the adoption process.
- Articulate the benefits of adopting uniform, science-based regulations.
- Help SLTT jurisdictions identify and understand gaps between their current retail food regulations and the most current *Food Code*.
- Serve as active participants in stakeholder meetings, providing clarifications or interpretations of *Food Code* sections, reviewing proposed language, and providing training or presentations to ensure a jurisdiction has a full understanding of *Food Code* provisions.

FDA Specialists provide support even after a jurisdiction adopts an edition of the *Food Code*. They work with SLTT jurisdictions to

ensure uniform understanding and consistent application of the principles in the *Food Code* and provide training that aligns with the most current edition as it evolves.

Preparation to Adopt the Food Code

Food Code adoption can be a complex process. Jurisdictions that are preparing to update their food code can meet the challenges and increase buy-in by:

- Knowing and fully understanding their jurisdiction's food code legislative process.
- Reviewing the various stages in the *Food Code* adoption process and identifying key partners (e.g., legislators, boards of health, retail food industry, consumer groups) that need to be engaged.
- Developing targeted messaging for each of their key audiences so interested groups can be leveraged to support adoption efforts.

To begin the *Food Code* adoption process or support a process that is already underway, jurisdictions can reach out to their FDA Retail Food Specialist (www.fda.gov/food/voluntary-national-retail-food-regulatory-program-standards/directory-fda-retail-food-specialists). We also encourage jurisdictions to connect with the Collaborative for tools, resources, and additional assistance (www.retailfoodsafetycollaborative.org).

Conclusion

The FDA *Food Code* provides a scientifically sound technical and legal basis for regulating the retail segment of the food industry. This framework supports standardization and coordination of resources and efforts

across SLTT jurisdictions that support both regulatory programs and industry partners. Although *Food Code* adoption has the potential to be complex and lengthy, there are tools, resources, and assistance available through the Collaborative. Leveraging the work of the Collaborative and pursuing support from FDA Retail Food Specialists can help jurisdictions adopt the most recent edition of the *Food Code*. ❁

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► BUILDING CAPACITY



Darryl Booth, MBA

Build Capacity With Generative Artificial Intelligence

Editor’s Note: A need exists within environmental health agencies to increase their capacity to perform in an environment of diminishing resources. With limited resources and increasing demands, we need to seek new approaches to the practice of environmental health. Acutely aware of these challenges, the *Journal* publishes the Building Capacity column to educate, reinforce, and build upon successes within the profession using technology to improve efficiency and extend the impact of environmental health agencies.

This column is authored by technical advisors of the National Environmental Health Association (NEHA) data and technology section, as well as guest authors. The conclusions of this column are those of the author(s) and do not necessarily represent the views of NEHA.

Darryl Booth has been monitoring regulatory and data tracking needs of environmental and public health agencies across the U.S. for over 20 years. He is the general manager of environmental health at Accela.

If you track popular culture, you are already aware of ChatGPT, Google Bard, Bing Chat, Microsoft 365 Copilot, and their artificial intelligence (AI) cousins. Collectively, these tools are known as generative AI. Generative in the sense that they can generate content in response to prompts.

It is magical to those users who first encounter it. “You mean it can write poems, emails, quizzes, outlines, and news reports?” Yes!

Generative Artificial Intelligence

The public preview of ChatGPT crossed over into popular culture as we transitioned into 2023 and started to look at the COVID-19 pandemic through the rearview mirror. The technology will certainly launch 10,000 new

startups this year. As you read this column, thousands of organizations are implementing AI strategies—and your environmental health department should, too.

Chatbots like ChatGPT and Bing Chat are trained on large language models (LLMs). If pointed to Wikipedia, they ingest and organize what Wikipedia covers. If pointed to U.S. tax codes and regulations, they learn what the codes and regulations contain. And if pointed to your food code, marking guide, and transactions (e.g., permitting, licensing, inspections, emergency response), they can learn a lot about environmental public health and the operations of your department.

Microsoft 365 Copilot was recently announced, which is a promise to integrate

generative AI into its Office 365 suite, including Word, PowerPoint, and Teams. Google will soon make available a “magic wand” for its popular Google Docs.

Be aware that there are free and paid versions of most generative AI services. The paid versions feature extended capabilities, such as plug-ins and faster responses. Both are useful.

For just 5 minutes, let’s play and learn about ChatGPT:

- Point your browser to <https://chat.openai.com>.
- Click Sign-up and create an account.
- First, one for fun. In the Send a Message prompt, type the following:

Write a haiku about my black beta fish, Max.

- Click Send Message and we might get:

In dark depths he glides,
Max, the black beta fish thrives,
Beauty veiled, yet wise.

That was cute. To change to a more serious topic, click New Chat (top left). Chat sessions are like conversations. Click New Chat when you change topics.

- Type the following in the Send Message prompt:

I’m a new environmental health professional for my county. In just a few sentences, help me explain to friends what I do.

- Press Enter and watch for your personalized response. My response was:

As an environmental health professional, my role is to ensure the well-being of our community by assessing and addressing potential health risks in our environment. I work on issues such as air and water quality, food safety, and sanitation to protect public health and promote a healthier living environment for everyone.

The Regenerate Response button requests another, slightly different, answer. What you type in is known as a prompt. Try using different personas and entering different prompts. Remember to click New Chat (top left) when changing topics.

Limitations and Gotchas

Primarily, let us confirm that like internet searches, generative AI sessions can be monitored by your employer, your internet service provider, and AI companies. You should not share with a chatbot any more than you are willing to share with a stranger.

Be aware that prompts and responses are not private. In fact, the model learns from its previous interactions.

AI services sometimes get it wrong. In the world of AI, response misfires are referred to as “hallucinations.” These cases are where the model responds incorrectly (yet with authority). I have seen examples where the chatbot invented website URLs and names that did not exist. This instance is why responses should be validated as accurate.

Although generally safe, it is possible for prompts and responses to violate your personal and department standards for respect and kindness. Do not rely on these tools blindly. They can (and do) sometimes misrepresent facts.

As you become more experienced in working with generative AI, you may start to create larger and larger prompts. Note that each model has limits to how much text it can accept for each prompt. So, asking it to summarize a new policy (copied and pasted into the prompt) might work fine but asking it to summarize the entire employee handbook might fail. Just break it into smaller parts.

Finally, be aware that these models were trained as of a specific date. Unlike traditional internet searches, questions about recent events will either be deferred or answered incorrectly. Considering the limitations and newness of generative AI, it is a great idea to check for any policies from your organization or department on its use. I have included a sample policy at the end of this column.

Carefully consider both the benefits and risks as you explore how to leverage this technology. If training is not currently available, advocate for it and get involved in establishing a policy to frame its use.

Three Prompts for Three Environmental Health Personas

With the knowledge of AI's limitations, you and your colleagues should still benefit by accessing the tools, which can save your time and energy for more compelling tasks. Try these prompts. Remember, if you do not like the response, you can add a follow-up command (e.g., make it shorter or generate as a table), click regenerate, or design your own prompts.

For the Trainer

Prompt 1: Generate a 20-minute presentation outline on the topic of fats, oils, and greases (FOGs). The presentation audience is the local rotary club. Use a voice that is authoritative but also relaxed and fun.

Prompt 2: Generate a 10-question multiple choice quiz on the training materials below. Each question should have five possible responses. Finally, create an answer key with only the correct answers. [Paste your training materials here before you hit send].

Prompt 3: Write a fun email inviting staff to attend this week's Lunch and Learn. The event is Friday at noon in the training room. This week's topic is "Mastering the Art of Mosquito Breed Identification" and the presenter is Dr. Martinez.

For the Inspector

Prompt 1: You are an inspector for an environmental health department. Your primary focus is on protecting the public's health. Your second focus is on education. Rewrite the following inspection comment to be compelling to a restaurant operator.

[Paste your inspection comment here before you hit send.]

Prompt 2: According to the 2017 Food Code, help me explain the relationship between time and temperature in food safety. Summarize it in a way that is understandable and relatable to all readers.

Prompt 3: You are an inspector for an environmental health department. Annually, our state environmental health association provides a 3-day educational conference. Help me write a short email to my manager with a compelling case for allowing me to attend this year.

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Three Prompts for Three Environmental Health Personas *continued from page 27*

For Supervisors, Managers, and Directors

Prompt 1: You are the director of an environmental health department. Your department is about to adopt a 4-day work week for a 3-month trial period. Write a memo to staff explaining the pilot and inviting employees to opt in or out. Explain that at the end of the trial period, the department will assess the results and consider a permanent policy.

Prompt 2: You are the director of an environmental health department. You must make a report to the board of supervisors itemizing the expected impact of new regulation that decriminalizes unlicensed food vendors. Draft a presentation outline. The new regulation is shown below. [Paste regulations here before you hit send.]

Prompt 3: You are the director of environmental health for your county. You use a data management system that captures facilities, permits, fees, inspection results, complaints, etc. Faced with budget pressures, what types of reports should I request to help me analyze my entire organization? Give your top five recommendations in a table with the report title and the report description for each.

Sample Policy for Environmental Health Departments on the Use of Generative Artificial Intelligence

Purpose and Scope: This policy sets guidelines for the appropriate use of generative artificial intelligence (AI) chatbots such as ChatGPT, GPT-4, Bing Chat, Google Bard, etc. This policy applies to employees using department equipment and networks.

Authorized Use: Employees may use generative AI for work-related tasks. The use of chatbots for personal reasons is discouraged and is covered by the existing internet acceptable use policy of the department.

Reducing Bias and Harm: Generative AI can reflect cultural, social, and other biases. Employees must review content to avoid unintended biases and harmful or offensive material.

Security and Privacy: Employees must ensure that the use of generative AI does not compromise the security or privacy of department information. All communications using generative AI must be in compliance with applicable laws and regulations.

Compliance With Department Policies: Employees must comply with all department policies, procedures, and guidelines related to the use of technology and communication tools.

Monitoring and Enforcement: The department reserves the right to monitor the use of generative AI on department-owned equipment or networks to ensure compliance with this policy. Violations of this policy may result in disciplinary action.

Public Records: Employee use of generative AI systems may result in the creation of a public record.

Training and Education: The department will provide training and education on the appropriate use of generative AI to interested employees.

Disclaimers: The department makes no warranties, express or implied, with respect to the use of generative AI on department-owned equipment or networks and disclaims any liability for any damages arising from such use. By using generative AI on department-owned equipment or networks, employees agree to comply with this policy and acknowledge that any violation of this policy may result in disciplinary action. ✨

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Did You Know?

The 2024 Integrated Foodborne Outbreak Response and Management (InFORM) Conference will be held in Washington, DC, on January 22–24, 2024. The InFORM Conference brings together the network of public health officials involved with foodborne and enteric disease outbreak response, including current federal, state, and local public health and environmental health specialists; epidemiologists; health communicators; and laboratory scientists. Abstract submission notifications will go out in mid-September. The submission for late-breaker abstracts will run from October 2–16. Registration will open no later than October 6. Stay tuned to www.neha.org/inform for the latest information regarding registration, the agenda, and award nominations.

NEHA Annual Financial Statement



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To the Board of Directors
National Environmental Health Association

Report on the Audits of the Financial Statements

Opinion

We have audited the financial statements of National Environmental Health Association (the "Association"), which comprise the statement of financial position as of September 30, 2022 and 2021 and the related statements of activities, changes in net assets, functional expenses, and cash flows for the years then ended, and the related notes to the financial statements.

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Association as of September 30, 2022 and 2021 and the changes in its net assets, functional expenses, and cash flows for the years then ended in accordance with accounting principles generally accepted in the United States of America.

Basis for Opinion

We conducted our audits in accordance with auditing standards generally accepted in the United States of America (GAAS) and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audits of the Financial Statements* section of our report. We are required to be independent of the Association and to meet our ethical responsibilities in accordance with the relevant ethical requirements relating to our audits. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Responsibilities of Management for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with accounting principles generally accepted in the United States of America and for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the Association's ability to continue as a going concern within one year after the date that the financial statements are issued or available to be issued.

Auditor's Responsibilities for the Audits of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance but is not absolute assurance and, therefore, is not a guarantee that audits conducted in accordance with GAAS and *Government Auditing Standards* will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the financial statements.



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To the Board of Directors
National Environmental Health Association

In performing audits in accordance with GAAS and *Government Auditing Standards*, we:

- Exercise professional judgment and maintain professional skepticism throughout the audits.
- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements.
- Obtain an understanding of internal control relevant to the audits in order to design audit procedures that are appropriate in the circumstances but not for the purpose of expressing an opinion on the effectiveness of the Association's internal control. Accordingly, no such opinion is expressed.
- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements.
- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the Association's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audits, significant audit findings, and certain internal control-related matters that we identified during the audits.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated March 9, 2023 on our consideration of the Association's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, grant agreements, and other matters. The purpose of that report is solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the Association's internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the Association's internal control over financial reporting and compliance.

Plante & Moran, PLLC

March 9, 2023

National Environmental Health Association

Statement of Activities

Years Ended September 30, 2022 and 2021

| | 2022 | | | 2021 | | |
|--|----------------------------|-------------------------|-------------------|----------------------------|-------------------------|-------------------|
| | Without Donor Restrictions | With Donor Restrictions | Total | Without Donor Restrictions | With Donor Restrictions | Total |
| Revenue and Gains | | | | | | |
| Program and partnership development | \$ 3,778,665 | \$ - | \$ 3,778,665 | \$ 2,652,859 | \$ - | \$ 2,652,859 |
| Membership dues | 529,776 | - | 529,776 | 525,766 | - | 525,766 |
| Credentialing and education | 755,398 | - | 755,398 | 814,635 | - | 814,635 |
| Annual educational conference | 993,656 | - | 993,656 | 432,149 | - | 432,149 |
| Journal of Environmental Health Publications | 158,918 | - | 158,918 | 126,957 | - | 126,957 |
| Retail flexible funding model | 29,194 | - | 29,194 | 30,783 | - | 30,783 |
| Hurricane supplemental Contributions | 6,316,487 | - | 6,316,487 | 839,688 | - | 839,688 |
| PPP grant funds | - | 17,639 | 17,639 | 1,028,229 | 13,553 | 1,028,229 |
| Entrepreneurial zone | 30,473 | - | 30,473 | 24,364 | - | 24,364 |
| Miscellaneous income | 1,934,218 | - | 1,934,218 | 370,662 | - | 370,662 |
| Net assets released from restrictions | 29,419 | - | 29,419 | 1,710,686 | - | 1,710,686 |
| | 3,500 | (3,500) | - | 28,730 | (3,500) | 28,730 |
| Total revenue and gains | 14,559,704 | 14,139 | 14,573,843 | 8,589,008 | 10,053 | 8,599,061 |
| Expenses | | | | | | |
| Program services: | | | | | | |
| Grants, contracts, and subawards | 9,822,160 | - | 9,822,160 | 4,580,805 | - | 4,580,805 |
| Special projects | 1,647,792 | - | 1,647,792 | 1,683,030 | - | 1,683,030 |
| Total program services | 11,469,952 | - | 11,469,952 | 6,263,835 | - | 6,263,835 |
| Support services: | | | | | | |
| Management and general | 2,049,662 | - | 2,049,662 | 1,748,729 | - | 1,748,729 |
| Fundraising | 16,791 | - | 16,791 | 8,670 | - | 8,670 |
| Total expenses | 13,536,405 | - | 13,536,405 | 8,021,234 | - | 8,021,234 |
| Increase in Net Assets - Before other changes | 1,023,299 | 14,139 | 1,037,438 | 567,774 | 10,053 | 577,827 |
| Other Changes - Investment return - Net | (384,097) | (32,321) | (416,418) | 21,668 | 23,217 | 44,885 |
| Increase (Decrease) in Net Assets | \$ 639,202 | \$ (18,182) | \$ 621,020 | \$ 589,442 | \$ 33,270 | \$ 622,712 |

The information in this statement is derived from audited financials; the entire audited report can be obtained by contacting NEHA.

▶ DIRECT FROM AEHAP



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Expanding Horizons: Online, In-Person, and Hybrid Internship Opportunities to Meet the Needs of Environmental Health Students and Potential Employers

Editor's Note: In an effort to promote the growth of the environmental health profession and the academic programs that fuel that growth, the National Environmental Health Association has teamed up with the Association of Environmental Health Academic Programs (AEHAP) to publish two columns a year in the *Journal*. AEHAP's mission is to support environmental health education to ensure the optimal health of people and the environment. The organization works hand in hand with the National Environmental Health Science and Protection Accreditation Council (EHAC) to accredit, market, and promote EHAC-accredited environmental health degree programs.

This column provides AEHAP with the opportunity to share current trends within undergraduate and graduate environmental health programs, as well as efforts to further the environmental health field and available resources. The conclusions of this column are those of the author(s) and do not necessarily represent the views or official position of NEHA.

Dr. Anne Marie Zimeri is the program director for the EHAC-accredited undergraduate program at the University of Georgia. Dr. Kim Lichtveld is the president of AEHAP and chair of the Department of Environmental, Safety, and Occupational Health Management at the University of Findlay.

Internships in environmental health provide students with a professional experience that allows them to accrue skills in the field. Interns can apply classroom knowledge in real-world settings. As a result, internships can impart and broaden technical skills, build résumés to become more marketable to future employers, allow for negotiation of higher starting salaries, and develop relationships with mentors who then serve as advocates in their careers (Scott & Richardson, 2011). These invaluable experiences

can also solidify the areas of environmental health each student might want to pursue.

Internship providers are critical in arranging positive experiences that can lead to new research, community outreach, and monitoring. Providers can expect internship opportunities to be a two-way learning exchange that prepares the current public health workforce now and for the future. Environmental health internship providers work with their interns to perform disease surveillance and to learn about legislative processes, sanitation,

groundwater and wastewater, pools, rodent control, and more. Through these activities, providers can critically evaluate how interns work, complete tasks that lack staffing support, teach interns to work independently, and develop a mentoring relationship. These mutually beneficial opportunities eventually can be a pipeline to new employees by providing a trial period prior to a permanent position. Select specific examples of internship projects completed in 2022–2023 are listed in Table 1.

Students who graduate from environmental health programs that are accredited by the National Environmental Health Science and Protection Accreditation Council (EHAC) are especially prepared for internships and employment (www.nehspac.org). EHAC-accredited programs, along with schools interested in environmental health, can join the Association of Environmental Health Academic Programs (AEHAP) to assist with student recruitment and retention, student engagement via internships, and student events and resources (www.aehap.org). Students in EHAC-accredited programs focus on core sciences and other framework requirements that form a comprehensive learning experience designed to produce graduates who are well prepared to respond to a variety of challenges in environmental health practitioner positions (EHAC, 2022). These students must complete an internship that is greater than 180 hours for course credit. Internships are most often completed in the summer of junior or senior years after students have had most of their upper-level environmental health classes.

TABLE 1

Examples of Internship Projects From Health Departments That Have Part-Time or Full-Time Online Components

| Internship Example |
|---|
| Assist in the coordination of outreach messaging, public advisory postings, and stakeholder actions if conditions are found to be a potential threat to public health (e.g., recreational waters). |
| Study of the peak activity times of different species of mosquitoes in Central Ohio, as well as assist with other aspects of integrated mosquito management. The results of this project will help inform control activities for adult mosquitoes and improve the control of species that pose a vectorborne disease concern. |
| Work on the National Environment Policy Act and Endangered Species Act through valuating maps, databases, interviews, and historical analysis for the determination of new construction and industry in public health districts. |
| Content development, design, and outreach material for a public health newsletter. |
| Content creator and designer for health department social media. |
| Environmental law literature search to support evidence for personal injury due to environmental exposures. |

FIGURE 1

Internship Logic Model Depicting Relationships Among Internship Factors and a Resulting High Impact Internship



Source: Recreated from Elon University, Center for Engaged Learning, 2023.

The National Environmental Public Health Internship Program (NEPHIP) is a guided internship program that provides students with stipends and placement at qualified state, tribal, local, and territorial environmental public health agencies (National Environmental Health Association [NEHA], 2023a). Benefits of the NEPHIP program—aside from providing financial support to students and providing health departments with quali-

fied students who have skills that match the internship—include providing health departments with students who can be taught to work independently and who can assist and support staff and projects. Furthermore, this internship period can be used as a trial period prior to a permanent position.

NEPHIP internships provide a year-round source of highly motivated students who can bring new perspectives to old problems.

Trained interns can give the professional staff of health departments the freedom to pursue more high-level projects. And as NEPHIP provides a stipend for interns to cover salary and moving expenses, health departments have a cost-effective way to host interns.

Outside of NEPHIP internships, health departments can develop their own internship programs. The University of Findlay (n.d.) offers a guide to developing a quality internship program. Furthermore, the process of internship development for health departments new to hosting interns can be facilitated through the use of the logic model and process in Figure 1. First, health departments need to determine what they would like to gain from an internship program, then begin to develop real-work assignments or projects for the intern. After those tasks, a person should be designated to be responsible for the intern and act as a mentor. Health departments should consult with their internal human resources department regarding pay unless the internship is voluntary. Wages vary widely from field to field and health departments should strive to offer competitive wages and incentives (e.g., housing, parking). Finally, a job description should be created that clearly explains the duties and expectations of the internship. Once finalized, health departments can share their internship opportunities with AEHAP or program directors of EHAC-accredited programs to advertise their internships. Health department can also submit an application through NEPHIP to host an intern (NEHA, 2023b).

Modern internships can be in person, fully online, or hybrid (both in person and online). After the COVID-19 pandemic, the field of environmental health began to use its practitioners in remote capacities for numerous job duties. Online activities can include but are not limited to writing handbooks or manuals, designing posters, evaluating data to produce charts and graphs, generating financial forecast and cost recovery reports, performing software and hardware modifications, conducting studies and surveys, developing presentations, compiling technical reports, creating academic lesson plans, conducting research, generating marketing plans, conducting training packages, preparing budgets and financial reports, and completing hands-on projects as needed.

When assigning professional tasks to interns, the evaluation of deliverables can be key to assessing the quality of an intern's work. These deliverables yield data that can report the time spent on each task and what tasks were completed. Internship deliverables like reports, presentations, social media content, inspection reports, and the assessment of the previously mentioned tasks can be used to determine the value of an intern and their work, especially when they are working independently on a project remotely.

University internship coordinators serve as support for interns and internship providers. Many programs require weekly status reports. These reports are typically organized around the identified projects, as well as the project plan, and include a discussion of pertinent information about all of the items outlined in internship requirements. The report should be sent through the mentor. The mentor is expected to evaluate weekly reports for accuracy, completeness, and conformance with any company policies concerning security, proprietary information exclusions, etc.

Evaluation of the intern's work and professionalism through feedback to the intern and their university internship coordinator is critical to the professional development of the student. These evaluations also allow health departments to document the potential of the intern as a permanent employee. A final report or presentation should be submitted to encapsulate the internship experience, encompassing the initial goals, challenges encountered,

and the profound impact the internship has had on the intern. The submission should encompass all the aspects detailed in the preceding paragraphs. This terminal report provides documentation of the greater than 180 hours of professional work required for course credit in EHAC-accredited programs. This information should be presented to the health department and to the intern's university.

An additional factor in establishing internships can include a memorandum of understanding (MOU) agreement between a health department and a university. MOUs establish the terms of the internships, the responsibilities and duties of the students, and the learning objectives that the provider will meet by providing the internship. Many are signed for a period of 3–5 years so that numerous interns can work with the health department without signing a new MOU for each intern.

In conclusion, intern technical skills and the application of these skills in real-world scenarios are essential for workforce development. Internships can yield great gains for students such as an increase in technical skills and communication abilities, opportunities to use problem-solving skills, and the development of soft skills and professionalism. Altogether, internship programs are an effective mechanism to assess students for employment in health departments. ✨

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Did You Know?

The 17th International Federation of Environmental Health (IFEH) World Congress on Environmental Health will be held in Perth, Australia, on May 20–24, 2024. Abstract submission is open and will close on December 8. Abstracts covering a broad range of environmental health topics are welcomed, including contemporary environmental health, environmental health practice, environmental systems, food, public health, and more. Learn more at www.wceh2024perth.com.

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The Environmental Justice Index: Measuring Cumulative Impacts of Environmental Burdens on Health

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Editor's Note: As part of our continued effort to highlight innovative approaches to improve the health and environment of communities, the *Journal* is pleased to publish regular columns from the Agency for Toxic Substances and Disease Registry (ATSDR) at the Centers for Disease Control and Prevention (CDC). ATSDR serves the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases related to toxic substances. The purpose of this column is to inform readers of ATSDR's activities and initiatives to better understand the relationship between exposure to hazardous substances in the environment, its impact on human health, and how to protect public health.

The findings and conclusions of this column are those of the author(s) and do not necessarily reflect the views of CDC or ATSDR.

Lauren Freeland, Benjamin McKenzie, and Erica Lehnert are geospatial epidemiologists at CDC/ATSDR. Dr. Barry Flanagan is a social geographer at CDC/ATSDR. Michel Conn and Dr. Gabriele Richardson are senior geospatial analysts at CDC/ATSDR. Dr. Angela Werner is a lead health scientist at CDC.

Introduction

The environmental justice movement has increased awareness that contamination of land, air, and water has disparate impacts on communities in the U.S. and that ending environmental injustice can only be accomplished with the diminution of race, gender, and class inequities (Bullard, 2001; Perez et al., 2015). To this end, the focus of scientific research on justice-centered environmental activism has increased in recent years, as has the development of tools aimed at helping reduce environmental injustices (Lee, 2020).

In response to calls for state and federal tools that address the cumulative impacts of environmental injustice on health (Callahan et al., 2021; Lee, 2020), the Geospatial Research,

Analysis, and Services Program (GRASP) at the Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry (CDC/ATSDR) partnered with the National Environmental Public Health Tracking Program within CDC and the Office of Environmental Justice within the U.S. Department of Health and Human Services to develop the Environmental Justice Index (EJI). The index was publicly released in August 2022.

Development of the Environmental Justice Index

The EJI is the first place-based, nationwide index designed to help public health officials, community-based organizations, and researchers identify and support communi-

ties facing cumulative impacts on their health from environmental and social burdens. The EJI is calculated at the census tract level, a geographic unit that is useful for analyzing community-level data for policy and planning (Krieger, 2006). The census tract level is also a standard unit used for tools that map national cumulative impacts.

Indicators of the Environmental Justice Index

Potential indicators for the EJI were identified based on the results of a thorough literature review, including a scoping review of current environmental justice literature and tools. Potential indicators were then evaluated to ensure that the data:

1. Come from a trusted, reliable, and stable national data source;
2. Accurately measure what they intend to;
3. Are at or can be easily aggregated to the census tract level; and
4. Are regularly updated for inclusion in future iterations of the EJI (ATSDR, 2023).

Following the application of these criteria, we identified 36 indicators, grouped into 10 domains and 3 overarching modules: the Social Vulnerability Module, Environmental Burden Module, and Health Vulnerability Module (Figure 1).

FIGURE 1

Indicators of the Environmental Justice Index

| | Module | Domain | Indicator | Data Source |
|------------------------------------|----------------------|---------------------------------------|--|---|
| Overall Environmental Justice Rank | Social Vulnerability | Racial/Ethnic Minority Status | Minority Status | U.S. Census Bureau American Community Survey (ACS) |
| | | Socioeconomic Status | Poverty No High School Diploma Unemployment Housing Tenure Housing Burdened Lower-Income Households Lack of Health Insurance Lack of Broadband Internet Access | |
| | | Household Characteristics | ≥65 Years ≤17 Years Individual With a Disability Speaks English “Less Than Well” | |
| | | Housing Type | Group Quarters Mobile Homes | |
| | Environmental Burden | Air Pollution | Ozone Particulate Matter 2.5 (PM _{2.5}) Diesel Particulate Matter Air Toxics Cancer Risk | U.S. Environmental Protection Agency (U.S. EPA) Air Quality System and National Air Toxics Assessment |
| | | Potentially Hazardous and Toxic Sites | National Priority List Sites Toxic Release Inventory Sites Treatment, Storage, and Disposal Sites Risk Management Plan Sites Coal Mines Lead Mines | U.S. EPA Facility Registry Service U.S. Mine Safety and Health Administration Mine Data Retrieval System |
| | | Built Environment | Lack of Recreational Parks Houses Built Pre-1980 Lack of Walkability | TomTom MultiNet Enterprise Dataset U.S. Census Bureau ACS U.S. EPA National Walkability Index |
| | | Transportation Infrastructure | High-Volume Roads Railways Airports | TomTom MultiNet Enterprise Dataset |
| | | Water Pollution | Impaired Surface Water | U.S. EPA Watershed Index Online |
| | Health Vulnerability | Preexisting Chronic Disease Burden | Asthma * Cancer * High Blood Pressure * Diabetes * Poor Mental Health * | Centers for Disease Control and Prevention Population Level Analysis and Community Estimates (PLACES) |

* Health vulnerability measures are marked with asterisks because they are calculated differently than other indicators. While most indicators can have a range of values, the health vulnerability indicators represent only whether a given census tract experiences a high estimated prevalence of disease or not.

Environmental Justice Index Model

Each indicator in the EJI is ranked from highest to lowest vulnerability across all census tracts in the nation for which data are avail-

able, producing a percentile rank score for each indicator for each census tract. Module scores are calculated a bit differently, depending on the module. For example, scores for the Social Vulnerability and Environmental

Burden Modules are calculated by summing the percentile rank scores for constituent indicators and then assigning each tract a percentile rank score for that module based on the scores of all constituent indicators.

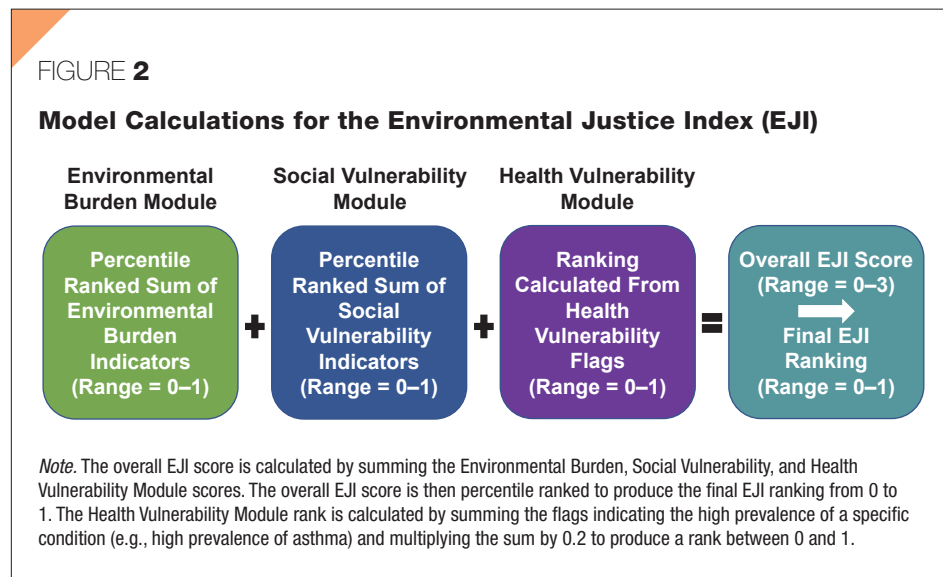
On the other hand, Health Vulnerability Module scores are calculated by first determining if the indicator estimate for a tract ranks in the top one third nationwide (>66.66%). If so, the tract is assigned a flag score of 1, otherwise, it receives a flag score of 0. The Health Vulnerability Module score is then calculated by summing the number of flags and multiplying this sum by 0.2 to produce a module score between 0 and 1, which ensures that all modules are weighted equally in the overall EJI. The overall EJI score is then calculated by summing the ranked scores of these three modules to determine an overall percentile ranking for each census tract (Figure 2).

The EJI model is based on the Environmental Justice Screening Method (EJSM; Sadd et al., 2011). The EJI differs, however, from other EJSM-derived tools—such as CalEnviroScreen (California Office of Environmental Health Hazard Assessment, 2021)—as the EJI uses an additive rather than multiplicative model. The EJI also differs from CalEnviroScreen and similar tools in that it does not give a heavier weight to pollution exposures than to other environmental justice factors. These decisions were intended to facilitate easy adaptation and interpretation of the EJI by a wide range of users with varying technical expertise and health literacy.

Using the Environmental Justice Index

The overall EJI rank is a useful tool for identifying and prioritizing communities experiencing high cumulative impacts of environmental burdens on health and health equity. Once highly burdened census tracts are identified, the module, domain, and indicator scores that drive high EJI ranks can be used to inform actions that are targeted to their specific social, environmental, and health burdens.

For example, during an environmental assessment for a new program in Manhattan, New York, census tracts along the Cross Bronx Expressway were identified as already experiencing high cumulative impacts from environmental burdens and thus were prioritized for mitigative actions based on their overall EJI rank. By taking a closer look into the module, domain, and indicator ranks provided in the EJI, it was clear that air pollution indicators (specifically diesel particulate matter and air toxics cancer risk) in the Environmental Burden Module and the high preva-



lence of chronic health conditions (including asthma and diabetes) in the Health Vulnerability Module were driving cumulative impacts in this area. As a result, recommendations for focused health protective mitigation measures, including the installation of air filtration systems and funding low- and zero-emission public transportation, were made to sponsoring agencies (Office of the Assistant Secretary for Health, 2022).

Limitations of the Environmental Justice Index

The EJI is intended as a high-level mapping and screening tool that characterizes cumulative impacts and patterns of environmental injustice across the U.S. and is a useful starting point for investigating issues of distributive and procedural justice and their effects on health and well-being. The EJI is not, however, intended for labeling highly impacted communities as “environmental justice communities,” nor is it intended to characterize all environmental justice issues that a community might experience. Additionally, as environmental injustice occurs locally, high-level tools, such as the EJI, cannot fully represent all the social, environmental, or health issues that a community might face, as the data representing these issues (e.g., pesticide use, low birthweight) might be limited or too coarse to be applied at a neighborhood scale. Given that the environmental indicators included in the EJI do not represent detailed measures of risk or exposure assessment, the EJI is not intended as a

representation of risk or exposure for a given community or as a tool to discern whether individuals are at risk of exposure.

While the full EJI ranking is useful for the identification, prioritization, and characterization of cumulative impacts in an area, it is not designed for use in secondary analysis where disease is the outcome of interest. To make the EJI more useful in this context, the EJI Social–Environmental Ranking was created using only the Environmental Burden and Social Vulnerability Modules of the EJI. Health outcome prevalence estimations from the Health Vulnerability Module were not included in its construction, making it appropriate for studying associations with health outcomes. The EJI Social–Environmental Ranking can be found in the EJI database at <https://eji.cdc.gov>.

Conclusion

The EJI adds to a growing body of literature and tools as the first national, place-based tool that looks at the cumulative impacts of environmental burdens on health. By using a cumulative impacts framework and relative rank methodology, the EJI allows users to identify communities experiencing high cumulative impacts from environmental burdens, so that those communities can be prioritized for mitigative action. This framework also allows users to further investigate indicators that could be driving high cumulative impacts in a community so that mitigative action can be tailored to meet the needs of individual communities. Lastly, this framework allows users

to adapt the EJ to their own needs, such as by removing Health Vulnerability Module indicators for use in studying health outcomes or by adding local indicators when appropriate. ❁

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Retail Collaborative Provides Tools and Resources to Drive Food Safety

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Editor's Note: The National Environmental Health Association strives to provide up-to-date and relevant information on environmental health and to build partnerships in the profession. In pursuit of these goals, we feature this column on environmental health services from the Centers for Disease Control and Prevention (CDC) in every issue of the *Journal*.

In these columns, authors from CDC's Water, Food, and Environmental Health Services Branch, as well as guest authors, will share tools, resources, and guidance for environmental health practitioners. The conclusions in these columns are those of the author(s) and do not necessarily represent the official position of CDC.

The authors represent organizations participating in the Communications Workgroup within the Retail Food Safety Regulatory Association Collaborative.

Addressing Restaurant Food Safety Is Key to Reducing Foodborne Illness

More than one half of all foodborne illness outbreaks in the U.S. are associated with restaurants (Centers for Disease Control and Prevention [CDC], 2019). Reducing foodborne illness is one of the nation's Healthy People 2030 goals (U.S. Department of Health and Human Services, n.d.). To reduce foodborne illness and outbreaks at the retail level, the Food and Drug Administration (FDA) brought together key partners to expand the capacity of food safety programs.

Mobilizing Leading Organizations Around Food Safety Goals

The Retail Food Safety Regulatory Association Collaborative (Collaborative) brings together representatives from seven member organizations with a role in improving retail food safety in the U.S.:

- Association of Food and Drug Officials (AFDO)
- Association of State and Territorial Health Officials (ASTHO)

- Conference for Food Protection (CFP)
- National Association of County and City Health Officials (NACCHO)
- National Environmental Health Association (NEHA)
- Centers for Disease Control and Prevention (CDC)
- Food and Drug Administration (FDA)

These organizations leverage their combined strengths and resources as the Collaborative to create and share tools and resources that food safety programs can use to improve food safety in their jurisdictions. In addition, the Collaborative's six objectives are poised to influence or benefit regulatory food safety programs and the food safety culture at restaurants and other retail food establishments. The Collaborative's objectives are as follows:

- Develop a strategy to support national FDA *Food Code* adoption.
- Increase use of risk-based inspections and intervention strategies.
- Increase use of the FDA Voluntary National Retail Food Regulatory Program Standards.
- Improve foodborne outbreak investigation methods.

- Increase the number of restaurants and other retail food establishments with well-developed food safety management systems that use active managerial control.
- Develop a strategy to enhance communication and better tell our collective story.

This column highlights some of the resources from the Collaborative for food safety programs. All Collaborative resources are available at www.retailfoodsafetycollaborative.org.

Using the Food Code Adoption Toolkit to Support Adoption Efforts

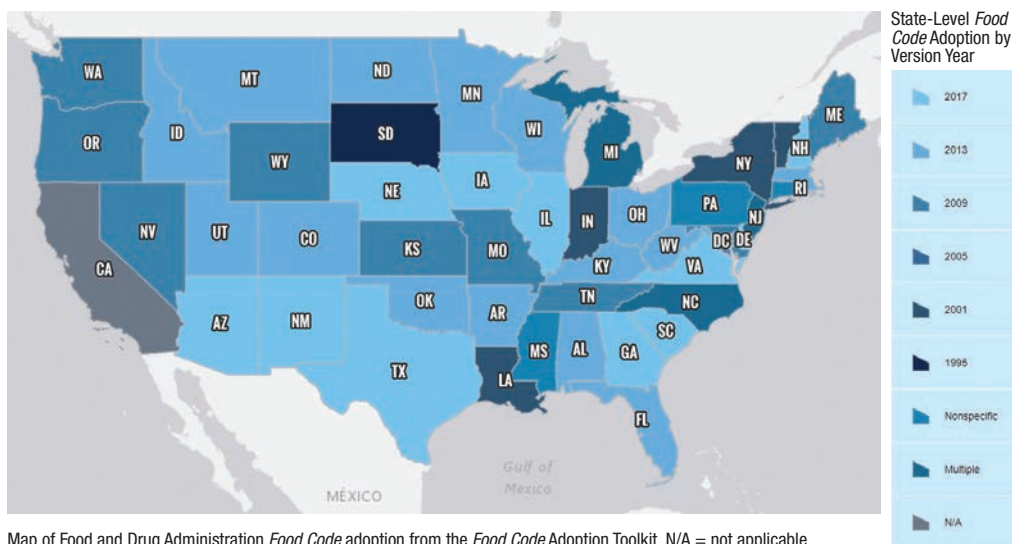
With release of the FDA 2022 *Food Code* earlier this year, adoption is fresh on the minds of regulators. The Collaborative's *Food Code* Adoption Toolkit helps food safety programs learn more about how the *Food Code* is used across the country. These programs can access resources to educate decision makers about the importance of these science-based standards. The Toolkit includes a map of current *Food Code* adoption across the U.S., along with statements supporting adoption from national organizations, major players in the food industry, and food safety programs. It also includes links to articles on the impact of the *Food Code*, including a study (Kambhampati et al.,

FIGURE 1

Explore Resources From the Retail Food Safety Regulatory Association Collaborative That Your Food Safety Program Can Use

- *Food Code* Adoption Toolkit
- Foodborne Illness Outbreak Resource Library
- Active Managerial Control Incentive Programs: Examples From Jurisdictions Leading the Way
- Issue Brief on Retail Program Standards Networks
- Study on Factors Influencing the Implementation of Risk-Based Inspections
- Study on Implementation of Effective Intervention Strategies

Find these resources and more at www.retailfoodsafetycollaborative.org.



2016) and a plain language summary (CDC, 2022) documenting that adoption of *Food Code* provisions is linked with lower rates of foodborne norovirus outbreaks.

Learning How Programs Meet the Voluntary National Retail Food Regulatory Program Standards

Members of the Collaborative researched how regulatory food safety programs are meeting the FDA Voluntary National Retail Food Regulatory Program Standards, including the benefits of participating in state- and region-wide networks focused on supporting programs to meet the standards. Extensive qualitative research revealed these networks played a huge role in helping participating programs. Specifically, the networks helped programs meet the standards more efficiently, facilitated resource sharing among jurisdictions beyond the standards, and strengthened communication among programs and state and federal agencies.

Exploring the Foodborne Illness Outbreak Resource Library

This open-access library houses materials to support foodborne illness outbreak investigations that food safety programs wanted but had trouble finding, according to a survey conducted by the Collaborative (National

Environmental Health Association & Retail Food Safety Regulatory Association Collaborative, 2022). These resources include a printable guide to help identify the roles and responsibilities of team members during an outbreak investigation, an interactive case study exercise based on an outbreak at a hotel, and instructions for collecting various types of environmental samples.

This library focuses on ready-to-use materials addressing various aspects of foodborne illness outbreaks. Resources include tools and links to training on such topics as interviewing restaurant staff members, collecting clinical and environmental samples, using pathogen-specific guidance, communicating with the media, and completing after-action reports. It also features links to well-known resources, such as the CDC Environmental Assessment Training Series and the Council to Improve Foodborne Outbreak Response *Guidelines for Foodborne Disease Outbreak Response*.

Discovering How Jurisdictions Lead the Way With Active Managerial Control Incentive Programs

Certified food protection managers can play an important role in creating safe food policies in their restaurants and actively ensuring those policies are followed. Active managerial

control (AMC) is when retail food establishments proactively incorporate specific actions and procedures into their operations to control hazards and reduce risks that cause foodborne illness outbreaks. To help encourage these practices, regulatory food safety programs can create AMC incentive programs to help shift the retail culture from a reactive mindset to a proactive approach to food safety.

The Collaborative asked regulatory food safety programs to identify key materials and resources they used to promote AMC, including incentive programs. In the words of one respondent, facilities that participate in the AMC incentive program have “fewer violations and have been able to conduct fewer inspections. It is a very positive outcome for both the facility and the health department” (National Environmental Health Association & Retail Food Safety Regulatory Association Collaborative, 2021). Explore the resources other regulatory food safety programs have developed to educate and support restaurants in using AMC, including educational classes, sample templates, and an AMC self-assessment.

Exploring Other Resources and Getting Involved

The Collaborative website houses a repository of tools and resources for food safety professionals at all levels (Figure 1), including stud-

FIGURE 2

Sign Up For Email Updates and Follow the Retail Food Safety Regulatory Association Collaborative on Social Media



ies on how regulatory food safety programs apply risk-based inspection methods and use interventions to address risk factors for foodborne illness in their jurisdictions. Visit the Collaborative website at www.retailfoodsafetycollaborative.org to find more information and sign up to receive email updates to be notified about new tools and events (Figure 2). Thank

you for all you are doing to improve food safety in your community. 🌸

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Did You Know?

September is National Food Safety Education Month. Every year, an estimated 1 in 6 people in the U.S. get sick from a foodborne disease. Check out our food safety resources at www.neha.org/food-safety_2. You can learn about the credentials, courses, and study materials we offer to strengthen your skills. You can also explore our policy statements that cover a broad range of topics, including food freedom operations, raw milk, uniform and integrated food safety systems, and more.

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▶ DIRECT FROM THE NEHA PREPAREDNESS PROGRAM COMMITTEE

Coordinating Environmental Health Preparedness Across Sectors

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Editor's Note: The National Environmental Health Association (NEHA) strives to provide up-to-date and relevant information on environmental health and to build partnerships in the profession. In pursuit of these goals, we are pleased to feature a column from the NEHA Preparedness Program Committee. Our organization has several committees made up of subject matter experts who are dedicated to environmental health topics including body art, climate change, food safety, preparedness, vector control, and more. These committees provide guidance, input, and expertise to NEHA leadership and staff, the environmental health workforce, and partner organizations.

The conclusions of this column are those of the author(s) and do not necessarily represent the official position or views of NEHA or of author affiliations.

Dr. Kai Elgethun, Sauda Yerabati, Charissa Cooper, and Shelby Haddeland are members of the NEHA Preparedness Program Committee. Dr. Liz Walker and Dr. Tania Busch Isaksen were facilitators of the panel held at the NEHA 2022 Annual Educational Conference & Exhibition. Dr. Jesse Bliss, Amy Chang, and Dr. David Dyjack are NEHA staff members.

Introduction

The National Environmental Health Association (NEHA) recognizes the important role of the environmental public health (EPH) workforce in public health preparedness, response, and recovery from emergencies and disaster-related events. NEHA established the Preparedness Program Committee to convene subject matter experts to showcase the significance of EPH within emergency preparedness and to advance best practices. The committee is made up of professionals from public and private sectors with EPH and emergency management expertise.

The mission of the NEHA Preparedness Program Committee is to serve as a resource for the organization and for the EPH pro-

fession in preparing for, responding to, and recovering from emergencies and disasters to create more resilient communities and to minimize death, illness, and injury. The committee champions the efforts of EPH professionals who respond to emergencies and disaster-related events. Committee activities include the following:

- Provide guidance on NEHA preparedness programs and projects.
- Identify training gaps and emerging issues in EPH preparedness.
- Promote and disseminate materials and resources developed by NEHA and the committee.
- Identify EPH preparedness funding and other opportunities to engage and support the workforce.

In 2022, committee chairs convened a panel at the 2022 NEHA Annual Educational Conference (AEC) & Exhibition held in Spokane, Washington, on June 28–July 1. The panel engaged the audience in a brainstorming session on the topic, “Coordinating Environmental Health Preparedness Across Sectors.” The audience, panel, and facilitators represented sectors that are active in EPH preparedness and response, including nonprofit organizations, nongovernmental organizations (NGOs), and voluntary organizations active in disaster (VOADs). These contributors detailed the challenges to coordination and provided recommendations regarding the need to improve this coordination across local, state, tribal, territorial, federal, NGO/VOAD, and other sectors.

Challenges

The following challenges were identified by the panel as barriers that impede EPH preparedness coordination across sectors.

- Staffing shortages and turnover were noted as recalcitrant issues. COVID-19 burnout among EPH professionals and a booming job market in more lucrative fields have made the problem even more pronounced in the past few years.
 - » Funding is needed to specifically support EPH preparedness staffing. This funding is especially critical to support the EPH workforce at the local level where EPH professionals are needed on the front lines.
 - » Dedicated EPH preparedness coordinators are needed. For example, there are only three EPH emergency preparedness coordinators in California funded by the Public Health Emergency Preparedness (PHEP) cooperative agreement at the state level, which is inadequate for such

a populous state. Who else can coordinate and help?

- » Many new recruits lack expertise in operational processes and norms.
- » Due to staff turnover, it is often difficult to find the right point of contact. Furthermore, agency websites are often out-of-date and list people who are no longer employed.
- » Preparedness and response staff are often different people because response requires more people and many responders are volunteers.
- » Health department leadership is often unfamiliar with the Incident Command System (ICS), which can lead to their reluctance to fully staff a response.
- » Local EPH staff are funded to provide fee-for-service regulatory work such as permitting and compliance enforcement. Operational systems and structures for routine work are not conducive to emergency preparedness, which has repercussions for the entire disaster management lifecycle. For example, if EPH is not involved in developing hazard mitigation, response, and recovery plans, capability gaps will be pervasive. The capacity gaps are frequently demonstrated as a lack of formal procedures for activation, communication, and coordination during an emergency.
- Interpersonal challenges exist, some of which are due to the way different agencies and groups are structured and some result from communication breakdowns.
 - » The ongoing process of identifying which groups are most important to build relationships with is necessary for success but is time-consuming to conduct.
 - » Interagency and interpartner coordination does not frequently happen in preparedness, which translates to poor coordination in response.
 - » Agencies do not always use the same language or terminology (e.g., job titles, roles differ by agency).
 - » Local EPH and emergency management often do not interact.
 - » EPH is organizationally separated from public health in many jurisdictions. Seamless integration of Emergency Support Function (ESF) 8 partners (public health and medical services) is the foundational bedrock for the coordination
- of policies and procedures upstream to operations downstream.
- » Roles and responsibilities are not well defined, which adds to a lack of awareness and understanding of the roles of EPH in disasters among the larger emergency management community.
- » The scope of each group is not well defined and often overlaps.
- » ICS terms are defined, but there is no enforcement of their proper use.
- Technologies and tools that responders use are often incompatible with one another, including communications technology, software, and databases.
 - » Data sharing is challenged by incompatible technology platforms.
 - » Maintenance of software and online content updates vary depending on the IT capacity of agencies or groups.
 - » The continuity of IT platforms across state lines is uneven (e.g., WebEOCs [Emergency Operations Centers], ESSENCE [Electronic Surveillance System for Early Notification of Community-Based Epidemics]).
 - » Job action sheets, mutual aid resource requests, and other tools are outdated or irrelevant to EPH.
 - » Databases are not updated regularly. Further, dates are not included to indicate when the last update took place, which makes it difficult to determine how current is the information.
 - » In most organizations, there is a lack of support for database technologies.
 - » Problems with continuity and interoperability of software (e.g., incompatibility of GIS software versions).
- Training challenges limit the number of qualified people working in preparedness. Initial and continuing education training to maintain certifications is challenging.
 - » Meaningful continuing education opportunities that specifically support EPH preparedness, response, and recovery professionals are lacking.
 - » ICS curricula do not cover EPH.
 - » There is not enough opportunity to participate in training exercises, in part because EPH professionals are often not invited.
 - » Training exercises that require EPH expertise are infrequently held. As previously stated, a lack of funding for preparedness precludes the par-

ticipation of EPH staff in interagency exercises.

- » There is a disconnect between the needs of EPH professionals and the training offered by local fire departments and emergency medical services (EMS).
- » There is a shortage of communication training for EPH preparedness professionals.
- » Language, definitions, and terminology are not used consistently and vary by agency, group, and geographic region.

Recommendations

The following recommendations were identified by the panel as solutions for increasing coordination across sectors.

- Perform a high-level “landscape analysis” to assess connectivity or the lack of connectivity within emergency preparedness. Given the consistent challenges related to a lack of coordination, mapping the existing emergency preparedness ecosystem of federal, state, tribal, territorial, and local agencies with an honest assessment of what is and is not well coordinated is needed.
- As a first step for local improvements, inventory everyone in your geographic area who works in the fields of emergency preparedness and management. Identify which groups and people are most important for building relationships with. Identify who is working well together and who needs to be introduced or invited to the table.
- Set a regular schedule for coordination meetings of entities involved in EPH preparedness and response (e.g., regional response teams). Regular meetings of EPH professionals that are led by and focus more specifically on this sector can help information, ideas, and best practices transfer across the sector and demonstrates excellence and leadership to other emergency preparedness sectors and entities.
- Leverage existing resources that help coordination. Many tools and approaches already exist and should be first considered to avoid wasted time and energy. Examples include the following:
 - » Laboratory Response Network for Chemical Threats from the Centers for Disease Control and Prevention (<https://emergency.cdc.gov/lrn/chemical.asp>).
 - » Environmental Health Training in Emergency Response (EHTER, www.ehter.org).

cdc.gov/nceh/ehs/elearn/eheter.htm) and other training.

- » Local emergency planning committees (LEPCs)—the EPH workforce needs to be at the table.
- » Rapid response teams (RRTs)—the EPH workforce is at the table.
- » Policy statement from NEHA on preparedness to show the added value of the EPH workforce (www.neha.org/Images/resources/NEHA-Policy-Statement-EH-Role-Preparedness-Final-Nov-2021.pdf).
- » Important role of social services (e.g., woman, infant, and children [WIC] services; services for older adults and people with disabilities). These services are already embedded in communities and can convey key preparedness messages to individuals and assist with disaster recovery.
- » Important role of NGOs: These organizations represent local voices and vulnerable groups and communicate needs to government emergency services at all levels, including representation of economic interests (e.g., tourism).
- Leverage faculty and university resources in coordination to improve preparedness, response, and recovery activities. Both state and local emergency preparedness can expand capacity by communicating gaps and needs to academia.
 - » Universities often have the perspective and training to design projects that will benefit the local EPH workforce.
 - » Universities often have the resources to provide training.
 - » University faculty do important research on technology and platforms that benefit all sectors (e.g., drones, environmental sampling).
- Leverage NGOs/VOADs to improve preparedness, response, and recovery activities. As possible, build relationships with local organizations that deliver critical services or represent vulnerable groups to enhance preparedness and define a system for communication and working together during a disaster. This work can enhance the response through predefined roles and processes, and hopefully minimize confusion.
- Increase grants to local agencies from states to enhance emergency preparedness. Such leadership from the state level

could ensure consistency, standardization, and interoperability of local preparedness within states. This work was recently accomplished in Illinois where funding to address the following was made available:

- » State grants to facilitate coordination and equipment sharing.
- » State grants to ensure software and communications are synchronized across the state.
- » State-funded regional coalitions that support relationship building and trust at the local level.
- Improve and standardize communication. From a common lexicon and awareness of processes to the technology that supports efficient and timely detection, response, coordination, and after-action review of disasters, clear communication is critical. Federal systems that can be accessed by all might be an avenue for true standardization; in their absence, reviewing interoperability for different scenarios can help identify issues.
- Grant deliverables should include EPH capabilities in clear, succinct language.
 - » Federal grants (e.g., Cybersecurity & Infrastructure Security Agency, SAFE-COM Aviation Safety Communiqué, U.S. Department of Homeland Security, Federal Emergency Management Agency [FEMA]) exist to improve emergency communications.
 - » Create a clearinghouse or centralized information center. Knowing the location of resources is key but many exist behind silo walls.
 - » Local knowledge sharing is key to multi-sector collaboration. Make sure the local EPH workforce is included in applicable communications.
- Improve plans. Too frequently, multiple plans that address overlapping scenarios or hazards exist and can create a fragmented, confusing, or incomplete disaster response. As key entities and individuals identify one another and begin to meet regularly, they must begin an ongoing inventory, revision, and updating of plans.
 - » Local response plans are needed that integrate with the state and federal agencies and other sectors. An example given during the panel was of a local EPH department that was not able to work

with their state counterparts on EPH issues during a disaster.

- » Recommend that senior-level health leaders in critical sectors complete ICS and National Incident Management System (NIMS) training from FEMA (<https://training.fema.gov/nims/>).
- » Review plans regularly to make them relevant to current threats.
- » Strive to maintain relationships that were newly formed during the COVID-19 response. Many relationships between EPH and other sectors of public health, healthcare delivery, and preparedness were built during the COVID-19 pandemic.
- Increasing and enhancing training could provide a common body of knowledge and vocabulary to EPH staff to enable them to engage more effectively in preparedness and response teams. Preparedness is a core public health service and requires a trained and respected cadre of EPH professionals to contribute their expertise to multi-agency teams.
 - » EPH staff who could become involved in disaster response and recovery should have initial and refresher (i.e., continuing education) trainings.
 - » Training EPH leadership using fire and hazardous materials (HAZMAT) instructors has proven to be an effective way to get EPH on the same page as fire and HAZMAT professionals who are often incident commanders during an event or disaster.
 - » Real scenarios are needed for training exercises to be effective.
 - » Propose creating an EPH-specific ICS 300 and 400, possibly through NEHA, that could be offered at the NEHA AEC and other venues.
 - » Create training for non-EPH partners on the roles and responsibilities of EPH in disasters. This training could be an amended EHTER course for these partners.

Conclusion

The panel discussion held at the NEHA 2022 AEC highlighted the unique challenges faced by EPH practitioners in the preparedness arena. A recurring theme is the challenge of technology incompatibilities, as well as the challenge of getting EPH professionals, fire departments, and EMS to regularly com-

municate and better understand each other. Securing adequate funding for preparedness infrastructure at the state or regional level has been shown to greatly improve coordination across sectors.

These findings are a call to action for all EPH professionals to engage their state and local preparedness exercise planners to invite EPH professionals to their exercises and to get EPH problems added to the script. Finally, the panel recommended that NEHA engage FEMA and the Administration for Strategic Preparedness and Response (ASPR) at the pol-

icy level to ensure that EPH is at the preparedness table. The authors thank the participants of this panel for sharing their insight and hope that the capacity for EPH preparedness and response continues to grow. 🌸

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Editor's Note: The National Environmental Health Association (NEHA) strives to provide relevant and useful information for environmental health practitioners. In a recent membership survey, we heard your request for information in the *Journal* that is more applicable to your daily work. We listened and are pleased to feature this column from a cadre of environmental health luminaries with over 300 years of combined experience in the environmental health field. This group will share their tricks of the trade to help you create a tool kit of resources for your daily work.

The conclusions of this column are those of the authors and do not necessarily represent the official position of NEHA, nor does it imply endorsement of any products, services, or resources mentioned.

For those of us who specialize in institutional environmental health or work in the food production industry, we focus primarily on what we affectionately refer to as the “service corridor.” This work sector includes the essential basic support operations such as food and laundry services, maintenance, warehouse, and sanitation (i.e., housekeeping, janitorial or environmental services), as well as a myriad of environmental health and safety-related activities that fall under these headings. Of these support operations, we probably spend most of our time with sanitation, secondary to maintenance. Our charge is to reduce the bioburden of critical areas to acceptable levels and minimize the risk of cross-contamination.

To accomplish this charge, we define “how clean is clean” in an objective, sustainable, economical, and effective manner by evaluating cleaning frequency, cleaning methods, chemicals, and equipment,

and then developing simple quality control systems. In addition, we are sensitive to the health, safety, functional, and aesthetic needs of the facility to reduce the risk of injury and illness and to minimize losses due to contamination of people, places, and things. We ensure that meeting these objectives does not result in any adverse effect on the public health of the community, such as destroying the local sewage disposal plant through the misuse of chemical cleaning, disinfecting, or sanitizing agents or that their use results in occupational health issues such as allergic reactions, respiratory problems, or contact dermatitis.

With that not-too-brief introduction, we are sometimes aghast when we see the poorly applied sanitation efforts in facilities that do not enjoy the oversight of an environmental health professional. These include store-front clinics, day care centers, group homes, motels, and particularly

some retail food establishments. We often find their custodial closets and cleaning equipment in an appallingly unclean condition. Gray mops stored in gray water that is starting to bubble due to septic fermentation, brooms and brushes that are worn and blackened from dirt and grease, cleaning cloths that can stand up on their own, and mop buckets that have not been cleaned since the turn of the millennium.

Worst of all, we find that the equipment used to clean food preparation and food service-related areas is the same that is used to clean toilets and waste rooms. We often find the widespread use of inappropriate household cleaning chemicals and incompatible cleaning chemical mixtures that either off-gas or are rendered completely ineffective. Often, we find excessive glug-pour (i.e., the idea that if a little is good, a lot is better) applications of toxic compounds regulated by the U.S. Environmental Protection Agency. It is not uncommon that odorants are used to cover the stench of rancidifying fats and putrefaction that result from the anaerobic bacterial digestion of proteins or used to cover foul-smelling, incompletely oxidized organic products. And if that was not enough, we see a total lack of adequate staff training and supervision, particularly in the use (proper or otherwise) of personal protective equipment.

All these conditions are rife for cross-contamination, not to mention seriously compromising the health and safety of everyone in the facility. Citing them as violations is justifiable.

Contrary to popular belief, effective cleaning is not intuitive. It is a skill like any other that must be learned and perfected.

And since soil accumulation is directly proportional to the presence of pestilence and precursors to disease and injury, it is our job to urge our clients in a positive and productive direction. But first, we strongly urge that you familiarize yourself with some of the tricks of the trade that are readily available through YouTube and other free online sources. At the least, become familiar with the basic steps of cleaning, cleaning chemistry, the dynamics of disinfection and sanitization (d-, z-, and f- values), and the various commercial methods available for the operator including the latest technologies (e.g., dry steam, electrolyzed water, dry ice blasting, ozone generation, microfiber mops and wipe cloths).

You may also want to share a few suggestions that would significantly help operators reach a higher level of sanitation in their facility.

- First, discourage the double-dipping of mops and cloths. Discourage the use of the single mop bucket. Rather have your client consider double-compartment buckets, or better yet, use an auto-scrubber or a no-touch spray or vacuum system for routine cleaning.
- Show your client the proper use of wipe cloths. Demonstrate how to fold cleaning cloths into quadrants and wipe in one direction instead of back and forth, and to change to a new quadrant when needed. To prevent cross-contamination, urge that the wipe cloths are laundered after use, rather than reusing them after rinsing in a single bucket sanitizer solution.
- Urge that all custodial equipment, including the custodial closet and janitorial area, is maintained in a clean and usable condition. Remember, you cannot sanitize anything that is soiled. Suggest that all mops, if they are to be stored between use, are stored in such a manner to prevent con-

tamination of the handles (i.e., mop heads hanging down).

- Along with the cleaning of equipment, help set up a program that directs hand-washing between various cleaning tasks and encourages the proper selection and use of personal protective equipment, particularly gloves and eye protection.
- Promote the color coding of custodial tools. Since there is no universal standard for color coding, conventional wisdom suggests using green tools (including mop heads) that are exclusively reserved for food service. Red cloths, mops, and other equipment are for use on toilets, urinals, and restroom floors. There are yellow options for restroom sinks and mirrors, and blue for general low contamination risk areas. At the very minimum, we suggest the red/green separation.
- Ideally, if it were not for the survival of the planet, we would encourage the use of disposable mops and wipes. This suggestion, however, is neither practical nor economical. Therefore, if a facility does not use a commercial laundry service, we strongly suggest that they consider purchasing an appropriately sized commercial washer/dryer system and have it serviced by a commercial distributor of laundry products. This practice will ensure the proper wash temperature and the necessary wash cycle settings to match the materials that are being laundered. It will also ensure the proper titration of wash chemicals for optimum soil removal. Proper laundering will significantly extend the useful life of mops and wipes, particularly microfiber ones.
- Pay attention to the condition of the cleaning hardware and ancillary equipment such as mop frames and handles, backer plates, utility sinks, equipment hooks, and

floor drains. These items see constant use and need to be replaced when they are no longer cleanable.

- Encourage adequate lighting measured at the ground level of at least 20 ft-candles (215.2 lumens) in all custodial areas. Remember, it is difficult to clean what you cannot see.
- Finally, suggest that your client direct sufficient ventilation to dry the area when not in use to prevent chronic septic conditions. As a final note, whenever possible, we always try to describe the state of sanitation, or anything else for that matter, in an objective way. Subjective descriptions such as “the stove area is very dirty” relies on opinion and experiences for interpretation. Because cleaning must be targeted to the type of soiling and frequency of attention, describing the area objectively leaves little for interpretation. For instance, “The area behind the stove including the gas lines and wall is covered with grease and dust. The heaviest accumulation is immediately adjacent to the deep fryers. The stove burners have accumulated charred food spillage that partially blocks some of the burner orifices.” Yes, this type of comment requires a bit more writing, but it is far more descriptive and provides guidance about the expectations of cleanliness. Terms such as very, extreme, or dirt do not have meaning in the prevention of cross-contamination.

We encourage cleaning validation, which is using some procedure that includes field instrumentation to establish evidence that cleaning processes prevent product contamination. While cleaning validation is a testing and documentation process, let us first see what we can achieve through basic, regular, and good cleaning practices and leave the validation for another day. 🌸

Contact: toolkit@sanitarian.com.

Did You Know?

September is National Preparedness Month. This year's theme is “Preparing for Older Adults.” The month aims to raise awareness about the importance of preparing for disasters and emergencies that could happen at any time. Visit www.ready.gov/september for more information. You can also check out our preparedness resources at www.neha.org/preparedness, which includes our recently released Wildfire Response Guide for Environmental Public Health Professionals.

ENVIRONMENTAL HEALTH CALENDAR

UPCOMING NATIONAL ENVIRONMENTAL HEALTH ASSOCIATION (NEHA) CONFERENCE

July 15–18, 2024: NEHA 2024 Annual Educational Conference & Exhibition, David L. Lawrence Convention Center, Pittsburgh, PA, <https://www.neha.org/aec>

NEHA AFFILIATE AND REGIONAL LISTINGS**Colorado**

October 11–13, 2023: 67th Annual Education Conference, Colorado Environmental Health Association, Estes Park, CO, <https://ceha49.wildapricot.org>

Florida

October 1–7, 2023: 75th Annual Education Meeting (AEM), Florida Environmental Health Association, Crystal River, FL, <https://feha.org>

Georgia

September 20–22, 2023: 77th Interstate Environmental Health Summit in Conjunction With the GEHA Annual Educational Conference, Georgia Environmental Health Association (GEHA), Jekyll Island, GA, <https://geha-online.wildapricot.org>

Illinois

November 8–9, 2023: Annual Educational Conference, Illinois Environmental Health Association, Oglesby, IL, <https://www.iehaonline.org>

Indiana

September 24–27, 2023: Fall Educational Conference, Indiana Environmental Health Association, Muncie, IN, <https://www.iehaind.org>

Nebraska

October 24, 2023: Annual Education Conference, Nebraska Environmental Health Association, Mahoney State Park, NE, <https://www.nebraskaneha.com>

North Carolina

September 27–29, 2023: Fall Educational Conference, North Carolina Public Health Association, Concord, NC, <https://ncpha.memberclicks.net>

North Dakota

October 17–19, 2023: NDEHA–NCAFDO–Region 4 NEHA Regional Education Conference, North Dakota Environmental Health Association (NDEHA), North Central Association of Food and Drug Officials (NCAFDO), and NEHA Region 4 Affiliates, West Fargo, ND, <https://ndeha.org>

Oregon

October 24–26, 2023: Annual Education Conference, Oregon Environmental Health Association, Newport, OR, <https://www.oregoneha.org/about-1>

Texas

October 16–20, 2023: 67th Annual Educational Conference, Texas Environmental Health Association (TEHA), Georgetown, TX, <https://myteha.org>

December 6–8, 2023: 20th Annual TEHA-STC Educational Conference, South Texas Chapter (STC) of TEHA, South Padre Island, TX, <https://myteha.org/page/SouthTexas>

Wisconsin

September 13–15, 2023: Educational Conference, Wisconsin Environmental Health Association, Appleton, WI, <https://weha.net/events>

TOPICAL LISTINGS**Food Safety**

January 22–24, 2024: Integrated Foodborne Outbreak Response and Management (InFORM) Conference, Washington, DC, <https://www.neha.org/inform>

One Health

October 2–6, 2023: One Health Conference: One Health | One Global Environment, Jamaica Association of Public Health Inspectors, Montego Bay, Jamaica, <https://www.onehealthconference.com>

Water Quality

October 22–25, 2023: Onsite Wastewater Mega-Conference, National Onsite Wastewater Recycling Association, Hampton, VA, <https://www.nowra.org/conference/mega-conference>

November 13–15, 2023: World Aquatic Health Conference, presented by the Pool & Hot Tub Alliance, Las Vegas, NV, <https://wahc.phta.org> 🌸

Did You Know?

You can share your educational events on our website at www.neha.org/education/events. Events should be educational and should specifically benefit the environmental health workforce. Just fill out the submission form with your event information (e.g., title, location, dates, website, description, environmental health topics covered, sponsor information) and we will review the submission for posting. If we are unable to post your educational event, we will let you know.

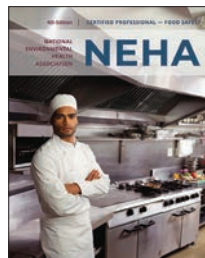
RESOURCE CORNER

Resource Corner highlights different resources the National Environmental Health Association (NEHA) has available to meet your education and training needs. These resources provide you with information and knowledge to advance your professional development. Visit our online bookstore at www.neha.org/store for additional information about these and many other pertinent resources!



CP-FS Study Guide (4th Edition)

National Environmental Health Association (2022)



The National Environmental Health Association (NEHA) has released an updated edition of the *Certified Professional–Food Safety (CP-FS) Study Guide*. The fourth edition of the study guide has been updated to the current FDA *Food Code* and includes information and requirements from the Food Safety Modernization Act. It was developed by retail professionals to help

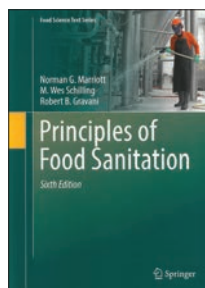
prepare candidates for the NEHA CP-FS credential exam with in-depth content, an examination blueprint, practice test, and many helpful appendices. The study guide is the go-to resource for students of food safety and food safety professionals in both regulatory agencies and industry. Chapters in the new edition include causes and prevention of foodborne illness, HACCP plans, cleaning and sanitizing, facility and plan review, pest control, inspections, foodborne illness outbreaks, sampling food for laboratory analysis, food defense, responding to food emergencies, and legal aspects of food safety. Also now available as an e-book!

358 pages, spiral-bound paperback

Member: \$199/Nonmember: \$229

Principles of Food Sanitation (6th Edition)

Norman G. Marriott, M. Wes Schilling, and Robert B. Gravani (2018)



Now in its 6th edition, this highly acclaimed book provides sanitation information needed to ensure hygienic practices and safe food for food industry professionals and students. It addresses the principles related to contamination, cleaning compounds, sanitizers, and cleaning equipment. It also presents specific directions for applying these concepts to attain hygienic conditions in food processing or preparation operations.

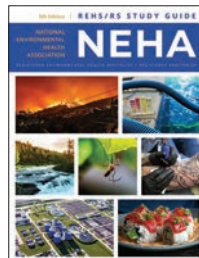
The new edition includes updated chapters on the fundamentals of food sanitation, as well as new information on contamination sources and hygiene, HACCP, waste handling disposal, biosecurity, allergens, quality assurance, pest control, and sanitation management principles. Study reference for the NEHA Registered Environmental Health Specialist/Registered Sanitarian and Certified Professional–Food Safety credential exams.

437 pages, hardback

Member: \$84/Nonmember: \$89

REHS/RS Study Guide (5th Edition)

National Environmental Health Association (2021)



The Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) credential is the premier credential of NEHA. This edition reflects the most recent changes and advancements in environmental health technologies and theories. Incorporating the insights of 29 subject matter experts from across academia, industry, and the regulatory community,

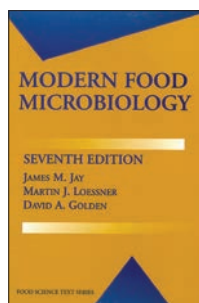
paired with references from over 30 scholarly resources, this essential reference is intended to help those seeking to obtain the NEHA REHS/RS credential. Chapters include general environmental health; statutes and regulations; food protection; potable water; wastewater; solid and hazardous waste; hazardous materials; zoonoses, vectors, pests, and poisonous plants; radiation protection; occupational safety and health; air quality and environmental noise; housing sanitation and safety; institutions and licensed establishments; swimming pools and recreational facilities; and emergency preparedness.

261 pages, spiral-bound paperback

Member: \$165/Nonmember: \$199

Modern Food Microbiology (7th Edition)

James M. Jay, Martin J. Loessner, and David A. Golden (2005)



This text explores the fundamental elements affecting the presence, activity, and control of microorganisms in food. It includes an overview of microorganisms in food and what allows them to grow; specific microorganisms in fresh, fermented, and processed meats, poultry, seafood, dairy products, fruits, vegetables, and other products; methods for finding and measuring microorganisms and their products in foods; methods for preserving foods; food safety and quality controls; and foodborne diseases. Other section topics include biosensors, biocontrol, bottled water, *Enterobacter sakazakii*, food sanitizers, milk, probiotics, proteobacteria, quorum sensing, and sigma factors. Study reference for the NEHA Certified Professional–Food Safety credential exam.

790 pages/hardback

Member: \$84/Nonmember: \$89 🌸

SPECIAL LISTING

The National Environmental Health Association (NEHA) Board of Directors includes nationally elected officers and regional vice-presidents. Affiliate presidents (or appointed representatives) comprise the Affiliate Presidents Council. Technical advisors, the executive director, and all past presidents of the association are ex-officio council members. This list is current as of press time.



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IN MEMORIAM

The National Environmental Health Association (NEHA) was saddened to learn of the deaths of the following individuals. We extend our sympathies to the families, friends, and colleagues of these individuals. Each had a profound impact on our profession and the people around them. All will be greatly missed.



Richard Briley

Richard Briley of Wills Point, Texas, passed away on April 21, 2023. Briley was employed at Hunt County Health Department and Garland Health Department, where he retired on June 30, 2017. He was a Registered Sanitarian with the state of Texas and a Diplomate of the American Academy of Sanitarians. Further, he held a Certified Professional–Food Safety (CP-FS) credential from NEHA. He was also a first responder.

Briley was active in many different associations. He was a member of the Lab Safety Committee at Texas A&M University–Commerce and a member of the Texas and Southwestern Cattle Raisers Association. He was also an active and longtime member of the Texas Environmental Health Association, Texas Association of Municipal Health Officials, and NEHA.

Briley was born in Dallas, Texas, and grew up in Wills Point. He received his bachelor's degree in 1983 and his master's degree in 1985 from East Texas State University. He was an Elton John enthusiast and enjoyed reading and gardening. He also had a cattle business that raised Simmental cattle.



Karen Casale

Karen Casale of Ramsey, Minnesota, passed away on April 30, 2023. She started her career as an environmental health specialist with the District of Columbia Bureau of Food and Drug. She had the honor of serving as the health inspector of an event at the White House to ensure food safety. After returning home to Minnesota, Casale worked as an environmental health specialist with the Anoka County Community Health and

Environmental Services Department for 45 years.

Casale was a dedicated and lifetime member of the Minnesota Environmental Health Association (MEHA) for 50 years. She was

the first female environmental health specialist in Minnesota and the first recipient of the MEHA Frank A. Staffenson Environmental Health Professional of the Year Award in 2003. She was honored with the MEHA Life Award following her retirement from Anoka County in 2017. Casale was also a member of NEHA for 50 years.

The memories and legacy Casale leaves behind are a testament to a well-lived life. Her friendly, intelligent, exuberant, and caring exterior endeared her to all. Her feistiness allowed her to face her battles with great strength and courage, and she navigated every twist and turn of life with resilience, optimism, and grace.



George A. Kupfer

George A. Kupfer of Grayslake, Illinois, passed away on June 4, 2023. He served as president of NEHA from 1990–1991. He was also honored with the Walter S. Mangold Award in 2001, the highest honor NEHA bestows on its membership.

The following are excerpts from his Mangold Award biography published in the October 2001 *Journal of Environmental Health*:

Kupfer spent his lifetime in public service and made a lasting contribution to the environmental health profession, both nationally and internationally. Starting as a staff sanitarian in the public sector and then moving into the private sector as an industry executive, his responsibilities included hands-on inspections, teaching, program and organizational administration, business development, and entrepreneurship.

In 2001, Kupfer was continuing into his 46th year in the environmental health profession and was serving as the executive liaison for health and environment for Underwriters Laboratories, Inc. (UL). He was a major contributor at UL in the development of standards in related safety disciplines, as well as the establishment of criteria for accrediting laboratories that conduct sanitation safety certification.

His time at UL was preceded by 6 years as chief operating officer for NSF International and 34 years as an environmental health director and specialist for the city of Milwaukee. At NSF, Kupfer worked hard to improve the quality of life through consensus standards and accurate, cost-effective conformity assessment of products and services focused on environmental and public health. Under his leadership in Milwaukee, the city developed a broad spectrum of new and innovative approaches to the prevention of environmental-related diseases.

During his time as president of NEHA, he was involved in several fundamental changes in the organization's structure. His organizational leadership extended beyond NEHA to the American Public Health Association, Conference of Local Environmental

IN MEMORIAM

Health Administrators, Council on Education for Public Health, and Canadian Institute of Environmental Health (CIEH).

Another respected quality of Kupfer's was that he truly understood the importance of a global perspective for environmental health professionals. At NSF, he played a major role in founding the NEHA/CIEH Sabbatical Award. The award was given annually to an environmental health professional from the U.S. and the UK to further their understanding and experience in the global aspects of environmental health. ❁

Editor's Note: If you would like to share information about the passing of an environmental health professional to be mentioned in a future In Memoriam, please contact Kristen Ruby-Cisneros at kruby@neha.org. The *Journal* will publish the In Memoriam section twice a year in the June and December issues, or in other issues as determined appropriate.

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Thank you to our donors!

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NEHA NEWS

Note of Thanks to Our Departing Board Members

The National Environmental Health Association (NEHA) is fortunate to have members who are willing to volunteer their time and energy to our organization through positions within our Board of Directors and on committees and work groups. Our board members also serve as subject matter experts, trainers, and peer reviewers for the organization. We would be remiss if we did not acknowledge the dedication and hard work of three board members on the occasion of their departure from the board: Immediate Past-President Roy Kroeger, Region 5 Vice-President Traci Michelson, and Region 7 Vice-President Tim Hatch.



Immediate Past-President Roy Kroeger, MPH, REHS, leaves the board after 16 years of dedicated service and leadership. He served as vice-president of Region 3 (Colorado, Montana, Utah, and Wyoming) for four consecutive terms between 2007 and 2018. In 2018, he was elected as second vice-president and served as a national officer from 2018–2023 and as president

from 2021–2022. And while his time on the board is at an end, Kroeger has indicated a willingness to continue to serve the association as a committee member, technical advisor, or in other roles as needed.

While on the board, Kroeger served on numerous standing committees including finance, policy and bylaws, membership, membership memorial, student engagement, Annual Educational Conference (AEC) planning, and nominations. Additionally, he served on several ad-hoc committees such as sustainability, response to the Deepwater Horizon event, and the search committee for a new executive director. Further, he has helped review and write new questions for several of the Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) and Certified Professional–Food Safety (CP-FS) credential exams. He has received numerous presidential citations during his 16 years.

Before serving on our board, Kroeger spent 8 years on the board of the Wyoming Environmental Health Association (WEHA). During this time he had the opportunity to learn more about NEHA by working with previous regional vice-presidents such as Jim Dingman and Tom Gonzales. Kroeger has been honored to receive all the awards offered by WEHA, including the Outstanding Environmental Health Specialist Award and the Arthur Williamson Award.

Water quality has always been a passion for Kroeger. After some academic twists and turns, he found his way to the accredited environmental health program at Colorado State University. He started his environmental health career as an intern for the Cheyenne–Laramie County Health Department in Cheyenne, Wyoming, where he took 1 week off after his internship

before starting as an environmental health specialist. He worked through every position within the department before becoming the environmental health director in 2019. He served in that role until retiring in 2022 after serving 29 years. Retirement was not the final chapter for Kroeger—he was retired for only 4 days before assuming the environmental health director position at El Paso County in Colorado.

Kroeger has been a respected professional and subject matter expert in numerous volunteer roles. Despite his interest in water quality, he has often been pulled toward food safety service. For nearly a decade, he has represented local public health agencies on the Governing Council with the Food and Drug Administration (FDA) Partnership for Food Protection. He has also represented NEHA on the Council to Improve Foodborne Illness Outbreak Response. Additionally, he continues to work with FDA, NEHA, the Association for Food and Drug Officials, and the International Food Protection Training Institute as a subject matter expert to develop a national food safety curriculum for all retail regulatory food safety professionals nationwide.

Another passion for Kroeger is that he enjoys teaching others about environmental health. That passion has allowed him to serve on the National Environmental Health Science and Protection Accreditation Council. During that time, he spoke with future environmental health students at several universities. He also worked with the State University of New York, College of Environmental Science and Forestry to achieve academic accreditation for their program. He also serves as an undergraduate advisor for the environmental health program at Colorado State University.

One of his greatest honors was when he had the opportunity to help train and mentor new environmental health professionals in the U.S. Virgin Islands. Following Hurricanes Irma and Marie that struck the islands in 2017, the Centers for Disease Control and Prevention worked with NEHA to help the territory rebuild its environmental health workforce. “Having the opportunity to train and work with a group of people who wanted to make a difference in their community is something that I will never forget. These new professionals had so much to learn and our team had so little time to train them. The students were incredible and many continue to provide environmental health service to their communities today.”

In reflecting on his time on the board, Kroeger shared, “Serving NEHA and the great people in our profession has been an honor. There have been some challenges, such as replacing a long-tenured executive director and enduring the challenges presented by a global pandemic. There have been, however, more rewards. I had the opportunity to serve as president during the expansion of the association, both financially and in employment. I do not take credit for that growth; it was due to the hard work and dedication of an amazing group of employees and volunteers.”

“Much of the success that I have had is due to the great mentoring that I received from those who preceded me on the board.

I thank Sandra Long, Brian Collins, Bob Custard, Pricilla Oliver, Adam London, Keith Krinn, and Carolyn Harvey. I thank you all and others that were not mentioned by name. I must also thank my wife and family who supported travel over the past 16 years. My daughter and I even had the opportunity to travel together during her time as an environmental health professional in Denver. As part of my family, I must include some coworkers who often held down the fort when I was gone—my thanks to Tiffany Gaertner and Jennifer Escobedo,” Kroeger stated.



Region 5 Vice-President Traci Michelson, MS, REHS, CP-FS, leaves the board after 3 years of dedicated service and leadership from 2020–2023. Region 5 includes the following states: Arkansas, Kansas, Louisiana, Missouri, New Mexico, and Oklahoma. Over the past 3 years, she has been a member of the NEHA Food Safety Committee; participated on NEHA board committees

including AEC planning, affiliate engagement, and credentialing; participated in three Hill Days for the organization, and served as the legacy advisor to the Business & Industry Affiliate.

“It has been a fantastic 3 years participating on the board. The team has accomplished so much and I’m so proud to be a part of the growth and enhancements that we have accomplished,” stated Michelson. “I’ve met so many new people, learned more about the environment health profession than I ever thought possible, and helped to drive awareness and engagement within our affiliates and our industry. As the sole industry constituent on the board during my term, I’ve continued to support and push our Business & Industry Affiliate to engage and grow our collaboration efforts with NEHA and other state affiliates. It has been an interesting and fulfilling experience—I can’t thank NEHA and all its members enough for providing me with this opportunity. I’ll be a NEHA member and advocate for life!”

Michelson has spent more than 20 years in the food industry working in various food safety and quality auditor roles within regulatory, manufacturing, and food service sectors. She currently works for McDonald’s as a food safety manager and has worked for iconic brands like Brinker International, Darden Restaurants, Pepperidge Farm, and Smucker’s. Furthermore, Michelson is actively involved and volunteers in other professional associations like the Conference for Food Protection, Partners With a Common Purpose within the Association of Food and Drug Officials, National Restaurant Association, and National Council of Chain Restaurants within the National Retail Federation. She also was a past president and secretary/treasurer for the Business & Industry Affiliate.

“Being elected and participating on the NEHA Board of Directors has been one of the most impactful and rewarding experiences in my life. The staff and leadership at NEHA are amazing and I’ve

grown so much professionally and personally by being a part of this great community,” reflected Michelson. “If you are considering volunteering for an organization that puts its members, community, and profession first, NEHA is the one for you!”



Region 7 Vice-President Tim Hatch, MPA, REHS, leaves the board after 9 years of dedicated service and leadership from 2014–2023. Region 7 includes the following states: Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee. During his tenure on the board, he has served on numerous committees including chair of the AEC Planning Committee,

as well as a technical advisor and *Journal* peer reviewer. He was the first chair of the NEHA Global Engagement Committee and was on the committee in 2014–2015 that selected a new executive director. “I decided that three terms is a good point to where I have learned the association, given back, have become one of the ‘old heads,’ and worked to recruit new people, ideas, and diversity into this board,” stated Hatch.

Hatch was proud to serve his region and work in one of the most disaster-prone areas in the U.S. Hatch observed, “The Gulf and Atlantic states are home to some of the best environmental health practitioners in the country who not only serve their communities on a regular basis but also respond to unique and complex environmental health challenges after disasters like hurricanes, floods, tornadoes, oil spills, and hot and cold weather events. From 2013–2019, I was blessed to represent NEHA and environmental health in general through international training sessions on environmental health and disaster response.” These trainings were held in countries including Australia, Croatia, Indonesia, Mexico, New Zealand, Portugal, and the U.S. and U.S. Virgin Islands. Hatch was also a core contributor to the Understanding the Needs, Challenges, Opportunities, Vision, and Emerging Roles in Environmental Health (UNCOVER-EH) initiative led by NEHA, the Centers for Disease Control and Prevention (CDC), and Baylor University in 2019.

Hatch began as a county-level environmental public health practitioner in 1995 and rose to the position of administrator, overseeing all public health services for an 11-county district. “I have always considered environmental health the core of public health. What matters most is human health, longevity, and environmental quality for a happy and safe existence. Environmental health practitioners ensure that,” commented Hatch.

From his first NEHA AEC in 2005, Hatch knew NEHA was the place to learn all he could about our profession. He was the first environmental health practitioner in Alabama in two decades to earn the NEHA REHS/RS credential in 2007. Since that time, he has mentored and encouraged a dozen more professionals to

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achieve this national credential. “Considering my environmental health career, two of my greatest accomplishments were bringing the knowledge of our profession into emergency preparedness and disaster response while serving as the public health lead during the 2010 Deepwater Horizon oil spill and serving as incident commander for Alabama during a portion of the COVID-19 pandemic,” stated Hatch. “Looking forward, I would like to continue to provide whatever support I can to NEHA and its programs to further our profession. I plan to continue my involvement with my state affiliate and participate in NEHA functions, trainings, and conferences in the future.”

Hatch has been the recipient of numerous awards from both local and national organizations:

- Ansel C. Mullins Award Recipient, Alabama Environmental Health Association (AEHA), 1999
- CDC Environmental Public Health Leadership Institute Fellow for Cohort IV, 2008–2009
- Alabama Environmentalist of the Year Award Recipient, AEHA, 2009
- Frederick S. Wolfe Award, Alabama Public Health Association (ALPHA), 2012
- Howell Special Meritorious Service to Public Health Award, Southern Health Association, 2013
- Past Presidents Award, NEHA, 2014
- D.G. Gill, MD, Award, ALPHA, 2018
- Honorary commission as colonel in the Alabama National Guard by the adjutant general of Alabama, 2020

“I have enjoyed my 9 years as a member of the NEHA Board of Directors and am thankful for the experience,” reflected Hatch. “I hope that my service to the environmental health profession was valuable and please know it was done selflessly and with honor. I will forever remain a supporter of our mission, a champion for the cause, and an active member and credential holder. Long live NEHA and best wishes to this fine association.”

New Wildfire Guide Now Available



We have a new tool for you! Now more than ever environmental public health professionals are on the front lines of wildfire response and recovery. We understand that even with plenty of all-hazard planning, the reality of the environmental health response to a wildfire can be daunting. These reasons are why we have created the first-ever wildfire guide just for our profession: the Wildfire Response Guide for Environmental Public Health Professionals.

The guide is intended for environmental public health professionals responding to a wildfire as part of an immediate response

or recovery process. It provides information needed in the event of a wildfire within a jurisdiction, with potential considerations and roles for environmental public health professionals. Furthermore, the guide outlines steps that can be taken before, during, and after a wildfire event. A number of guidance documents and weblinks are provided to review prior to a wildfire occurring. The guide also includes:

- Response and recovery objectives for each environmental health area
- Template messages
- Sample forms that can be used to meet objectives
- Recommended guidance documents
- Suggestions for cross-sector partnerships and policies

Check out the guide today at www.neha.org/epr-wildfire-resources.

Portal Open for the NEHA-FDA RFFM Grant Program

The grant portal for Year 3 of the NEHA-Food and Drug Administration (FDA) Retail Flexible Funding Model (RFFM) Grant Program opened on August 16. This annual funding opportunity supports state, local, tribal, and territorial retail food regulatory programs to meet the FDA Voluntary National Retail Food Regulatory Program Standards. These grants are supported by FDA under award U2FFD007358.

Retail food safety programs can apply for a base grant (through one of two tracks) and up to three additional add-on grants (for Track 2 applicants and Track 3 grantees). Consider applying for:

- A Track 1 Development Base Grant with options to be a mentee and/or attend a self-assessment and verification audit (SA/VA) workshop.
- A Track 2 Development Base Grant with options to be a mentee, work on Standard 9, and/or attend retail training courses.
- Optional Add-On Grants:
 - » In addition to the options above, Track 2 applicants may also apply to be a mentor (instead of a mentee) and/or apply for a Special Projects Grant.
 - » Existing Track 3 Maintenance and Advancement Base Grantees may apply to be a mentor or a mentee, request funds for retail training courses, and/or apply for a Special Projects Grant.

Changes for Year 3

Track 1 and Track 2 Development Base Grants now have combined applications that include options to request Mentee and Track-Appropriate Training funds (both are now 3-in-1 applications). Track 1 and Track 2 Base, Mentee, and Mentor funding are now fixed-amount awards for 2024, with payments based on objectives met (no receipts required for reimbursement).

The grant portal closes on **October 11!** Learn more at www.neha.org/retail-grants.

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Call for Abstracts Now Open!

AEC 24



87th Annual Educational
Conference & Exhibition

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The deadline for abstracts submission is **October 9.**

Pittsburgh, PA
July 15–18, 2024



Learn more at [neha.org](https://www.neha.org)

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Join the Private Water Network



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If you are an expert working to keep private water sources safe, we invite you to become a member of our free Private Water Network (PWN). PWN is a virtual community of practice for people who work to protect the public's health from contaminants in private drinking water sources. PWN provides opportunities to connect with peers; share experiences, ideas, and resources; access timely and relevant guidance for existing and emerging issues; and build capacity to work more efficiently and effectively.

Members of PWN have access to benefits including:

- Resource library with more than 300 resources
- Access to participate in webinars, roundtable talks, and online chats
- Discussion forum
- Newsletter on current private water issues
- Event calendar
- Member directory
- Community-wide searchability

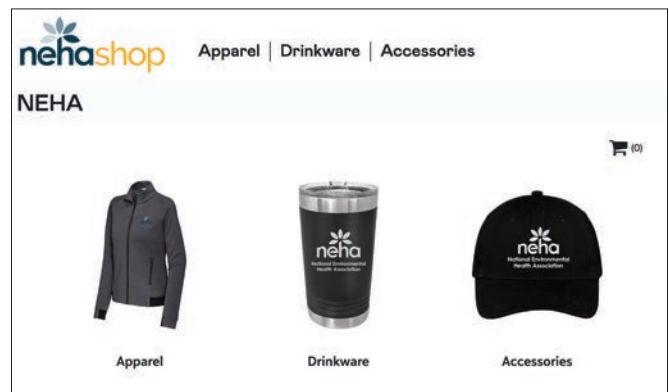
There is no cost to join PWN and you do not need to be a NEHA member to join. If you are a NEHA member, you can log in today using your NEHA login at <https://pwn.neha.org>. If you are not a member, first create a free MyNEHA account and use the same login information to log in to PWN at <https://pwn.neha.org>.

Virtual Workshop: Impacts of Climate Change on Private Wells

We are hosting a virtual workshop—Impacts of Climate Change on Private Wells With a Focus on Groundwater Depletion, Microbiological Contamination, and Saltwater Intrusion—aimed at addressing the impacts of climate change on private drinking water systems and wells. The workshop will feature presentations and a roundtable discussion led by subject matter experts that will focus on groundwater depletion, saltwater intrusion, and microbiological contamination. Participants will have the opportunity to share experiences, challenges, and opportunities while earning continuing education contact hours from NEHA (up to 3 hours). We will also host two learning sessions to provide ongoing technical assistance, connecting workshop graduates with experts specializing in mitigating climate change impacts on groundwater.

The virtual workshop will be on September 12 at 12:30 p.m. ET. Register at https://neha.zoom.us/webinar/register/WN_ycliG5taQdOMMzMIKo6YTQ#.

Show Your Support With NEHA-Branded Items



Check out our new online store of NEHA-branded items at <https://neha.checkoutstores.com>. Including apparel, drinkware, and accessories, you can find something to show off your pride in your association and profession. All items are produced on demand with no minimum to order and are shipped directly to you. We will also offer branded items for our AEC. Keep an eye out for what we will offer for the upcoming 2024 AEC in Pittsburgh, Pennsylvania.

And your purchase supports students as a portion of the sale from these items purchased will go to the NEHA/AAS Scholarship Fund. Don't wait, get your items now! 🌿

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