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Sewage Monitoring in Rural Communities

A Strategy for COVID-19 Surveillance

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ABOUT THE COVER

To contain the COVID-19 outbreak and mobilize mitigation efforts, public health surveillance relies heavily on individual COVID-19 test results. A shortage of supplies, equipment, facilities, public health professionals, and trained laboratory personnel creates challenges for detection and management of the outbreak, especially in rural and underserved communities. Clinical testing might not be feasible or cost-effective for monitoring community spread of COVID-19, especially in rural areas. Robust surveillance approaches with a greater coverage potential are needed for developing effective public health strategies during the current pandemic. Findings from recent studies show that the SARS-CoV-2 virus can be detected in stool samples collected from hospitalized individuals, which has led to a new surveillance approach for testing sewage to detect the presence of SARS-CoV-2 RNA. This approach offers a tremendous potential for real-time screening of community spread of COVID-19. This month's cover highlights a guest commentary, "Sewage Monitoring in Rural Communities: A Powerful Strategy for COVID-19 Surveillance," that explores the merit, limitations, and challenges of implementing sewage monitoring methods in rural parts of the U.S. to protect public health and inform policy and decision making.

See page 8.

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Erratum

In the October 2020 *Journal of Environmental Health* (volume 83, number 3), Table 1 for "Health Risk Assessment of Heavy Metals in Suburban Vegetable Soils From Open Fields and Greenhouses in Jilin City, an Industrial City in China" by Q. Liu, C. Fan, F. Cheng, and J. Zheng incorrectly defined BW as exposure duration. The correct definition is body weight.

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This award was established to recognize NEHA members, teams, or organizations for an outstanding educational contribution within the field of environmental health.

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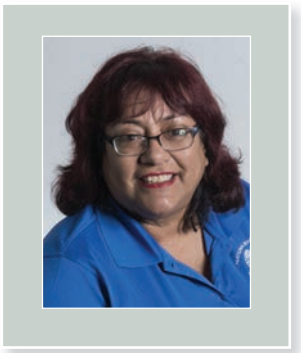

Sandra Long, REHS, RS

2020 in the Rearview Mirror

How many times have you heard or said, "2020 has been a bad year," "We should get a do-over for 2020," or heard or said something similar but less appropriate for publication in a professional journal. To that point, 2020 has been a year of challenges, changes, loss, and reinvention. In any given year we would have our own personal challenges and losses, as well as go through a variety of changes. This year we did it as a community, a nation, and a world. The feeling was different and more profound because we went through this year together.

We lost several environmental health champions in 2020—professionals who dedicated their careers to promotion, development, and advocacy of environmental health. They were trailblazers, leaders, and mentors to many in the field:

- **Chris Kochtitzky** (May 2020): Kochtitzky was described as a "tenacious public health professional who pursued his work with vigor, charm, wisdom and intelligence." He recognized the importance of the built environment in terms of enabling people and communities to lead healthy lives. He served as an expert on the development of evidence-based guidelines and recommendations to increase physical activity across the U.S.
- **Bailus Walker** (April 2020): Dr. Walker was a consummate public health practitioner and was a past president of the American Public Health Association. His research interests included lead toxicity and environmental carcinogenesis. Dr. Walker was a distinguished fellow of the Royal Society of Health and the American College of Epidemiology. He also served as a senior science advisor for environmental health to the National Library of Medicine. His service included leading various state and federal government working groups, committees, and task forces.
- **Sheila Davidson Pressley** (January 2020): Dr. Pressley joined the staff at Eastern Kentucky University (EKU) in 2004 and was named dean of the College of Health Sciences in 2017. She had a profound impact on the students she taught and mentored. She became the first African American to chair the EKU Faculty Senate from 2012–2014. In 2017, the University of Kentucky honored her with the Lyman T. Johnson Torch of Excellence Award. She was an active member of the National Environmental Health Association (NEHA) and the American Academy of Sanitarians. In 2015, NEHA honored her with the Past Presidents Award for her leadership in the organization.
- **Carolyn Hester Harvey** (October 2020): Dr. Harvey was the recipient of the 2020 Walter S. Mangold Award, the highest honor given to an individual by NEHA. She had an accomplished career in environmental health, was a pioneer for women in industrial hygiene, and was a mentor to many. Dr. Harvey was the president of NEHA from 2014–2015. She also served on the board of directors for the Association of Environmental Health Academic Programs and was cochair of the National Committee for Diversity in Environmental Health. Dr. Harvey was a professor and chair emerita of the Department of Environmental Health Science at EKU.

Through all of our experiences this past year, we have all had the opportunity to change, grow, learn, teach, and evolve.

Please reach out to your mentors and colleagues—individuals who are significant to you on a professional and personal level—and connect, continue to learn, and share.

Rather than talking about how the pandemic has changed what we do and moved us away from routine functions, let us think about how the pandemic has provided an opportunity to grow, learn, teach, and evolve.

Thinking about the things we have learned in the past year, we realize growth. Our computer skills have improved. Our ability to use electronic meeting formats and the different types of formats has increased. Our ability to use these formats for learning, as well as communicating, is far beyond where it was a year ago. We have had to become fearless in the face of technology. Many of us were familiar with these types of meetings but largely used them when we could not travel to a meeting or just as a convenience. Electronic meetings have now become part of our daily lives. Webinars

and electronic conferences have shown us how to facilitate learning through virtual platforms, as well as how to connect with colleagues. Many now have had the opportunity to participate as trainers, speakers, and hosts—a skill we likely did not possess one year ago.

Workspaces have changed to home offices for some, presenting us with the unique challenges and advantages of teleworking. We have learned to perform in a different environment, recognizing the equipment needed and the information to maintain, realizing the need for connectivity with coworkers, implementing methods to maintain that contact, and learning the new balance between work and home life. We have learned to adapt and become efficient and productive.

Written and verbal communication skills have improved through our work in providing the public with quickly changing information, using virtual inspections, and working on contact tracing. Proper communication is a key element in each of these functions. Speaking with people concerning contact with COVID-19-positive individuals, obtaining and providing information for clarity, and expediency are skills we have added to our repertoire.

Through all of our experiences this past year, we have all had the opportunity to change, grow, learn, teach, and evolve. We need to acknowledge our newfound skills and continue to build upon them. With that in mind, we can look at 2020 in a more positive perspective.

Wishing you a wonderful holiday season and a Happy New Year.

President@neha.org

Did You Know?

NEHA supports your continuing education (CE) needs by providing educational opportunities to complement your credentials and life-long learning. We have improved and expanded our virtual CE offerings, which are available in a variety of formats and free to members. Learn more at www.neha.org/earn-ce-credit.

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The NEHA Endowment Foundation was established to enable NEHA to do more for the environmental health profession than its annual budget might allow. Special projects and programs supported by the foundation will be carried out for the sole purpose of advancing the profession and its practitioners.

Individuals who have contributed to the foundation are listed below by club category. These listings are based on what people have actually donated to the foundation—not what they have pledged. Names will be published under the appropriate category for 1 year; additional contributions will move individuals to a different category in the following year(s). For each of the categories, there are a number of ways NEHA recognizes and thanks contributors to the foundation. If you are interested in contributing to the Endowment Foundation, please call NEHA at (303) 756-9090. You can also donate online at www.neha.org/about-neha/donate.

Thank you.

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GUEST COMMENTARY

Sewage Monitoring in Rural Communities: A Powerful Strategy for COVID-19 Surveillance

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The coronavirus (COVID-19) pandemic has resulted in more than 10.1 million confirmed cases and 238,000 deaths in the U.S. (at time of press, Johns Hopkins University, 2020). The outbreak has laid bare the urban–rural divide, with glaring disparities in health outcomes among rural populations where more older individuals and those with chronic health conditions reside (Monnat, 2020). As the pandemic started to impact rural parts of the U.S., a 56% increase in COVID-19 cases was detected in May 2020, a significantly higher spike than its urban counterpart of 32% (Fehr, Kates, Cox, & Michaud, 2020).

Public Health Surveillance for SARS-CoV-2 Detection

To contain the COVID-19 outbreak and mobilize mitigation efforts, public health surveillance relies heavily on individual COVID-19 test results (Centers for Disease Control and Prevention [CDC], 2020a). A shortage of supplies, equipment, facilities, public health professionals, and trained laboratory personnel creates challenges for detection and management of the outbreak all over the country, especially in rural and underserved communities. The Harvard Global Health Institute (2020) estimated the ideal number of daily tests required for satisfactory nationwide coverage as 900,000 in May 2020. The average number of daily tests performed in the U.S. for the week ending on June 13, 2020, however, was only 462,196 (The Atlantic Monthly Group, 2020). This number later increased by October 2020 (Johns Hopkins University, 2020).

In addition, clinical testing also creates a significant burden on the economy, as the estimated cost of testing the entire population of 330 million in the U.S. is $3.5 billion (Hart & Halden, 2020). Given that multiple tests could be needed per individual depending on initial exposure or reoccurrence, clinical testing is neither feasible nor cost-effective for monitoring community spread of COVID-19, especially in rural areas. Robust surveillance approaches with a greater coverage potential are needed for developing effective public health strategies during the current pandemic.

Sewage Testing for COVID-19 Surveillance

Clinical diagnosis of individuals with COVID-19 consists of collecting patient samples and analyzing for the presence of genetic material (RNA) or antigens of the virus (CDC, 2020b). Studies show that the SARS-CoV-2 virus can also be detected in stool samples collected from hospitalized individuals (Pan, Zhang, Yang, Poon, & Wang, 2020; Xiao et al., 2020) This finding has led to a new surveillance approach for testing sewage to detect the presence of SARS-CoV-2 RNA (Lodder & de Roda Husman, 2020). This approach offers a tremendous potential for real-time screening of community spread of COVID-19.

Given the fact that there are 16,000 wastewater treatment plants (WWTPs) covering 75% of the population in the U.S. (Department of Homeland Security, 2018), weekly sampling from these facilities for 1 year could provide meaningful data on community spread of COVID-19 at a cost of approximately $12.5 million (Hart & Halden, 2020). This mode of surveillance allows for detecting outbreaks in a community before individual diagnoses, which could be economically more efficient than the cost-prohibitive and impractical current clinical testing strategies.

Monitoring sewage for COVID-19 offers at least two additional benefits. First, because of several challenges facing direct surveillance mechanisms, efforts to identify SARS-CoV-2 hot spots are severely curbed, resulting in failures to control transmission. For instance, in addition to the shortage of testing resources, challenges in contact tracing result in gross underestimation of the disease prevalence. These contact tracing challenges include lack of training of contact tracers, lack of conformity to protocols, and inability to locate contacts, as well as issues surrounding contacts such as noncooperation due to distrust in government employees, fear of fake contact tracers, fear about anonymity and privacy, and nonconformity to guidelines for self-quarantine and associated measures. Sewage-based monitoring can unmask the COVID-19 hot spots not detectable due to these challenges (CDC, 2020c).

Second, sewage-based monitoring can also provide critical early warning signals for the

resurgence of infection in communities and thus can be used to evaluate the effectiveness of public health interventions such as lockdowns and social distancing practices (Kitajima et al., 2020). Private enterprises have already started to offer sewage testing services in 42 states for COVID-19 detection, which would allow for screening of nearly 75% of the population at a fractional cost compared with clinical testing (Gillespie, 2020). Despite its advantages though, sewage testing in rural locations is underutilized as a surveillance tool.

Challenges Associated With Sewage Testing in Rural Communities

Although COVID-19 monitoring of communities through sewage seems to be a promising approach, there are limitations and challenges in implementing this method in rural parts of the U.S. First, the detection and quantification of SARS-CoV-2 from sewage depend on molecular microbiological methods. These techniques rely on collecting a representative number of samples for isolation, purification, and quantification of the SARS-CoV-2 RNA. Each of the steps requires trained personnel, specific reagents, and equipment that are scarce across the country, especially in rural areas. To mitigate these shortcomings, rural areas will require a coordinated alliance among WWTPs, private and/or public diagnostic laboratories, academic institutions, and local public health departments to enable timely testing and effective dissemination of surveillance data. Higher education institutions near rural areas have a unique opportunity to address COVID-19 mitigation efforts through community health education programs and research that involves sewage sample collection and testing (Utah Department of Environmental Quality, 2020).

Second, while this method is feasible in urban and suburban areas, rural areas cannot be readily tested using this strategy (Medema, Heijnen, Elsinga, Italiaander, & Brouwer, 2020), mainly because roughly 20% of the U.S. population do not have access to centralized wastewater treatment services (Department of Homeland Security, 2018). Moreover, some rural homeowners might be reluctant to request testing of their septic system due to lack of awareness about SARS-CoV-2 infectivity or the stigma associated with a potential positive detection at their property. Therefore, wastewater-based epidemiological data are primarily going to come from urban and suburban areas that have WWTPs. Meaningful data collection on the occurrence of COVID-19 in rural communities is hard to achieve due to this bias. To increase the rural wastewater sampling, a two-pronged approach is essential that consists of educational campaigns targeted towards homeowners, as well as mobile testing facilities to collect and test sewage samples from rural households.

Finally, because this approach is dependent on the presence of SARS-CoV-2 RNA in sewage, any error in sample collection, transportation, storage, or detection could lead to potential sensitivity issues; highly skilled and trained personnel will be needed to conduct these analyses. Furthermore, as the ecology of this virus and the persistence of its RNA in the environment are relatively unknown, WWTP or septic tank ecosystems could have varying effects on detection. Initial concentrations of SARS-CoV-2 entering the system, as well as temperature, travel, and holding times within the system, are some of the factors that could cause variability and should be considered when relating viral load detected in sewage to the actual number of infected individuals in the community.

Regardless, recent studies on the wastewater epidemiology of COVID-19 have shown promising results as an effective surveillance method. In the Netherlands, viral genes were detected in sewage samples 6 days before the first case was diagnosed clinically (Medema et al., 2020). In Brisbane, Australia, concentrations of viral RNA in sewage matched with the prevalence in the community (Ahmed et al., 2020). The presence of SARS-CoV-2 RNA particles in sewage might be a better estimation than clinical testing for determining COVID-19 prevalence in the community, as asymptomatic patients might not get tested individually.

For instance, in Dauphin County, Pennsylvania, sewage testing revealed infection rates that were 10 times higher than those reported by the state (LaMar, 2020). In spite of all its limitations, sewage testing is a sensitive method that has been proven to give communities timely and reliable data on infection rates. Resource-strapped rural communities could benefit from the combined strategy of cost-effective sewage monitoring for early detection of COVID-19 and the subsequent individual testing for containment.

Conclusion

COVID-19 is a public health crisis that has strained healthcare resources, especially in rural areas of the U.S. Surveillance is an essential tool for assessing and addressing the impact of the pandemic. As countries and communities around the globe are easing lockdown restrictions, the focus is increasingly on targeting COVID-19 hot spots and imposing partial lockdowns.

Identification of COVID-19 hot spots will require innovation in surveillance, including sewage-based surveillance. Monitoring sewage for the occurrence of SARS-CoV-2 is gaining popularity as an additional mode of surveillance. There are merits and limitations of this approach compared with individual clinical testing and contact tracing. Residents of rural areas face inequalities containing the outbreak: clinical testing, isolation of those positive for the SARS-CoV-2 virus, tracing those who came in contact with positive individuals, and quarantine of contacts before retesting.

Disadvantages related to proper surveillance in rural communities will require public health policy makers to adopt the "equity" not "equality" approach, which warrants redistribution of surveillance resources. The utilitarian value of sewage testing for assessing community spread of the infection, deliberating reopening strategies, and determining preemptively the emergence of the second wave of infection is currently underestimated. The tremendous impact of this surveillance tool on public health and policy, however, is gaining momentum globally.

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References on page 10

References *continued from page 9*

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Did You Know?

You can access NEHA's policy and position statements at www.neha.org/publications/position-papers. NEHA's latest policy statement focuses on research and innovations that enhance environmental health science and practice. Other recent statements cover racism and environmental health, COVID-19, adoption and implementation of the current Food and Drug Administration *Food Code*, cottage foods, clean energy, ear piercing guns and microblading, and mosquito control. You can also view recent declarations of support from NEHA.

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AEHAP gratefully acknowledges the volunteer efforts of AEHAP members who serve on the advisory committee for this competition.

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Dust and Noise Exposure While Using a Portable Wood Dust Collector

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Abstract **The use of a portable wood dust collector (PWDC) to reduce exposure to wood dust during sanding with a belt sander or sawing with a miter saw was studied and an assessment was conducted of the effect of this collector on noise exposure. This pilot study used Institute of Occupational Medicine (IOM) samplers to collect wood dust samples and personal noise dosimeters to measure noise exposure. The PWDC was used to study various setup configurations for sanding and sawing. Other variables of interest were wood type, PDWC filter type, and sandpaper use frequency. The setup configuration of a commercially available hood was an important factor in the inhalable dust exposure when using sanding (p = .0001) and also sawing (p < .0001). The PDWC did not increase the noise during either task. None of the variables of interest predicted the noise level while sanding with a belt sander (p = .56). The type of wood was a significant predictor of noise for sawing with a miter saw (p = .01). The time it takes to adjust the PDWC hood and how this additional task affects productivity should be assessed to further understand the effectiveness of this control strategy.**

Introduction

The American Conference of Governmental Industrial Hygienists (ACGIH) has established their threshold limit value for exposure to wood dust aerosol (WDA) to be 1 mg/m^3 (inhalable) for all tree species except western red cedar, which is 0.5 mg/m^3. These limits were established to protect workers from adverse health effects ranging from decreased lung function to adenocarcinoma (American Conference of Governmental Industrial Hygienists, 2015). Many workers, from manufacturing to industrial arts schoolteachers, are exposed to WDA (Teschke, Marion, Vaughan, Morgan, & Camp, 1999). Douwes and coauthors (2017) studied worker exposure to wood dust in joineries and furniture factories and the percentage of workers who had exposures over the ACGIH recommendation was 37.5–100% at the joineries and 12.9–28.6% at the furniture factories.

Within the manufacturing sector, the use of a local exhaust ventilation (LEV) system influenced worker exposure to WDA (Brosseau et al., 2001; Schlünssen et al., 2008). An LEV system with an outside exhaust can be expensive to install and operating costs are high because replacement air must be tempered (McDermott, 2001). If an LEV system is not used, or if it is used incorrectly, not only does the woodworker creating the wood dust potentially have a greater exposure but also other workers in the shop can be exposed to elevated background wood dust concentrations (Martin & Zalk, 1997). Schlünssen and coauthors (2008) found that workers in woodworking factories with <20 employees had higher dust exposures than those in larger facilities. These smaller facilities might lack an LEV system due to capital and operational costs.

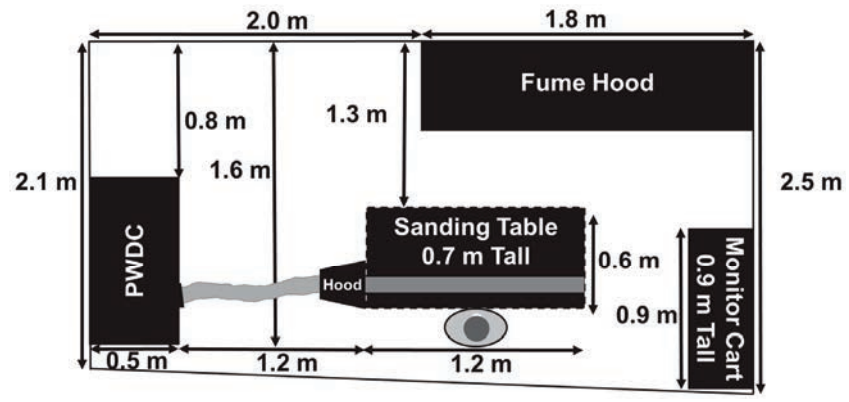
A portable wood dust collector (PWDC) could be a solution for small businesses that have high wood dust exposures. PWDCs are functionally similar to vacuums. A basic PWDC draws in the wood dust aerosol and passes it through the blower to a filter (either a bag or cartridge) and recirculates the cleaned air into the work area. Large wood particles fall off of the filter into a collection bag while the small particles are collected on the filter. PWDCs can also have cyclones or multiple filters. Little is known about the effectiveness of cartridge filters for woodworking PWDCs; however, research has been done with bag filters that found the bag filters were effective at reducing WDA when the wood dust was fed into the PWDC (Thorpe & Brown, 1998). Research is needed to evaluate PWDC effectiveness during actual woodworking tasks.

Currently, no studies are available that assess noise exposure from using a PWDC. As a PWDC is used only when a power tool is being used, the noise generated by that tool could outweigh the effect of the PWDC. If the power tool produces sound levels 10 dB greater than the PWDC, the worker's noise exposure might not be increased (Plog & Quinlan, 2012). Theoretical noise exposure levels could be calculated; however, most PWDCs for woodworking require operation of the unit before and after using the power tool. Even if the power tool sound pressure level was 10 dB greater than the PWDC,

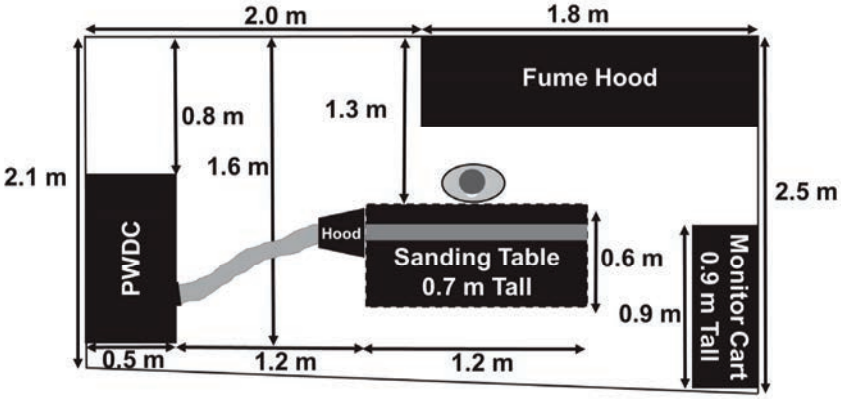
FIGURE **1**

Sample Area Setup Configurations

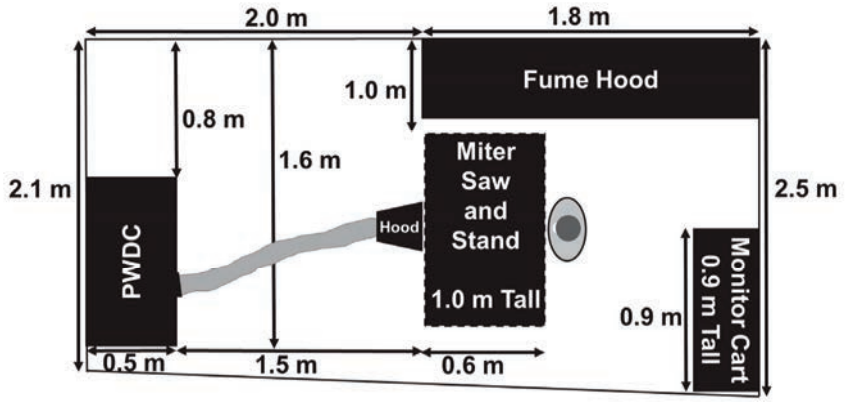
A) Sanding Front of Stroke



B) Sanding Back of Stroke



C) Sawing With PWDC



PWDC = portable wood dust collector.

the extra running time for the PWDC could increase the overall noise exposure.

In this study, we examined the effectiveness of a PWDC during sawing with a miter saw and sanding with a belt sander. We also investigated the potential noise exposure due to PWDC use. The objectives of this study were to:

1. Determine if wood dust exposure was reduced using a commercially available PWDC, and if so, which setup configuration significantly reduced exposure.
2. Assess the influence of other variables such as wood type on the effectiveness of the PWDC.
3. Measure the effect of the PWDC on noise exposure.

Methods

We chose the Dust-Force 1.5 HP motor (JDS Company) PWDC for this study because it can incorporate either a bag filter or a cartridge filter. The selected filters were labeled by the manufacturer as a 1-µm bag filter and a 1-µm cartridge filter. The PWDC did not come with a hood attachment. We purchased a 0.31 m x 0.41 m WoodRiver hood with floor stand (WoodCraft) to attach to the PWDC. We used a 3.05 m flexible tube (3:1 compression ratio) with a diameter of 10.16 cm to attach the hood to the PWDC.

For both sawing and sanding, pine (a softwood) boards (5.1 cm x 10.2 cm x 122 cm nominal size) and oak (a hardwood) boards (2.5 cm x 10.2 cm x 122 cm nominal size) were used. Samples were collected in an area of the laboratory that was separated from the rest of the laboratory with a cotton cloth curtain (Figure 1). The curtained area was approximately 3.9 m x 2.1 m. The curtains were suspended 30 cm from the ceiling to the floor on a curtain rod made from PVC pipe, thus inhibiting air from entering the restricted area. There were no room HVAC ventilation inlets or outlets in the curtained area. Within the area was a fume hood that was not used during sampling. The same woodworker conducted the sawing and sanding for all sampling events.

Institute of Occupational Medicine (IOM) samplers connected to personal sampling pumps were used to collect inhalable wood dust samples. An M30 Mini-Buck calibrator (A.P. Buck, Inc.) was used to precalibrate and postcalibrate the flow rate of 2 L/min. The IOM sampler was placed in the breathing zone on the woodworker's right shoul-

der. The IOM samples were gravimetrically analyzed by an American Industrial Hygiene Association-accredited laboratory.

Prior to the initiation of sampling, airflow through a loaded PWDC was measured using a pitot tube traverse (McDermott, 2001). The loading was the maximum amount of wood dust that was anticipated during sampling and was less than one half the capacity of the PWDC. A duct was attached to the PWDC and the velocity was measured with a model 100.5 pitot tube traverse (red gage fluid). The wood dust loading in the collection bag did not reduce the air velocity. The filter was vacuumed only when we changed the filter or wood type. We turned the cartridge filter handle each sample per manufacturer's instructions.

While the WDA samples were collected, the noise exposure of the woodworker was determined using a 3M EDGE eg5 noise dosimeter. The dosimeter was programmed according to ACGIH criteria (Berger, Royster, Royster, Driscoll, & Layne, 2003) and precalibrated with a 3M QC-20 sound calibrator. Although the woodworker was right handed, the dosimeter was placed on the woodworker's left shoulder because the IOM sampler was on the woodworker's right shoulder. After completion of the dust sampling, the noise dosimeter was stopped, postcalibrated, and the data from the dosimeter were downloaded as 1-min measurements. The A-weighted equivalent-continuous sound level (L_{Aeq}) was calculated for the sampling time period after the 1-min noise levels from the dosimeter data were downloaded using the following equation (Berger et al., 2003):

$$L_{Aeq,T} = 10\log\left[\left(\tfrac{1}{T}\times\sum_{i=1}^{N}\left(\left(\tfrac{1}{60}\right)\times 10^{\left(\frac{Li}{10}\right)}\right)\right)\right]$$

where $L_{Aeq,T}$ is the A-weighted average noise level for the task of duration T where L_i is the 1-min noise level from the noise dosimeter.

Sanding

A Porter-Cable 352VS belt sander was used to sand the boards. The distance the board was sanded was 0.8 m, which was the mean sanding stroke length found by Thorpe and Brown (1994). The sander's speed option 6 and an 80-grit sandpaper belt were used for all samples. Each sandpaper belt was employed for a maximum of two samples before replacement and the order of sandpaper belt use (first or second use) was recorded for each sample. The board was sanded on one side for 20 min, flipped over (1 min), and the other side of the board was sanded for an additional 20 min. For each minute of sampling, the board was sanded for 45 s followed by a respite of 15 s when no sanding occurred.

Before sampling, the thickness of the boards was measured at six locations (102 mm, 242 mm, 406 mm, 559 mm, 711 mm, and 902 mm). After the 41-min cycle was completed, the board was measured again at the six locations. The difference in wood volume/cycle was used to normalize the results to account for differences in pressure applied by the woodworker that could have influenced the amount of wood removed from the board and thus aerosolized. $C_{m(sand\ norm)}$ was the normalized concentration and it was calculated using the following equation:

$$C_{m(sand\,norm)} = C_m \times \frac{v_{wood(diff)}}{v_{wood(comp)}}$$

where $v_{wood(diff)}$ is the difference in volume of the wood before sanding and after sanding.

The measurements before and after sanding from the six locations on the wood were used to calculate the volume difference. $v_{wood(comp)}$ was the comparison wood volume difference and was the sample volume with the least volume removed. There were two values for $v_{wood(comp)}$, one for pine and one for oak. The comparison volume difference for pine was 319.8 cm^3 and the comparison volume difference for oak was 119.3 cm^3. All results from pine sanding were normalized to the pine comparison value and all results from oak sanding were normalized to the oak comparison value. C_m was the concentration of the sample and was calculated with the following equation:

$$C_m = m/v$$

where m was the mass of the sample and v was the volume of the air sampled after it was corrected to normal temperature and pressure.

Four PWDC setup configurations were measured for sanding (Figure 1):

1. "Front of stroke" referred to when the hood was placed at the front of the stroke.
2. "Back of stroke" referred to when the hood was placed at the back of the stroke.
3. "General ventilation" referred to when the hood and tubing connecting the hood were disconnected from the PWDC and the hood and tubing were removed from the curtained area so the PWDC could function as a general ventilation unit.
4. "Without PWDC" referred to when the PWDC and hood were not used and were both removed from the curtain area.

The hood was placed 10.2 cm in front of the sanding stroke for the "front of stroke" configuration, and 31.8 cm behind the sanding stroke for the "back of stroke" configuration. For all setup configurations, the sawdust collection bag that came with the sander was used on the sander. The sawdust collection bag did not influence hood placement because the sawdust collection bag came out from the top of the sander at an angle.

TABLE **1**

Sanding Multiple Linear Regression Results With Tukey–Kramer Multiple Comparison Test Results for Setup Configurations

Configuration Identification	Portable Wood Dust Collector (PWDC) Configuration	Model Fit Inhalable Dust Geometric Mean* (mg/m^3)	Significantly Different Comparisons
A	Back of stroke	9.9	C, D
B	Front of stroke	14.0	D
C	Without PWDC	22.3	A
D	General ventilation	23.8	A, B

*The model fit exposures are for the task if the sanding belt was used a second time.

Sawing

The same woodworker used a Makita LS1216L compound miter saw to cut boards one time

TABLE **2**

Sawing Multiple Linear Regression Results With Tukey–Kramer Multiple Comparison Test Results for Setup Configurations

Configuration Identification	Portable Wood Dust Collector (PWDC) Configuration	Model Fit Inhalable Dust Geometric Mean* (mg/m^3)	Significantly Different Comparisons
A	With PWDC	3.0	B**, C**
B	General ventilation	9.2	A**, C
C	Without PWDC	16.4	A**, B

*The model fit exposures are for the task if the sanding belt was used a second time.
**Indicates inhalable dust geometric means that are significantly different with $p \leq .001$.

every 15 s for 80 min. The resulting pieces of wood were approximately 4 mm thick. Three PWDC setup configurations were measured for sawing (Figure 1):

1. "With PWDC" referred to removing the sawdust collection bag that came with the saw and placing the hood at the back of the saw next to the opening where the sawdust collection bag would have connected to the saw.
2. "General ventilation" referred to when the sawdust collection bag was left on the saw and the hood and tubing connecting the hood were disconnected from the PWDC and were removed from the curtained area so the PWDC could function as a general ventilation unit.
3. "Without PWDC" referred to when the sawdust collection bag was left on the saw and the PWDC and hood were not used and both were removed from the curtained area.

The sawdust collection bag that came with the saw was removed for the "with PWDC" configuration because it extended straight back from the saw approximately 23 cm. When the miter saw tilted to cut the wood with the sawdust collection bag on, it did not allow the PWDC hood to be close enough to the saw to function. To allow the PWDC hood to be close to the saw, the sawdust collection bag was removed. When the saw was used with the sawdust collection bag in place for the "general ventilation" and "without PWDC" configurations, the sawdust collection bag was emptied at approximately 35 min. Emptying the sawdust collection bag took 1 min and was not counted in the 80-min sampling period.

Data Analysis

A total of 80 IOM samples was used in the data analysis. All exposures were calculated after correcting for normal temperature and pressure. Four conditions were assessed: pine wood with bag filter, oak wood with bag filter, pine wood with cartridge filter, and oak wood with cartridge filter. Within each condition, we randomly assigned the order of PWDC setup configurations.

For each combination of wood/filter PWDC setup configuration, except for the "without PWDC" setup configuration, three samples were collected. Three samples of each "without PWDC" setup configuration were collected for the categories of pine wood with bag filter and oak wood with bag filter. Two samples of each "without PWDC" setup configuration were collected for the setup configurations of pine wood with cartridge filter and oak wood with cartridge filter—one randomly placed in the sampling order and one as the last sample. These "without PWDC" setup configuration samples served as a quality control verifying consistent sampling conditions in the curtained area. All of the "without PWDC" samples were within the allowed deviation, so we made the assumption that sampling conditions were consistent. We used all of the "without PWDC" samples in the data analysis.

Contemporaneous real-time aerosol concentrations were measured during sampling using a 3M EVM-7 photometer placed on a monitor cart (Figure 1). The photometer provided real-time assurance that there was consistent dust generation during the sampling period. The photometer data were not used in the analysis of the PWDC because the sanding results could not be normalized. The process for normalizing the sanding IOM samplers could not be used with the monitor because the aerosol size range that the monitor measures does not match the inhalable size range an IOM sampler measures.

Statistical Analysis

We used multiple linear regression models to analyze the IOM results and the noise results. The variables of interest in the sanding model were PWDC setup configuration, wood type, filter type, and number of times the sandpaper belt was used. The variables of interest in the sawing model were PWDC setup configuration, wood type, and filter type. A post hoc Tukey–Kramer multiple comparison test identified the levels of model features that were statistically different. Statistical significance for all tests was evaluated at the 95% confidence interval level. Analyses were carried out using SAS version 9.4.

Results

The log transformed sanding and sawing IOM results were normally distributed, as determined by Shapiro–Wilk test ($p = .90$ and $p = .22$, respectively). The noise results were normally distributed as determined by Shapiro–Wilk test ($p = .06$ and $p = .45$, respectively). For sanding with a belt sander, the multiple linear regression model revealed that inhalable wood dust exposure of the task was significantly associated with PWDC setup configuration ($p < .0001$) and whether it was the first or second time the sandpaper belt was used ($p < .0001$).

Table 1 shows that placing the PWDC hood in the back of the sanding stroke (back of stroke) significantly reduced exposure compared with not using the PWDC or placing the PWDC in the room without a hood ("general ventilation"). Using the PWDC as general ventilation was not statistically different from using the sander without PWDC; this setup configuration also caused an increase in the model fit inhalable dust geometric mean that was not significant. The model estimated that using a sandpaper belt for the first time caused a 1.9 mg/m^3 increase in exposure compared with using a sandpaper belt for the second time.

For sawing with a miter saw, the multiple linear regression model revealed that PWDC setup configuration was the only variable of

interest that was significantly associated with the task wood dust exposure ($p < .0001$). Having the PWDC functioning as a general ventilation unit significantly reduced inhalable wood dust exposure compared with sawing without the PWDC (Table 2).

None of the variables of interest predicted the A-weighted equivalent-continuous sound level that was produced during sanding ($p = .56$). The overall mean decibel level during sanding was 97.3 dB with a standard deviation of 0.8 dB. During sawing, the noise level was significantly associated with the type of wood ($p = .01$) and the mean differences between oak and pine were small (mean for oak = 93.9 dB, mean for pine = 92.9 dB). The PWDC setup configuration was not significant for sawing ($p = .07$), with a mean of 93.9 dB for "with PWDC," 93.3 dB for "general ventilation," and 93.0 dB for "without PWDC."

Discussion

The PWDC reduced woodworker exposure to WDA during the tasks of sanding with a belt sander and sawing with a miter saw. Not surprisingly, the PWDC created the greatest reductions when there was a hood that could take advantage of the inertial movement of the wood dust (Tables 1 and 2). There was also a significant reduction in exposure during sawing when the PWDC functioned as a general ventilation unit, whereas there was not a significant reduction—and in fact, a slight increase—in exposure when the PWDC was used as a general ventilation unit during sanding. Cutting wood and sanding wood create different-sized aerosol distributions (Vaughan, Chalmers, & Botham, 1990), which might have led to the difference in effectiveness as a general ventilation unit.

The effectiveness of the PWDC with the miter saw might be deceiving to woodworkers who have not been trained that the inhalable dust size is the dust size that causes health concerns. A miter saw creates not only inhalable dust but also wood dust with particle sizes that are larger and therefore not a health concern for workers. The "with PWDC" sawing setup configuration collects inhalable particles but does not effectively collect the larger wood particles that deposit around the saw. This housekeeping problem could lead some woodworkers to believe that the PWDC is not effective because they still have to clean the work area.

The sampling protocol for both sanding and sawing did not include 8-hr samples of continuous sawing and sanding but instead looked only at the results for the time of the task. Our study's protocol of a 40-min sample time for sanding would be equivalent to 8% of a workday and the 80-min sample time for the sawing would be equivalent to 17% of a workday. In many small woodworking shops, woodworkers do not spend eight continuous hours doing the same task and the amount of time spent on the tasks varies by the type of shop.

In a pilot study conducted by Brosseau and coauthors (2001), it was found that the time spent sanding with a hand power tool varied from 1% to 16% of a workday and the time spent sawing with a power tool varied from a 8% to 34% of a workday. In joineries, Douwes and coauthors (2017) found belt sanders were used 9% of the workday, whereas a miter saw was employed only 0.6% of the workday.

Another important aspect of any control strategy is cost. The PWDC with cartridge filter is more expensive than the PWDC with bag filter. This research found no difference in effectiveness, therefore the cheaper bag filter option would be sufficient for sanding with a belt sander and sawing with a miter saw. The longevity of the filters, however, was not addressed in this study and thus could influence the overall cost effectiveness of the bag filters.

Limitations

Although our study found that the PWDC reduced exposure to WDA, this conclusion is based on only two woodworking tasks under laboratory conditions. Additional research is needed to investigate the use of a PWDC with additional woodworking tools. The time it takes to adjust the PWDC hood or to move the PWDC affects productivity, which highlights another factor to investigate.

Conclusion

A PWDC is a potential low-cost solution for small businesses addressing the problem of WDA exposures. This solution does not increase noise exposure. The PWDC with the hood placed behind the sanding stroke significantly reduces the woodworker's exposure to WDA. For sawing, the WDA exposure was significantly reduced when the PWDC was used as a general ventilation unit. The decrease in WDA exposure was even greater when the hood was attached to the PWDC and placed in close proximity to the back of the saw. Both PWDC filter options are equally effective.

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Abstract **We examined mold cleanup practices in the U.S. in a general population that was not selected on a history of natural disaster. We used a population-based survey (*n* = 3,624) to assess associations between 1) sociodemographic, housing, and respiratory health variables and 2) mold cleanup, personal protective equipment (PPE) use, and cleaning agent use. Bleach was the most commonly used cleaning agent, with approximately 90% of residents reporting using bleach alone or with other agents. More respondents used gloves (76%) than any other PPE. The use of PPE varied: 42% of bleach users wore a facemask/respirator compared with only 19% of soap and water users. Hispanic populations frequently reported mold cleanup. Bleach use was less likely in the Western region of the country and among Asians. Although green products were rarely used, Asians were more likely to use them. Bleach was the most commonly used cleaning agent for mold and PPE use was common when using bleach, which supports the need for current Centers for Disease Control and Prevention safe-use recommendations.**

Introduction

Mold remediation is common after hurricanes and floods and includes the use of varied cleaning agents and personal protective equipment (PPE). Respiratory protection used in mold remediation frequently varies in frequency and type, as it did after Hurricane Katrina (Cummings & Kreiss, 2008; Riggs et al., 2008). In 2015, the Centers for Disease Control and Prevention (CDC) and other federal agencies published postdisaster mold cleanup guidance (CDC, U.S. Environmental Protection Agency, Federal Emergency Management Agency, U.S. Department of Housing and Urban Development, & National Institutes of Health, 2015). This guidance recommends eye, skin, mouth, and respiratory protection and includes safe-use advice for cleaning agents. We examined mold cleanup practices in a general population in the U.S. that was not selected on a history of natural disaster.

Methods

Porter Novelli Public Services conducts surveys multiple times annually to ask people style preferences; surveys are conducted via an online panel that is representative of the noninstitutionalized U.S. adult population. The fall 2019 survey was sent to 4,677 panelists from October 8–22. In all, 3,624 adults completed the survey, for a response rate of 77.5%. In addition to sociodemographic and health questions, there were three questions about mold remediation:

1. How many times have you cleaned up mold caused by flooding or a roof, window, or plumbing leak?
2. What have you used to clean up mold?
3. When cleaning up mold what have you worn to protect yourself?

Statistical Analysis

Mold cleanup was used as a dichotomous variable because few respondents (33%) reported cleanup more than once. Cleaning agent use was categorized as bleach only, soap and water only, vinegar only, or green product only. Bleach use reported with any other product was combined into a category of bleach and other. PPE use was dichotomized for any use of PPE, gloves, facemask/respirator, or goggles. Associations between 1) sociodemographic, housing, and respiratory health variables and 2) mold cleanup, PPE use, and cleaning agent use were tested with bivariate and multiple logistic regression models to adjust for confounding.

Results

Mold Cleanup

For mold cleanup at least once in the past, 2,600 respondents reported mold cleanup and 1,024 did not report mold cleanup. Several sociodemographic and housing variables were significantly associated in bivariate models (Table 1). In an adjusted model, with all significant variables listed in Table 1, Hispanic ethnicity was a significant predictor for mold cleanup (odds ratio [*OR*] = 1.75, 95% confidence interval [*CI*] [1.04, 2.95]).

TABLE **1**

Bivariate Logistic Regression Models for the Associations Between Covariates, Mold Cleanup, and Mold Cleaning Agents

		Cleaning Agent* *OR* (95% *CI*)			
Predictor Variable	**Mold Cleanup *OR* (95% *CI*)**	**Bleach**	**Soap and Water**	**Vinegar**	**Green Product**
Age category (1 = 18–29 years; 2 = 30–44 years; 3 = 45–59 years; and 4 = ≥60 years)	1.1[c] (1.1, 1.2)	1.2[c] (1.1, 1.2)	0.8[a] (0.7, 1.0)	0.8[a] (0.6, 0.9)	1.1 (0.9, 1.3)
Renter	0.8[a] (0.6, 0.9)	0.7[c] (0.6, 0.8)	1.1 (0.5, 2.1)	1.9 (1.0, 3.6)	0.7 (0.3, 1.6)
Sex	1.0 (0.8, 1.2)	1.0 (0.8, 1.2)	1.0 (0.5, 1.8)	0.7[a] (0.5, 1.0)	1.1 (0.8, 1.4)
Education level	1.2[b] (1.1, 1.3)	1.0 (1.0, 1.1)	1.1 (0.8, 1.6)	1.2 (0.6, 2.3)	1.2 (0.7, 2.1)
Region (1 = Northeast; 2= Midwest, 3=South, 4 = West)	1.0 (0.9, 1.1)	1.0 (0.9, 1.0)	1.1 (0.8, 1.5)	1.3 (0.9, 1.8)	0.9 (0.7, 1.1)
South	1.2 (1.0, 1.4)	1.2[a] (1.0, 1.5)	0.6 (0.3, 1.1)	0.6 (0.3, 1.2)	1.2 (0.6, 2.1)
West	0.9 (0.7, 1.1)	0.7[b] (0.6, 0.9)	1.7 (0.9, 3.3)	2.3[a] (1.1, 4.7)	0.7 (0.3, 1.4)
Single-family house	1.4[b] (1.2, 1.7)	1.6[c] (1.3, 1.9)	0.9 (0.5, 1.8)	0.6 (0.3, 1.1)	0.8 (0.4, 1.6)
Apartment	0.7[c] (0.5, 0.8)	0.6[c] (0.5, 0.7)	1.1 (0.5, 2.2)	2.1[a] (1.1, 4.0)	1.4 (0.7, 2.8)
Mobile home	1.4 (0.8, 2.2)	1.1 (0.7, 1.7)	1.1 (0.2, 8.2)	0.4 (0.1, 2.9)	0.6 (0.1, 2.5)
Hispanic ethnicity	1.8[a] (1.1, 3.0)	1.6 (1.0, 2.5)	0.4 (0.1, 1.3)	0.2[b] (0, 0.5)	0.4 (0.1, 1.2)
Metropolitan statistical area category (1 = nonmetro; 2 = metro)	1.0 (0.7, 1.2)	1.0 (0.8, 1.3)	2.4 (0.9, 6.3)	1.5 (0.5, 4.3)	1.0 (0.4, 2.2)
Race					
American Indian/Alaska Native	0.9 (0.3, 2.6)	0.7 (0.2, 1.9)	2.4 (0.3, 18.5)	0.3[a] (0.1, 0.7)	2.9 (0.4, 23.8)
Asian	1.1 (0.5, 2.5)	0.7 (0.4, 1.4)	3.3 (0.9, 13.0)	1.4 (0.2, 9.7)	3.7 (0.8, 18.1)
Black	1.5 (0.7, 3.1)	1.3 (0.7, 2.4)	0.8 (0.2, 3.7)	0.2[c] (0.1, 0.4)	1.0 (0.1, 6.7)
Hawaiian/Pacific Islander	2.0 (0.6, 6.3)	1.0 (0.2, 4.9)	2.1 (0.3, 14.6)	0.6 (0.2, 1.4)	0.6 (0.2, 1.4)
White	0.7 (0.4, 1.2)	1.2 (0.8, 1.8)	0.7 (0.2, 2.2)	0.3[a] (0.1, 0.9)	0.4 (0.1, 1.2)
Other	0.7 (0.3, 1.6)	0.6 (0.3, 1.2)	1.3 (0.2, 8.7)	17.5[c] (4.7, 65.9)	1.1 (0.2, 6.9)
Don't know	2.0 (0.6, 6.4)	1.0 (0.2, 4.9)	0.6 (0.2, 1.5)	0.6 (0.2, 1.5)	0.6 (0.2, 1.5)
Asthma	1.3 (0.9, 1.8)	0.8 (0.6, 1.0)	0.6 (0.3, 1.1)	0.9 (0.4, 2.4)	0.5 (0.1, 1.7)
Chronic obstructive pulmonary disease (COPD)	1.6[a] (1.0, 2.6)	1.1 (0.7, 1.6)	2.1 (0.6, 7.2)	0.9 (0.4, 1.7)	0.5 (0.1, 5.1)
Allergy	1.3[b] (1.1, 1.6)	1.0 (0.8, 1.2)	0.5[a] (0.2, 1.0)	1.0 (0.5, 2.0)	0.5[a] (0.2, 1.0)
Physical activity limitation	1.0[b] (1.0, 1.1)	1.0 (1.0, 1.0)	1.0 (0.9, 1.0)	0.9[a] (0.8, 1.0)	1.0 (0.9, 1.1)

CI = confidence interval; *OR* = odds ratio.
*Cleaning agents were reported as exclusively using a single product (e.g., bleach only, soap and water only, vinegar only, or green product only). [a]$p < .05$. [b]$p < .01$. [c]$p < .0001$.

Cleaning Agents Used

About one half of respondents used only one agent. This percentage dropped as the number of products increased (28% used two types, 15% used three, 6% used four, and 2% used five). Bleach was the most commonly used cleaning agent, with approximately 90% of residents reporting using bleach alone or with other agents. Full strength bleach was used by 52% of respondents. When exclusive product use was examined, bleach only was most common (46%), followed by soap and water only (2%), vinegar only (2%), and green products only (2%).

Regression analyses of exclusive use of agents are shown in Table 1. Several sociodemographic, health, and housing variables were significantly associated in bivariate models.

In the adjusted model for bleach only, with all significant variables listed in Table 1, the only variable remaining significant was the Western region (*OR* = 0.5, 95% *CI* [0.3, 0.8]). For the category bleach and others, Hispanic ethnicity (*OR* = 3.9, 95% *CI* [1.5, 9.9]) and Asian respondents (*OR* = 0.3, 95% *CI* [0.1, 0.8]) remained significant. For soap only, age category (*OR* = 0.8,

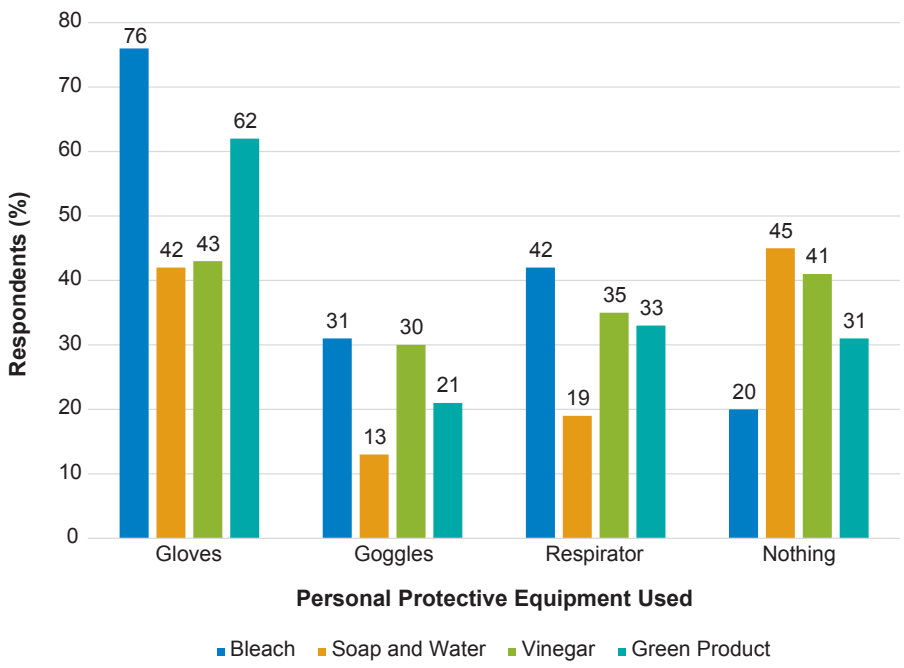
95% *CI* [0.7, 1.0]) and allergy (*OR* = 0.5, 95% *CI* [0.3, 0.9]) remained significant. For vinegar only, apartment residence (*OR* = 0.2, 95% *CI* [0, 0.8]), Black respondents (*OR* = 0.1, 95% *CI* [0, 0.4]), and those indicating other as their race (*OR* = 11.0, 95% *CI* [1.3, 95.3]) remained significant. For green products only, Hispanic ethnicity (*OR* = 0.2, 95% *CI* [0.1, 0.8]) and Asian respondents (*OR* = 6.7, 95% *CI* [1.2, 36.5]) remained significant.

Personal Protective Equipment Used

Overall, more respondents used gloves (76%) than any other PPE (Figure 1). When we focused on specific types of cleaning agent use, the use of PPE varied: 42% of bleach users wore a facemask/respirator compared with only 19% of soap and water users. In the adjusted model, with all significant variables listed in Table 1, only Black respondents remained statistically significant (*OR* = 3.8, 95% *CI* [1.7, 8.3]).

FIGURE **1**

Personal Protective Equipment Use Categorized by Cleaning Agent



Discussion

Hispanic populations and those with allergies frequently reported mold cleanup, which could reflect inequities in housing that give rise to water damage and mold growth (Jacobs, 2011). Individuals with allergies could be following guidance to remove a common allergy trigger.

Bleach was the most commonly used cleaning agent; other investigators have also observed its common use, with Parks and coauthors (2020) finding 32% reported monthly, weekly, or daily use. Soap and water, vinegar, and green products were rarely used. Adjusted models showed those with allergies were less likely to use soap and water to remove mold, perhaps because bleach is perceived as a stronger agent to remove mold. Hispanics were likely to use bleach, whereas bleach use was less likely in the Western region of the country and among Asians. Although green products were rarely used, Asians were more likely to use them.

Following Hurricane Harvey, facemask/respirator use was higher in the general population we surveyed than among the immunocompromised population (Chow et al., 2019). If PPE use was driven mainly by a need to protect the user from mold exposure, we would expect the same PPE use across all types of cleaning agents; however, PPE use varied with cleaning agent type. Facemasks/respirators were more common for users of bleach, vinegar, and green products, yet most facemasks and disposable N95 respirators do not protect against vapors or gases.

Given that only 20% of bleach users reported not using any PPE, compared with 31–45% of the users of other cleaners, bleach users could understand that there is inherent danger to using bleach, and hence they take precautions. The 20% of bleach users not using PPE might also reflect minor or routine cleaning as opposed to extensive remediation cleaning. Given the lower percentages reported for PPE use associated with use of nonbleach cleaners, it appears that the dangers of bleach are frequently recognized and the dangers of other cleaners are insufficiently recognized.

Conclusion

Our findings demonstrate that bleach is the most commonly used cleaning agent and that PPE use is common when using bleach, supporting the need for current CDC safe-use recommendations (CDC, 2020). Bleach effectively kills mold and denatures proteins of many allergens (Chen & Eggleston, 2001; Reynolds, Boone, Bright, & Gerba, 2012). In practice, allergists as well as environmental and public health professionals should consider cultural differences in how individuals clean mold. Based on this information, they can recommend and tailor guidance on appropriate cleaning agent and PPE use.

Disclaimer: The findings and conclusions in this manuscript are those of the authors and do not necessarily represent the official position of CDC.

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Did You Know?

You can view NEHA's Digital Defense: Education for a Safer World Virtual Conference & Exhibition on-demand until February 28, 2021. The free, on-demand offering includes access to the recorded sessions and the exhibition and poster halls. Learn more at www.neha.org/digital-defense.

DIRECT FROM AAS

Eric Bradley, MPH, REHS, CP-FS, DAAS

Call to Arms: Don't Just Join, Get Involved!

Editor's Note: In an effort to provide environmental health professionals with relevant information and tools to further the profession, their careers, and themselves, the National Environmental Health Association has teamed up with the American Academy of Sanitarians (AAS) to publish two columns a year in the *Journal*. AAS is an organization that "elevates the standards, improves the practice, advances the professional proficiency, and promotes the highest levels of ethical conduct among professional sanitarians in every field of environmental health." Membership with AAS is based upon meeting certain high standards and criteria, and AAS members represent a prestigious list of environmental health professionals from across the country.

Through the column, information from different AAS members who are subject-matter expects with knowledge and experience in a multitude of environmental health topics will be presented to the *Journal*'s readership. This column strengthens the ties between both associations in the shared purposes of furthering and enhancing the environmental health profession.

Eric Bradley is an AAS board member and currently works as an environmental health manager. He has been a Registered Environmental Health Specialist for 15 years and has over 20 years of experience in the environmental health field.

Many young professionals entering the environmental health field want to build up their résumés quickly so it will stand out compared to others entering the field. One of the quickest ways to build up your résumé is by joining professional associations.

When I started my first environmental health job in 1997, I wanted to build up my résumé and so I became a member of the National Environmental Health Association (NEHA). As I was not even making twice the minimum wage ($5/hr at that time), I let the membership drop after only 1 year.

For the first 9 years of my career, I worked at three different health departments in two different states and was not a member of any of the state affiliates of NEHA. The state affiliates were briefly mentioned during onboarding but it was not encouraged or even suggested that I should join these organizations.

It wasn't until I started working for my current employer (in a third state) that I was encouraged to join a state affiliate. While filling out all of the human resources forms on my first day, my new supervisor, Larry Linnenbrink, handed me the membership application for the Iowa Environmental Health Association (IEHA). He said to fill it out and give it back to him. At that time, membership to IEHA was only $20 and the other seven environmental health specialists I would be working with were IEHA members. Their membership was not because each had asked to be a member, it was due to the fact that Linnenbrink felt it was important for them to be members. If one of us wanted to take an active role on an IEHA committee, he was supportive and actually encouraged this activity. I look back now on May 8, 2006, and can say this date marks when environmental health became my career and not just my job.

I immediately volunteered to represent IEHA on a state legislative policy committee. This work led to becoming president of IEHA a few years later, as well as being active with almost all of its committees over the years. It also led me to being an active member of the Iowa Public Health Association, a member of advisory workgroups at the National Association of County and City Health Officials, and taking an active role in NEHA (conference speaker, technical advisor, committee/subcommittee member, and instructor).

Taking an active role with your state association and/or a national association can open more doors for you than just listing these memberships on your résumé. These endeavors will allow you to not only share

your knowledge and expertise but also give you the opportunity to learn more about the field, demonstrate your knowledge, and allow you to network and collaborate. It also provides leadership opportunities where you can find a mentor and/or find someone else to mentor.

The American Academy of Sanitarians believes that these are essential qualities to have as an environmental health professional. The Academy is "dedicated to improving the practice, elevating the standards, and advancing the profession of environmental health. The Academy meets these goals through professional and scholarly activities, mentoring of future environmental health leaders, providing scholarships to promising students in accredited environmental health programs, and continuing to promote leaders in the diverse areas of this worthy profession" (American Academy of Sanitarians [AAS], 2014). If you speak with an Academy Diplomate, there is a high probability that they had someone at some point in their career who pushed them or provided them the encouragement to do and be more.

As a Diplomate, the Academy recognizes you as a professional with exceptional knowledge and experience in the field of environmental health. The Diplomate status is the second "highest certification available in the field of environmental health" (AAS, 2014). To become a Diplomate, you have had to go beyond the job requirements of an environmental health professional by taking the initiative to obtain a master's degree and the Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) credential, as well as have a paper published in a peer-reviewed journal (AAS, 2009). The highest environmental health certification available is Diplomate Laureate, which recognizes someone who has 25 years of experience in environmental health, as well as 15 years as an REHS/RS and five of the following: hold an advanced degree beyond a master's degree; hold more than one nationally recognized credential; have at least five published papers; have held an elected office in a state or national environmental health association; membership on a national or international advisory board or standard committee; hold a patent or copyright; have received a state or national environmental health award, or membership on a professional examination, licensing, or other environmental health credentialing board (AAS, 2008).

NEHA Immediate Past-President Dr. Priscilla Oliver discussed the importance and necessity of volunteering and networking in two of her columns in the *Journal of Environmental Health*. Dr. Oliver points out in one column that volunteering can lead to a career or change an existing career, be fulfilling, improve the profession, and ensure our individual successes (Oliver, 2020a). In another column, she highlights that networking is the "sharing of skills, knowledge, abilities, talents, culture, the dos and don'ts, and enjoying the relationship of being connected" (Oliver, 2020b).

By getting involved with environmental health associations, your career can take off and take you places you never envisioned. These opportunities might be speaking engagements, becoming an expert on something you never thought you would have to learn, or even awards for your work. At the end of the day, however, knowing you have had an impact and made a difference in the lives of others is always the most rewarding factor.

There is nothing wrong with joining an organization just to be a member. Most of us do not have the time or energy to be an active member of every association we join. Being a member keeps you connected and allows you to stay current with the association's activities. Members receive general information and training opportunities related to their fields of work. Members can also discover possible opportunities for collaboration within the associations they are active in.

By taking that extra step and becoming involved with one, two, or even three associations where you believe your skills, knowledge, and experience can have an impact, you will be able to participate in the development of local, state, and national environmental health policies that can have a positive impact on the communities we serve. At the end of the day, is this goal not our highest priority?

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DIRECT FROM CDC ENVIRONMENTAL HEALTH SERVICES

Elaine Curtiss, MEd

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Use Resources From the Centers for Disease Control and Prevention to Strengthen Environmental Health Programs

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, NEHA features 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 insights and information about environmental health programs, trends, issues, and resources. The conclusions in these columns are those of the author(s) and do not necessarily represent the official position of CDC.

Elaine Curtiss and Pamela Wigington work on communications in CDC's Water, Food, and Environmental Health Services Branch.

Strong environmental health programs understand the public health needs of their communities and meet those needs with effective solutions. The Centers for Disease Control and Prevention's (CDC) Water, Food, and Environmental Health Services Branch provides a variety of resources to help your program, such as:

- preventing environmental causes of foodborne illnesses and outbreaks,
- addressing threats to health from recreational water and drinking water, and
- using data to address environmental hazards and improve services.

Preventing Environmental Causes of Foodborne Illnesses and Outbreaks

More than one half of all foodborne outbreaks in the U.S. are associated with restaurants, delis, banquet facilities, schools, and other institutions (Dewey-Mattia, Manikonda, Hall, Wise, & Crowe, 2018). Furthermore, environmental factors are responsible for many of the foodborne illnesses in the U.S. every year, particularly in restaurants. CDC supports state and local environmental health programs to identify environmental factors that contribute to foodborne illness outbreaks.

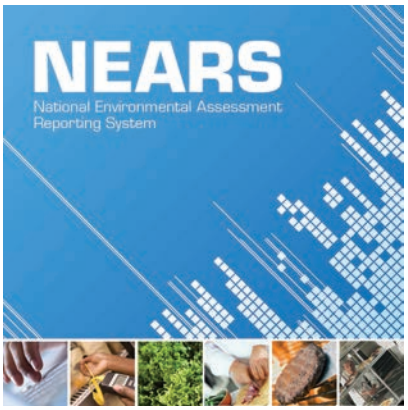
Studies from CDC's **Environmental Health Specialists Network (EHS-Net)** found that bare hand contact by a food worker is a contributing factor in about 1 of 4 restaurant-related outbreaks (Centers for Disease Control and Prevention, 2019; Lipcsei et al., 2019). EHS-Net studies show that restaurants with certified managers were less likely to be linked with outbreaks, were more likely to comply with Food and Drug Administration *Food Code* regulations, and had better food safety practices (Hoover et al., 2020). Explore more of EHS-Net's food safety study findings and evidence-based recommendations for improving food safety and reducing foodborne outbreak risk, including new summaries on:

- key takeaways from four studies on food workers and hand washing and
- how retail delis can address food safety gaps.

CDC's **National Environmental Assessment Reporting System (NEARS)** (Figure 1) captures environmental assessment data from foodborne illness outbreak investigations. The data can then be used to improve food safety

FIGURE **1**

National Environmental Assessment Reporting System (NEARS)



Address environmental causes of foodborne illnesses with NEARS and more resources at www.cdc.gov/nceh/ehs/activities/food.html.

FIGURE **2**

Safe Water Resources

Learn how to keep your water resources safe, including recreational water, private wells, drinking water, and emergency water supplies, at www.cdc.gov/nceh/ehs/activities/water.html.

FIGURE **3**

Understanding the Needs, Challenges, Opportunities, Vision, and Emerging Roles in Environmental Health (UNCOVER EH)

Use data-driven approaches to address environmental hazards and improve services with free resources at www.cdc.gov/nceh/ehs/activities/eh-practice-resources.html.

programs. In fact, NEARS data report that restaurants with norovirus outbreaks had smaller and shorter outbreaks when they had preventive practices such as cleaning policies, food safety training, and certified food safety managers on staff (Hoover et al., 2020).

Addressing Threats to Health From Recreational Water and Private Wells

Water is both a basic need and a source of recreational enjoyment but it can carry contaminants such as *E. coli* and *Cryptosporidium*.

About 1 in 8 individuals in the U.S. get their drinking water from a private well (Dieter et al., 2018) and about 1 in 5 sampled private wells were found to be contaminated at levels that could affect health (DeSimone, Hamilton, & Gilliom, 2009). Learn how to use the 10 Essential Environmental Public Health Services to build strong public health programs for safer well water with CDC's **Safe Water Program Improvement e-Learning Series (SWPI)** (Figure 2). Also, join the virtual **Private Water Network** (Figure 2) for resources on private water issues, including a discussion forum, resource library, event calendar, webinars, and newsletters. This community is offered in collaboration with the National Environmental Health Association (NEHA).

For recreational waters, 1 in 8 public pool inspections and 1 in 7 of public hot tub/spa inspections resulted in immediate closure because of at least one identified violation that represented a serious threat to public health (Hlavsa et al., 2016). Reduce the risk for waterborne illness outbreaks, drowning, and chemical poisoning at public pools and other aquatic venues with CDC's free science-based **Model Aquatic Health Code (MAHC)** guidelines.

Almost all (9 in 10) Legionnaires' disease outbreaks were caused by problems preventable with more effective water management (Garrison et al., 2016). Learn how to create a water management program to reduce risk for Legionnaires' disease in the **Preventing Legionnaires' Disease: A Training on *Legionella* Water Management Programs (PreventLD Training)**.

Using Data to Improve Services and Address Environmental Hazards

The **Understanding the Needs, Challenges, Opportunities, Vision, and Emerging Roles in Environmental Health (UNCOVER EH)** (Figure 3) initiative surveyed 1,700 environmental health professionals across the nation, the first such assessment of the environmental health workforce. Data showed that environmental health professionals commonly work in multiple program areas, requiring unique technical and scientific expertise. Furthermore, 1 in 4 environmental health professionals plan to retire within 5 years (Gerding et al., 2019). Explore more information about this cooperative project with NEHA and Baylor University, including data collected from the web-based survey and subsequent workshop discussions, to learn more about research and workforce development needs in environmental health.

Environmental health professionals can leverage data to increase the impact of their services and inform best practices (Banerjee, Gerding, & Sarisky, 2018). Learn about our new **Environmental Health Capacity (EHC) program** to detect, prevent, and control environmental health hazards through data-driven, evidence-based approaches.

Sign Up Today!

Sign up for the Environmental Health Services Newsletter for more timely and practical tools and resources for environmental health professionals at www.cdc.gov/nceh/ehs/news/newsletter.html.

Environmental health professionals work behind the scenes to keep communities safe and our free resources are a great way to assist with that mission. These tools, along with the branch's practice-based research and guidance, are free and available on our branch website at www.cdc.gov/nceh/ehs.

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NATIONAL ENVIRONMENTAL HEALTH SCIENCE AND PROTECTION ACCREDITATION COUNCIL (EHAC)-ACCREDITED PROGRAMS

The following colleges and universities offer accredited environmental health programs for undergraduate and graduate degrees (where indicated). For more information, please contact the schools directly or visit the National Environmental Health Science and Protection Accreditation Council website at www.nehspac.org.

Baylor University
Waco, TX
Bryan W. Brooks, MS, PhD
bryan_brooks@baylor.edu

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Milton A. Morris, MPH, PhD
morrism@benedict.edu

Boise State University
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††Accredited graduate program only.

DIRECT FROM ecoAmerica

Robert M. Perkowitz

Rebecca C. Rehr, MPH

Ambition, Restoration, and Justice: A Path Forward on Climate Solutions

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 feature this column from ecoAmerica whose mission is to build public support and political resolve for climate solutions. NEHA is an official partner of ecoAmerica and works closely with their Climate for Health Program, a coalition of health leaders committed to caring for our climate to care for our health. The conclusions in this column are those of the author(s) and do not necessarily represent the official position of NEHA.

Robert Perkowitz is the founder and president of ecoAmerica and Rebecca Rehr is the director of ecoAmerica's Climate for Health Program.

Climate change is moving to the forefront of concern for people in the U.S. and all over the world. Accelerating climate-change charged events, including wildfires, floods, severe storms, displacement of people, and economic damage, cannot be ignored. We all need to consider new strategies to amplify the effectiveness of our work to mitigate and prepare for these impacts in our communities and the nation.

The National Environmental Health Association (NEHA) as an institution and environmental health professionals as individuals have a critical role to play in climate solutions. Working at the intersections where people live, work, learn, and recreate, environmental health professionals are on the front lines of ambitious climate solutions that protect our health, help restore our natural environment, and achieve a more just and equitable future. NEHA leads this charge with its exemplary climate change policy statement and clean energy declaration (National Environmental Health Association, 2018), as well as initiatives like the full day of climate change and health programming at its Annual Educational Conference & Exhibition.

NEHA and ecoAmerica have partnered for several years now on climate and health initiatives, most recently at the 9th annual American Climate Leadership Summit. The theme for this summit—Ambition, Restoration, and Justice—is a good framework for environmental health professionals to think about the issue and their interventions.

We must move from disparate and fledgling mitigation efforts to greater *ambition*. Current goals are too weak and too far away. We need 100% clean energy by 2035. We need to begin taking carbon out of the atmosphere on a larger scale as fast as we can. We need to move from adaptation to *restoration*. Healthy nature can restore itself and heal the planet. We need to help nature by reversing the pollution we have emitted and restoring our forests and waters. The most impactful thing we can do to restore the planet is to simply stop burning fossil fuels. Finally, we need to move toward a broader understanding of climate *justice*. We need to help workers and communities that provided fossil fuels to transition to new livelihoods. And we must address our education, health, wealth, and racial disparities.

The ambition, restoration, and justice framework can lead to timely and effective solutions when grounded in three straightforward observations. We are amidst a true climate emergency, solutions are available now, and they must be solved in a broader social context by all of us working together.

The climate emergency perspective and health impacts are more apparent than ever. The 2020 hurricane season in the Atlantic is one of the most active and severe (National Oceanic and Atmospheric Administration, 2020), fires are raging in the western part of the U.S. and are making it difficult for people to breathe, and people across the country have experienced swelteringly hot record temperatures this past summer. A decade ago, climate change was something that was going to happen to us in the future; people spoke of incremental sea level rise and made predictions for the years 2030, 2050, and 2100. What we know now is that climate change is here, impacting our health and well-being, and getting worse every year. As environmental health professionals help their communities address climate impacts,

"Climate change is impacting all aspects of our environmental health work—air, water, vector control, food, safety, and the built environment. … If you have not started to address this impact of climate change in your community, you must start now." (Radke, 2018, p. 6)

— Vince Radke, 2018–2019 President, National Environmental Health Association

urgency needs to be at the forefront. If we do not act now, the impacts of climate change will be irreversible.

At the same time, over the past decade or so, we have developed all the climate solutions we need to address climate change. Today, we are retiring more fossil fuel plants than we are building and renewable energy availability and affordability are increasing (U.S. Energy Information Administration, 2020). We are electrifying transit fleets and making electric cars more accessible with the promise of building more efficient heavy industry and aviation. Corporations like Microsoft are paving the path for us all to not only achieve carbon neutrality but also remove our historic emissions. Natural solutions like tree planting, green roofs, and more permeable surfaces are available today. Carbon pollution removal technologies are also on the rise. It is now a matter of implementation. Environmental health professionals are well positioned to advocate for cost-effective climate solutions in their companies, organizations, and communities.

As we address the solutions, we need to keep in mind that climate change is a social problem as much as a technical or policy issue. Our climate, public health, economic, democratic, and racial crises are intertwined, rooted in the same systemic injustice. Climate change can be addressed as an integral part of housing, education, agriculture, transportation, and electricity generation.

Many environmental health professionals are familiar with the Health in All Policies (HiAP) approach. Health is influenced by many factors and is not simply the absence of disease. HiAP integrates and articulates health considerations into policy making across sectors to improve the health of all communities and people (Centers for Disease Control and Prevention, 2016). We should consider climate change across decision making in the same manner.

As the visible impacts of climate change accelerate, so has concern. From a recent survey, 74% of Americans now report being concerned about climate change, including almost one half (45%) who are very concerned. An additional 14% are a little concerned, bringing the total to 88%. So why aren't we up in arms about climate change? Analyzing one step further, while 45% say they are very concerned, only one half as many (23%) believe others around them are very concerned (ecoAmerica, 2020a). Americans are also more aligned on climate change than it seems: 88% agree that Republicans and Democrats should find a way to work together to address climate change (ecoAmerica, 2020b).

Environmental health professionals need to step up and help close this gap by connecting the dots on climate change and health to motivate action on climate solutions. Environmental health professionals get it. When NEHA members were asked, "If the United States took steps to help prevent future climate change, would it affect your health," nearly three quarters (72%) responded that it would improve their health compared with 66% of national respondents (McAdams, Rehr, Kobayashi, & DeArman, 2019). When we work to reduce the gap between those who are concerned but do not think others are and when we reach across the aisle to work on climate solutions, these are the principles that yield results. We can lead on climate solutions, we can be bold now, and we will do it together.

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JEH QUIZ

FEATURED ARTICLE QUIZ #3

Dust and Noise Exposure While Using a Portable Wood Dust Collector

Available to those with an active NEHA membership, *JEH* Quiz, offered six times per calendar year through the *Journal of Environmental Health,* is an easily accessible means to accumulate continuing education (CE) contact hours toward maintaining your NEHA credentials.

1. Read the featured article carefully.
2. Select the correct answer to each *JEH* Quiz question.
3. a) Complete the online quiz found at www.neha.org/publications/journal-environmental-health,
   b) Fax the quiz to (303) 691-9490, or
   c) Mail the completed quiz to
   JEH Quiz, NEHA
   720 S. Colorado Blvd., Ste. 1000-N
   Denver, CO 80246.
   Be sure to include your name and member number!
4. One CE contact hour will be applied to your account with an effective date of December 1, 2020 (first day of issue).
5. Check your continuing education account online at www.neha.org.
6. You're on your way to earning CEs!

Quiz Registration

Name

NEHA Member Number

E-mail

→ Quiz deadline: March 1, 2021

1. The American Conference of Governmental Industrial Hygienists (ACGIH) has established its threshold limit value for exposure to wood dust aerosol to be __ (inhalable) for all tree species except western red cedar.
   a. 0.5 mg/m^3
   b. 1 mg/m^3
   c. 2 mg/m^3
   d. 3 mg/m^3
2. In a study that explored worker exposure to wood dust, the percentage of furniture factory workers who had exposures over the ACGIH recommendation was
   a. 12.9–28.6%.
   b. 12.9–37.5%.
   c. 28.6–37.5%.
   d. 37.5–100%.
3. Another study found that workers in woodworking factories with <20 employees had __ dust exposures than those in __ facilities.
   a. lower; smaller
   b. lower; larger
   c. higher; smaller
   d. higher; larger
4. The objective(s) of this study were to
   a. determine if wood dust exposure was reduced using a commercially available portable wood dust collector (PWDC), and if so, which setup configuration significantly reduced exposure.
   b. assess the influence of other variables such as wood type on the effectiveness of the PWDC.
   c. measure the effect of the PWDC on noise exposure.
   d. all the above.
   e. none of the above.
5. The study's protocol of a 40-min sample time for sanding would be equivalent to __ of a workday and the 80-min sample time for the sawing would be equivalent to __ of a workday.
   a. 4%; 8%
   b. 8%; 17%
   c. 17%; 8%
   d. 17%; 40%
6. In the study, pine (a softwood) and oak (a hardwood) boards were used for
   a. sawing.
   b. sanding.
   c. both sawing and sanding.
7. While the wood dust aerosol (WDA) samples were collected, the noise exposure of the woodworker was determined using a noise dosimeter that was placed on the woodworker's
   a. left shoulder.
   b. right shoulder.
   c. left forearm.
   d. right forearm.
8. For the study, __ PWDC setup configurations were measured for sanding and __ PWDC setup configurations were measured for sawing.
   a. three; three
   b. three; four
   c. four; three
   d. four; four
9. A total of __ WDA samples collected by Institute of Occupational Medicine samplers was used in the data analysis.
   a. 50
   b. 60
   c. 70
   d. 80
10. For sanding with a belt sander, the multiple linear regression model revealed that inhalable wood dust exposure of the task was __ associated with PWDC setup configuration and whether it was the first or second time the sandpaper belt was used.
    a. not significantly
    b. significantly
11. For sawing with a miter saw, the multiple linear regression model revealed that PWDC setup configuration was the only variable of interest that was __ associated with the task wood dust exposure.
    a. not significantly
    b. significantly
12. None of the variables of interest predicted the A-weighted equivalent-continuous sound level that was produced during sanding.
    a. True.
    b. False.

JEH Quiz #1 Answers

July/August 2020

1. d	4. b	7. a	10. d
2. d	5. c	8. b	11. b
3. a	6. d	9. c	12. a

EH CALENDAR

Editor's Note: Due to the COVID-19 pandemic, many conferences and events are being canceled or transitioned to virtual events as organizers assess health and safety issues, as well as take into consideration current state and local orders related to social distancing and gatherings. As such, the status of the conferences listed below might not be correct. Attendees are encouraged to check the websites for each conference listing for the latest information. Any cancellations or changes that occurred prior to the time of press have been noted below.

UPCOMING NATIONAL ENVIRONMENTAL HEALTH ASSOCIATION (NEHA) CONFERENCE

2021: NEHA 2021 Annual Educational Conference & Exhibition Three-Part Virtual Series, www.neha.org/aec

NEHA AFFILIATE AND REGIONAL LISTINGS

Kentucky
February 8–10, 2021: Annual Conference, Kentucky Environmental Health Association, Lexington, KY, http://kyeha.org/events

Michigan
March 2021: Annual Educational Conference, Michigan Environmental Health Association, Port Huron, MI, www.meha.net/AEC

Utah
May 5–7, 2021: Spring Conference, Utah Environmental Health Association, Kanab, UT, www.ueha.org/events.html

TOPICAL LISTINGS

Water Quality
January 20–22, 2021: *Legionella* Conference: Prevention of Disease and Injury From Waterborne Pathogens in Health Care, NSF Health Sciences and NEHA, Chicago, IL, www.legionellaconference.org

Did You Know?

You can stay up-to-date on environmental health issues within the various levels of government through NEHA's Government Affairs page at www.neha.org/government-affairs. Check out the Your Insider in Government Affairs blog, view one of the Government Affairs webinars, read a recent position paper or sign-on letter, or learn about recent state and federal legislative alerts.

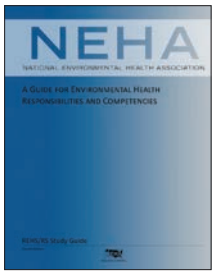
RESOURCE CORNER

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 NEHA's online Bookstore for additional information about these and many other pertinent resources!

NEHA BOOKSTORE
www.neha.org/store

REHS/RS Study Guide (4th Edition)

National Environmental Health Association (2014)

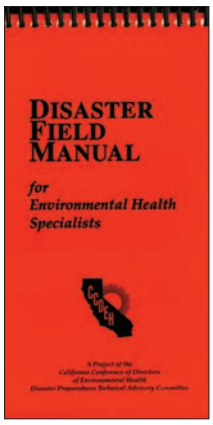


The Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) credential is the National Environmental Health Association's (NEHA) premier credential. This study guide provides a tool for individuals to prepare for the REHS/RS exam and has been revised and updated to reflect changes and advancements in technologies and theories in the environmental health and protection field. The study guide covers the following topic areas: general environmental health; statutes and regulations; food protection; potable water; wastewater; solid and hazardous waste; zoonoses, vectors, pests, and poisonous plants; radiation protection; occupational safety and health; air quality; environmental noise; housing sanitation; institutions and licensed establishments; swimming pools and recreational facilities; and disaster sanitation.

308 pages / Paperback
Member: $149 / Nonmember: $179

Disaster Field Manual for Environmental Health Specialists

California Association of Environmental Health Administrators (2012)

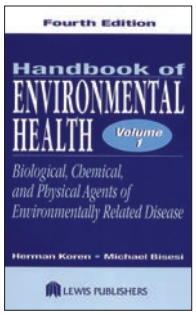


This manual serves as a useful field guide for environmental health professionals following a major disaster. It provides an excellent overview of key response and recovery options to be considered as prompt and informed decisions are made to protect the public's health and safety. Some of the topics covered as they relate to disasters include water, food, liquid waste/sewage, solid waste disposal, housing/mass care shelters, vector control, hazardous materials, medical waste, and responding to a radiological incident. The manual is made of water-resistant paper and is small enough to fit in your pocket, making it useful in the field. Study reference for NEHA's Registered Environmental Health Specialist/Registered Sanitarian credential exam.

224 pages / Spiral-Bound Hardback
Member: $37 / Nonmember: $45

Handbook of Environmental Health, Volume 1: Biological, Chemical, and Physical Agents of Environmentally Related Disease (4th Edition)

Herman Koren and Michael Bisesi (2003)

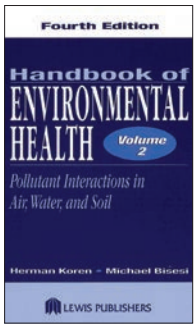


A must for the reference library of anyone in the environmental health profession, this book focuses on factors that are generally associated with the internal environment. It was written by experts in the field and copublished with NEHA. A variety of environmental issues are covered such as food safety, food technology, insect and rodent control, indoor air quality, hospital environment, home environment, injury control, pesticides, industrial hygiene, instrumentation, and much more. Environmental issues, energy, practical microbiology and chemistry, risk assessment, emerging infectious diseases, laws, toxicology, epidemiology, human physiology, and the effects of the environment on humans are also covered. Study reference for NEHA's Registered Environmental Health Specialist/Registered Sanitarian credential exam.

790 pages / Hardback
Member: $215 / Nonmember: $245

Handbook of Environmental Health, Volume 2: Pollutant Interactions With Air, Water, and Soil (4th Edition)

Herman Koren and Michael Bisesi (2003)



A must for the reference library of anyone in the environmental health profession, this book focuses on factors that are generally associated with the outdoor environment. It was written by experts in the field and copublished with NEHA. A variety of environmental issues are covered such as toxic air pollutants and air quality control; risk assessment; solid and hazardous waste problems and controls; safe drinking water problems and standards; onsite and public sewage problems and control; plumbing hazards; air, water, and solid waste programs; technology transfer; GIS and mapping; bioterrorism and security; disaster emergency health programs; ocean dumping; and much more. Study reference for NEHA's Registered Environmental Health Specialist/Registered Sanitarian credential exam.

876 pages / Hardback
Member: $215 / Nonmember: $245

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The board of directors includes NEHA's 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

Carolyn Hester Harvey

The National Environmental Health Association (NEHA) was saddened to learn that Carolyn Hester Harvey, MS, PhD, RS, CIH, CHMM, passed away on October 3, 2020. A pioneer and leader, Dr. Harvey's career in environmental health, industrial hygiene, and public health spanned over 50 years. She had over 30 years of professional experience working in the field before moving into academia where she shared her rich knowledge.

Dr. Harvey began her career in academia in 1996 at East Tennessee State University. She joined the Department of Environmental Health Science (EHS) and Medical Laboratory Science faculty at Eastern Kentucky University (EKU) in 2001. At EKU she directed the Master of Public Health (MPH) Program from 2009–2014, held the full professor's rank, and became department chair. Dr. Harvey retired from active teaching at EKU on January 1, 2017, and served as a faculty emeritus and adjunct faculty until her passing. One of Dr. Harvey's lasting legacies is her positive influence on students and in the development of young emerging professionals. She also contributed to the furthering of the profession through the publication of several articles and numerous presentations.

Further notable legacies are Dr. Harvey's leadership within the profession and volunteerism within numerous organizations. She was a member of NEHA for almost 25 years. She served as NEHA president from 2014–2015 and provided unsurpassed leadership during that time as the association searched for a new executive director. She also was a technical editor of the *Journal of Environmental Health* since 2011. Dr. Harvey was a founding member, president, and a board member of the Association of Environmental Health Academic Programs; a diplomate of the American Academy of Sanitarians (AAS); and a member of numerous professional organizations including the Kentucky Environmental Health Association, National Environmental Health Science and Protection Accreditation Council, and American Public Health Association. She was also a founding member of the National Council on Diversity in Environmental Health.

Dr. Harvey was honored with numerous awards during her career. Most notably she was the 2020 recipient of the prestigious Walter S. Mangold Award, NEHA's highest honor. "Dr. Harvey's professionalism, numerous individual achievements, contributions made toward improving our profession, her active involvement in NEHA and state associations, and the professional positions she has held, coupled with her education, made her most worthy and deserving of being recognized as this year's Mangold Award recipient," stated CAPT Craig Shepherd, 2020 Mangold Award Committee chair.

The following quotes from coworkers, colleagues, and former students provide rich insight into Dr. Harvey's true impact on the people who knew her and the profession as a whole.

"As a new faculty member, Dr. Harvey assisted me in numerous ways while becoming family. She made me a part of the NEHA family by introducing me to so many legends in the field. I would not be in my leadership position at NEHA without her encouragement, guidance, and unwavering support. I will miss her each and every day. She was my partner in crime and we had so many wonderful adventures together," Dr. D. Gary Brown, EKU professor and NEHA first vice-president.

Dr. Carolyn Harvey receives the National Environmental Health Association (NEHA) Outgoing President's Award from Bob Custard at the NEHA 2015 Annual Educational Conference & Exhibition.

"At every opportunity, Dr. Harvey mentored and inspired students and aspiring professionals. It was truly an honor to serve on NEHA's board with her. She was an impressive leader with magnificent fortitude; she always remained focused on the best interest of the organization and the environmental health profession. She had an admirable spirit of giving. Dr. Harvey was a hero, a true professional, a role model, and a person of the highest integrity. We built a lifelong trusting relationship, both professionally and personally. We recently spoke about the importance of doing things that bring us joy. I miss her dearly and am eternally grateful for our friendship," Alicia Collins, NEHA past president.

"With the passing of Dr. Harvey, we have at once lost a beautiful mind and a beautiful, character-filled person. All of us are eternally grateful for her commitment, professionalism, and wicked sense of humor," Dr. David Dyjack, NEHA executive director.

"Dr. Harvey will be deeply missed but never forgotten. She was a friend of our family, a colleague in our academic endeavors, a fellow NEHA past president, and an exemplary model of humanity and professionalism," Dr and Mrs. Amer El-Ahraf, NEHA past president.

"She was a legend and a pioneer in our field and she blazed a trail that I and many others, before and after me, followed to success. She was not only my professor, mentor, and friend, she was family. There will never be another like her," DaJuane Harris, former student.

"Dr. Harvey was one of the strongest, most influential women I have ever known. She came into my life at a pivotal moment and completely changed my trajectory. She was warm and inviting, yet

had a no-nonsense personality that challenged those around her and made people work harder and want to do and be better. She never met a stranger and always had a way of making those around her feel loved and important. She was quick witted, sharp as a tack, said whatever was on her mind, had the ability to get things done, and fought for what she believed in. I know I would not be where I am today without her love and guidance over the years. I will be forever thankful for my time with her and I hope that I can help carry on her legacy in my continued work with students and this profession," Jaime Hisel, EKU faculty.

"I would not have found the EHS/MPH program if it was not for her. She was an amazing woman. It's heartbreaking that we cannot hear one more joke from her. I loved her laugh and how she always laughed at her own jokes," Blake Johnson, former student.

"It is sad that we have lost such a fine human being, environmental health practitioner, and educator," Dr. and Mrs. Hank Korem, retired professor.

"It was a blessing to learn from her—such a strong professional woman that so many of us tried to model. She truly left her mark on us and that continues to spread as we mentor others moving up in the field. I will miss her no-nonsense approach and assertiveness, her heart of gold, and her knowledge that seemed endless," Courtney Lewis, past student.

"Beyond being a trailblazer for so many, Dr. Harvey also believed in providing students and many others with opportunities. She knew the purpose underlying our profession offered so much inspiration that it could improve lives, careers, and future generations. She treated everyone like family with her heart of gold, and her pure and polished character conveyed authenticity, no-nonsense, genuine grace, and love for all people," Dr. Jason Marion, EKU professor.

"Dr Carolyn Harvey was a friend, colleague, dedicated environmental health professional, and humble servant leader who touched many lives in many ways. She always gave her best and made us all better people. Her tireless contributions and giving spirit will have a lasting impact on EKU, NEHA, AAS, and across the environmental health community," Dr. Wendell A. Moore, retired colonel.

"Dr Harvey was a leader, a woman that I looked up to and aspired to be in this field. I would not be where I am today without her," Tori Nasrallah Sparks, former student.

"Carolyn's passing is both a deeply personal and professional loss. She set THE example for all of us in the gentle way she valued young aspiring professionals, her unwavering dedication to our profession as mentor and teacher, and her demonstration of leadership and commitment," Dr. Robert Powitz, Mangold Award winner.

"Dr. Harvey was the consummate environment health professional. She was a leader, practitioner, and academician. We shared many glasses of wine over the years. I will miss my environmental health colleague," Vince Radke, NEHA past president.

For over 20 years, Dr. Carolyn Harvey was a passionate supporter, teacher, mentor, and friend to countless environmental health students.

"If it were not for Dr. Harvey, I would have not graduated. Dr. Harvey took me in with open arms and her world-famous charisma and kindness put my mind at ease and reassured me that I was making the right choice. Without her I wouldn't have been close to the position in life I am in now. I have not done enough but I am not done. I hope to continue and develop myself into a leader for the industry like she was," Daniel Rennaker, former student.

"Long after my graduation from EKU, Dr. Harvey remained available to provide sound career and technical advice, as well as friendly encouragement. She will be greatly missed by many," Dr. Troy Ritter, former student.

"I was truly blessed to have worked with Dr. Harvey throughout my time at NEHA. Her wisdom, leadership, grace, heart, and tenacity made an impression on me and shaped my career. She was my role model, as I'm sure she was for countless others. In this sadness, however, I do find joy as I know her legacy will live on through the work and lives of those that she touched," Kristen Ruby-Cisneros, NEHA staff.

"Dr. Harvey always exhibited exuberance, enthusiasm, and warmth in everything she did. She was a real people person," Webster "Webb" Young, Jr., retired rear admiral.

NEHA extends its deepest sympathies to Dr. Harvey's family, friends, and colleagues. Her memory will indelibly be a part of the environmental health profession's history through the knowledge, leadership, mentorship, and friendship she so willingly gave. She will be missed tremendously.

Editor's Note: We thank the individuals who provided quotes and information regarding the life of Dr. Carolyn Harvey, as well as the organizations that provided biographical information. 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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Application Period Open for the National Environmental Public Health Internship Program

By Reem Tariq (rtariq@neha.org)

National Environmental Public Health Internship Program

In partnership with the Centers for Disease Control and Prevention's (CDC) Water, Food, and Environmental Health Services Branch, the National Environmental Health Association (NEHA) is currently accepting applications for the National Environmental Public Health Internship Program (NEPHIP) to support 22 environmental health student internships during summer 2021. The application is open exclusively to environmental health students that are currently enrolled in a program accredited by the National Environmental Health Science and Protection Accreditation Council. In addition, the application is also open to local, state, territorial, and tribal health departments that are interested in hosting an intern.

The purpose of NEPHIP is to encourage environmental health students to consider careers at local, state, or tribal environmental public health departments following graduation. Through this internship program, students will be exposed to the exciting career opportunities, benefits, and challenges of working with environmental public health agencies throughout the U.S., and the program is beneficial to local, state, and tribal environmental public health departments by providing qualified students who will contribute to the department's work at no cost to the department. NEPHIP is supported through a cooperative agreement with CDC (CDC-RFA-OT18-1802).

NEHA's role in the program is to:

1. solicit applications from eligible environmental health departments and select locations based on established application criteria;
2. solicit applications from eligible environmental health students and select interns based on established application criteria; and
3. match selected interns with selected environmental health departments based on geolocation preferences, interests, and professional goals that align with health department opportunities.

The application period for health departments and students is now open and will close on January 22, 2021. Selected students will receive a base stipend of $6,000 ($600/week) for undergraduate students and $8,000 ($800/week) for graduate students to complete a 10-week internship. Information regarding student and health department eligibility and additional considerations, as well as the applications and application checklists, can be found at www.neha.org/nephip. NEHA's NEPHIP web page also includes 2021 program guidelines and past intern success stories.

A National Environmental Public Health Internship Program intern conducts shellfish inspections under the guidance of environmental health professionals at the Alaska Department of Environmental Conservation in Anchorage, Alaska. Photo courtesy of the Alaska Department of Environmental Conservation.

NEHA FUNdraising Events for December

By Lexi Nally (atnally@neha.org)

- **Colorado Gives Day 2020**: We are excited to announce our participation in Colorado Gives Day on December 8, 2020. Support us in reaching our goal of $10,000 and Colorado Gives guarantees a multiplied impact! By contributing to this campaign, you are supporting the National Environmental Health Association/American Academy of Sanitarians (NEHA/AAS) Scholarship Fund directly, making it possible for dedicated environmental health students to complete their programs with less debt and feel empowered to get started in the environmental health profession following graduation. Mark your calendars for December 8, the day that will multiply your impact and support our NEHA/AAS Scholarship Fund!
- **AmazonSmile Gives Back**: One simple way to support NEHA during the holidays is to shop online through AmazonSmile and choose "National Environmental Health Association" as your charitable organization. With every purchase you make through AmazonSmile, Amazon will donate 0.5% of your eligible sales back to us!
- **Dear NEHA, Letters From Our Supporters**: Check out our new donor blog to read the inspirations of our supporters who continue to give back to us as their professional organization. Become enlightened by their thoughtful words and unwavering commitment as they endorse the advancement of environmental health. View the blog at www.neha.org/membership-communities/get-involved/day-in-life.

For more information on these events, please visit www.neha.org/about-neha/donate.

NEHA Releases Second COVID-19 Environmental Health Workforce Needs Assessment

On November 5, 2020, NEHA released the preliminary findings report from its nationwide environmental health workforce needs assessment in response to COVID-19. The needs assessment was conducted between July 15 and August 31, 2020. The aim of the assessment was to collect primary data in support of efforts to assess environmental health workforce activities and identify needs in response to COVID-19.

Information about the survey was sent to approximately 6,800 individuals via several e-mail marketing endeavors and had a reach of approximately 1,200 individuals via three social media platforms. In total, 767 individuals completed the survey with over one half of respondents (52%) working at local environmental health programs.

The findings support that environmental health practitioners, many of whom are employed at small local agencies, are actively supporting COVID-19 response and recovery. Their contributions

are felt in safely reopening and restoring the economy, emergency operation centers, contact tracing, and communications efforts, in addition to their customary responsibilities. They have been tasked to take on new roles and responsibilities that sometimes place them at risk of harm from the disease.

The most frequently identified issue caused by the COVID-19 pandemic was staff shortages (51%), followed by lack of guidance (48%), insufficient training (46%), and budget/resource shortages (46%). An overwhelming number of respondents reported feeling more emotionally exhausted (74%) and worn out at the end of the working day (67%). A high percentage of local (60%), state (64%), and tribal (67%) environmental health programs reported an insufficient number of staff to conduct the work needed.

A comprehensive report of the assessment will be published at a later date. To view the assessment, as well as the first needs assessment conducted in late March 2020, please visit https://emergency-neha.org/covid19/eh-workforce-reports.

NEHA Announces the Launch of the COVID-19 Early Care and Education Collaborative

Meeting the urgent needs resulting from the COVID-19 pandemic, the Agency for Toxic Substances and Disease Registry (ATSDR) has awarded support for a collaborative of public health partners to work in coordination to advance environmental health capacity to implement COVID-19 guidance and safe practices in early care and education (ECE) facilities. The partner organizations include the Children's Environmental Health Network, Association of State and Territorial Health Officials, National Association of County and City Health Officials, National Center for Healthy Housing, and NEHA.

Environmental health practices play an important role in reducing the spread of COVID-19 in our communities, specifically environmental health practices around sanitation, disinfection, food safety, and other related considerations for the ECE environment. The need for guidance on cleaning practices is especially necessary in ECE facilities where many children spend a majority of their active hours during the day. Children at ECE facilities can also be subject to an increased risk of exposure to COVID-19 and other environmental health hazards. Children are more susceptible to environmental health hazards than adults due to a smaller body weight, underdeveloped brain and immune systems, and an increased tendency to put their hands in their mouths. Resources developed from this project will provide ECE providers and health departments with the ability to improve environmental health for children during COVID-19, supporting their critical roles in protecting children's health.

"Environmental health professionals play a critical assurance role in the health and safety of families at this time in our nation's history," said Dr. David Dyjack, NEHA executive director. "We are honored to facilitate this collaborative that will provide tools and resources to the environmental health workforce in support of our efforts to ensure every child reaches their full potential free from recognized risks in the environment."

A full press release can be viewed at www.neha.org/neha-announces-launch-covid-19-early-care-and-education-collaborative to learn more about the partner organizations and the importance of this effort.

NEHA Awarded Retail Food Safety Association Collaborative Cooperative Agreement

A recent press release from the Food and Drug Administration (FDA) announced the award of three Retail Food Safety Association Collaborative Cooperative Agreements to the Association for Food and Drug Officials (AFDO), National Association of County and City Health Officials (NACCHO), and NEHA. The three organization represent state, local, tribal, and territorial (SLTT) retail food safety programs. The Conference for Food Protection (CFP) is also a sub-awardee under this cooperative agreement program.

The total funding for the cooperative agreement program is $1.25 million. The amount awarded to each association varies based on the expected outcomes of their respective cooperative agreements. These cooperative agreements directly support FDA's efforts to modernize the nation's retail food protection program under the New Era of Smarter Food Safety (www.fda.gov/food/new-era-smarter-food-safety).

"We want to work with stakeholders to reimagine how we approach retail food safety. We are serious about bending the curve of foodborne illness in this country by reducing the number of illnesses. To do that, we must do more to modernize and help ensure the safety of foods sold at restaurants and other retail establishments," stated Frank Yiannas, deputy FDA commissioner for food policy and response.

These cooperative agreements will help FDA to better leverage their national association partners to assist SLTT retail food programs in efforts to reduce the occurrence of foodborne illness risk factors, implement and attain conformance with the Voluntary National Retail Food Regulatory Program Standards (Retail Program Standards), and advance a nationally integrated food safety system. As part of the 2-year cooperative agreement program, AFDO, NEHA, NACCHO, and CFP will work collaboratively with FDA to achieve the following national retail program objectives:

- Identify, assess, and promote industry and regulatory intervention strategies designed to reduce foodborne illness risk factor occurrence.
- Leverage the associations to enhance Retail Program Standards technical support to SLTTs through a multiplier effect.
- Assess and promote greater application of risk-based inspection methods by SLTT retail regulatory jurisdictions.
- Develop and promote use of an FDA *Food Code* adoption, implementation, and sustainability toolkit.
- Develop and implement a national strategy for promoting *Food Code* adoption.

continued on page 44

STUDENTS

Don't Miss This Opportunity!

Applications for the 2021 National Environmental Health Association/American Academy of Sanitarians (NEHA/AAS) Scholarship Program are now being accepted.

Undergraduate and graduate students enrolled in an accredited college or university with a dedicated curriculum in environmental health sciences are encouraged to apply.

Nomination deadline is March 31, 2021.

For eligibility information and to apply, visit www.neha.org/scholarship.

DAVIS CALVIN WAGNER SANITARIAN AWARD

The American Academy of Sanitarians (AAS) announces the annual Davis Calvin Wagner Sanitarian Award. The award consists of an individual plaque and a perpetual plaque that is displayed in NEHA's office lobby.

Nominations for this award are open to all AAS diplomates who:

1. Exhibit resourcefulness and dedication in promoting the improvement of the public's health through the application of environmental and public health practices.
2. Demonstrate professionalism, administrative and technical skills, and competence in applying such skills to raise the level of environmental health.
3. Continue to improve through involvement in continuing education type programs to keep abreast of new developments in environmental and public health.
4. Are of such excellence to merit AAS recognition.

NOMINATIONS MUST BE RECEIVED BY APRIL 15, 2021.

Nomination packages should be e-mailed to Dr. Robert W. Powitz at powitz@sanitarian.com

Files should be in Word or PDF format.

For more information about the award nomination, eligibility, and the evaluation process, as well as previous recipients of the award, please visit www.sanitarians.org/awards.

NEHA **NEWS**

continued from page 42

- Enhance utilization of foodborne illness outbreak investigation resources and best practices by SLTT retail regulatory jurisdictions.
- Promote and connect available resources among retail food safety stakeholders.

Information about this collaborative and NEHA's involvement will be forthcoming at www.neha.org, as well as in the upcoming January/February 2021 *Journal of Environmental Health*.

New Environmental Health and Land Reuse Certificate Program From NEHA and ATSDR

Beginning in 2016, ATSDR and NEHA launched a partnership to create a free online course with the goal of building capacity within communities to help remediate and redevelop many of the brownfields around the country. Brownfields are land reuse sites often contaminated by harmful chemicals or redeveloped without proper environmental oversight, such as former gas stations, manufactured gas plants, factories, dry cleaners, and abandoned properties. Due to their potentially hazardous status, brownfields can lead to harmful exposures in humans while accentuating, and often exacerbating, socioeconomic disparities within communities. These sites, therefore, have unique funding eligibilities and regulatory steps for developmental processes.

ATSDR has been working diligently with brownfields since the mid-1990s, and in 2006, launched the National Land Reuse Health Program that focuses on incorporating community health considerations into land revitalization activities. This program promotes a well-rounded, healthful approach to redevelopment; measures changes in community health; encourages community involvement in public policy; and improves ways to discuss health and environmental risks. Collaborating with NEHA to transport ATSDR's expertise to an online learning space, the Environmental Health and Land Reuse (EHLR) Certificate Program provides all the information needed to build "healthfields" or other health-focused redevelopments in communities.

Based on a NEHA survey, environmental professionals working in local health departments (LHDs) reported varying levels of education in environmental health and land reuse/redevelopment in the areas of risk assessment, risk communication, epidemiology, land reuse and redevelopment, and toxicology. Among LHD respondents who indicated working on land reuse/brownfields issues, almost 75% indicated having either no formal education or only continuing education courses related to land reuse and/or brownfields.

The EHLR Certificate Program was created to fill that knowledge gap. This holistic training course consists of six modules:

- Prerequisite: Introduction to the Environmental Health and Land Reuse Certificate Program
- Module 1: Engaging With Your Community
- Module 2: Evaluating Environmental and Health Risks
- Module 3: Communicating Environmental and Health Risks
- Module 4: Redesigning With Health in Mind
- Module 5: Measuring Success

The wealth of knowledge contained in these modules will provide environmental or health professionals the information, procedures, and resources needed to identify, cleanup, and redevelop land reuse sites.

Participants can receive either a Community Engagement and Risk Communication Certificate upon completion of the prerequisite and modules 1 and 3 (aimed at public health professionals such as nurses) or an Environmental Health and Land Reuse Certificate upon completion of the prerequisite and all five modules (all audiences).

The course can be accessed with a MyNEHA account through NEHA's online E-Learning (www.neha.org/e-learning). Please visit www.neha.org/ehlr for more information about the EHLR Certificate Program.

NEHA Announces Virtual FDA Course Catalog

NEHA is pleased to announce the enhanced delivery of its extensive FDA course catalog on a new, virtual learning platform. The new virtual FDA trainings will take the place of the previously held face-to-face trainings for fiscal year 2021. In partnership with AFDO and FDA, state, local, and tribal regulatory agency participants can anticipate engaging food safety courses delivered through a new and dynamic online delivery. The courses are free to qualifying applicants.

Courses delivered by NEHA cover topics on temporary food establishments, plan review, and special processes at retail. Courses offered by AFDO cover topics on managing retail food safety and risk-based inspection methods in retail establishments. NEHA credential holders can earn continuing education contact hours by participating in these courses.

More information about these courses can be found at www.neha.org/national-retail-food-program-courses-0.

Online Recordings Available for the Data and Environmental Health Best Practices Webinar Series From NEHA

From October 15–November 4, 2020, NEHA hosted the Data and Environmental Health Best Practices Webinar Series. The webinar series provided attendees with the opportunity to build foundational knowledge on open data to be applied at their environmental health agencies. The four-part webinar series featured top open data experts and dove into open data, data management, and data standards for environmental health.

Webinars offered in this series included:

- Best Practices for Open Data,
- How to Manage Your Technology for Better Data Outcomes,
- Communities Using Data, and
- Data Standards and Environmental Health.

Recordings of all webinars can now be viewed for free on NEHA's website at www.neha.org/eh-topics/informatics/data-and-environmental-health-best-practices-webinar-series.

DirecTalk

continued from page 46

characters are headed to the halls of Congress. My hunch is that we don't have a generally available vaccine, there is some civil unrest, and the economy is unsettled, particularly the dimension that affects state and local governments.

I ask at this moment in history that you revel in your ikigai and bring your love and enthusiasm to your work and home life. We are the glue that keeps society functioning. I direct these comments to our private sector members, as well as those in the governmental public health enterprise. We mediate food, water, septic systems, air—the essentials of the human condition. The tone we set, the professionalism we display, and the love we express are essential if we value the health, safety, and security of our nation and those of our esteemed partners worldwide.

We also recognize that appropriately giving and sharing love provides health benefits to the giver. There is insufficient space here to unpack the evidence but again, rest assured there is abundant data to support this assertion. We represent the second largest segment of the public health workforce, and the single largest element that interacts with the public and the regulated community. The love we bring to our work, our coworkers, and the public we serve matters to them, and it matters to us. I feel that during my lifetime, it matters more today than any time since my birth.

Photo courtesy of David Dyjack.

The finest public speech of my career was not at Jacksonville University. It was at an all-staff holiday season talk I gave in 2009 to the Riverside County Health Department in California. The venue was the 430-seat Annenberg Theater in Rancho Mirage. It's an extraordinary theater in the round and I was on point. That story, however, is for another day. This story is about love. Please give, receive, and share in its abundance because our lives depend on it.

Best for the holiday season and New Year.

Dave

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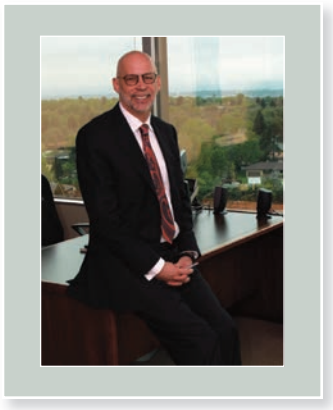
DirecTalk MUSINGS FROM THE 10TH FLOOR



David Dyjack, DrPH, CIH

Ikigai

Renowned for its acoustics, whispers were clearly audible within the walls of the Terry Concert Hall at Jacksonville University in Florida. The venue seats 400, divided among a concourse and balcony, providing musicians an opportunity to display their talents in functional elegance. I took my seat along the isle, four or five rows from the wooden staircase leading to the stage. My heart skipped a beat as I was introduced as the commencement speaker for the School of Nursing graduation ceremony. As I ascended to the lectern, fidgeting family members, faculty, and graduates collectively gave me a look that conveyed, "Say your thing quickly so we can get on with our celebration." Ikigai.

Within 20 seconds I felt confident I had their attention. Cell phones dropped to people's laps, children uncharacteristically hushed, and faculty beamed with interest as I unapologetically harpooned evidence-based nursing, big data, cloud technology, telehealth, telemedicine, Fitbits, electronic health records, electronic medical records, and GIS. Our country possesses the best information technology in the world and our life expectancy is less than the residents of Slovenia, Malta, and Costa Rica. Mobile phone apps are not the answer.

The answer is that the greatest improvements in our collective health status might not lie in our technical acumen but rather in the compassion, empathy, and love we bring to our respective professional enterprises. I suggest to you as we enter 2021 that love is the key to healing and health promotion in our respective communities and within the environmental health profession.

Love provides health benefits to the giver.

In *Love and Survival*, Dr. Dean Ornish cites many peer-refereed publications that provide an empirical foundation for my hypothesis around love. Ornish coauthored a study at Yale University that involved 119 men and 40 women who underwent coronary angiography. Those who felt most loved and supported had substantially less blockages in their hearts than other subjects. In a separate study of 10,000 married men, those who felt their partners did not show them love experienced twice as much angina when compared with men who felt loved by their partners.

Love's benefits are not limited to chronic disease. Social ties with friends, family, coworkers, and communities that involve love and intimacy might also protect against infectious diseases. In a study of 276 healthy volunteers, participants were exposed to rhinovirus, the tiny beast responsible for the common cold. Researchers assessed subjects on 12 types of relationships, including those with spouses, parents, in-laws, children, and classmates, among others. The participants who reported less than four types of relationships had more than 4 times the risk of developing a cold than those reporting six types of relationships. If you doubt me, I encourage you to conduct a PubMed search and see what you discover.

Here's a sample of what I found.

- A study of a community that followed 3,000 people for 12 years found individuals who volunteered in a variety of settings lived longer than those who did not volunteer.
- A Finnish study of 13,000 people reported socially isolated individuals were 2–3 times more likely to die sooner than those in active relationships. This finding controlled for serum cholesterol, age, smoking history, and blood pressure.
- A meta-analysis of many studies demonstrated the act of being heard is healing in itself. That is, we can be a healing influence in our communities by practicing active listening.

Ikigai is a Japanese concept that roughly translates to our reason for being. It's our purpose in life. It represents the confluence of many factors, namely what you love and what you are good at. I feel that love and sense of purpose when I'm around our members and colleagues, and I have missed that interaction with you during the pandemic.

As you read this column in December, please recognize that I wrote this piece in early October. At this moment in December, the election cycle is complete, the calendar year is ending, and a new cast of elected

continued on page 45

Thank You!

Thank you to all who've tirelessly pursued public health and safety since COVID began, upholding NEHA's mission "To advance the environmental health professional for the purpose of providing a healthful environment for all." Our country needs more people like you.

All of us at Ozark River Manufacturing Co. send our endless gratitude.

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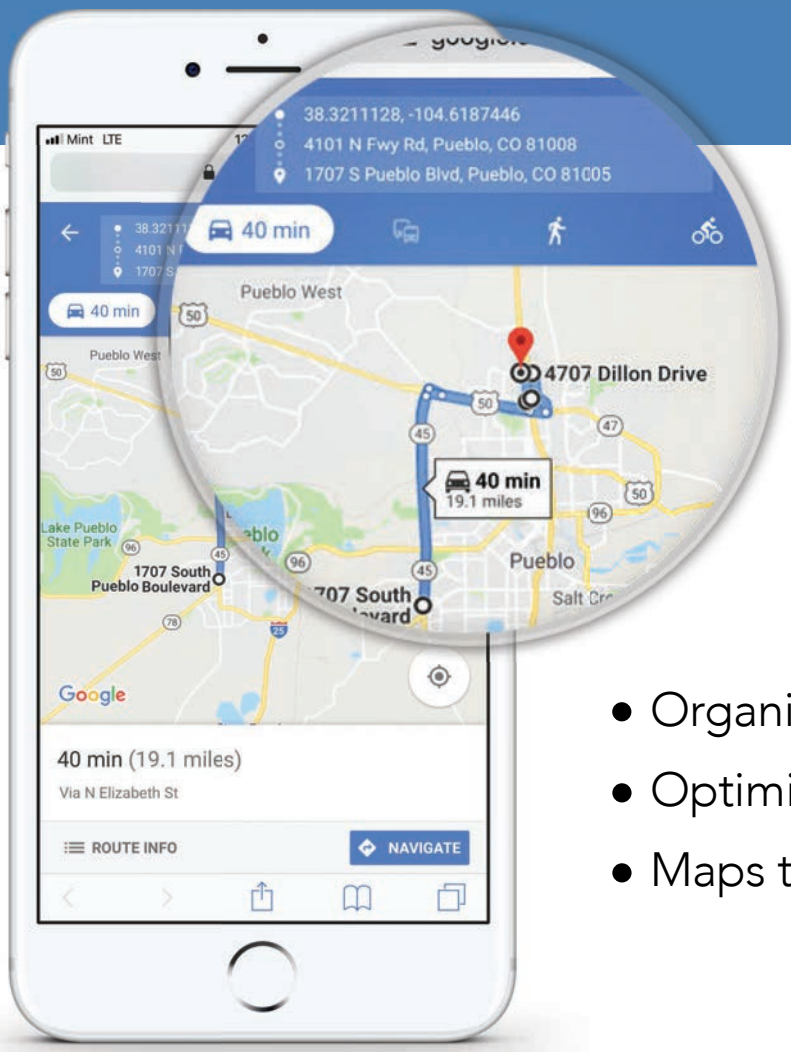

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