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TICK DRAGGING

Assessing the Difference in Drone and Human Surveillance Methods

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ABOUT THE COVER

Incidence of tick-borne diseases is increasing in the U.S. and is a concern to the public. As environments are becoming more suitable for sustaining tick populations, these arthropod vectors are spreading and making their way into new regions. This month's cover article, "Tick Dragging: Using a Drone to Reduce Surveyor Exposure," explored the use of a drone to conduct tick dragging surveillance as an alternative to the standard human personnel method. While statistical analysis showed no difference in the drone and human personnel drag methods, further studies are needed to confirm these findings and identify any potential differences in human and drone tick dragging surveillance.

See page 8.

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Erratum

Funding information for "Is Cleanliness Really a Reason for Consumers to Visit a Hotel?" published in the *Journal of Environmental Health*, 82(5), 16–21, was omitted. The research conducted in the article was supported by 2018 Woosong University academic research funding.

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PRESIDENT'S MESSAGE

Priscilla Oliver, PhD

Volunteerism: The Big Picture

Some years ago as a young faculty member, I was asked by my chair, Dr. Ulf Zimmerman, to develop and teach a graduate class on managing staff and volunteers. As I did this class, I was made more fully aware of the importance of volunteers. It is more common, however, to acknowledge the work of staff. Both are equally as important to the big picture of work. Both staff and volunteers are necessary to the success of humankind.

At the time of my class, the nonprofit management field was becoming a profession and grew much like environmental health. Now some schools offer doctoral degrees in this field. There is a need for the higher levels of professionals to teach others, oversee services, consult, and conduct research to improve society. A big congratulations to those that are very dedicated in this manner.

My first volunteer job was volunteering in the church, serving on committees with the Sunday school. Next, volunteering at school with the band was important. My mother was a volunteer den mother with the Boy Scouts and I was a helper. I soon became a Brownie with the Girl Scouts under Mrs. Mary Charles Burton. It is important that young children learn about work and volunteering is an ideal controlled environment for that to happen. Leadership skills can develop and the students grow in service. Many schools require volunteering and service-learning activities for students to graduate. These are all groundwork to prepare for the bigger picture of getting all the work done that is necessary in many fields of study. Environmental health is no exception.

The work needed for humankind to flourish cannot all be accomplished in the 8-hour day with paid hands.

The work needed for humankind to flourish cannot all be accomplished in the 8-hour day with paid hands. In every profession, there is a need for volunteers and student learners (internships are a part of the learning process.) This concept is true to environmental health. Some internships are volunteer and have no pay attached. To ensure growth, one might not get paid for all the work that is done. There is a need for persons to help the profession by picking up the trash, capturing a video clip, serving on a mission inside and outside of the country and community, making a speech, and being on or leading a committee or team. Workers must also be willing to volunteer to do extra work in the job that might not receive compensation in money.

The overarching purpose of this column is to encourage readers and enlighten all on the big picture of volunteerism and service. It can lead to a career or a career changer resulting from volunteering. It can be fulfilling. It is better or more blessed to give than to receive. There should be a level of appreciation to those that volunteer. Persons cannot be paid for all the good that is done in society in volunteer efforts. Who would pay for the simple acts of kindness? What one set of eyes can see all that needs to be seen and done? Often volunteers are overlooked. In environmental health, it is imperative that we acknowledge and embrace the volunteer work that helps us as workers to get the many jobs done. Working together helps us all to improve the profession and ensures our individual successes.

Volunteering and service are required to enter some professions. Altruism has its place for it builds character, increases one's self-worth, and instills confidence. To find yourself is to lose yourself in a cause to serve others. The passion is often ignited. As teachers and leaders, this revelation is what we try to uncover. Many of us in environmental health are dedicated to that level, we volunteer. Some companies encourage volunteering as a group. It provides for effective teamwork and bonding of people. Learning can also occur and a better you, organization, and team can result. We need all of these activities to happen in environmental health.

Earth Day will occur on Wednesday, April 22, 2020. This year marks the 50th anniversary of Earth Day and the theme is climate action. The first Earth Day in 1970 started the environmental movement to wake up the world to the importance of saving, preserving, maintaining, and sustaining the earth for future generations. Over the years, many strides have been accomplished, especially through legislation and policies, but the challenges are ongo-

ing. Global issues are prevailing and the need for climate action has increased.

Earth Day is a big event for volunteering with the environment. Please place that month, week, and day on your calendar and plan an activity for yourself and your family, friends, work team, community, church, and social group to commemorate Earth Day. Please repeat the assignment each year thereafter. As professional boxer Muhammad Ali stated, "The service you do for others is the rent you pay for your room here on Earth."

The National Environmental Health Association (NEHA) is just one such place to volunteer. Visit the website and find your spot (www.neha.org/membership-communities/get-involved). There are the volunteer NEHA board of directors, editorial board, committees, technical advisors, past presidents, and other individual positions. There are various ways to lend service to NEHA and the profession. Let me personally say a big thank you to all the individuals who have volunteered to help NEHA over the years. Your works are noticed and greatly appreciated. Thank you, NEHA volunteers!

Priscilla

President@neha.org

Did You Know?

NEHA is pleased to announce its second annual membership recruitment campaign: Be a Beacon for NEHA Membership. Current NEHA members who successfully recruit a new member will receive a NEHA Beacon tote bag, which is inspired by the association's original lighthouse logo. The campaign ends June 15. Participate now and you can help strengthen the environmental health profession by being a beacon of light for NEHA membership! Find more information at www.neha.org/membership-communities/membership-campaign.

SUPPORT THE NEHA ENDOWMENT FOUNDATION

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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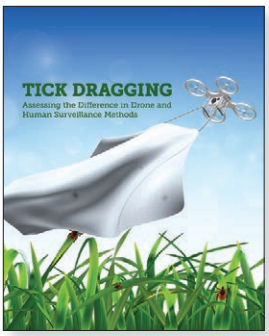

Tick Dragging: Using a Drone to Reduce Surveyor Exposure

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Abstract **Pulling a cloth over the ground remains the primary method for conducting a tick surveillance survey. A person physically walking in the collection zone pulling a flannel cloth creates an opportunity for a human–tick encounter. Walking ahead of the drag cloth also disrupts the area to be sampled and increases the opportunity for a human–tick encounter. In order to reduce this potential interaction, a remotely piloted vehicle (drone) was used to pull the flannel cloth, which allows the drag cloth to be the first contact in the swath to be sampled. A small camera-equipped drone used to replace the human in dragging the cloth was found to be powerful enough to pull a drag-cloth over grassy or slightly brushy terrain. The cloth-to-surface contact was found to be similar enough to the standard dragging practice to result in similar numbers, types, and ages of ticks collected. Statistical analysis using chi-square and paired *t*-tests determined there was no difference in drag methods ($\chi^2 = 1.9756$, $p = .37$; $t = 1.31$, $p = .22$). Further tests are needed to confirm this study and identify other potential differences in human and drone tick dragging surveillance.**

Introduction

Ticks are arthropod vectors known to transmit a number of pathogens. Ticks found in the U.S. can carry pathogens that cause Lyme disease, ehrlichiosis, southern tick-associated rash illness, Rocky Mountain spotted fever, Powassan virus, and other diseases (Centers for Disease Control and Prevention [CDC], 2019). In recent years, mammalian meat allergy associated with tick bites has been identified. The syndrome is thought to be associated with Lone Star ticks and involves a sensitization to alpha-gal, a carbohydrate allergen (Commins et al., 2011).

Incidence of tickborne diseases is increasing in the U.S. and is a concern to the public, especially for those who must protect their employees from vectorborne disease. According to the Centers for Disease Control and Prevention, reports of Lyme disease more than doubled from 1992–2006 and similar trends are being observed with other tickborne diseases (CDC, 2008). As environments are becoming more suitable for sustaining tick populations, these arthropod vectors are spreading and making their way into new regions (Robinson et al., 2015). For example, in the U.S., Gulf Coast ticks initially were associated with inhabiting southeastern states bordering the Gulf of Mexico, as well as the South Atlantic States. In recent years, the range of Gulf Coast ticks has expanded northward and to the west, reaching Oklahoma, Kansas, Tennessee, and even southern Arizona (Sonenshine, 2018). Similar expansion trends are being reported for other tick species. Rosenberg and coauthors (2018) noted the number of tickborne bacterial and protozoan diseases doubled from 2004–2016.

The increase of tickborne diseases and the emergence of ticks in more geographic ranges create a widespread problem that is difficult to control. Efforts such as the surveillance of tick populations, however, contribute to more effective public health approaches (Rosenberg et al., 2018).

Tick dragging surveillance to enumerate tick populations and species, and possibly state of infection, are useful assessments from which to derive informed risk assessments and prevention strategies (National Ecological Observatory Network, 2017). The method itself is conducted by dragging a flannel material over vegetation suspected to contain ticks in order to collect the ticks for analysis (Cohnstaedt et al., 2012). Currently, tick dragging requires a human to pull the flannel material, exposing personnel to ticks and increasing their risk for contracting a tick-transmitted disease. Replacing the human with a drone to pull the drag minimizes potential human–tick contact.

Besides exposure to ticks during the traditional protocol for tick dragging by human personnel, heat stress has been documented in

FIGURE **1**

Personnel Collecting Ticks According to Protocol

Photo courtesy of Burton Ogle.

FIGURE **2**

Drag Cloth Attachment to Drone and Drone Tick Collection

Photo courtesy of Burton Ogle.

workers using personal protective equipment (PPE) (Bernard, 1999; Nerbass et al., 2017). The use of encapsulating suits introduces an additional element in the form of heat stress potential and because drone dragging requires little to no PPE, it decreases heat stress risks associated with encapsulating suits.

As the prevalence of tickborne disease increases, there is an increased need to perform more surveillance. Dobson (2013) recommended that regular surveillance should occur throughout the year at intervals no greater than 3 weeks due to bias from occasional sampling. The purpose of this study is to determine if a drone can be used to collect ticks and if there is a difference in the number of ticks collected based on whether a drone or person is dragging the flannel material.

Methods

The drone we selected for testing was a quadcopter readily obtainable from typical retail sources for around $1,000. Flight time for one battery was approximately 20 min under load. The drone was capable of producing approximately 4–5 lb of pulling effort, which was sufficient to drag a lightly weighted 3-ft square flannel cloth over tall grass and nonthorny bushy plants.

A tick dragging protocol implemented by the Ontario Agency for Health Protection and Promotion (2015) was used. Dragging was conducted in the spring/summer during the late morning or afternoon to avoid wet vegetation (Mays, Houston, & Trout Fryxell, 2016). The terrain selected for dragging consisted of grassy uncultivated/unmowed fields interspersed with small clumps of emerging woody vegetation. Personnel performing a drag were required to use PPE (i.e., wear a full Tyvek suit with legs tucked into boots or taped); DEET was also applied (Figure 1).

Each run started by attaching a 2 ft x 3 ft white flannel cloth to a 2 ft triangular light aluminum metal tube (approximately ¾ in. inside diameter), which served to keep the cloth spread and added weight to keep the cloth from flying up behind the drone. A coat hanger wire was used to form the remaining two legs of a triangle whose apex constituted the attachment point with the drone via an 8 ft length of paracord (Figure 2).

Drone flights were conducted under the direction of a Federal Aviation Administration (FAA) Part 107 licensed pilot. The drone itself was operated in position (P) mode allowing for visual positioning, obstacle sensing, and GPS and satellite positioning information. Regardless, the drone was operated only within line of sight. The drone forward speed was held at a slow to moderate walking pace to ensure the cloth remained in contact with the surface vegetation. Drone altitude was limited by the length of the attachment cord and was only varied to free the cloth if it became caught or to clear small objects in the drag path.

The drag pattern consisted of side-by-side drone and personnel drags extending for approximately 250 ft (Figure 3), after which ticks were collected with forceps and placed in collection vials labeled by drag method.

A total of 10 personnel drags (PD) and 10 drone drags (DD) were completed prior to returning to the lab for counting and species/growth stage identification using a reference key (The University of Rhode Island, 2018). For purposes of comparison between methods, counts were converted to density (ticks/m^2 of dragged surface) and also grouped by total numbers collected per drag into the categories of low (0–1), moderate (>1–≤5), or high (>5). Both methods of enumeration were considered as no consensus as to tick quantification could be ascertained from the literature reviewed.

Statistical analysis to determine the level of agreement between the two dragging methods was approached using two different methods based on how tick counts are reported in the literature. The working hypothesis was that tick dragging by drone is equivalent to tick dragging by personnel. To test our hypothesis, we looked at the number of ticks collected (H_o: DD = PD). First, a chi-square test for frequency data was used to test for association in a contingency table (Remington & Schork, 1970). The number of ticks per drag grouped as either low, medium, or high met the chi-square conditional requirement that most expected frequencies (≥80%) are >5 with no frequency less <1. A paired *t*-test was also completed comparing number of ticks found per square meter of dragging.

Results and Discussion

The total number of ticks collected per drag by each dragging method is presented in Figure 4. In most drags, a similar number of ticks was found, with the exception of the first drag. Similarly, Figure 5 depicts ticks collected per m^2 and shows a similar number of ticks collected per standard area that was dragged.

The statistical analysis was completed to determine if there was any difference in drag methods. The chi-squared analysis revealed no significant difference between dragging methods when tick numbers were categorized ($\chi^2 = 1.9756$, $p = .37$). The paired *t*-test revealed no significant difference between mean numbers collected by either dragging method ($t = 1.31$, $p = .22$).

Ticks collected as a combination of both types of dragging were sorted by species, development stage, and sex (Figure 6). The numbers of ticks collected when broken down into species by development stage and sex yielded cells too small to provide for meaningful statistical comparison of drag method effectiveness for either species or development stage. The Lone Star nymph, followed by the Lone Star male and female, comprised the most common species found during this sampling campaign.

Based on the limited sample size, it appears that dragging for ticks using a drone is a possibility to increase surveillance while decreasing threats to human health for personnel performing tick dragging. Side-by-side dragging using both methods produced similar tick collections in terms of number, type, and

FIGURE **3**

Dragging Pattern

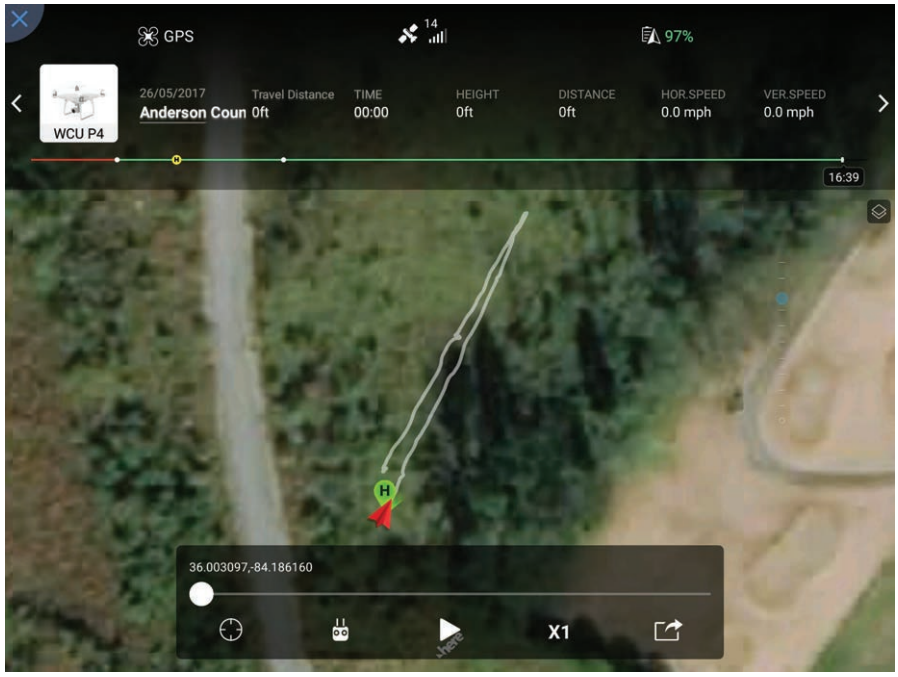


FIGURE **4**

Number of Ticks Collected per Drag

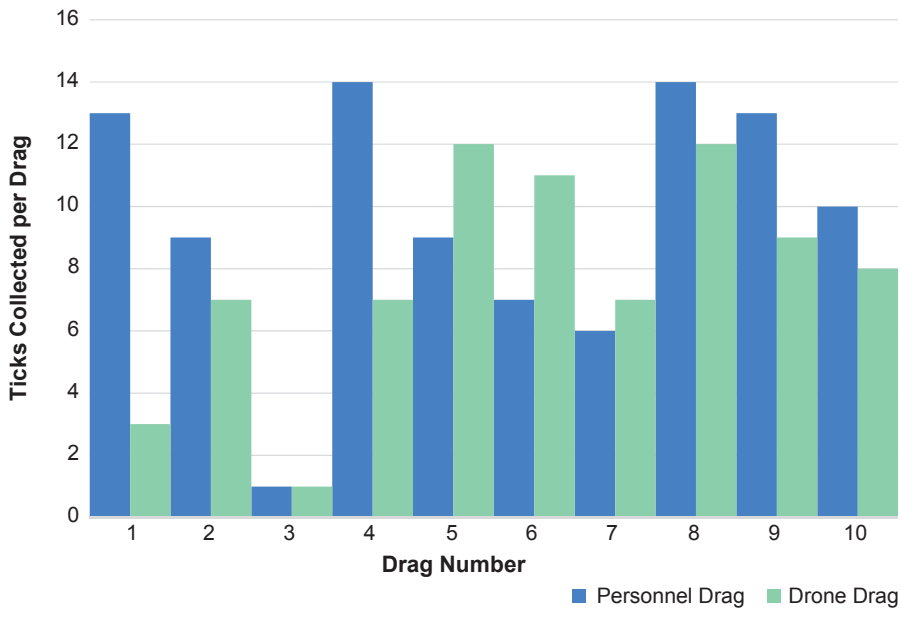


FIGURE **5**

Ticks Collected per Square Meter of Area Dragged

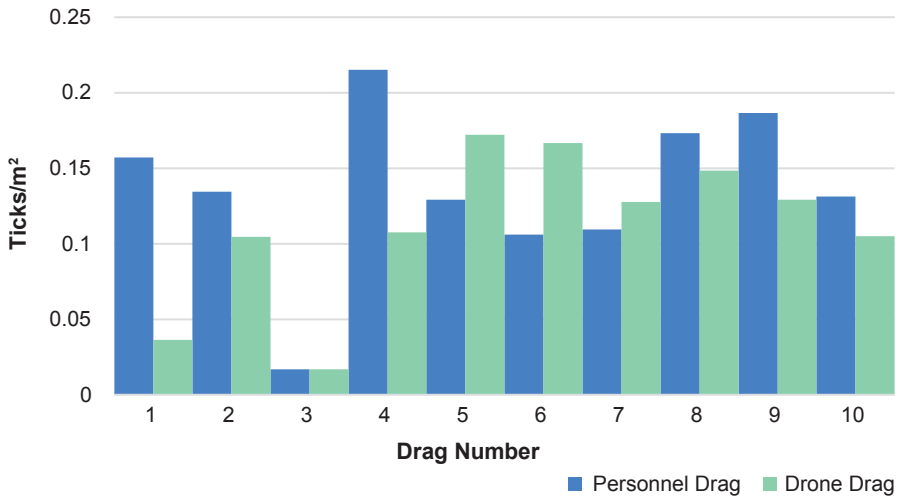
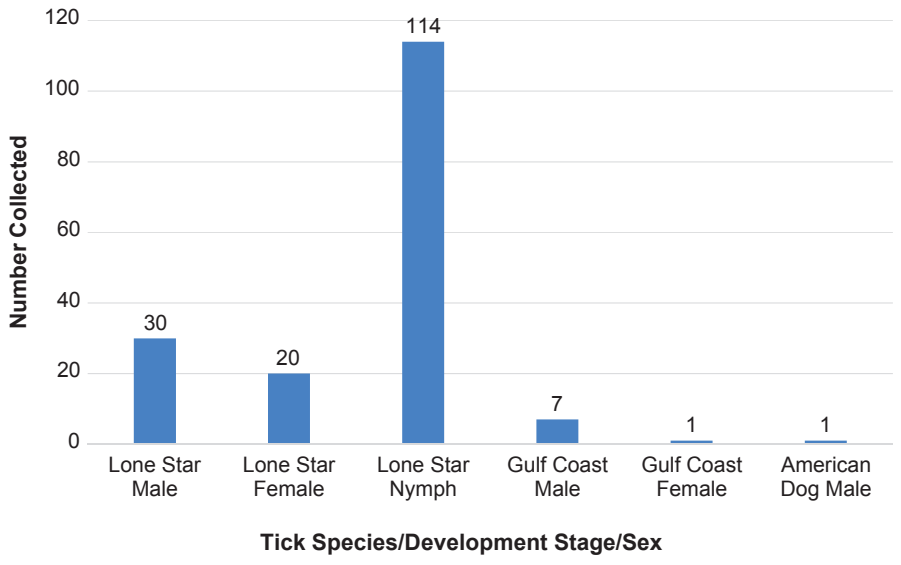


FIGURE **6**

Species, Development Stage, and Sex of Ticks Collected From Both Dragging Methods



age, suggesting that using a drone to conduct tick dragging is entirely feasible. The number of ticks collected, when broken down by species, development stage, and sex, resulted in numbers too small for meaningful statistical analysis. Therefore, it cannot be stated that one method preferentially collects ticks of a certain species, development stage, or sex. The number of ticks collected by each method in this study was not statistically different.

Drones more than 2 lb are sufficiently powerful to drag the flannel cloth. Furthermore, the quadcopter design with GPS positioning is easily controllable in terms of maintaining the proper height and direction to keep the cloth moving in order to simulate the typical walking pattern of a human pulling a drag cloth. Limitations of tick dragging by drone include the ability of the pilot to accurately control (or program) the drone, occasional snags of the flannel cloth on vegetation, and inability to fly in more wooded/forest areas. Further, drone use is becoming more limited in public spaces; use of drones may require local approval. Additionally, FAA regulations may also limit drone use.

Drones from 0.55–55 lb in weight, flown by a certified remote pilot, are regulated by FAA and must be registered under Part 107 (Federal Aviation Administration, 2016). To fly under a Section 336 registration (recreational user), the drone application must be for hobby or recreational use only. Stipulating public health surveillance requires registration under Part 107. Nonrecreational use registration requires a remote pilot certificate from FAA.

The necessity of FAA requirements beyond those required for hobby or recreational use should be further explored. It is unclear if public use for research or protecting public health requires the additional burden of meeting Part 107 in terms of requiring pilot testing and licensing, as these are not-for-profit activities and would not typically be conducted around airports or heavily populated areas. Additionally, altitudes would necessarily be very low (well below tree line) and could only be conducted in line of sight. This aspect of drone use for environmental surveillance is emerging and needs to be more fully explored.

Conclusion

FAA regulatory considerations aside, we conclude that a drone might be an effective method for tick dragging in grassy areas or terrain that is typically accessible to humans. Additionally, the study suggests that a drone can effectively reduce human exposures to ticks and to risks associated with heat stress from PPE for personnel conducting dragging operations. A larger study is necessary to determine if tick dragging by drone disproportionately collects different species or developmental stages and to confirm results of this study.

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Did You Know?

NEHA's Vector Control Tools & Resources (VeCToR) Toolkit provides tools and resources for program improvement activities that are in line with the Centers for Disease Control and Prevention's 10 Essential Environmental Public Health Services. The 10 Essential Environmental Public Health Services form the framework used to evaluate the effectiveness of a community's environmental public health system. You can find the toolkit at www.neha.org/eh-topics/vectors-and-pest-control-0/essential-services.

INTERNATIONAL PERSPECTIVES

Exposure Assessment Survey in Schools: Pilot Project in Osijek, Croatia

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Abstract **Children's health is affected by the quality of indoor and outdoor environments. In order to prevent environmentally mediated diseases among children, the Member States of the World Health Organization (WHO) European Region adopted the Parma Declaration on Environment and Health in 2010, which includes commitments to provide children with access to safe water and sanitation, improve indoor air quality in children's facilities, and make schools tobacco- and smoke-free places. To measure progress towards these goals, WHO facilitated the development of a survey toolkit for national surveys. In preparation for a national school survey in Croatia, this toolkit was pilot tested in two high schools in the city of Osijek, Croatia, in spring 2012. The main problems detected in the survey were: 1) high prevalence of smoking, with 34% of pupils smoking inside or outside school during school hours; 2) poor ventilation, with pupils spending over 30% of their school time in classrooms with carbon dioxide concentrations exceeding 1,000 ppm; and 3) the presence of dampness in school premises. Sanitation facilities were generally satisfactory. Concentrations of formaldehyde, nitrogen dioxide, and benzene in classrooms were generally low. Smoking, poor ventilation, and dampness were the environmental risk factors identified in this survey in the two schools.**

Introduction

Children are the most vulnerable subpopulation to environmental insults (Fiala et al., 2001). Apart from their homes, school-age children spend a significant amount of time (4–6 hr daily) in schools (Živković et al., 2015). The classroom environment plays an important role in children's health and learning outcomes (Eicker, 2010; Puteh, Ibrahim, Adnan, Che'Ahmad, & Noh, 2012). At the Fifth Ministerial Conference on Environment and Health held in Parma, Italy, in 2010, the World Health Organization (WHO) Member States adopted the Parma Declaration on Environment and Health that contains a series of commitments to reduce environmental risks in children's facilities, including schools (WHO, 2010a). To measure progress toward these goals, WHO developed a harmonized set of tools for school surveys aiming to assess exposure to selected indoor air pollution, stuffy air, mold and dampness, smoking, and inadequate sanitation. Pilot testing of the survey methodology was conducted in Osijek, Croatia, in April 2012 in preparation for a national survey.

Exposure to indoor air contaminants can lead to immediate negative health effects and increased school absenteeism, as well as delayed effects months or years after exposure (Park et al., 2002; WHO, 2014; Zheng et al., 2002). Cigarette smoke, internal combustion engines, and gasoline fuels—as well as chemicals used for building, refurbishing, and decorating indoor spaces—are the main sources of volatile organic compounds (VOCs), including benzene and formaldehyde in indoor air (Hodgson & Levin, 2003). Benzene in indoor air can originate from outdoor air, as well as from indoor sources such as building materials and furniture, attached garages, heating and cooking systems, stored solvents, and various human activities. Main indoor sources of formaldehyde are furniture and construction materials, as well as adhesives, lacquers, cleaning agents, and other products (Kelly, Smith, & Satola, 1999; Salthammer, Mentese, & Marutzky, 2010).

Nitrogen dioxide (NO_2) mainly enters indoor environments from either outdoor or indoor combustion sources (Glorennec et al., 2008; Levy, Lee, Spengler, & Yanagisawa, 1998). Indoor concentrations of pollutants are affected by air exchange rates in indoor premises (WHO, 2010b). Poor ventilation in classrooms results in accumulation of carbon dioxide (CO_2), moisture, and organic compounds exhaled by occupants, as well as accumulation of chemical air pollutants from indoor sources. Poor ventilation

TABLE **1**

Summary of Data Collection Activities in Osijek Schools

Parameter/ Type of Data	Data Collection Method	# of Observations in Two Schools
General characteristics of school building and student population	Interview with school administration, inspection of school	2 schools (3 buildings)
Exposure to mold and dampness	Visual inspections, surface moisture measurements by Tramex monitors	34 classrooms out of 37 classrooms
Nitrogen dioxide (NO_2)	Gradko TDS 15 Rapid Air Monitor passive samplers Sampling time period: 1 school week (Monday–Friday, 5 days) Sampling methods: ISO 6768 (1998) and ISO 16000-15 (2008) Laboratory analysis method: Hafkenscheid et al. (2009)	6 classrooms out of 37 classrooms, 2 outdoor sites
Formaldehyde	Passive Radiello Code 165 samplers Sampling time period: 1 school week (Monday–Friday, 5 days) Sampling methods: ISO 16000-1 (2004) and ISO 16000-2 (2004) Laboratory analysis method: ISO 16000-4 (2004)	6 classrooms out of 37 classrooms, 2 outdoor sites
Benzene	Passive Radiello Code 130 samplers Sampling time period: 1 school week (Monday–Friday, 5 days) Sampling method: ISO 16000-1 (2004) Laboratory analysis method: ISO 16200-2 (2000)	6 classrooms out of 37 classrooms, 2 outdoor sites
Exposure to carbon dioxide (CO_2)	CO_2 data loggers Measuring time: Continuously (1-min intervals) during 1 school week (Monday–Friday, 5 days) by portable Delta Ohm HD 21AB indoor air quality monitors (measurement range up to 5,000 ppm) Classroom occupancy diaries	6 classrooms out of 37 classrooms
Access to properly maintained and serviced sanitation facilities	Inspection of sanitation facilities, questionnaire for pupils	7 toilets out of 11 toilets inspected, 197 pupils out of 1,382 pupils completed questionnaires in 8 senior classes
Hygiene practices in pupils	Questionnaire for pupils	197 pupils out of 1,382 pupils completed questionnaires in 8 senior classes
Pupils smoking in school and on school grounds	Questionnaire for pupils	197 pupils out of 1,382 pupils completed questionnaires in 8 senior classes

can adversely affect children's attention and learning outcomes (Bakó-Biró, Clements-Croome, Kochhar, Awbi, & Williams, 2012; Toftum et al., 2015). While CO_2 is usually considered an indicator of air stuffiness and a proxy for exposure to other pollutants, it can also produce adverse effects on its own.

One study has shown that increasing levels of CO_2 in indoor air while keeping all other air quality parameters constant can adversely affect cognitive performance and learning processes (Satish et al., 2012). Poor ventilation and deficiencies in building design and maintenance are also associated with exposure to mold and dampness, and resulting adverse health outcomes (WHO, 2009a). Molds can produce toxins and allergens that can trigger allergic reactions and asthma attacks in susceptible individuals (Centers for Disease Control and Prevention [CDC], 2012; U.S. Environmental Protection Agency, 2008). Office and school buildings can develop persistent moisture problems due to roof and window leaks, high indoor humidity, and flooding events, leading to mold growth.

Inadequate quality of drinking water and sanitation facilities in schools have negative consequences on children's school attendance, learning outcomes, and health (Haines & Rogers, 2000; Mathekgana, Chauke, & Otieno, 2001).

Smoking initiation usually occurs in school-age children. The Member States of the WHO European Region committed themselves to make the school environment completely free of tobacco smoke (WHO, 2009b). Providing young people with skills to resist smoking can be efficiently achieved through a multidisciplinary management approach, including community- and school-based interventions highlighted by mass media campaigns (Harrabi et al., 2009).

Methods

This pilot survey was conducted in two randomly selected high schools in Osijek, Croatia, in April 2012. The survey was organized by the Institute of Public Health for the Osijek-Baranya County and the WHO European Centre for Environment and Health. This pilot survey was designed to evaluate the feasibility of and resources required for a nationwide survey in schools, as well as to pilot test the data collection methodology. Specific aims of the survey were to generate preliminary data on 1) indoor exposure to selected chemical air pollutants (formaldehyde, NO_2, and benzene), 2) exposure to stuffy air with high levels of CO_2, 3) exposure to mold and dampness, 4) quality and quantity of school sanitation facilities, and 5) prevalence of smoking in the schools and on school premises.

The survey involved the following data collection approaches (Table 1):

1. An interview with the school administration to collect information on general characteristics of the school buildings and population of pupils.

TABLE **2**

Air Concentrations of Formaldehyde, Nitrogen Dioxide, and Benzene Sampled in Two Schools

Sample Code (Indoor/Outdoor)	Exposure (minimum)	Concentration (µg)	Concentration (µg/m³)	Concentration Summary Statistics (µg/m³)			
				Minimum	Mean	Median	Maximum
Formaldehyde							
RM071 (indoor)	4,675	4.90	10.7	5.9	8.9	8.5	12.2
RM075 (indoor)	4,575	5.00	11.1				
RM072 (indoor)	4,575	5.47	12.2				
RM070 (indoor)	4,680	3.89	8.5				
RM064 (indoor)	6,135	3.81	6.3				
RM069 (indoor)	6,065	4.67	7.8				
RM066 (indoor)	6,075	3.51	5.9				
RM062 (outdoor)	6,155	0.79	1.3	1.3	1.8	1.8	2.3
F12 (outdoor)	4,570	1.03	2.3				
Benzene							
SZ120 (indoor)	4,675	0.23	0.64	0.34	1.04	0.91	2.52
SZ121 (indoor)	4,575	0.12	0.34				
SZ116 (indoor)	4,680	0.13	0.36				
SZ115 (indoor)	6,135	0.57	1.21				
SZ114 (indoor)	6,065	0.55	1.18				
SZ113 (indoor)	6,075	1.18	2.52				
SZ112 (outdoor)	6,155	0.34	0.72	0.65	0.69	0.69	0.72
B11 (outdoor)	4,570	0.23	0.65				
Nitrogen dioxide							
SZ118 (indoor)	77.92	8.73	1.17	0.99	1.70	1.71	2.45
SZ119 (indoor)	77.92	9.27	1.24				
SZ122 (indoor)	76.25	7.60	0.99				
SZ117 (indoor)	78.00	11.29	1.51				
RM063 (indoor)	102.25	13.46	2.36				
RM068 (indoor)	101.08	11.03	1.91				
RM067 (indoor)	101.08	11.58	2.01				
RM065 (indoor)	101.25	14.08	2.45				
RM061 (outdoor)	102.58	13.44	2.37	2.08	2.22	2.22	2.37
NO210 (outdoor)	76.17	15.94	2.08				

2. Inspection of all indoor premises for signs of mold, water damage, and dampness, including measurements of surface moisture.
3. Detailed inspections of three selected classrooms in each school and weeklong monitoring of CO_2, formaldehyde, NO_2, and benzene in three classrooms and one outdoor site per school.
4. Inspection of all school sanitation facilities by survey technicians.
5. Questionnaire for pupils in randomly selected classes in each school on smoking practices, and on hygiene practices and sanitation in schools.

Questionnaire data were deidentified to ensure confidentiality of responses. All data were recorded in standardized forms and entered into computer databases.

Monitoring of Nitrogen Dioxide, Formaldehyde, and Benzene in Indoor and Outdoor Air

In each school, we selected three classrooms for indoor air quality monitoring to represent a range of conditions (i.e., ground and top floor, different sides of the building) and one outdoor site at each school for assessing outdoor levels of air pollutants. Classrooms selected for monitoring sites were measured

TABLE **3**

Results of Pupil Questionnaire Surveys on Sanitation and Hygiene

Question	Boys (*n* = 59)			Girls (*n* = 138)		
	Yes # (%)	No # (%)	No Opinion # (%)	Yes # (%)	No # (%)	No Opinion # (%)
Sanitation						
Can students complain about toilets?	10 (17)	16 (27)	33 (56)	39 (28)	29 (21)	70 (51)
Does school staff address their complaints?	4 (7)	4 (7)	51 (86)	10 (7)	15 (11)	113 (82)
Do you use the toilet every school day?	26 (44)	33 (56)	0 (0)	52 (38)	86 (62)	0 (0)
Is there enough privacy?	17 (29)	34 (58)	8 (14)	55 (40)	55 (40)	28 (20)
Are the toilets easily accessible?	38 (64)	17 (29)	4 (7)	92 (67)	33 (24)	13 (9)
Is toilet paper available all the time?	3 (5)	42 (71)	14 (24)	2 (1)	132 (96)	4 (3)
Are the toilet rooms clean?	28 (47)	23 (39)	8 (14)	36 (26)	72 (52)	30 (22)
Are you satisfied with the toilet facilities?	11 (19)	33 (56)	15 (25)	18 (13)	92 (67)	28 (20)
Hygiene						
Does the school teach proper hygiene?	9 (15)	25 (42)	25 (42)	24 (17)	69 (50)	45 (33)
Do you wash your hands at school?	53 (90)	6 (10)	0 (0)	132 (96)	5 (4)	1 (1)
Is there always sufficient soap available?	26 (44)	28 (47)	5 (8)	56 (41)	77 (56)	5 (4)
Do you use soap for washing hands?	47 (80)	8 (14)	4 (7)	124 (90)	8 (6)	6 (4)
Is there always sufficient water available?	56 (95)	1 (2)	2 (3)	135 (98)	3 (2)	0 (0)
Are the hand wash rooms clean?	35 (59)	15 (25)	9 (15)	78 (57)	37 (27)	23 (17)
Are you satisfied with the hand wash facilities?	37 (63)	13 (22)	9 (15)	85 (62)	34 (25)	19 (14)

TABLE **4**

Smoking Habits by Age as Reported in Pupil Questionnaires

Age (years)	# of Pupils	Ever Smoked at School # (%)	Smoked Less Than Once per Week (%)	Smoked Every Week but Less Than Daily (%)	Smoked Every School Day (%)
15	51	8 (16)	38	25	38
16	33	11 (33)	36	18	46
17	62	27 (44)	19	19	63
18	40	14 (35)	7	7	86
19	11	6 (55)	0	0	100
All	197	66 (34)	20	15	65

and inspected for potential sources of indoor air pollutants. Any outdoor sampling point was protected from unstable weather conditions by a shelter.

Benzene, NO_2, and formaldehyde concentrations were monitored using passive diffusive samplers during one school week from Monday through Friday. Radiello Code 165 and Code 130 Passive Samplers were used for formaldehyde and benzene monitoring, respectively. Sampling was processed in accordance with International Organization for Standardization (ISO) 16000-1 (2004a) and ISO 16000-2 (2004b) for formaldehyde, and ISO 16000-1 (2004a) for benzene. NO_2 was sampled using Gradko TDS 15 Rapid Air Monitors; sampling was processed in accordance with ISO 6768 (1998) and ISO 16000-15 (2008). Samples were analyzed in a laboratory in accordance with ISO 16000-4 (2004c) for formaldehyde, ISO 16200-2 (2000) for benzene, and the method by Hafkenscheid and coauthors (2009) for NO_2. Detailed measurements are shown in Table 2.

CO_2 concentrations were measured with 1-min intervals during one school week from Monday through Friday in the same classrooms using portable Delta Ohm HD 21AB indoor air quality monitors with a measurement range up to 5,000 ppm. Teachers recorded in classroom attendance logs the numbers of pupils in each class in order to estimate CO_2 emission rates. Data analysis involved only time intervals when classrooms were occupied by pupils. Results were expressed as proportion of time that pupils spent at different CO_2 concentration intervals.

TABLE **5**

Carbon Dioxide (CO_2) Concentrations in Classrooms and Percentage of Person-Time Spent

	CO_2 Concentration (ppm)				% of Time Spent at CO_2 > 1,000 ppm	Δt
	Minimum	Mean (*SD*)	Median	Maximum		
School 1	426	1,024 (320)	1,002	1,783	50	158 hr, 35 min
Classroom 1	521	735 (140)	747	999	0	29 hr, 20 min
Classroom 2	426	847 (333)	955	1,431	33	28 hr, 0 min
Classroom 3	474	1,113 (297)	1,114	1,783	62	101 hr, 15 min
School 2	382	851 (337)	796	2,248	21	184 hr, 15 min
Classroom 1	483	1,179 (411)	1,141	2,248	72	55 hr, 10 min
Classroom 2	416	759 (307)	720	1,897	15	55 hr, 20 min
Classroom 3	382	746 (156)	758	1,323	4	73 hr, 45 min
Overall	382	901 (341)	840	2,248	30	342 hr, 50 min

Δt = duration of CO_2 measurements.

School Inspections for Exposure to Mold and Dampness

All accessible premises in each school were inspected for visible mold and signs of dampness and water damage. We measured surface moisture content in building materials using TRAMEX MEP Moisture Encounter Plus surface monitors. In each classroom, we took multiple measurements to detect areas with elevated moisture content (classified as damp or moist). If such an area was detected, we took additional measurements to assess the size of the moist or damp surfaces.

We based the estimated proportion of exposed pupils on proportion of premises affected by dampness and mold (Brdarić et al., 2015). Data analyses involved dichotomizing each indoor premise as "exposed" based on the presence of moldy odor or visible mold, or if the area affected by water damage exceeded approximately 1 m^2 (or 1.25% of the floor area in typical classrooms), or if the moist area exceeded approximately 10 m^2 (12.5% of the floor area). The data were summarized as the proportion of time pupils spent exposed to mold and dampness in each school and in the entire population of schools included in the study. For the purpose of this calculation, it was assumed that pupils spent 4 times as much time in classrooms as in hallways, bathrooms, and halls, and 10 times as much time in classrooms as in administrative offices and other spaces that are not intended for pupil occupancy.

Questionnaires for Pupils

Questionnaires for pupils were administered in randomly selected classes. All pupils present were asked to complete a questionnaire. Personal characteristics were limited to sex and age of pupils. Pupil names were not recorded. To ensure confidentiality, completed forms were collected from pupils by survey technicians rather than the researchers. The questionnaire included a block of questions on school sanitation facilities and hygiene practices of pupils, and detailed questions on smoking behavior including smoking at home, smoking by family members, smoking in school and on school property, and smoking by other pupils. Data collection activities are summarized in Table 1.

Results

Description of Surveyed Schools and Pupils

Both high schools that participated in the survey were located in the downtown area of Osijek. One school was located within 100 m of a busy road. The schools had 547 and 835 pupils. The smaller school had one building and the larger school was comprised of two buildings. All school buildings were more than 50 years old; however, they had undergone renovations in the previous 5 years. All school buildings were connected to the district heating, water supply, and sewage systems and had natural gravimetric ventilation.

We administered the pupil questionnaire to a total of 200 pupils (65 from the smaller school and 135 from the larger school). Of these, 197 pupils successfully completed questionnaires. Of these, 59 (30%) were male and 138 (70%) were female. Ages of respondents ranged from 15–19 years.

Water, Sanitation, and Hygiene (WASH)

School 1, the larger school, had nine toilet facilities (four for boys and five for girls) and School 2, the smaller school, had two toilet facilities (one for boys and one for girls). Only 15% of the surveyed pupils in both schools were satisfied with the school toilets, 63% were not satisfied, and 22% expressed no opinion. Only 40% of the pupils reported using school toilets every day. Girls were significantly less likely than boys to report toilet rooms as clean (26% versus 47%, $p < .05$), but more likely to report that there was adequate privacy (40% versus 29%, $p < .05$). Of the pupils, 25% felt that they had opportunities to complain about inadequate sanitation facilities and 7% (29% of those who felt they had oppor-

tunities to complain) felt that the school staff addressed reported problems. Only five (3%) pupils reported that toilet paper was always available (Table 3).

A higher percentage of the surveyed pupils (62%) reported being satisfied with hand-washing facilities. The majority of pupils (94%) reported washing their hands at school, with a lower percentage (85%) using soap. The provision of water in hand-washing facilities was adequate (87%), with a smaller percentage of pupils reporting that a sufficient amount of soap is always available (42%). Over half of the pupils (57%) reported hand-washing facilities to be clean, but only 17% reported receiving adequate education about hygiene practices (Table 3). There were no significant differences between responses from boys and girls regarding hand-washing facilities ($p > .05$).

Smoking in School

The questionnaire for pupils revealed a high prevalence of smoking, with 91 (46%) pupils reporting having smoked at least once during the last 30 days, including smoking in school and elsewhere. Of these 91 pupils, 56 (28%) reported smoking at least 20 days or more during the past 30 days. Smoking in the school or on school grounds was also prevalent. In total, 66 (34%) pupils smoked in the school or on the school grounds during school hours at least occasionally (Table 4). The difference in rates of smoking in the school between boys (25%) and girls (37%) was not statistically significant ($p = .125$). The rate of smoking in school increased with age from 16% among 15-year-old pupils to 55% among 19-year-old pupils ($p = .004$). The proportion of pupils smoking in the school who reported smoking there every school day increased with age steeply from 38% of smokers among 15-year-old pupils to 100% of smokers among 19-year-old pupils.

Exposure to Chemical Air Pollutants

The results show that chemical air pollutant concentrations (Table 2) did not exceed the WHO guideline values for NO_2 (40 µg/m^3 for short-term exposure and 200 µg/m^3 for long-term exposure) and formaldehyde exposure (100 µg/m^3) (WHO, 2015). As benzene is a carcinogen with no threshold of carcinogenic effects, there is no safe level recommended by WHO (2015); however, the European Union established the 5 µg/m^3 standard average annual level of benzene in the ambient air (European Commission, 2008, 2019). Both indoor and outdoor levels of benzene in this study were below this standard, as described by Brdarić and coauthors (2019).

Exposure to Stuffy Air

The results also show that CO_2 concentrations during class time ranged from the ambient level of approximately 400 ppm to the maximum of 2,248 ppm, with a mean level of 901 ppm. Weekly average concentrations in classrooms varied from 735–1,179 ppm. In the two schools combined, pupils spent 30% of their classroom time in poorly ventilated classrooms, with CO_2 levels exceeding 1,000 ppm (Table 5). School-specific proportions of time spent in poorly ventilated classrooms were 50% in School 1 and 21% in School 2.

Exposure to Mold and Dampness

Inspections covered 2,480 m^2 of total floor area, including 1,930 m^2 of classrooms. As was reported earlier (Brdarić et al., 2015), inspectors found 7 m^2 of moisture damage/dampness in School 1 and 9 m^2 in School 2, as well as 353 m^2 of surface moisture in School 1 and 130 m^2 in School 2. We calculated the total weighted proportion of time that pupils spent in premises affected by mold or dampness: 29.8% in School 1 and 33.2% in School 2. Data analyses involved dichotomizing each indoor premise as exposed or not exposed and estimating the proportion of person-time pupils spend in exposed premises. In one of the schools, dampness problems were limited to the ground floor, with moisture coming from the ground through the foundation.

Discussion

Resources Required for the Survey

This pilot survey in two typical urban high schools in Osijek, Croatia, demonstrated feasibility of conducting a comprehensive nationwide survey to assess variable environmental health factors in the school environment using a survey toolkit developed by WHO. The survey involved two visits to each school: 1) one for the school inspection, interview with administration, questionnaire survey, and installation of air quality monitoring equipment at the beginning of a school week and 2) a second visit at the end of the school week for retrieving the air quality monitoring equipment. The total amount of person-time for field data collection was approximately 1.5 person-days per school.

After the pilot survey, a nationwide survey was conducted in 200 primary schools across the country, including urban/rural and continental/coastal clusters. Fieldwork was organized in two phases in 2012–2014 by WHO, Croatian Institute of Public Health, Ministry of Health, Ministry of Science and Education, and regional public health institutes. The nationwide survey was completed in 2015.

Preliminary Information on Adverse Environmental and Behavioral Factors in the School Environment

The pilot survey also demonstrated potential problems in Croatian schools. Specifically, the prevalence of smoking in both schools was exceptionally high, exceeding 50% in the oldest pupils. The data show increasing trends of smoking prevalence and smoking frequency with age. Oldest smokers tended to smoke in schools or on school premises every day despite the existing rules prohibiting smoking in schools.

While the small size of this survey is its main limitation, smoking data were largely consistent in both schools. Our results are also consistent with previously conducted surveys. According to the results of the European School Survey Project on Alcohol and Other Drugs (European Monitoring Centre for Drugs and Drug Addiction, 2015), Italy currently stands out with the highest prevalence of smoking (37%), followed by Bulgaria and Croatia (both 33%). The Global Youth Tobacco Survey in Croatia (CDC, 2011) showed that 66.5% of students had ever smoked cigarettes and 27.2% were current smokers.

Another potential problem was relatively poor ventilation in the classrooms surveyed. The results show that CO_2 levels in most classrooms often exceeded 1,000 ppm. Similar results were confirmed by nationwide survey as well. The limitation of this pilot survey is that it was conducted in April when the weather was relatively warm. Further monitoring should be conducted during the cold season to assess the peak prevalence of exposure to stuffy air. The Schools Indoor Pollution & Health Observatory Network

in Europe project (European Commission's Directorate, 2014a, 2014b) demonstrated high CO_2 levels in schools in several European countries, thus highlighting the importance of ensuring adequate ventilation in classrooms. Information gained in the pilot survey was used in organization of the nationwide survey.

Conclusion

This small pilot survey did not detect high levels of chemical air pollutants in indoor premises. The main problems detected in this survey were a high prevalence of smoking on school premises, poor ventilation in classrooms, and the presence of mold and dampness in school premises. Overall, our results confirm the importance of the school environment for pupil health, well-being, and learning outcomes.

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Did You Know?

NEHA's latest policy statement addresses the adoption and implementation of the current Food and Drug Administration's *Food Code*. All recent NEHA policy statements can be found at www.neha.org/publications/position-papers.

GUEST COMMENTARY

A Matter of Debate: Developing National Retail Food Policy

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Abstract **Retail food policy plays an important role in ensuring the safety of food in retail and food service establishments. The process of developing, adopting, and evaluating these policies, however, is not well described in the literature or evidenced in practice. Policy debate has become essential to the development of retail food policy. Through deliberations, such as those at the Conference for Food Protection, stakeholders offer and debate policy recommendations intended to advance retail food safety. The lack of an agreed upon debate framework, however, has led to inconsistencies in how perceived problems and their recommended policy solutions are deliberated. This guest commentary suggests a stock issues framework, which includes components labeled ill, blame, cure, and consequence, as a guide for stakeholders to follow to consistently deliberate the salient aspects of policy propositions during retail food policy debates.**

Introduction

Unlike manufactured foods that are regulated at the federal level, the regulatory responsibility for policy development and oversight of retail food and food service establishments falls under the combined authority of state, local, territorial, and tribal regulatory agencies (Keenan, Spice, Cole, & Banfi, 2015). The Food and Drug Administration (FDA) assists these agencies by offering a model *Food Code* that provides a "scientifically sound, technical, and legal basis for regulating the retail and food service segment of the industry" (U.S. Department of Health and Human Services, 2017, p. iii). As a national standard, the *Food Code* consists of a uniform system of provisions addressing food safety and protection in retail food and food service establishments (U.S. Department of Health and Human Services, 2017). It is published every 4 years as a full edition and every 2 years as a supplement between full editions.

While regulatory agencies of retail food at the state level have the discretion to adopt the *Food Code*, stakeholders encourage adoption as a means of supporting national uniformity (Connecticut Department of Public Health, 2017; Food and Drug Administration, 2011, n.d.). At the same time, these agencies play a significant role in the development of the *Food Code*. This form of vertical (or top-down) policy diffusion in which national policy influences state-level policy adoption highlights the symbiotic relationship that exists between state and federal regulators in the development of national retail food policy (Lyson, 2016; Shipan & Volden, 2012).

Through participation in the biennial meetings of the Conference for Food Protection (CFP), an organization that brings together scientists, industry, academia, consumers, and policy makers from all levels of government to deliberate and formulate, among other things, recommended changes to the *Food Code*, state retail food regulatory agencies actively participate in the process of discussing pressing and emerging national retail food safety issues and debating proposed changes to the *Food Code* (Conference for Food Protection, 2012). This guest commentary suggests a stock issues framework—a common structure specifying key arguments—for retail food policy debate as a way to consistently deliberate the most salient aspects of policy propositions.

Policy Debate and the Conference for Food Protection

Long described as a means of problem solving, policy analysis—the process of evaluating policy options to determine the most effective, efficient, and feasible policy action (Centers for Disease Prevention and Control [CDC], 2012)—is essential to policy development (Bardach & Patashnik, 2016; CDC, 2013; Dunn, 2012). As problems in the public domain affect many stakeholders, the process of policy analysis often involves debate among the different stakeholders. Policy debate refers to the process of introducing a policy proposition and allowing differing and sometimes opposing views to be heard and critically evaluated. During such debates, stakeholders often discuss the need, importance, significance, and impact of various policy solutions.

While debates over potential policy solutions to today's retail food safety problems can occur within associations, advisory groups, and regulatory agencies long before being presented at the biennial CFP meeting, CFP serves as the primary venue for introducing and vetting proposed changes to the *Food Code*. In fact, it is the inclusive nature of the debates that occur at CFP that fosters a broad perspective, evidenced from having all major stakeholders represented, and thus lends credence to final CFP policy recommendations. At the CFP meeting, debate occurs on three different councils where members decide whether to accept, amend, or take no action on propositions. An Assembly of State Delegates, which includes representatives from state, territorial, and District of Columbia retail food regulatory agencies, then considers and votes on the actions recommended by the councils (CFP, 2012).

Debate at the CFP meeting is constrained by both time and the number of matters deliberated. In only 2.5 days, as many as 90 or more separate matters are debated. For matters including policy recommendations, decisions to act (as voted on by the Assembly of State Delegates) result in final recommendations being sent to a federal agency, most often FDA, requesting the implementation of a specific action or policy amendment. The federal agency has the discretion whether or not to concur with these recommendations. Based upon our review of the final recommendations from the past three biennial meetings of CFP in 2014, 2016, and 2018, almost one third of final recommendations include a suggestion to amend the *Food Code*.

Like other public health policy in the U.S., the *Food Code* strives to be evidence-based (Brownson, Chriqui, & Stamatakis, 2009; U.S. Department of Health and Human Services, 2017). As such, FDA depends on stakeholder involvement in CFP debates to arrive at science-based, practical policy recommendations. Likewise, stakeholders depend on FDA to ensure the *Food Code* contains scientifically and technically sound provisions that offer an adequate means of food protection.

Inconsistency in Policy Debate

Most policy debates at the CFP meetings, especially as they relate to potential changes to the *Food Code*, flow from an individual introducing a perceived problem and recommending a specific policy solution (Marasteanu, Liggans, Otto, & Lasher, 2018). Introductions to the perceived problem often include the public health reasons or justification for the recommended policy solution and are followed by an opportunity for questions from and discussion by members of the assigned council. Unfortunately, questions are not always asked of the presenter after matters are introduced. Moreover, it is not uncommon for problems to be poorly defined; proposed solutions to be uncertain; and supporting data, reasoning, and alternative solutions to be missing.

Debates are often limited to the pros and cons of implementing a given policy recommendation and discussions can meander, limiting full consideration and evaluation of the arguments associated with the problem and the proposed solutions. Arguments in this case refer to a chain of sentences, statements, or propositions (called premises) that provide rationale for a claim (Dunn, 2012; Larsen, Hodge, & Perrin, 2010; Simosi, 2003; Sinnott-Armstrong & Fogelin, 2014; Weston, 2018). With no agreed upon or consistently used framework that identifies the key arguments that should be offered and evaluated during debate, many claims go unchallenged or are simply accepted while others are explored in detail. This inconsistency in the debate process reduces the substantive understanding of problems, solutions, and implications and can contribute to flawed evaluations of each. The inconsistency is exaggerated by circumstances in which "the value of evidence is in the eye of the beholder" and that some stakeholders argue emotionally as opposed to taking a position only after weighing facts and assumptions (Brownson, Fielding, & Maylahn, 2009; Gluckman, 2013; Parkhurst, 2017). The incorporation of stock issues in retail food policy debates could promote consistency in the arguments that are presented, supported, and evaluated—regardless of time constraints or the number of matters being discussed (Borchers, 2013; Nadeau, 1958).

The Stock Issues Framework

Dating back to rhetoric of ancient times, stock issues refer to the common arguments useful for contending that a particular course of action should be taken (Borchers, 2013). The stock issues framework (Borchers, 2013; Nadeau, 1958) is commonly used in modern competitive policy debate where teams compete in structured rounds of arguments both for and against a policy proposition. This framework, or common structure, specifies the arguments that should be consistently offered and evaluated and provides both sides of the debate an opportunity to address the salient aspects of the proposition being discussed in a standardized way within the time constraints.

While described in different ways, Ziegelmueller and Kay (1996) utilized a medical metaphor to explain the four stock issues: ill, blame, cure, and consequence. Ill refers to the problem. In public policy debate, it is widely agreed that if no problem exists, then there is no need to offer a policy solution (Bellon & Smith Williams, 2006). Trying to implement a policy change to solve a nonexistent problem can lead to unintended and unanticipated consequences. Therefore, when an ill is asserted to challenge the status quo, there is a burden to prove, using reason and evidence, the existence of the problem as well as to show that the size and severity of the problem warrants action (Bellon & Smith Williams, 2006; Ziegelmueller & Kay, 1996).

In addition to identifying the ill, the blame must be established. Blame, or the cause of the problem, is established by identifying the inherent impediments preventing the current system from solving the ill. The blame connects to the cure, which refers to the plan or solution that will overcome inherent obstacles in the existing system and eliminate the ill. Any recommended policy solution (cure) should be shown to explicitly and meaningfully address the cause(s) of the problem (Bellon & Smith Williams, 2006; Ziegelmueller & Kay, 1996). Consequence refers to the impact of implementing the recommended cure. It is imperative to demonstrate, with evidence, the impact of the consequences. This demonstration allows for further comparison against the status quo and alternative solutions. Such comparisons aid in determining both the need to act and the most appropriate action.

The burden of proof required throughout the stock issues framework rests with the one asserting the need for a change in the status quo because changes in the status quo require tradeoffs in resources and consequences, as well as acknowledgement from affected stakeholders of the ability and need

for a policy solution to address a given problem. Using the stock issues framework, sufficient depth and breadth of the problem and solution can be established, which can lead to practical and specific policy solutions that solve the identified problem (Bellon & Smith Williams, 2006; Borchers, 2013).

A Framework for Retail Food Policy Debate

Unlike competitive policy debates, real-world public policy debates do not involve the scoring of points. The objective of real-world policy debates is to develop well-thought-out, practical, and often science-based recommendations that are suitable for implementing as policy. It is common for these debates to involve complex problems with opposing and often uncertain solutions. Supporting data often fails to fully describe or consider the pros and cons of opposing solutions. Furthermore, science alone is rarely the sole determinant of a final policy decision (Brownson, Chriqui, et al., 2009; Parkhurst, 2017).

Real-world policy debate involves an interplay among facts, technical considerations, values, and desired actions that merge with politics and judgment to influence final policy decisions (Brownson, Fielding, et al., 2009; Head, 2008; National Research Council, 2012). Retail food policy debate is no different. Technical considerations involve understanding the applicability of the available science and scientific techniques, whereas values involve consideration of normative aspects of prevailing or underlying ideals and philosophies (Gluckman, 2013; National Research Council, 2012). These technical considerations provide a science-based foundation upon which tradeoffs between competing values and desired actions are applied in the decision-making process. As such, policy propositions and decisions are rarely deduced solely from technical considerations (Head, 2008; National Research Council, 2012).

Considering the nature of retail food policy debates and drawing from the four stock issues framework, all retail food debates should consist of claims and arguments on 1) the identified problem, 2) the cause of the problem, 3) the recommended policy solution(s), and 4) all potential consequences (positive and negative) of incorporating the recommended policy solution. The four stock issues, however, should not be considered as absolute or linear in retail food policy debate and policy making. Rather, they should be considered important guideposts for insight into whether a recommended policy has a chance of solving an actual problem relative to the status quo and other alternatives (Kerpen, 1999).

Conclusion

Policy debates occurring at the CFP biennial meetings play an important role in the development and vetting of recommendations that shape national retail food policy. The lack of a consistent framework specifying the arguments that should be consistently offered and evaluated during debate has led to inconsistencies in how perceived retail food-related problems and their recommended policy solutions are debated and evaluated. Debates have not consistently involved deliberations focused on proving the existence and cause of a problem or that a recommended policy solution is plausible and effective before arguing the positive and negative consequences of implementing the recommendation.

Inculcating the systematic use of the stock issues framework of ill, blame, cure, and consequence in retail food policy debate can promote consistency in addressing the salient aspects of propositions intended to address perceived national retail food-related problems. Within this framework, those asserting the need for a change in the status quo have the burden of proof, which includes the use of scientific evidence and an awareness of stakeholder values. The consistent use of the stock issues framework can strengthen stakeholder confidence in the process used to arrive at recommended policy solutions for addressing pressing and emerging national retail food safety problems.

Disclaimer: The conclusions in this guest commentary are those of the authors and do not necessarily represent the views of FDA.

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DIRECT FROM AEHAP

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Public Health Needs the National Environmental Health Science and Protection Accreditation Council and the Council on Education for Public Health

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

This column provides AEHAP with the opportunity to share current trends within undergraduate and graduate environmental health programs, as well as efforts to further the environmental health field and its available resources and information.

Jamie Hisel is the president of AEHAP and a clinical faculty member at Eastern Kentucky University. Clint Pinion is the past-president of AEHAP and an associate professor at Eastern Kentucky University.

The focus of accreditation discourse since 2016 has been the changes made to the Council on Education for Public Health's (CEPH) accreditation criteria. A collection of competencies has bolstered a rift between public health accreditors and many environmental health academicians and scientists throughout the U.S. The main point of contention is whether the changes to the 2016 CEPH accreditation criteria would beget the ending of environmental health education in the U.S. In lieu of arguing if CEPH's accreditation changes will have an impact on the number of environmental health programs across the U.S., the Association of Environmental Health Academic Programs (AEHAP) argues instead for the continued coexistence and possible collaboration of CEPH and the National Environmental Health Science and Protection Accreditation Council (EHAC).

We base our argument on the fact that the two accrediting bodies have different training foci. CEPH aims to accredit schools and programs focused on preparing public health practitioners who master broad public health competencies. EHAC accredits programs that provide students with the foundational knowledge and technical skills required for individuals wanting to obtain an environmental health job. Public health practitioners are to environmental health scientists as primary care doctors are to surgeons. Primary care doctors, like public health practitioners, are broadly trained and have vast general knowledge of their field. Surgeons, like environmental health scientists, have more in-depth preparation and require honed technical skills and expertise.

According to the World Health Organization (WHO) in 2019, there are 10 health challenges that beg for immediate attention. These challenges are:

1. air pollution and climate change,
2. noncommunicable diseases such as cancer and diabetes,
3. global influenza pandemic,
4. fragile and vulnerable settings,
5. antimicrobial resistance,
6. high threat pathogens such as Ebola,
7. weak primary healthcare,
8. vaccine hesitancy,
9. dengue, and
10. HIV.

Addressing the aforementioned public health challenges will require public health generalist and technically trained environmental health scientists. Public health generalists are trained to address 5 of the 10 major issues identified by WHO (i.e., noncommunicable diseases, fragile and vulnerable settings, weak primary healthcare, vaccine hesitancy, and HIV). The remaining five issues require technically trained environmental health practitioners. These practitioners must be capable of assessing the risks to human health and well-being regardless of

TABLE **1**

National Environmental Health Science and Protection Accreditation Council (EHAC) Environmental Health Technical Areas

Technical Area
Air quality control*
All-hazard preparedness
Built environment
Disease prevention
Environmental health planning
Food protection*
GIS
Global climate change and human health
Global environmental health
Hydrogeology
Injury and violence prevention
Institutional health
Occupational health and safety*
Radiation health
Recreational environmental health
Risk analysis
Soils
Solid and hazardous material and waste management*
Water and wastewater*
Zoonotic and vectorborne disease and their control*

*Topics EHAC requires programs to cover in their curriculums.
Source: EHAC, 2016.

media (i.e., air, water, food, or soil), location (i.e., home, work, or recreational facilities), or transport mechanism (i.e., air, drinking water, food, hazardous materials and wastes, radiation, solid waste, wastewater, or zoonotic and vectorborne disease). Although 2,600 environmental health science students graduated from universities with undergraduate or graduate EHAC accreditation from 2012–2017, an academically trained environmental health science workforce shortage still exists (Marion, Murphy, & Zimeri, 2017). AEHAP highlights this shortage to indicate the need for more EHAC-accredited programs in the U.S. and abroad.

Why are EHAC-accredited programs needed? EHAC works with accredited undergraduate and graduate programs to train graduates capable of preparing for and responding to environmental health issues (EHAC, 2016), such as those noted by WHO as requiring immediate attention. Students enrolled in EHAC undergraduate programs complete course and laboratory work in the natural sciences (i.e., physics, chemistry, geology, and biology) (EHAC, 2016). Additionally, students complete coursework in mathematics, communication, and general education. The aforementioned foundational preparation enables students to complete methodology coursework (i.e., toxicology, statistics, and epidemiology) and develop skills necessary to design and manage environmental health programs (EHAC, 2016). Such skills include assessing risk, communicating risk to varying audiences, managing risk, analyzing public health policy, administering environmental health programs, and interpreting environmental health laws (EHAC, 2016).

To ensure students have a broad knowledge of environments, media, and transport mechanisms, EHAC requires accredited undergraduate programs to offer coursework in a minimum of four technical topic areas and expose students to most of the remaining topic areas. According to EHAC (2016), "exposure to 'most' topic areas shall mean that at least half of the topic areas," shown in Table 1 are, "covered in one or more courses during the course of the program" (p. 12). In addition to course and laboratory work, students complete at least 180-clock hours in a field experience (EHAC, 2016). Field experiences (e.g., internships or practicums) further enable students to develop problem solving skills, learn teamwork skills, and understand organizational dynamics (EHAC, 2016).

AEHAP believes that EHAC continues to lead the way for environmental health academic programs, providing much needed educational leadership for its academic intuitions that primarily consist of regional, comprehensive, and historically black colleges and universities. Currently, very few schools of public health have EHAC-accredited environmental health programs. To meet the growing need for environmental health scientists, schools of public health must offer environmental health concentrations.

Is it possible for schools of public health to meet both CEPH and EHAC accreditation? Simply put, yes. CEPH competencies can be met through the coursework, laboratory experiences, and fieldwork completed by students in EHAC programs. For example, EHAC students can meet CEPH curriculum and competency requirements (CEPH, 2016) through existing coursework, laboratory experiences, and fieldwork.

For example:

- CEPH competency D9 (i.e., science, social and behavioral sciences, math/quantitative reasoning, and humanities/fine arts) can be met through completion of required EHAC foundation coursework (i.e., natural sciences, mathematics and general education).
- CEPH competencies D10 and D11 (i.e., public health bachelor's degree foundational domains and foundational competencies) can be met through EHAC-required methodology coursework (i.e., epidemiology and biostatistics), technical area courses (Table 1), and coursework that develops skills necessary to design and manage environmental health programs (i.e., EHAC crosscutting knowledge areas).
- CEPH competency D12 (i.e., public health bachelor's degree cumulative and experiential activities) can be met through EHAC-required foundation and technical coursework, as well as through completing 180-clock hours of fieldwork.

AEHAP calls on CEPH-accredited schools of public health to collaborate with EHAC. The collaboration should lead to the schools of public health dually accrediting existing environmental health programs or establishing new environmental health programs. Having dual accreditation will ensure future environmental health professionals are prepared to identify and respond to dynamic public health challenges.

Regardless of enrollment numbers, environmental health academic programs are and will continue to be needed to address evolving public health issues. We believe East Tennessee State University, the first EHAC-accredited environmental health program, captured our take on the necessity of environmental health in their accreditation application to EHAC in 1969:

> Environmental health practice is as old as Moses, as young as tomorrow's smog, as simple as water, as complicated as a nuclear reactor; if its past might seem inglorious and its future unclear, it is clear that in the future there must be

environmental health if there is to be a future for humankind.

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National Environmental Health Science and Protection Accreditation Council. (2016). *Requirements for the accreditation of environmental health science and protection baccalaureate programs*. Burien, WA: Author. Retrieved from https://www.nehspac.org/wp-content/uploads/2019/08/2016_10_3-MASTER-UG-Requirements-Final-2019_8_1.pdf

ACCREDITED ENVIRONMENTAL HEALTH SCIENCE AND PROTECTION 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
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bryan_brooks@baylor.edu

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DIRECT FROM CDC ENVIRONMENTAL HEALTH SERVICES

Creating a Comprehensive Data Set of Private Wells and Well Vulnerability in New York

Ursula Lauper, MA, MPH
Martin Zartarian, MS
Chelsea Hogan
Braden Savage
David Dziewulski, PhD
New York State Department of Health

Editor's Note: 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 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.

The authors are research scientists in the Bureau of Water Supply Protection at the New York State Department of Health (NYSDOH). Ursula Lauper is the principal investigator of the CDC-funded NYSDOH Safe Water for Community Health (Safe WATCH) cooperative agreement. David Dziewulski is the water systems control and analysis section chief.

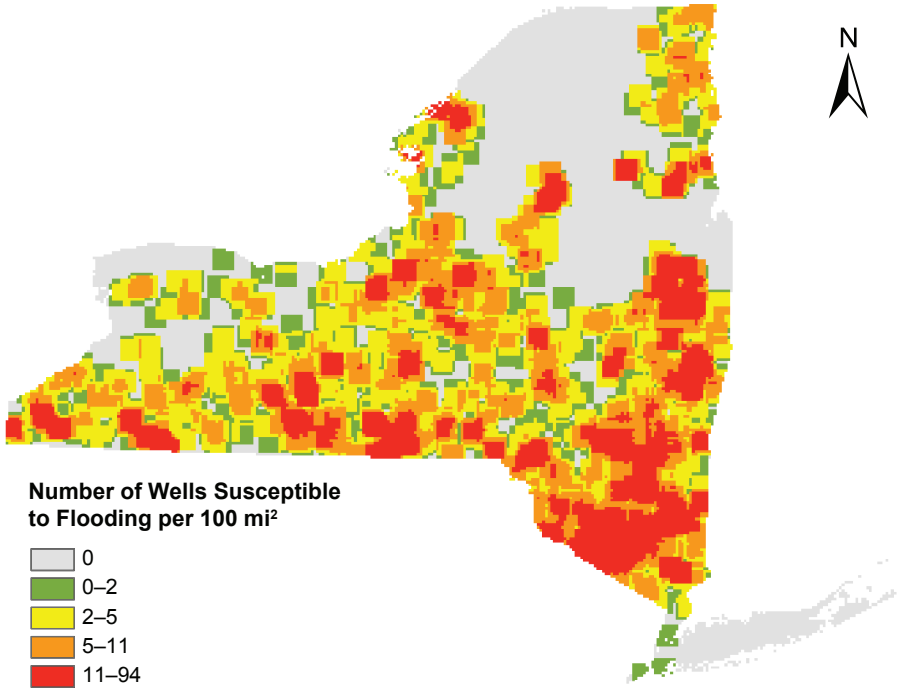
Many states struggle with the lack of data on water sources and drinking water systems that are not regulated by the Safe Drinking Water Act (SDWA). In the U.S., most unregulated systems are private wells. While New York regulations provide additional coverage for non-SDWA regulated wells with 5–14 service connections and fewer than 25 users, an estimated 1 million sites serving approximately 4 million residents across the state rely on unregulated private wells for their potable water. Systems not regulated by SDWA do not have consistent operation, monitoring, or reporting requirements and have not been thoroughly evaluated for their potential to contribute to the occurrence of waterborne disease. There is currently an information gap among private well users about possible harmful exposures or hazards, vulnerabilities of the water sources to contamination, treatment, and assessment of health outcomes.

Considering these issues and with funding from the Centers for Disease Control and Prevention's (CDC) Safe Water for Community Health (Safe WATCH) Program, the New York State Department of Health (NYSDOH) set about to create a more comprehensive private well data set that includes relevant, colocated vulnerabilities. Since 2000, the New York State Department of Environmental Conservation (NYSDEC) has required that all well drillers obtain a certificate of registration. As of December 2016, NYSDEC listed 107,415 wells in their well drilling log database. This list was revised from an initial count of 82,472 using the 668,683 private water sources listed in the New York State Office of Real Property Tax Services (ORPS) database. Most updates corrected locational data, including adding latitude/longitude values and removing wells outside of the state. While most of the unregulated water sources and systems in the ORPS data set are likely private wells, data are not differentiated between wells and sources such as springs, lakes, and streams. All points in the ORPS data set were listed as centroids of property parcels and data were unavailable for 12 counties. The NYSDEC data set also had some limitations in that it included only wells drilled since the beginning of 2000 and data for five counties were missing. Nonetheless, the 107,415 NYSDEC wells and 688,683 ORPS unregulated water sources maps show similar distributions and concentrations of wells susceptible to flooding (Figure 1). Linking these data sets allowed us to take advantage of the strengths of each while mitigating their individual weaknesses.

Next, we updated the GIS layers for floodplains in New York by consolidating multiple sources to cover 87% of the state. These sources included the Federal Emergency Management Agency's national flood hazard layer (the most accurate data source that covered only 35% of the state) and additional flood hazard layers from the New York State Office of Information Technology Services and NYSDEC. Eight counties had no flood zone data and a ninth had only partial data. The number of wells and unregulated water sources located in a flood zone was 2,483 (2.3%) in the NYSDEC data set and 30,502 (4.6%) in the ORPS data set. The updated and expanded floodplain map layer, GIS lay-

FIGURE **1**

Number of Wells in New York Susceptible to Flooding



ers, and database were built to show well locations in 100- and 500-year floodplains.

Karst geology and proximity to concentrated animal feeding operations (CAFOs) were also included in the mapping because flooding-related risks are elevated in these areas (Figure 2). According to NYSDEC, New York has approximately 500 CAFOs, the majority of which are dairy farms with ≥300 cows and associated livestock operations. We requested the CAFO map layer from NYSDEC and obtained the karst geology map layer from the U.S Geological Survey.

Vulnerable wells were identified when the hydrogeology of a specific site was known. In the absence of specific information, buffers were created extending different lengths from the center of each CAFO to capture inventory of nearby water wells, taking into consideration the special features of karst zones (e.g., porosity and surface recharge areas that exist over long distances). In the karst zones, we placed 2-mi buffers around each CAFO with ≥300 cows and a 1-mi buffer around each CAFO with <300 cows. In the non-karst zone, 1-mi and 0.2-mi buffers were created for larger and smaller CAFOs, respectively. For CAFOs straddling a karst zone, the radius was extended when the buffer zone of a CAFO in a non-karst zone reached a karst zone and reduced the length when a karst zone CAFO reached a non-karst zone. Using these GIS map layers, the number of NYSDEC vulnerable wells and ORPS vulnerable unregulated water sources were again mapped by county and a strong agreement between the data sets was again demonstrated. These findings indicate that private wells in areas where karst geology and CAFOs overlap are more vulnerable to contamination during flooding events.

Creating this linkage of data sources and types has significantly improved the understanding of well distribution and vulnerability across the state. To date, these integrated data sets have been used to identify vulnerable wells during flooding and manure spillage events, to select study populations for surveys and pilot sampling programs, and to target outreach and education efforts. New data sets, such as updated county-level source water survey results, will be added as they become available to further enhance NYSDOH's ability to anticipate and respond to the public health needs of private well users.

Acknowledgements: The authors would like to acknowledge Caitlin Norton and Grace Chen for their earlier work on this project and CDC's Safe WATCH program for its funding.

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continued on page 32

Quick Links

- Steps to Improve Drinking Water Programs: www.cdc.gov/nceh/ehs/safe-watch/steps-to-improve.html
- New York State Department of Health Private Wells: www.health.ny.gov/environmental/water/drinking/private_wells.htm

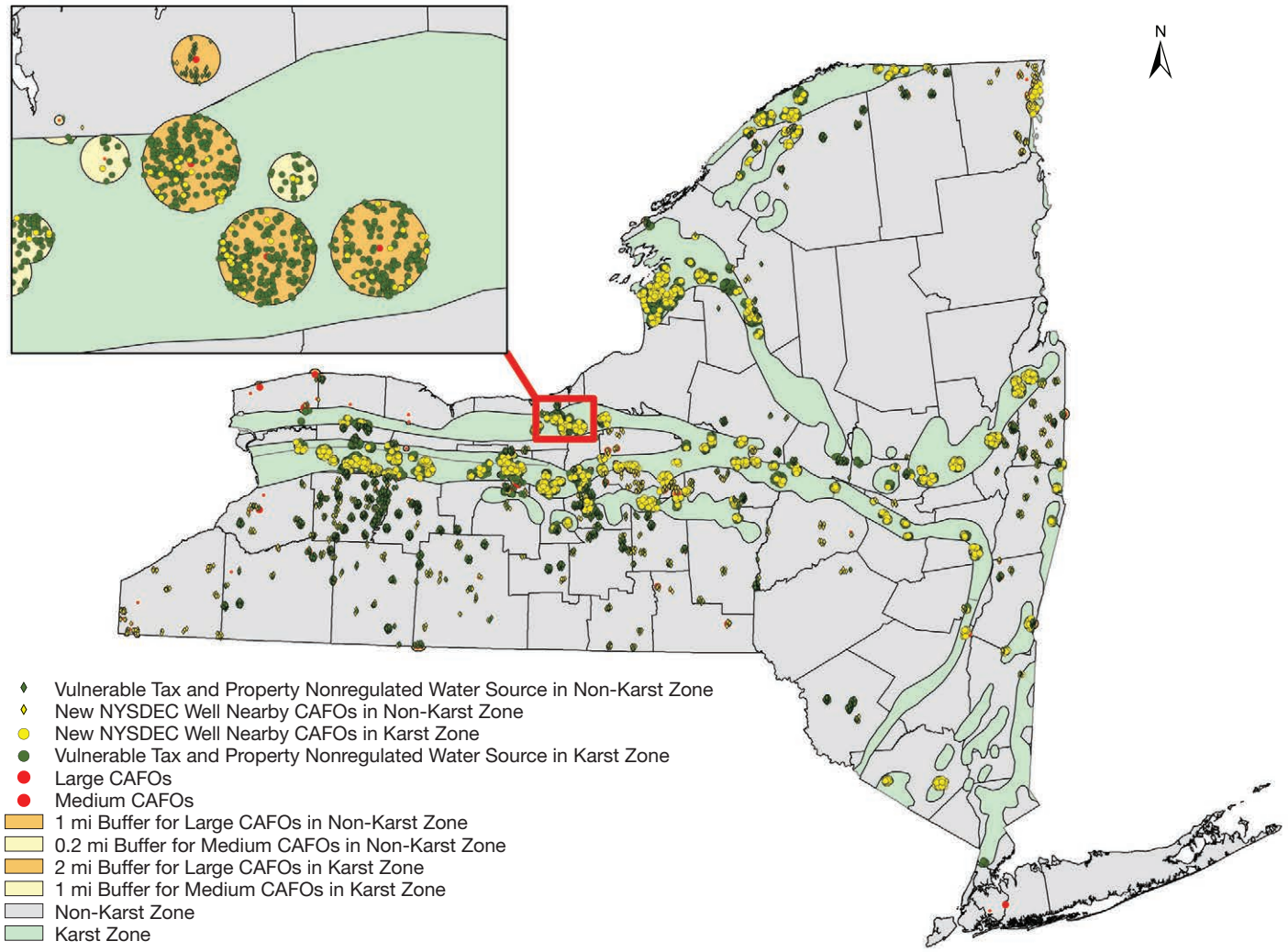
Did You Know?

National Groundwater Awareness Week is March 8–14. Groundwater is the most extracted raw material with withdrawal rates estimated at 259 trillion gallons per year. In the U.S., 44% depend on groundwater for their drinking water supply. Learn more about this observance and how you can get involved at www.ngwa.org/get-involved/groundwater-awareness-week/groundwater-awareness-week-2020.

continued from page 31

FIGURE **2**

Private Wells and Unregulated Water Sources Located on Karst Geography and Near CAFOs



CAFO = concentrated animal feeding operation; NYSDEC = New York State Department of Environmental Conservation.

Data sources: Water well drilling information (log) from NYSDEC (2015). Property inventories data from the New York State Office of Real Property Services (2014). CAFO locations from NYSDEC (2015). Karst zone information from the U.S. Geological Survey.

Did You Know?

NEHA, in partnership with the Centers for Disease Control and Prevention and the National Network of Public Health Institutes, has launched the Private Water Network (PWN). PWN is a virtual community of practice for those working to protect the public's health from contaminants in private drinking water sources. Membership is free and offers access to a multitude of resources including a discussion forum, resource library, membership directory, and more. Visit www.neha.org/node/59966.

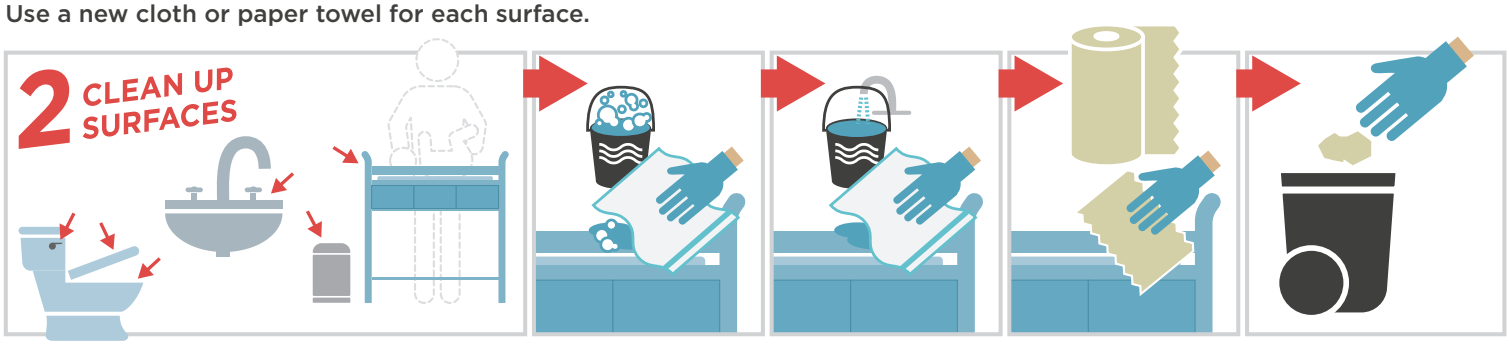
Routine Disinfection of Surfaces in CHILDCARE ENVIRONMENTS

WARNING
MIX BLEACH WITH WATER ONLY
WARNING

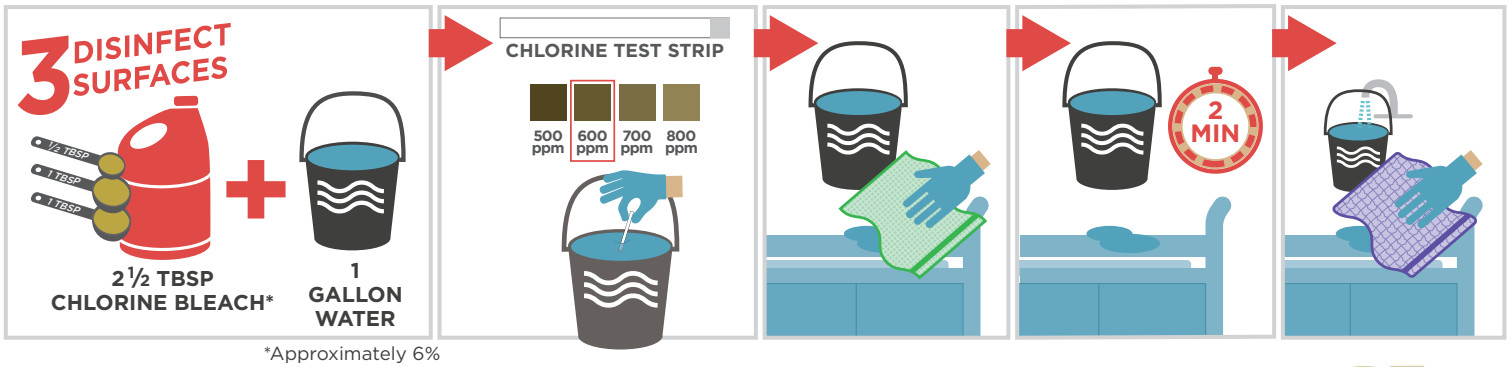
1 WIPE UP SURFACES

Use a new cloth or paper towel for each surface.

2 CLEAN UP SURFACES

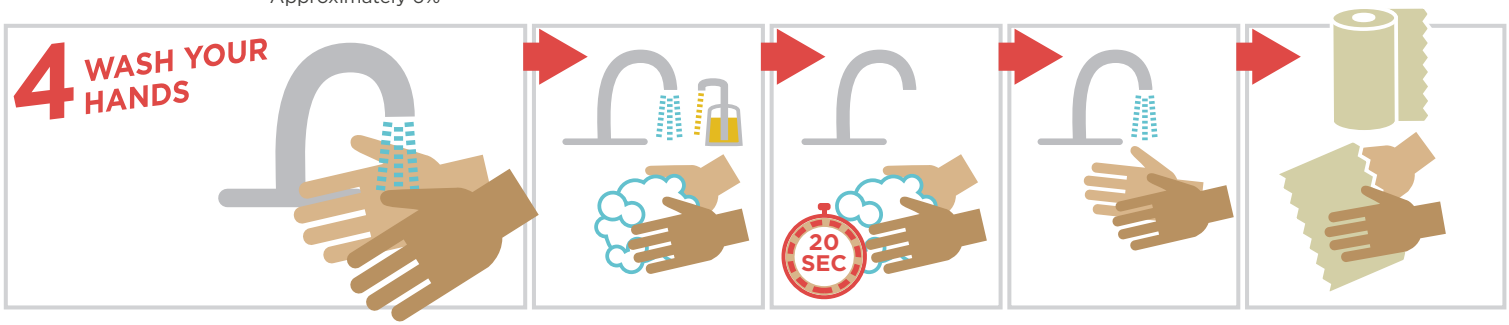


3 DISINFECT SURFACES



*Approximately 6%

4 WASH YOUR HANDS



Disinfecting products must be EPA-registered. Always read and follow manufacturer's directions.

Scientific experts from the U.S. Centers for Disease Control and Prevention and the U.S. Food and Drug Administration helped to develop this poster.

Posters are available for download at **www.waterandhealth.org/resources/posters**

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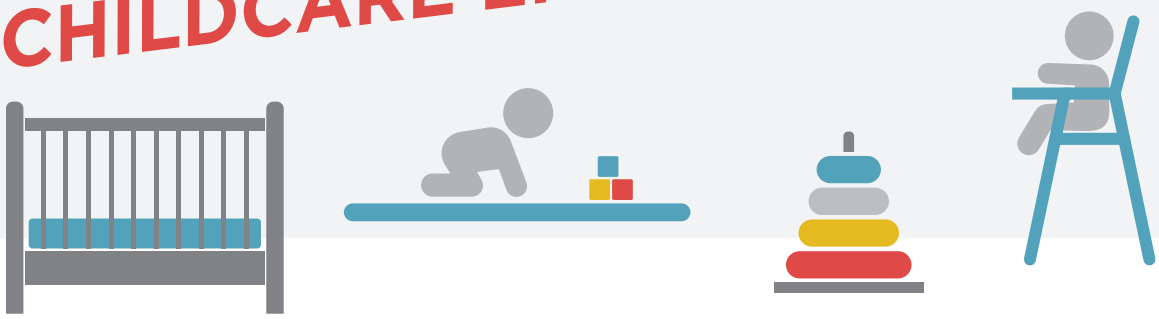
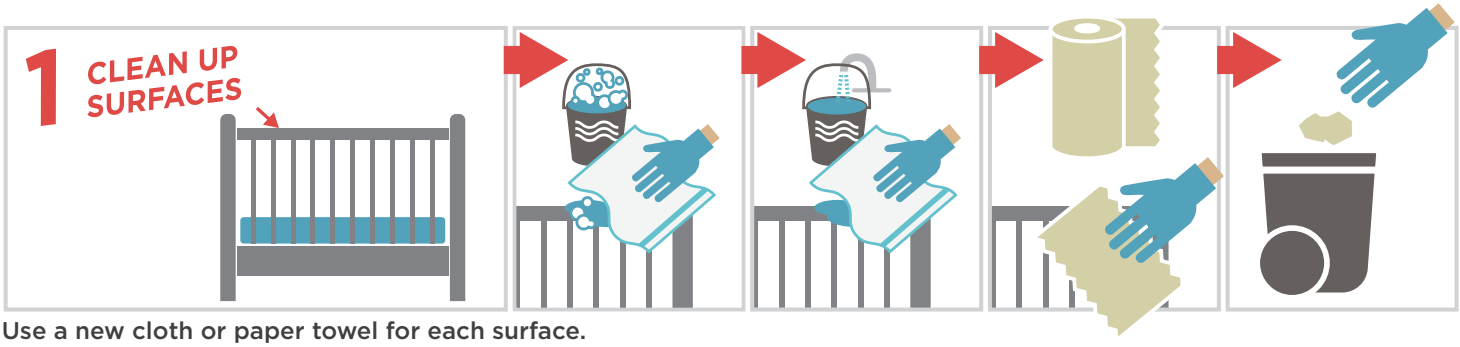
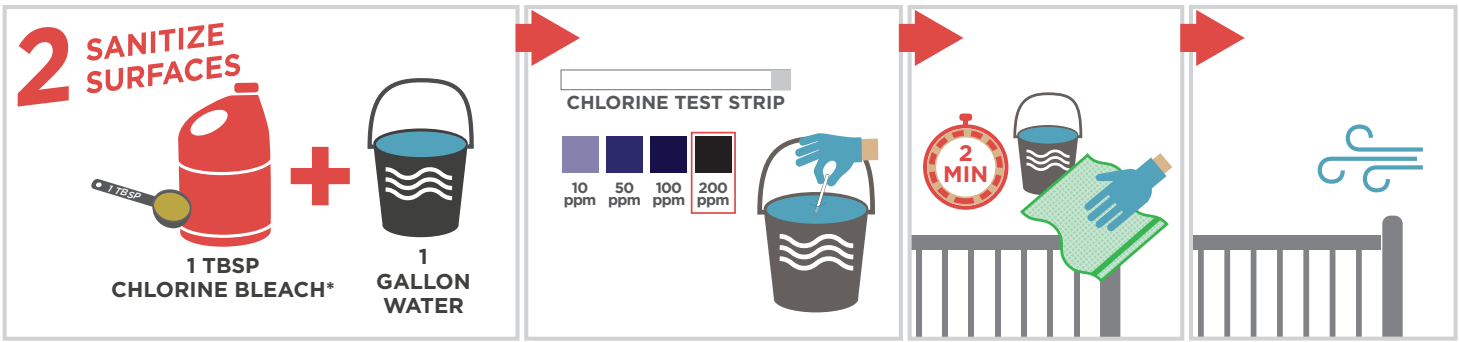
Sanitizing Surfaces in CHILDCARE ENVIRONMENTS

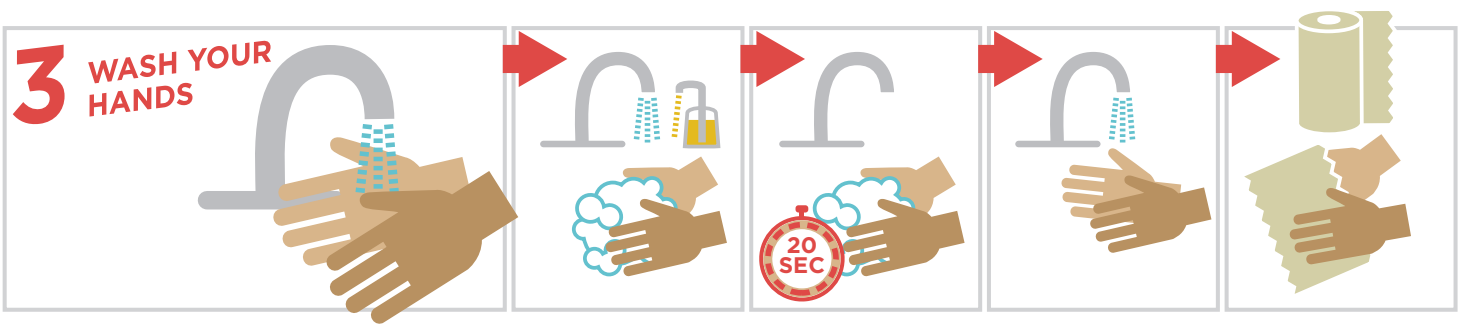




Use a new cloth or paper towel for each surface.



*Approximately 6%



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EH CALENDAR

UPCOMING NEHA CONFERENCES

July 13–16, 2020: NEHA 2020 Annual Educational Conference & Exhibition, New York City, NY, www.neha.org/aec

July 12–15, 2021: NEHA 2021 Annual Educational Conference & Exhibition, Spokane, WA

NEHA AFFILIATE AND REGIONAL LISTINGS

California
March 2–5, 2020: Annual Educational Symposium, California Environmental Health Association, Seaside, CA, www.ceha.org/2020-aes.html

Colorado
September 15–18, 2020: Annual Education Conference, Colorado Environmental Health Association, Pueblo, CO, www.cehaweb.com

Florida
August 2–8, 2020: Annual Education Meeting, Florida Environmental Health Association, Jensen Beach, FL, www.feha.org/2020AEM

Georgia
May 27–29, 2020: Annual Education Conference, Georgia Environmental Health Association, Lake Lanier Islands, GA, www.geha-online.org

Illinois
November 2–3, 2020: Annual Educational Conference, Illinois Environmental Health Association, Utica, IL, http://iehaonline.org

Indiana
September 21–23, 2020: 70th Annual Fall Educational Conference, Indiana Environmental Health Association, Lawrenceburg, IN, www.iehaind.org/Conference

Iowa
October 14–15, 2020: Fall Conference, Iowa Environmental Health Association, Des Moines, IA, www.ieha.net/FallConference2020

Michigan
March 18–20, 2020: Annual Education Conference, Michigan Environmental Health Association, Traverse City, MI, www.meha.net/AEC

Missouri
April 7–10, 2020: Annual Education Conference, Missouri Environmental Health Association, Springfield, MO, https://mehamo.org

Nevada
April 28–29, 2020: NFSTF & NVEHA Joint Conference, Nevada Food Safety Task Force (NFSTF) and Nevada Environmental Health Association (NVEHA), Las Vegas, NV, www.nveha.org

New Jersey
March 1–3, 2020: Educational Conference & Exhibition, New Jersey Environmental Health Association, Atlantic City, NJ, www.njeha.org

Oregon
March 31–April 2, 2020: Annual Education Conference, Oregon Environmental Health Association, Bend, OR, www.oregoneha.org/aec.htm

Texas
October 26–30, 2020: 65th Annual Education Conference, Texas Environmental Health Association, Austin, TX, www.myteha.org

Utah
May 6–8, 2020: Spring Conference, Utah Environmental Health Association, Kanab, UT, www.ueha.org/events.html

Virginia
April 24, 2020: Spring Onsite Workshop/Field Day, Virginia Environmental Health Association, Charlottesville, VA, https://veha32.wildapricot.org

Washington
April 27–29, 2020: 68th Annual Educational Conference, Washington State Environmental Health Association, Tacoma, WA, www.wseha.org/2020-aec

TOPICAL LISTINGS

Food Safety
March 9–12, 2020: Integrated Foodborne Outbreak Response and Management (InFORM) 2020 Conference, Atlanta, GA, www.aphl.org/conferences/InformConf/Pages/default.aspx

Public Health
April 7–8, 2020: Iowa Governor's Conference of Public Health, Des Moines, IA, www.ieha.net/IGCPH

Water Quality
August 19–21, 2020: *Legionella* Conference 2020, NSF Health Sciences and NEHA, Chicago, IL, www.legionellaconference.org

JEH QUIZ

FEATURED ARTICLE QUIZ #5

Tick Dragging: Using a Drone to Reduce Surveyor Exposure

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

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Quiz Registration

Name

NEHA Member Number

E-mail

→ Quiz deadline: June 1, 2020

1. According to the Centers for Disease Control and Prevention, reports of Lyme disease __ from 1992–2006.
   a. stayed the same
   b. more than doubled
   c. more than tripled
   d. more than quadrupled

2. As environments are becoming more suitable for sustaining tick populations, these arthropod vectors are spreading and making their way into new regions.
   a. True.
   b. False

3. Tick dragging surveillance is conducted by dragging a __ material over vegetation suspected to contain ticks in order to collect ticks for analysis.
   a. cotton
   b. linen
   c. flannel
   d. polyester

4. It is recommended that regular surveillance should occur throughout the year at intervals no greater than __ due to bias from occasional sampling.
   a. 1 week
   b. 2 weeks
   c. 3 weeks
   d. 1 month

5. In the study, dragging was completed in the __ during the late morning or afternoon to avoid wet vegetation.
   a. winter/spring
   b. spring/summer
   c. summer/fall
   d. fall/winter

6. The drag pattern in the study consisted of side-by-side drone and personnel drags extending for approximately
   a. 250 ft.
   b. 350 ft.
   c. 450 ft.
   d. 550 ft.

7. In the study, a total of __ personnel drags and __ drone drags were completed.
   a. 5; 5
   b. 8; 8
   c. 10; 10
   d. 15; 15

8. In most drags, a similar number of ticks was found, with the exception of the __ drag.
   a. first
   b. second
   c. third
   d. fifth

9. A chi-squared analysis revealed __ difference between dragging methods when the ticks were categorized.
   a. a significant
   b. no significant

10. Ticks collected as a combination of both types of dragging were sorted by
    a. species.
    b. development stage.
    c. sex.
    d. all of the above.
    e. none of the above.

11. The __ comprised the most common tick found during the study's sampling campaign.
    a. Lone Star male
    b. Lone Star female
    c. Lone Star nymph
    d. Gulf Coast male

12. Limitations of tick dragging by drone include
    a. the ability of the pilot to accurately control the drone.
    b. occasional snags of the cloth on vegetation.
    c. the inability to fly in more wooded/forest areas.
    d. all of the above.
    e. none of the above.

JEH Quiz #3 Answers
December 2019

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

Did You Know?

The *Legionella* Conference 2020, hosted by NSF Health Science and NEHA, will take place August 19–21 in Chicago, Illinois (www.legionellaconference.org/index.php). The conference will center on how hospitals, water utilities, health departments, and industry can identify best practices for disease prevention in healthcare settings. Deadline to submit a podium presentation abstract is March 1. Deadline to submit a poster presentation abstract is April 1.

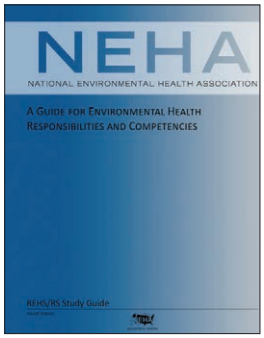
RESOURCE CORNER

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)

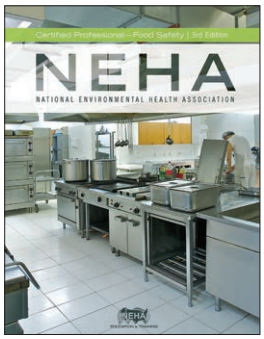


The Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) credential is the National Environmental Health Association's (NEHA) premier credential. This study guide provides a tool for individuals to prepare for the REHS/RS exam and has been revised and updated to reflect changes 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

Certified Professional–Food Safety Manual (3rd Edition)

National Environmental Health Association (2014)

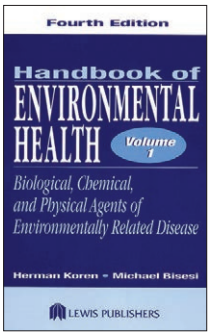


The Certified Professional–Food Safety (CP-FS) credential is well respected throughout the environmental health and food safety field. This manual has been developed by experts from across the various food safety disciplines to help candidates prepare for NEHA's CP-FS exam. This book contains science-based, in-depth information about causes and prevention of foodborne illness, HACCP plans and active managerial control, cleaning and sanitizing, conducting facility plan reviews, pest control, risk-based inspections, sampling food for laboratory analysis, food defense, responding to food emergencies and foodborne illness outbreaks, and legal aspects of food safety.

358 pages / Spiral-bound paperback
Member: $179 / Nonmember: $209

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

Herman Koren and Michael Bisesi (2003)

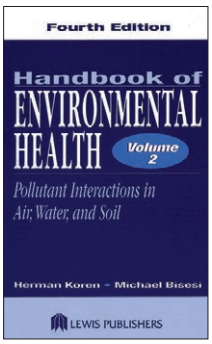


A must for the reference library of anyone in the environmental health profession, this book focuses on factors that are generally associated with the internal environment. It was written by experts in the field and copublished with NEHA. A variety of environmental issues are covered such as food safety, 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 REHS/RS 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 REHS/RS credential exam.

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

Did You Know?

NEHA has redesigned its Understanding the Needs, Challenges, Opportunities, Vision, and Emerging Roles in Environmental Health (UNCOVER EH) web page at www.neha.org/uncover-eh. The UNCOVER EH initiative seeks to assess and improve the profession and practice of environmental health. Through NEHA's redesigned web page, you can access an overview of the initiative, as well as published key findings and resources such as factsheets, infographics, and blog posts.

SPECIAL **LISTING**

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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NEHA SECOND VICE-PRESIDENTIAL CANDIDATE PROFILES

The National Environmental Health Association (NEHA) is governed by a corporate board of directors who oversee the affairs of the association. The board is made up of two groups: national officers and regional vice-presidents. NEHA elects its national officers through a ballot that goes to all active and life members prior to the annual conference. Among other things, the ballot features the election for the position of NEHA second vice-president. The person elected to this position begins a 5-year commitment to NEHA that involves advancing each year to a different national office, eventually to become NEHA's president.

Election policy specifies that candidate profiles for the second vice-president be limited to 800 words in total length. If a candidate's profile exceeds that limit, the policy requires that the profile is terminated at the last sentence before the 800-word limit is exceeded. In addition, the submitted profiles have not been grammatically edited, but presented as submitted and within the 800-word limitation. This year, NEHA presents two candidates for the office of second vice-president. The candidates are listed alphabetically.

Thomas J. Butts, MSc, REHS

Tom Butts believes it is important to assure support for and recognition of environmental health practitioners and the key role they play in protecting communities from adverse health impacts. He will encourage an active role for environmental health professionals as evidence-based policy advocates. Additionally, he believes NEHA must seek ways to engage with newer staff to translate their enthusiasm, skills and abilities into program and systems improvements in our environmental health practice and while working to address climate change.

Tom earned a BS in Environmental Health from Colorado State University and a MSc in Environmental Science & Engineering from Colorado School of Mines. He started his 32+ year career Tri-County Health Department as an environmental health specialist conducting a wide range EH activities. Tri-County is the local public health agency that serves 3 counties and over 1.5 million people surrounding Denver.

Tom then spent 15 years working with hazardous waste generators, spill response, household chemical collection programs and local oversight of hazardous waste cleanups.

In 2002, Tom was selected to lead the agencies new emergency preparedness and response program where he played a key role in developing agency and regional response plans with staff and local and state agencies. Environmental health staff play key roles in all hazard's incident management and during response and recovery from natural disasters and other events. Tom served as the NEHA Terrorism and All-Hazard Preparedness Technical Section Co-chair 2003-2005

Tom served as Director of Environmental Health beginning in 2008 for over 4 years managing programs including: food safety, child care, recreational waters, onsite wastewater treatment, vector control, body art, land use planning and a variety of solid and hazardous waste activities (~55 staff and $6M budget). In this position Tom actively worked with local agency peers across the state and with key state staff on program issues of both local and statewide interest to environmental public health. These efforts led to statute changes for food safety and onsite wastewater management programs. Tom served the Colorado Directors of Environmental Health (CDEH) as Vice-President, President and the CDEH representative to the Colorado Association of Local Public Health Officials, respectively (2008-2013) working to represent both urban and rural perspectives in local, state and national forums.

Tom was involved several health impact assessments (HIA) where the goal was to address health impacts while informing policy or land use decisions. Tools like this will be important to environmental health professionals as we work to address sustainability, health equity and built environment issues.

One effort of key interest was serving on the technical advisory committee for Colorado's Environmental Public Health Tracking system as it has developed from a very limited environmental health data visualization tool to a more functional resource for local environmental health staff and leadership across the state.

This data is now accessible as communities complete their community health assessment and develop community/public health improvement plans. It is very important that environmental health data is a key element of these efforts.

Prior to his retirement in 2017, he served as Deputy Director for nearly 5 years overseeing and guiding the Directors of the Office of Human Resources, Division of Administration & Finance, Division of Environmental Health, and Office of Emergency Preparedness and Response. He enthusiastically supported the development of an agency strategic plan and managed that process. He also actively participated in the development of the documentation package for accreditation (PHAB) and participated in the site visit resulting agency accreditation.

Tom currently works on environmental health programs as a consultant and as an hourly employee for two local health agencies in Colorado and was appointed to the Colorado State Board of Health in March of 2019.

Tom welcomed the opportunity to actively participate on the NACCHO Environmental Health Committee for 4 years (2014-2018) engaging on Environmental Public Health Tracking, working to identify best practices, emerging issue and contributing to the revisions of a number of NACCHO position papers.

Tom served as a regional representative, treasurer and then president of the Colorado Environmental Health Association (CEHA) and has been recognized with their Milton M, Miller award, CEHA's highest, in recognition of contributions and distinguished service in advancing the Environmental Health profession.

Through CEHA, Tom has worked with the accredited EH Program at Colorado State University and selects EH oriented state

science fair winners each year. These activities and the interaction with students are always inspiring.

Environmental health professionals have more contact with the community than any other element of the public health system and we need to capitalize on those contacts and the community members (regulated community, local agency contacts, the public at large) that we interact with to demonstrate the value of our work.

Please support Tom Butts for Second Vice President in 2020 and see me on LinkedIn.

Timothy Murphy, PhD, REHS, DAAS

I have been a member of NEHA for over 35 years and it has been an influence on my career since my undergraduate degree at Ferris State College! I look forward to the opportunity to influence NEHA's growth and positive development by serving in a leadership role.

Statement of Intent – I seek your support and vote for the office of Second Vice President (2nd VP) of the National Environmental Health Association (NEHA). As NEHA is the premier professional organization for environmental health practitioners. I will strive to bring a fresh perspective to enhance our strategic direction, and to accomplish our shared objectives for NEHA.

My Vision of how I see the future in the areas of strategic direction, the REHS credential and membership in NEHA includes the following: A revitalized strategic direction that is supported by current and new initiatives and future membership, an improved national and international recognition of NEHA based upon our work to advance the science and policies of environmental health, a more diverse Environmental Health workforce including students, faculty, practitioners, and leaders, increased communication and cooperation with other environmental/occupational health and safety organizations.

Regarding the REHS credential, our premier credential –Increases awareness of the importance and value of the REHS credential among policy makers and the general public throughout the nation, working with policy makers to create policy that improves the competencies of the environmental public health workforce, and ensuring the certification maintenance program is a value-added process.

Regarding Membership – Working with organizations to increase the number of college and university EH majors and student /faculty diversity, working with the NEHA Board to create student activities/mentorship programs that are value-added. Thus, increasing the number of new NEHA members, increase membership in American Academy of Sanitarians (AAS).

NEHA REGIONAL VICE-PRESIDENTIAL CANDIDATE PROFILES

The National Environmental Health Association (NEHA) is governed by a corporate board of directors who oversee the affairs of the association. The board is made up of two groups: national officers and regional vice-presidents (RVPs). NEHA has nine different regions. See page 40 for a listing of the regions and the states/groups each region represents. RVPs are elected by NEHA active and life members in their respective regions. RVPs serve 3-year terms.

Election policy specifies that candidate profiles for RVPs be limited to 400 words in total length. If a candidate's profile exceeds that limit, the policy requires that the profile is terminated at the last sentence before the 400-word limit is exceeded. In addition, the submitted profiles have not been grammatically edited, but presented as submitted and within the 400-word limitation. Three regions are up for election this year—Region 1, Region 5, and Region 7. There are no candidates running for Region 1 and that position will be filled per board policy. The candidates for Regions 5 and 7 are listed alphabetically by region.

Region 5

Traci (Slowinski) Michelson, MS, REHS, CP-FS

Traci Slowinski is a Food Safety & Quality Assurance professional with over 20 years of experience in the food industry. She gained her breadth of skills and knowledge while working in food manufacturing, food service, regulatory and technology positions. She has a M.S. in Food Science & Nutrition and a B.A. in Dietetics. Her professional aspiration (and passion) is ensuring all consumers have a safe food supply.

Traci currently works for Brinker International as their Sr. QA & Food Safety Manager where she ensures that guests have safe, delicious, enjoyable visits. Her other food service positions included time at Darden Restaurants and Red Robin Gourmet Burgers. She tried her hand at QA manufacturing positions at Smuckers, Deli Express and Pepperidge Farm. She was also a food and meat inspector for the MN Department of Agriculture. She even had a stint as a subject matter expert at a technology company, EtQ.

Traci holds REHS and CP-FS credentials along with numerous continuing education certificates related to environmental health topics. She is a recent past President (2017-2019) of the NEHA Business & Industry Affiliate. She also held the office of Treasurer/Secretary (2015-2017) in the BIA. She is a member of the Conference for Food Protection and participates on at least 2 committees per biennial. And she was recently appointed to the Partners with a Common Purpose Steering Committee.

As an environmental health professional, she is hard working to promote collaboration and greater partnership between the private and public sectors. She also wants to ensure industry has a strong voice within the environmental health arena. Her goal as a NEHA RVP would be to promote inclusion and increased participation of industry/business within NEHA and its affiliates. Her networking skills and contacts in both sectors can help open lines of communication and help find common ground for the profession to work together on shared environmental health initiatives. Her involvement in various professional organizations can help drive changes that are identified by our NEHA groups.

Please consider Traci for the Region 5 NEHA RVP position. She will work hard to make a difference in the environmental health world.

Region 7

Tim Hatch, MPA, REHS

- 23.5 years with the Alabama Department of Public Health
- 5 years with the Montgomery County Health Department
- 1 year with Public Health Area 8
- 7 years with the Bureau of Environmental Services
- 10.5 years with the Center for Emergency Preparedness
- Graduate of Auburn University where he earned a Bachelor of Science degree in Biology.
- Graduate of Auburn University Montgomery where he earned a Master of Public Administration.
- CDC's Environmental Public Health Leadership Institute Fellow: 2008-2009, Mentor – 2011-2012
- Scholar of the South Central Public Health Leadership Institute – 2006-2007
- Current Peer Reviewer for the National Environmental Health's Journal of Environmental Health
- Adjunct Instructor for FEMA's Center for Domestic Preparedness in Anniston, AL (2009-2014) as a subject matter expert for the Environmental Health Training for Emergency Response course and the Healthcare Leadership course. He has trained over 1,000 in these courses combined.
- President of the Alabama Environmental Health Association from 2006-2007 & 2014-2015 and a Board of Directors member for 8 years.
- President of the Alabama Public Health Association 2014-2015 and a Board of Directors for 5 years.
- Committee member on Disaster Risk Reduction with the International Federation of Environmental Health since 2013. International lecturer on environmental health and disaster management (Indonesia, Australia, Croatia, New Zealand, Portugal, and the USA)
- Environmental Health Workgroup appointee for the National Health Security Preparedness Index 2014. – NEHA Region 7 Vice-president 2014 – present (AL, SC, NC, GA, MS, TN, FL)

NEHA REGIONAL VICE-PRESIDENTIAL CANDIDATE PROFILES

Professional Recognition and Achievements

- Howell Special Meritorious Service Award to Public Health from the Southern Health Association (2013)
- Alabama Public Health Association – Frederick S. Wolf Award (2012); D.G Gill Award (2018)
- Ansel C. Mullins Award Recipient (1999)
- Registered Environmental Health Specialist (2007 – present)
- Advanced Crisis Leadership Institute – Tulane University (2008)
- Environmentalist of the Year Award Recipient (2009)
- National Environmental Health Association – Past Presidents' Award (2014)
- Hall of Fame Inductee (2018) – Alabama Public Health Association

Disaster response includes: Hurricane Ivan (2004), Hurricane Katrina (2005), Kentucky Ice Storm (2009), wide-spread water outage in rural Alabama (2009), Gulf Oil Spill (2010), Hurricane Florence (2018), Hurricane Michael (2018) and Alabama Tornadoes (2011 and 2019).

Tim is a husband, father, church deacon and Bible class teacher, and lifelong resident of Montgomery, Alabama who enjoys hunting, travel and following the Auburn Tigers!

Did You Know?

NEHA and the U.S. Department of Housing and Urban Development (HUD), through its Office of Lead Hazard Control and Healthy Homes, are pleased to announce that applications are being accepted for the 2020 HUD Secretary's Awards for Healthy Homes. These awards recognize excellence in making indoor environments healthier through healthy homes research, education, and program delivery. The awards will be presented on July 15 at the NEHA 2020 Annual Educational Conference & Exhibition. Deadline to apply is March 10. Learn more at www.neha.org/about-neha/awards/hud-award-healthy-homes.

NATIONAL ENVIRONMENTAL HEALTH ASSOCIATION

84th ANNUAL EDUCATIONAL CONFERENCE & EXHIBITION

NEW YORK CITY ◆ JULY 13–16

CELEBRATE THE UNKNOWN HERO

Invest in your career and your future

Meet, network, and socialize with over 1,000 environmental health professionals from around the globe to share and discuss current and emerging environmental health topics.

REGISTRATION PACKAGES	UNTIL APRIL 24	AFTER APRIL 24
	MEMBER/NONMEMBER	
Full Conference Registration Includes one ticket to each of the * items below	$630/$805	$800/$975
Full Conference Registration + 1-Year NEHA Membership*	$730	$900
Full Conference Registration for Students*	$220	$220
Full Conference Registration for Retirees*	$250	$250
Single Day Registration	$260/$320	$330/$390

*Includes one ticket to the **Exhibition Grand Opening** and **A Bite of the Big Apple Event**.

HOTEL RESERVATIONS

Room Block with discounted room rates now open!

neha.org/aec/hotel

SPECIAL EVENTS

Attending our social and networking events is an effective way to meet and interact with NEHA team members, your fellow peers, and important environmental health professionals and leaders.

Exhibition Grand Opening

Monday, July 13

Meet, network, and socialize with companies and organizations as they showcase products and services that will help you be more productive in your career. Don't miss out on the food, fun, and business opportunities at this event!

Included in full conference registration.
Additional tickets available for $55.

UL Event

Tuesday, July 14

Join environmental health leaders and NEHA staff members at this exclusive networking event at New York City's Manhattan Manor, across the street from the conference hotel. The evening will feature showtunes, food, and the opportunity to connect with old friends, meet new colleagues, and expand your network. Be sure to purchase tickets in advance as this event typically sells out.

Tickets available for $75.

A Bite of the Big Apple Event

Wednesday, July 15

This year's networking event will provide an exciting New York inspired atmosphere full of food, music, and dancing the night away at the Sheraton New York Times Square Hotel. Don't miss out on the chance to meet, interact, and socialize with fellow environmental health professionals from around the world.

Included in full conference registration.
Additional tickets available for $65.

NATIONAL ENVIRONMENTAL HEALTH ASSOCIATION

NEHA **NEWS**

NEHA's Celebration of World Environmental Health Day

By Maddie Gustafson (mgustafson@neha.org)

The National Environmental Health Association (NEHA) was honored to join the International Federation of Environmental Health in celebrating World Environmental Health Day on September 26, 2019. This partnership was built to raise global awareness about today's most pressing environmental health concerns. This year's theme was "Climate Change Challenges, Time for Global Environmental Health to Act in Unison."

Climate change is the greatest threat to global health we currently face. It harms health by decreasing the quality of air we breathe, increasing our exposure to more frequent and intense extreme weather events, increasing extremes of precipitation including flooding and drought, expanding the geographic distribution and number of disease-carrying vectors, and exacerbating health inequities. Around the world, these impacts increase the risk of chronic and infectious diseases, harm mental health and well-being, threaten the safety and security of our communities, trigger food insecurity, and place a disproportionate burden on vulnerable populations.

In the spirit of this event, NEHA developed a declaration on climate and health, held a Twitter chat, developed a toolkit, and reduced its own carbon emissions. The declaration included NEHA's commitment to spreading awareness of the environmental health workforce through the World Environmental Health Day activities. All the activities and how to navigate the Twitter chat were documented in the toolkit. The Twitter chat sparked conversation between partners and allies to discuss how climate impacts health, highlight the role of environmental health professionals in protecting communities, and build resilience. The declaration and toolkit can be found at www.neha.org/news-events/latest-news/celebrate-world-environmental-health-day-2019-neha.

In addition to these activities, NEHA wanted to reduce its organizational environmental impact on World Environmental Health Day. As such, World Environmental Health Day was an organization-wide telework day. Instituting an organization-wide telework day is a great way to collectively participate by working from home and cutting back on staff vehicle carbon emissions for the day.

To estimate the impact of the organization-wide telework day, NEHA conducted an emissions survey of all staff. NEHA staff answered a series of 10 questions about their morning and evening commutes to work and length of time spent in the car, as well as gas mileage of staff cars. Employees who work remotely or take public transportation completed the survey as well. The results showed that an organization-wide telework day eliminated the emission of over 650 pounds of carbon dioxide (CO_2) into the atmosphere. In addition to the World Environmental Health Day telework day, NEHA staff have the option to work remotely one day a week. By implementing a one telework day per week policy, NEHA has cut its staff's yearly CO_2 emissions by over 34,000 pounds.

With a successful event in 2019, we are excited for World Environmental Health Day 2020!

NEHA Releases UNCOVER EH Visual Abstract

By Maddie Gustafson (mgustafson@neha.org)

A December 2019 article published in *Environmental Health Perspectives*—from a team of researchers at Baylor University, the Centers for Disease Control and Prevention, and the National Environmental Health Association (NEHA)—examines the challenges and needs in the environmental health workforce (https://ehp.niehs.nih.gov/doi/10.1289/EHP5161). Understanding the Needs, Challenges, Opportunities, Vision, and Emerging Roles in Environmental Health (UNCOVER EH) is a groundbreaking study that describes the environmental health workforce. In the new article, "Environmental Health Practice Challenges and Research Needs for U.S. Health Departments," the authors present results from UNCOVER EH identified through an online survey and in-person focus group interviews of over 1,700 environmental health professionals from health departments across the nation.

To complement the release of the article, NEHA has designed a visual abstract (www.neha.org/membership-communities/get-involved/day-in-life/uncover-environmental-health-workforce-visual). A visual abstract is the graphic equivalent to a written abstract. Much like an infographic, it is tailored to be comprehendible by all audiences through visuals, health literate text, and a high-level summary of the article's findings. This visual abstract was unique as we translated qualitative results into a graphic representation. The visual abstract provides a nice complement to the article, conveying the importance of the environmental health workforce, exploring six key challenge areas it is facing, and describing recommendations for the environmental health practice.

The environmental health workforce is critical to the public health delivery system. In fact, environmental health is one of the largest segments in the public health workforce, second only to public health nursing. Environmental health professionals have unique and specialized knowledge to diagnose, intervene, and prevent emerging threats. The primary focus of the workforce is to protect the health of communities through addressing environmental factors that affect health, including air quality, food safety, and vector control. The role of the workforce is of growing importance and this new article highlights the continued utility of environmental health professionals as we face emerging environmental health issues in a rapidly changing field.

The article presents six different challenges that environmental health professionals face, which are highlighted in the visual abstract. Thematic analysis of the survey results led to the identification of food safety, vectors and public health pests, healthy homes, wastewater management, drinking water quality, and emerging issues as six primary environmental health topic areas.

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STUDENTS Don't Miss This Opportunity!

Applications for the 2020 National Environmental Health Association/American Academy of Sanitarians (NEHA/AAS) Scholarship Program are now available.

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

VISIT

www.neha.org/scholarship

Application and qualification information are available online.

CONTACT

Jonna Ashley
with a request for information.

E-mail: jashley@neha.org

Phone: (303) 756-9090, ext. 336

Write: NEHA/AAS Scholarship
720 S. Colorado Blvd.,
Ste.1000-N
Denver, CO 80246-1926

Deadline: March 1, 2020

THANK YOU for Supporting the NEHA/AAS Scholarship Fund

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To donate, visit www.neha.org/about-neha/donate.

NEHA **NEWS**

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Having identified these key areas by environmental health professionals, the article additionally shares several problem statements identified through the focus group discussions for each of the challenge areas. These results can inform future priorities for the field.

Results from the key topics and problem statements can inform recommendations for environmental health practice. Three main topic areas are included in the recommendations, which include training, research, and partnerships. The training topic area focuses on professional credentials, academic preparation, and strategic national training. The research topic area recommends translational science partnerships, nontraditional partnerships, and joint leadership programs. Finally, the article recommends that partnerships highlight strategic research initiatives and integration with existing programs. From the Registered Environmental Health Specialist/Registered Sanitarian credentials to robust science-based education, cross-disciplinary public health leadership programs, and translational research teams, these recommendations can better prepare the environmental health workforce.

Through the UNCOVER EH research project (www.neha.org/uncover-eh), the needs and challenges of the environmental health workforce have been identified. This new groundbreaking study has never been done before and the results are essential to advance the needs of environmental health professionals.

NEHA Staff Profiles

As part of tradition, NEHA features new staff members in the *Journal* around the time of their 1-year anniversaries These profiles give you an opportunity to get to know the NEHA staff better and to learn more about the great programs and activities going on in your association. This month we are pleased to introduce you to two NEHA staff members. Contact information for all NEHA staff can be found on page 40.

Lindsi Darnell

I joined NEHA in March 2019 as the executive assistant to Dr. David Dyjack. In my role, I have a plethora of responsibilities that include scheduling, booking travel, external and internal communication, general coordination, and anything else that is asked of me. Recently, I've started to assist with accounts payable.

Born and raised in Houston, Texas, I grew up playing tennis. I carried that passion on with me through college, where I played tennis for the first year. I graduated with a bachelor's degree in elementary education, followed by a master of arts in teaching, from the University of Arkansas (Woo Pig!). After graduating, I packed up and moved to Dallas, Texas, where I taught elementary math for 4 years and met my husband. In summer 2016, his job brought us out to Colorado, where I taught for another year. After much thought, I decided to take my career in a different path and found myself at NEHA. I knew I loved helping others and wanted to be a part of an organization that makes a difference, which is one of the things I love about NEHA.

In my personal life, I live with my husband in a suburb south of Denver. We have two golden retrievers, Izzy and Teddy, who constantly keep us on our toes. I love to hike, run, walk my dogs, and play tennis. I also enjoy skiing in the winter (when it's not too cold).

Cole Wilson

I was born and raised in Littleton, Colorado, and plan to spend the rest of my life here. In my free time I enjoy rock climbing, video games, and crochet. I graduated from Colorado State University with a degree in sociology. After college I spent several years working in the medical and recreational cannabis industry managing dispensaries. It was a fun and exciting industry but not quite what I was looking for, which is why I joined NEHA in February 2019.

I have found an engaging and inspiring atmosphere of people at NEHA who are committed to environmental health. I am so excited to be a part of this team. In my role as training logistics and administrative coordinator, I get to travel all over the country to assist with Food and Drug Administration training programs. In these trainings, my team and I meet with local sanitarians and health inspectors and provide training to enable them to better keep the public safe and healthy. I have had the opportunity to meet many wonderful people and have gained a better understanding of food safety and its relationship to environmental health.

Did You Know?

You can stay in the loop every day with NEHA's social media presence. Find NEHA on

- Facebook: www.facebook.com/NEHA.org
- Twitter: https://twitter.com/nehaorg
- LinkedIn: www.linkedin.com/company/national-environmental-health-association

2020 Walter F. Snyder Award

Call for Nominations

Nomination deadline is April 30, 2020

Given in honor of NSF International's cofounder and first executive director, the Walter F. Snyder Award recognizes outstanding leadership in public health and environmental health protection. The annual award is presented jointly by NSF International and the National Environmental Health Association.

❖ ❖ ❖

Nominations for the 2020 Walter F. Snyder Award are being accepted for environmental health professionals achieving peer recognition for:

- outstanding accomplishments in environmental and public health protection,
- notable contributions to protection of environment and quality of life,
- demonstrated capacity to work with all interests in solving environmental health challenges,
- participation in development and use of voluntary consensus standards for public health and safety, and
- leadership in securing action on behalf of environmental and public health goals.

❖ ❖ ❖

Past recipients of the Walter F. Snyder Award include:

2019 – LCDR Katie Bante	2009 – Terrance B. Gratton	1998 – Chris J. Wiant	1988 – Mark D. Hollis	1979 – John G. Todd
2018 – Brian Zamora	2008 – CAPT Craig A. Shepherd	1997 – J. Roy Hickman	1987 – George A. Kupfer	1978 – Larry J. Gordon
2017 – CAPT Wendy Fanaselle	2007 – Wilfried Kreisel	1996 – Robert M. Brown	1986 – Albert H. Brunwasser	1977 – Charles C. Johnson, Jr.
2016 – Steve Tackitt	2006 – Arthur L. Banks	1995 – Leonard F. Rice	1985 –William G. Walter	1975 – Charles L. Senn
2015 – Ron Grimes	2005 – John B. Conway	1994 – Nelson E. Fabian	1984 – William Nix Anderson	1974 – James J. Jump
2014 – Priscilla Oliver	2004 – Peter D. Thornton	1993 – Amer El-Ahraf	1983 – John R. Bagby, Jr.	1973 – William A. Broadway
2013 – Vincent J. Radke	2002 – Gayle J. Smith	1992 – Robert Galvan	1982 – Emil T. Chanlett	1972 – Ralph C. Pickard
2012 – Harry E. Grenawitzke	2001 – Robert W. Powitz	1991 – Trenton G. Davis	1981 – Charles H. Gillham	1971 – Callis A. Atkins
2011 – Gary P. Noonan	2000 – Friedrich K. Kaeferstein	1990 – Harvey F. Collins	1980 – Ray B. Watts	
2010 – James Balsamo, Jr.	1999 – Khalil H. Mancy	1989 – Boyd T. Marsh		

The 2020 Walter F. Snyder Award will be presented during NEHA's 84th Annual Educational Conference & Exhibition to be held in New York City, New York, July 13–16, 2020.

For more information or to download nomination forms, please visit www.nsf.org or www.neha.org or contact Stan Hazan at NSF at (734) 769-5105 or hazan@nsf.org.

DAVIS CALVIN WAGNER SANITARIAN AWARD

The American Academy of Sanitarians (AAS) announces the annual Davis Calvin Wagner Sanitarian Award. The award will be presented by AAS during the National Environmental Health Association's (NEHA) 2020 Annual Educational Conference & Exhibition. 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, 2020.

Nomination packages should be e-mailed to Gary P. Noonan at gnoonan@charter.net.

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 sanitarians.org/awards.

2020

ACCEPTING NOMINATIONS NOW

Walter S. Mangold Award

The Walter S. Mangold Award recognizes an individual for extraordinary achievement in environmental health. Since 1956, this award acknowledges the brightest and best in the profession. NEHA is currently accepting nominations for this award by an affiliate in good standing or by any five NEHA members, regardless of their affiliation.

The Mangold is NEHA's most prestigious award and while it recognizes an individual, it also honors an entire profession for its skill, knowledge, and commitment to public health.

Nomination deadline is March 15, 2020.

For application instructions, visit www.neha.org/about-neha/awards/walter-s-mangold-award.

2020 Joe Beck Educational Contribution Award

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

Named in honor of the late Professor Joe Beck, this award provides a pathway for the sharing of creative methods and tools to educate one another and the public about environmental health principles and practices. Don't miss this opportunity to submit a nomination to highlight the great work of your colleagues!

Nomination deadline is March 15, 2020.

For application instructions, visit www.neha.org/about-neha/awards/joe-beck-educational-contribution-award.

DirecTalk
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I believe our past does not need to bury our future. We have tended to conquer a problem and then divest the solution to a new agency (e.g., water management districts, mosquito control districts, health department lead programs, etc.). Let us not employ the lather, rinse, repeat cycle of the past. I believe we need to think differently about the next steps, embrace new relationships that will stimulate our thinking, and reframe our position so it resonates with society. What do I mean?

There is no intrinsic value in the healing arts. Medicine? Zero. There is no intrinsic value in dentistry. There is no intrinsic value in the pharmaceutical sciences. Allied health professions? None. On the other hand, there is intrinsic value in public health. There is intrinsic value in environmental health. Why? Because at their roots, preventive professions are about what really matters. I believe we are about social justice—everyone's food should be safe to eat. We are about joy—everyone should enjoy recreational waters free from harmful chemicals or organisms. We are about peace—communities can live their lives knowing that we are at work to promote and protect their health, safety, and security. We are about love—everyone's child should attend a school free from recognized harm.

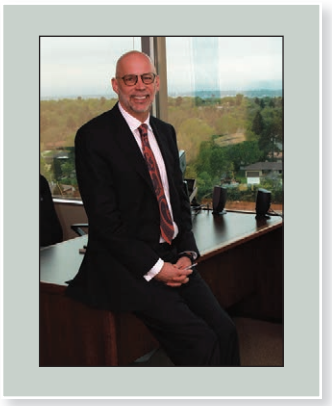
A window onto a sea of possibilities. Photo courtesy of David Dyjack.

We are a profession identified by values that most people aspire to. Our nation, when it reflects on the value of science, wants us at the table. Our communities, when they articulate what is important to them, want us at the table. Let's make it easier for them to support us. Let us commit to packaging and socializing our professional essence in a manner where the outcome is that our society advocates for us, as opposed to us lobbying for attention in endless budget and social media cycles.

If you have ideas about the content of this column, please share them. Together we might start a national conversation on the future of our collective environment and health. Otherwise, I'm just another feral mutt yapping at pedestrians with the endless racket echoing through opened windows.

Dave
ddyjack@neha.org
Twitter: @DTDyjack

DirecTalk MUSINGS FROM THE 10TH FLOOR



David Dyjack, DrPH, CIH

The Overton Window

A bark with no bite is simply noise. The Overton window is a theoretical construct that embodies the menu of governmental policies that the mainstream population finds acceptable or desirable. Throughout history, our politicians have instinctually recognized that the ideas most likely to get them elected reside within the window. Alternately, advocating for radical ideas outside the window leads to a stunted or marginal political trajectory. For example, Medicare for All, the Green New Deal, and free college tuition are arguably outside the national window in 2020. Amending the contents or scope of the window requires a mood shift in society at-large. In other words, when the public demands free college tuition, a political "leader" will identify the issue as their own and become an advocate. Excuse my snark but this tendency might be labelled as "leading from behind."

A subjective review of modern environmental health sentiment suggests that interests central to our profession might be edging toward the window, possibly offering us a once in a generation opportunity to advance values we and our communities hold dear. For example, 40% of Americans believe climate change is a crisis. Compared with five years ago, that percentage was less than 25%. In a 2018 survey, 60% of surveyed consumers reported that it is important that the food they consume is produced in a sustainable manner, an increase from 50% in 2017. Two out of three Americans believe their communities are vulnerable to a water crisis and most of the public believes that significant and immediate investments in water infrastructure are needed to avoid future water crises.

I believe our past does not need to bury our future.

I could cite additional data but I sense you don't need convincing. How do we, if even possible, get our arms around the increasing interest and enthusiasm for environmental health and harness the energy to advance the profession? After all, we are, in the big scheme, a relatively tiny member-centered organization. Can we afford to stitch prevailing societal attitudes and beliefs in children's health, retail food, recreational waters, decentralized wastewater, indoor air quality, and emergency preparedness and response, among others, into a grand challenge? Are we confident these collective issues are in the window? Or, do we continue to take on individual matters one bite at a time, akin to our success with embedding environmental health language into the 2019 Pandemic and All-Hazards Preparedness and Advancing Innovation Act reauthorization? This pithy conversation is worthy of a round of carbonated beverages.

In recent years our association has been reasonably effective in getting itself invited to tables where meaningful conversations centered on investments in the public health workforce and health systems are convened. Incremental progress achieved at these meetings is important. I sense, however, that we are potentially at a generational leapfrog moment where we can rebrand our profession as a solution to challenges most Americans agree upon. Here is the dreadful disclosure, I'm not sure what to do next.

There is a cacophony of letters to the editor, tweets, and Facebook and LinkedIn articles that in aggregate appear to be chasing the next great public health storyline. Per- and polyfluoroalkyl substances (PFAS), lead service line replacement, opioid addiction, and cannabis are some of those storylines that immediately come to mind. This morning I scanned CNN, Fox, and the Washington Post. All three had lead stories on some dimension of environmental and public health. What I find missing is the thread that weaves these independent stories together. I feel the urge to map out a course that threads all the random stories into a single, compelling, and memorable narrative. During my years as a university professor, I knew that when students solved complex problems on their own, they felt a sense of pride. The truth is that I created the conditions under which they could be successful. Likewise, how do we create the conditions under which the country recognizes and communicates its desire for comprehensive environmental health services in a meaningful and productive fashion, as opposed to a series of one-off outrages that dominate the news cycle? A lot of bark with no bite.

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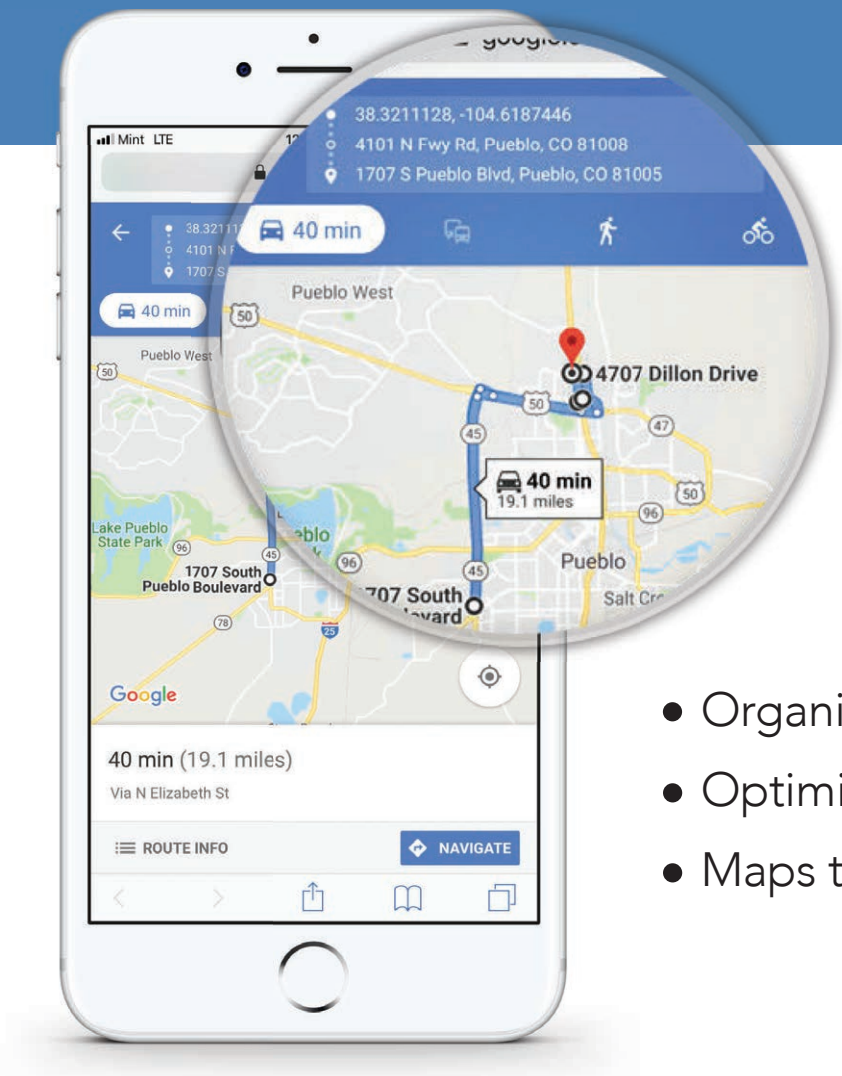

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