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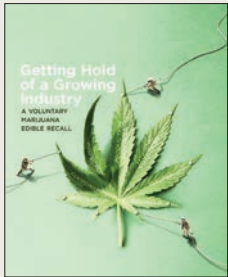
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Environmental Health

Dedicated to the advancement of the environmental health professional

Volume 80, No. 7 March 2018

ABOUT THE COVER



The legalization of cannabis for medical and recreational use in the U.S. has expanded over the past few years, with more states looking to implement legalization on some

level. Politics and personal opinions aside, the legalization of cannabis poses several environmental health issues, such as the food safety of cannabis-infused edible products. This month's cover feature, "Medical Marijuana Edible Voluntary Recall in Arizona," provides an example of how one health department is striving to regulate this growing industry to ensure the safety of consumers. This month's issue also includes a highlight of NEHA's activities to address the growing educational and training needs of environmental health professionals related to food safety and cannabis-infused products (see page 52).

See page 8.

Cover photos © Getty Images | Yuji Sakai; underworld111; skydie

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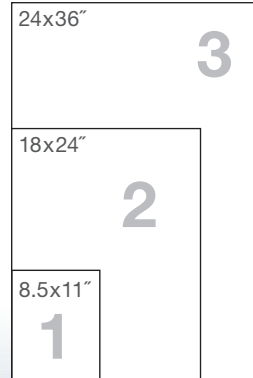


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Ozark River Portable Sinks® Kicks Off Their 2017/18 Hardship & Hope Program

Special Invitation to NEHA Members

Ozark River Portable Sinks kicked off their 2017/18 Hardship & Hope Program at the 2017 World Food Championships in November 2017 in Orange Beach, Alabama. Two recipients were selected and honored for their dedication to food safety and the focused attention to the importance of hand washing while serving or handling food.

Each recipient was awarded one of Ozark River's portable, hot water hand sinks during an award ceremony during the Championships.

Ozark River Portable Sinks will continue receiving nominations for the 2017/18 Hardship and Hope annual give-back to businesses and civic organizations. They are sending a special invitation to all NEHA Members to participate in the nominations.

"This give-back program was born out of our business culture", said Martin Watts, CEO of Ozark River Portable Sinks. "We believe clean hands lead to healthier people and businesses, and everyone deserves that."

Ozark River Portable Sinks® is excited to be awarding their compliance driven portable sinks to deserving businesses, non-profits and civic organizations.

Know a deserving business or organization? Click on Hardship & Hope Nominations at Ozarkriver.com to submit your nomination with a detailed story of why you think they deserve consideration.



Image provided by Courtland William Richards

WINNER! Braswell McMeans of Please Island Paradise receives his Hardship & Hope Award. Right to Left: Chef Chris Sherrill, Braswell McMeans, Martin Watts, CEO of Ozark River Portable Sinks.



Image provided by Courtland William Richards

WINNER! Chandra Wright of Nuisance Group receives her Hardship & Hope Award. Right to Left: Chef Chris Sherrill, Chandra Wright, Martin Watts, CEO of Ozark River Portable Sinks.



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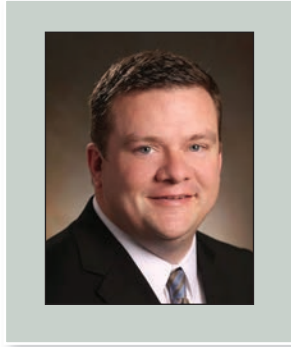
It's our personal responsibility to provide clean hands for people and businesses **because healthy people matter.**



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▶ PRESIDENT'S MESSAGE



Adam London,
MPA, RS, DAAS

Staying on the Right Side of History

I am surely not the only one who is tired of the political and social polarization that has swept over our nation. I believe that this “if you’re not with me, you must be against me” sort of binary thinking is unproductive and damaging to civil society. Far too many people have bought the narrative that people who think differently are dangerous and deserve to be insulted, humiliated, and attacked. This kind of thinking is tribal in nature and more concerned with political allegiance than with true problem solving. To be clear, this criticism applies to both liberals and conservatives, and it also applies to virtually all their preferred sources of news and information. The lack of willingness to afford thoughtful consideration to other points of view and data compromises our ability to move forward together.

Our communities, consisting of a great diversity of people, should trust that we are grounded in science and not the tools of political worldviews. As environmental health professionals, we need to carefully avoid the temptation to march in step with the war songs of the political tribes. This action is especially difficult because it seems there are any number of environmental health issues polarizing enough to send people into their tribal foxholes. We need to have the courage to wander the no-man’s land of scientific curiosity and intellectual honesty. Climate change is one of the most obvious of these challenging issues, but others such as recreational and edible cannabis are going to put our profession in uncomfortable situations if we do not proactively seek to understand the issues and options moving forward.

I find it helpful to reflect on the history of our profession to identify strategies and examples that could be helpful in the present.

I find it helpful to reflect on the history of our profession to identify strategies and examples that could be helpful in the present. As you may recall from your public health history 101 course, social reformer Edwin Chadwick published *The Sanitary Condition of the Labouring Population* in 1842. This landmark study profiled living conditions in socioeconomically stressed parts of London. His findings that this population was less healthy and lived in less sanitary environments influenced the formation of sanitation policy. His study also demonstrates that environmental health practitioners have been talking about social determinants of health long before other public health disciplines.

Chadwick’s strict adherence to the miasma theory of disease transmission, however, prevented him from fully understanding how

waterborne illnesses (e.g., cholera) were being spread. While Chadwick’s work did so much to advance public health, his rigid and incomplete understanding of disease causation made him vulnerable to errant ideas and policy. Twelve years later, Chadwick was a key member of London’s General Board of Health, which was struggling to address a cholera outbreak that was devastating the city. Chadwick’s belief system was challenged by an upstart physician who insisted that it was not noxious airborne gases but something causative in the drinking water—maybe invisible small animals—responsible for spreading this disease.

That physician was John Snow and he was suggesting a new theory of disease causation that would be confirmed over three decades later. Even though Snow’s ideas sounded ridiculous to the Victorian mind, he was eventually able to convince desperate parish authorities to remove the handle of the suspected well’s pump. The outbreak subsided shortly after as people obtained drinking water from other sources. It’s often said that modern epidemiology was born when Snow used tools of qualitative and quantitative analysis to identify the responsible exposure.

I believe that modern environmental health was born the moment the pump’s handle was removed. Chadwick is a giant of our profession’s history and he deserves to be applauded for his many contributions, but he was clearly on the wrong side of history regarding disease causation. His reluctance to consider new information prolonged human suffering during the London cholera outbreaks in the 1850s. We would all do well to remember this lesson.

My challenge to you this month is to set aside personal feelings, at least temporarily, and reexamine the evidence of a controversial environmental health issue. As laws regarding the medical and recreational use of cannabis evolve, our profession is being called upon to enter the conversation. In some instances, we are also being called upon for involvement from a regulatory perspective. While I do not believe that expanding the use of substances such as cannabis is a good idea, I am willing

to admit that I am not fully informed of the pros, cons, and possible environmental hazards presented by this issue.

I hope this issue of the *Journal* can help us on this journey of learning. The National Environmental Health Association is committed to providing you with the latest and best information about emerging issues in the pages of the *Journal*, at our conferences, and through all the resources offered to members. Please take advantage of these resources and

encourage your colleagues to do likewise. Let's agree, in the spirit of Chadwick and Snow, that we need to be continuous learners and followers of the science if we are going to stay on the right side of history. 🐼



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Did You Know?

NEHA has several blogs!

One of our blogs, The Day in the Life of an Environmental Health Professional, consists of stories about the work of environmental health professionals, and we are adding to this blog all the time. Please stop by to read our series of interviews with presenters from the 2018 AEC at www.neha.org/membership-communities/get-involved/day-in-life.

The other blog, The Voice of NEHA, consists of columns written by our president and executive director. You can read the columns online, leave your comments, and start a conversation. Check out these blogs at www.neha.org/membership-communities/get-involved/blog.

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 one 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.

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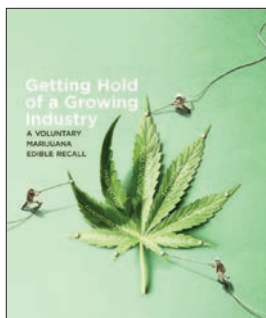
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▶ SPECIAL REPORT



Medical Marijuana Edible Voluntary Recall in Arizona

Marlene Gaither, MPA, ME, REHS
 Marie Peoples, PhD
 Randy Phillips
 Trish Lees
 Jennifer Corrigan, REHS
 Eric Bohn, REHS
*Coconino County Public Health
 Services District*

Abstract In January 2017, during a routine food service inspection at a local medical marijuana dispensary, Coconino County Public Health Services District (Health District) discovered that the dispensary was processing and bottling potentially hazardous food items, including marinara sauce, and selling the product as shelf stable. Prior to distribution, these jarred potentially hazardous foods did not go through any food processing review or testing for biological hazards. These food products posed a danger to consumers. Therefore, the Health District initiated a voluntary recall, which was the first time a medical marijuana-infused food product had been recalled in Arizona.

Introduction

After Arizona passed a medical marijuana initiative in 2008, the Arizona Department of Health Services (ADHS) adopted regulations in 2010 for medical marijuana dispensaries. Although the ADHS regulations did not address edibles, in 2011 the Coconino County Public Health Services District (Health District) recommended adoption of rules for medical marijuana edibles (medibles), which were incorporated into the Coconino County Food Code.

Currently, four of the seven medical marijuana dispensaries in Coconino County have kitchens for processing medibles. As the Health District began enforcing the 2011 rules, it became apparent that the processing of medical marijuana edibles is very different from processing food without marijuana.

The Health District applied for a grant with ADHS to conduct research on best practices for medibles.

A grant was awarded to the Health District in 2014 to conduct research on the processing of medibles. As a result of the grant, the Health District developed three guides on best practices. It is important to note that the guides are considered best practices, but are not mandatory. The three guides include:

- *Best Practices for Medical Marijuana Edible Processing*, which outlines production and process controls, hygienic practices, sanitary operations, food equipment, physical facilities, and plan review.
- *Best Practices for Medible Labeling & Packaging*, which includes best practices for display panels, product identity, active ingredient concentrations and list, food

allergens, nutrition labeling, solvent and other chemicals, medible packaging, and general health warnings.

- *Physician's Guide for Medical Marijuana*, which outlines the state law, qualifying conditions, frequently asked questions, and the application process.

When the Arizona 2010 laws were adopted for medical marijuana, medibles consisted primarily of baked goods and confectionaries. Since that time, dispensaries have become more creative with medible production and now produce a range of savory food items including salad dressings, oils, milk shakes, sodas, and (in the case that resulted in the voluntary recall) marinara sauce named "Marynara" sauce, ketchup, hot sauce, and honey mustard.

Inspection at Dispensary

During a routine inspection of the dispensary kitchen in January 2017 by two health inspectors, it was discovered that the dispensary had added four new food products without informing the Health District of the menu change. Originally the dispensary kitchen was approved to prepare confectionary items. The dispensary, however, had started processing the Marynara sauce, ketchup, hot sauce, and honey mustard.

The savory foods were being processed in the dispensary kitchen, with marijuana extractants added to them. The items were then bottled and stored as shelf-stable products. The health inspectors learned that the

FIGURE 1

Voluntary Recall Notice



2625 North King Street, Flagstaff, Arizona 86004
TEL 928.679.7272, FAX 928.679.7270

Marie Peoples, PhD, Chief Health Officer

Consumer Announcement:

Voluntary Recall of Edible Medical Marijuana Products

January 28, 2017

A nonprofit medical marijuana dispensary located in Coconino County, Arizona is voluntarily recalling several medical marijuana edible products because the products have not been tested for pathogens.

The recalled marijuana edible products include all products that have been processed and packaged in jars and containers for sale to the consumer sold under the product name "_____." Some of the products being recalled include marinara sauce, hot sauce, honey-mustard sauce, and ketchup which were processed and packaged for retail sale.

The Coconino County Public Health Services District is investigating the situation and working to notify dispensaries located throughout Arizona where the potentially contaminated products were distributed or sold. More information on where these products may have been distributed or sold are referenced at the dispensary website. Consumers who have purchased the product are advised to avoid consuming the product. People experiencing gastrointestinal illness after consuming these products should seek immediate medical attention.

For more information please contact the dispensary.



Photos of the recalled products. Photos courtesy of Jennifer Corrigan.

dispensary had not consulted with a food processing authority; had not developed a hazard analysis and critical control point (HACCP) plan; and had not had the foods tested for pH, water activity, or biological hazards. The health inspectors also learned that the savory products had been distributed to 33 other dispensaries in 22 different cities statewide.

Voluntary Recall

As the recall of edibles was a new frontier, the Health District was unsure if it had the authority to embargo the potentially hazardous foods. Traditional foods suspected to be hazardous would be embargoed per well-established federal, state, and local protocols. The procedures, however, around transporting and securing edibles infused with a Schedule

I drug, tetrahydrocannabinol (THC), brought about numerous unforeseen concerns.

Upon contacting ADHS for direction, it was discovered that procedures for notifying the public and the rules for embargoing edibles were unavailable. The Health District decided, due to the lack of guiding rules or procedures, not to embargo these marijuana-infused food products.

Therefore, the Health District researched the actions that could be taken to have the products removed from the dispensaries. Food Safety and Environmental Services at ADHS was contacted and indicated that it had no authority for marijuana-infused foods, or for recalling those types of food products. Next, the Food and Drug Administration (FDA) was contacted. FDA did agree that a voluntary recall was necessary for

the products in question, but indicated it could not assist with a recall involving food products containing marijuana. FDA did provide, however, a guideline for conducting a voluntary recall that the Health District followed (Food and Drug Administration, 2014).

It was determined by the Health District through consultation with ADHS that the only state program that could assist with the recall was the Special Licensing Department of ADHS, which currently administers the state medical marijuana program. The next action taken after identifying the appropriate state partner was to coordinate implementation of the recall. The voluntary recall involved the following steps:

- *Coordination with Special Licensing*—The first step of the recall process was to draft a

consumer service announcement for medical marijuana cardholders and dispensaries to instruct purchasers of these products what to do with the implicated food products. The announcement instructed purchasers not to consume the food products and to return the products to the dispensary where the product was purchased (Figure 1). Recall information was distributed to medical marijuana cardholders and dispensaries statewide.

- **Coordination with Dispensary Owner**—The dispensary owner was contacted and requested to voluntarily recall all bottled savory food products. The owner agreed, and the Health District requested a complete list of all savory foods that were distributed, a list of places that received these foods, and a list of foods that each dispensary received. The dispensary also posted the consumer announcement on its website to make sure consumers were notified of the recall.
- **Product Destruction List**—After all products had been recalled, the dispensary provided a detailed list of all dispensaries that received the recalled product, the product name, and the number of each product. The dispen-

sary also provided detailed information and pictures on how the product was destroyed. This list was compared with the initial list of savory foods distributed to ensure all products were accounted for.

The final tally of products recalled consisted of 134 jars of Marynara sauce, 138 jars of hot sauce, 100 jars of honey mustard, and 70 bottles of ketchup (see photos of recalled products on page 9). The dispensary that manufactured the products reimbursed medical marijuana cardholders who had purchased recalled products.

Conclusions

As this recall was the first of edible products in Arizona, the recall process was unclear and untested. These foods fall into a gray area and this type of scenario had not previously occurred in Arizona; therefore a formal process had not been developed to address marijuana-infused foods. Although the dispensary owner was cooperative with the recall, the owner did not have a comprehensive food recall plan in place. The dispensary has since incorporated the voluntary recall guidelines that FDA provided.

The voluntary recall process was successful, as no illnesses associated with these products have been reported to date. All recalled products were returned and destroyed within one month. Had the dispensary owner not been cooperative, it is unknown how returned edibles, reimbursement of the product, and other voluntary recall components would have been handled. This situation has provided a valuable opportunity for the Health District and other agencies to develop a response should a similar situation occur in the future. 🐾

Corresponding Author: Marlene Gaither, Environmental Health Program Manager, Coconino County Public Health Services District, 2625 North King Street, Flagstaff, AZ 86004. E-mail: mgaither@coconino.az.gov.

Reference

Food and Drug Administration. (2014). *Guidance for industry: Product recalls, including removals and corrections*. Retrieved from <https://www.fda.gov/Safety/Recalls/IndustryGuidance/ucm129259.htm>

Did You Know?

NEHA has hosted several webinars focused on edible cannabis products—one that provides an overview of edibles and the other that focuses on the regulation of edibles. You can view these webinars at www.neha.org/eh-topics/food-safety-0/edible-cannabis-products.



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Details:

- Application period is March 1-30, 2018
- Must be an active environmental health professional—sorry, no students
- Accela will announce the winners in May 2018

Questions? Contact us at marketing@accela.com

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An Estimate of the Economic Burden of Norovirus Disease Among School-Age Children in the United States (2009–2013)

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Abstract The health burden and resultant economic burden of foodborne norovirus disease among school-age children in the U.S. is unknown, but believed to be significant. The economic burden encompasses not only direct medical costs associated with medical care but also indirect costs such as loss of work days and direct nonmedical costs. National passive surveillance data from norovirus outbreaks spanning 2009–2013 were used to identify cases, health outcomes, interventions, and healthcare resource utilization among the school-age population. The cost of supportive care was \$2,483,379, outpatient healthcare was \$57,672, hospitalization was \$48,670, and emergency care was \$38,336. The cost of providing supportive care (direct nonmedical costs) was relatively low. When indirect costs were factored in, however, the total cost of care escalated, which illustrates the high burden of loss of productivity. It is important to incorporate the indirect and direct nonmedical costs of disease to more accurately characterize the total economic burden of a disease.

Introduction

Economic Burden of Norovirus Disease

Characterization of the impact of norovirus disease among the school-age population should involve estimating its health burden, as well as its economic burden. Estimates of health burden in terms of mortality and morbidity provide important insight into disease risk and severity. The economic burden, on the other hand, provides insight into the healthcare resource utilization associated with the disease. Researchers conducting an economic burden study of a disease should also examine all potential costs.

Many studies report only direct medical costs (i.e., outpatient, inpatient, medications,

diagnostic tests, etc.) while ignoring the direct nonmedical costs (i.e., transportation, over-the-counter medications) and indirect costs (i.e., lost productivity incurred by the caregivers) borne by the patient, caregivers, healthcare system, employers, and society at large. Economic burden estimation that factors in these costs and provides a more accurate assessment of the true burden of a disease can then help to identify and prioritize influential cost drivers, as well as offer greater insight into future cost trends.

Research evidence suggests that norovirus and 13 other foodborne pathogens account for 95% of all confirmed foodborne illnesses and associated hospitalizations. These 14 foodborne pathogens account for 98% of foodborne deaths in the U.S. (Batz,

Hoffmann, & Morris, 2012). Given its high incidence and severity of symptoms such as vomiting and diarrhea, the health burden and resultant economic burden of norovirus disease were reported to be significant by previous studies (Debbink, Lindsmith, Donaldson, & Baric, 2012; Scallan et al., 2011). Norovirus-associated hospitalizations alone were estimated to cost \$500 million per year in the U.S. (Batz, Hoffmann, & Morris, 2011). When the cost for lost average daily wages, that is, “lost labor market productivity,” were added to healthcare costs, the cost of norovirus gastroenteritis was estimated to be \$2 billion (Batz et al., 2011).

In a simulation model, researchers examined the annual disease and economic burdens of norovirus in the absence of a vaccine. They estimated that 16.7 million norovirus cases result in 1.8 million outpatient visits, 69,000 hospitalizations, and 800 deaths in a year, at an annual cost of \$5.5 billion in direct medical costs (Bartsch, Lopman, Hall, Parashar, & Lee, 2012). In a study conducted by Hall and coauthors (2013), incidence data from previous studies spanning 1979–2009 were analyzed in order to derive greater accuracy for estimates of acute gastroenteritis associated with norovirus. They estimated that there are 19–21 million cases of norovirus, 1.7–1.9 million outpatient visits, 400,000 emergency room visits, and 570–800 deaths, resulting in an annual healthcare cost of approximately \$777 million (Hall et al., 2013).

Gastañaduy and coauthors (2013) used rates of emergency room and outpatient visits for gastroenteritis from July 2001–June 2009 to estimate the economic burden of norovirus in ambulatory settings. They extrapolated MarketScan rates to the U.S. population-

TABLE 1

Health and Economic Burdens of Norovirus Disease Estimates

Year	Estimation Method	Cases	Outpatient Healthcare	Emergency Care	Hospital Admissions/ Discharges	Death	Total Cost	Source
1979–2009	Attributable proportion (all age groups, U.S.)	19–21 million	1.7–1.9 million visits	400,000 visits		570–800	\$777 million	Hall et al., 2013
1997–2007	Estimated hospital discharges (children 5–17 years, U.S.)				5,854 discharges per 100,000 admissions		\$27 million	Lopman, Hall, Curns, & Parashar, 2011
2001–2009	Estimated annual mean rates (children 5–17 years, U.S.)		453,000 visits	54,000 visits			\$34 million \$18 million	Gastañaduy, Hall, Curns, Parashar, & Lopman, 2013
2009–2010	Population-based rates (children <5 years, U.S.)		627,000 visits \$95 million	281,000 visits \$122 million	14,000 admissions \$55 million		\$273 million	Payne et al., 2013
2011	Incidence estimates (all age groups, U.S.)				\$500 million		\$2 billion (\$1.5 billion indirect costs)	Batz, Hoffmann, & Morris, 2011
2012	Incidence estimates (all age groups, U.S.)	16.7 million	1.8 million visits		69,000 admissions	800	\$5.5 billion	Bartsch, Lopman, Hall, Parashar, & Lee, 2012

Note. Costs expressed as 2013 U.S. dollars.

based claims, encounters, and the healthcare charges. The total healthcare charges for emergency room visits for children 5–17 years, based on an extrapolated annual estimate of 54,000 visits, was \$18 million. The total healthcare charges for outpatient visits for children 5–17 years, based on an extrapolated annual estimate of 453,000 visits, was approximately \$34 million (Gastañaduy, Hall, Curns, Parashar, & Lopman, 2013).

In another study examining the incidence of norovirus among children under 5 years during the years 2009–2010, researchers estimated that each year, norovirus resulted in 14,000 hospitalizations (\$3,918 per hospitalization), 281,000 emergency care visits (\$435 per visit), and 627,000 outpatient healthcare visits (\$151 per visit) (Payne et al., 2013). The estimated cost of treatment was \$273 million each year for children under 5 years of age. Lopman and coauthors (2011) analyzed and modeled the annual hospital discharges and estimated that there were 5,584 per 100,000 associated with norovirus discharges among children 5–17 years at a cost of \$27 million (Lopman, Hall, Curns, & Parashar, 2011).

Batz and coauthors (2011) designed a study in order to derive more accurate attribution estimates and examined yearly variability of economic burden using outbreak data from 1999–2008. They found that on an annual basis, the mean number of norovirus illnesses for all ages was estimated to be 5,461,731 (range of 3,227,078–8,309,480), a mean of 14,663 hospitalizations (range of 8,097–23,323), and a mean of 149 deaths (range of 84–237) for norovirus disease (Batz et al., 2012). All of the previous published norovirus cost estimates were based on documented cases requiring medical treatment in healthcare settings.

To date, there is no estimate of the economic burden associated with norovirus disease in the school environment in the U.S. The school environment represents a closed setting and an optimal environment to facilitate the spread of norovirus disease to the community and beyond. The purpose of this study was to estimate the direct medical, nonmedical, and indirect costs of norovirus disease among school-age children enrolled in the U.S. (The World Bank, 2013). Previous

studies have not captured and categorized costs in this way.

Norovirus outbreaks that occur in healthcare settings can be contained more rapidly and its spread limited, while it is difficult to contain those outbreaks that occur in closed settings where individuals re-enter the community and perpetuate the spread of disease to susceptible individuals. A norovirus outbreak in a school setting can impact 50% or more of the total school population, which does not include transmission outside this closed environment (i.e., to family members) (Gomez, 2008).

One recent study compared the cost of norovirus outbreaks in closed environments with those that occur in the community and found that outbreaks in closed settings are more costly than those that occur in the community (Navas et al., 2015). This study estimated that the direct medical (i.e., hospitalization), direct nonmedical (i.e., travel for medical treatment), and indirect costs (i.e., work, school absenteeism) in a closed environment were \$5,454.67 per outbreak, while the costs of a community outbreak were \$3,829.60 per outbreak (Navas et al., 2015).

TABLE 2

Direct Medical Cost Estimates

Healthcare Intervention	Unit Cost Mean (Range)	Source
Outpatient healthcare (per visit): Children 5–16 years	\$175 (\$160–\$190)	Blue Cross and Blue Shield Association, 2009; Payne et al., 2013
Emergency care (per visit): Children 5–16 years	\$572 (\$510–\$635)	Blue Cross and Blue Shield Association, 2009; Gastañaduy, Hall, Curns, Parashar, & Lopman, 2013; Payne et al., 2013
Emergency care (per visit): Children 5–17 years	\$333 (\$240–\$580)	
Hospitalization (per 2 days)	\$3,464 (\$2,877–\$4,062)	U.S. Department of Health and Human Services, 2012a, 2012b

Note. Costs expressed as 2013 U.S. dollars.

Several studies have attempted to estimate the health and economic burdens of norovirus disease using various methodological approaches. The health outcomes—defined as the number of cases, outpatient visits, emergency room visits, plus hospitalizations and associated medical costs—vary widely, but are costly regardless of the methodology used to calculate total costs (Table 1).

Methods

Data Sources and Analyses

Passive surveillance data on norovirus disease outbreaks from 2009–2013 among school children in the U.S. obtained from the Centers for Disease Control and Prevention's (CDC) National Outbreak Reporting System (NORS) were used to calculate the incidence (CDC, 2013). Norovirus health outcomes based on the laboratory confirmed and suspected norovirus cases were defined by severity of healthcare intervention (i.e., outpatient healthcare, emergency care, hospitalization, or death).

Healthcare resource utilization data obtained from the Healthcare Cost and Utilization Project (U.S. Department of Health and Human Services [HHS], 2012a, 2012b) were used to estimate medical costs. Unit costs for healthcare resource utilization were obtained using selected ICD-9 codes. The ICD-9 codes included 008.63, 008.8, 009.0, 009.1, 009.2, and 009.3, and were based on the definition for infectious gastroenteritis (Health Fusion, Inc., 2017). Direct

medical costs included expenses associated with outpatient healthcare, emergency care, and hospitalization inclusive of other related expenses such as physician fees, laboratory tests, diagnostic tests, and medications. For this study, direct nonmedical costs included oral rehydration therapy, prescriptions, and over-the-counter medications. In addition, direct nonmedical costs included those costs associated with transportation and included travel costs to and from medical facilities (e.g., outpatient healthcare, emergency care, or hospitalization), whereas indirect costs were those costs associated with lost productivity or lost work time for caregivers as a result of caring for the child suffering with norovirus illness (Gold, Siegel, Russell, & Weinstein, 1996).

Direct Medical Costs

The direct medical costs for outpatient care were estimated by calculating healthcare resource utilization based on unit cost per visit. The direct medical costs for emergency care were estimated by calculating healthcare resource utilizations based on unit cost per visit, diagnostic tests, and medications (Blue Cross and Blue Shield Association, 2009; Gastañaduy et al., 2013; Payne et al., 2013). The direct medical costs for hospitalizations were estimated by calculating healthcare resource utilizations based on unit cost per stay, diagnostic tests, and medications based on a typical duration of stay of 2 days (HHS, 2012a, 2012b).

Direct Nonmedical Costs

The direct nonmedical costs were estimated by calculating the average expenses of travel and transportation to medical facilities in order to facilitate the recovery of the child. These costs include fuel consumed and amount of time it takes to travel to the destination. The average time it takes to commute to work is assumed to be 25 minutes (McKenzie, 2013, 2014). The transportation calculation includes the cost of fuel by the amount consumed, and the hourly wage of the caregiver by the number of hours the caregiver spends in transit to and from treatment facilities (American Automobile Association, 2017; Bouzón-Alejandro et al., 2011; U.S. Department of Energy, 2016). Other costs such as meals away from home, oral rehydration therapy, and over-the-counter medications were also included (Bartsch et al., 2012; Bouzón-Alejandro et al., 2011).

Indirect Costs

The results from published research studies indicate that, on average, a caregiver (time and cost of a caregiver taking off from work and away from routine activities) takes about 2–3 days to care for a sick child (National Institutes of Health, 2017). It is assumed that the time a caregiver takes to transport a sick child to medical facilities would otherwise be time spent in traveling to work. It is also assumed that the time a caregiver spent at the medical facility would be time otherwise spent at work. The indirect costs were estimated by calculating the average gross

TABLE 3

Direct Nonmedical Cost Estimates

Cost Category	# (Mean)	Unit Cost Mean (Range)	Source
Outpatient healthcare, emergency care transportation, or travel costs (e.g., fuel, parking, mileage, maintenance, etc.)	1 day 25 miles/trip	\$42 (\$21–\$61)	American Automobile Association, 2017; Bouzón-Alejandro et al., 2011; McKenzie, 2013, 2014; U.S. Department of Energy, 2016
Hospitalization transportation or travel costs (e.g., fuel, parking, mileage, maintenance, etc.)	2 days 25 miles/trip	\$84 (\$43–\$125)	Bouzón-Alejandro et al., 2011
Caregiver expenses (following hospitalization)	2 days	\$40 (\$20–\$60)	Bouzón-Alejandro et al., 2011
Meals (during hospitalization)	2 days 8.0 (8.2–7.8)	\$71 (\$66–\$76)	Bouzón-Alejandro et al., 2011
Oral rehydration therapy	2 days	\$15 (\$14–\$17)	Bouzón-Alejandro et al., 2011
Over-the-counter medications	\$3	(\$2–\$4)	Bartsch, Lopman, Hall, Parashar, & Lee, 2012
<i>Note.</i> Costs expressed as 2013 U.S. dollars.			

weekly wages by the number of lost work days or hours due to outpatient visits, emergency care, or hospitalizations for a sick child (Constenla et al., 2008; U.S. Bureau of Labor Statistics, 2013).

In order to estimate the economic burden of norovirus disease, we first calculated the illnesses and incidence proportion by health intervention among the school-age population. We then calculated costs for each type of health intervention and categorized costs as direct medical, direct nonmedical, or indirect costs. Finally, we calculated the total costs, which were derived by multiplying the number of cases by the unit cost for each type of health intervention.

Results

Direct Medical, Direct Nonmedical, and Indirect Costs

Based on the estimation of direct medical costs for outpatient care, emergency care, and hospitalizations, total direct medical costs for an episode of norovirus infection are largely due to hospitalizations, followed by emergency care, outpatient care, and finally supportive care (Table 2).

Direct nonmedical cost estimates for travel and transportation to medical facilities, as well as meals away from home, oral rehydra-

tion therapy, and over-the-counter medications were negligible, but when factored in with indirect costs, the economic burden for all outcomes were much higher (Table 3).

Indirect cost estimates for lost productivity for a caregiver varied depending on the health intervention. The cost for supportive care is relatively inexpensive when considering treating the symptoms of the infection with oral rehydration fluid and over-the-counter medications. When lost productivity is factored into the total cost, however, indirect costs accounted for a sizable proportion of the expenditures and were second to and slightly less than direct medical costs (Table 4).

Based on the NORS surveillance data number of cases for each health intervention, the estimated cost of supportive care was \$2,483,379 (94.5%), outpatient healthcare was \$57,699 (2.2%), hospitalization was \$48,674 (1.9%), and emergency care was \$38,348 (1.5%) (Table 5).

Discussion

The present study examined the economic burden of norovirus disease among school-age children from 2009–2013, estimating direct medical, direct nonmedical, and indirect costs. The results align with findings from previous studies regarding costs for supportive care, outpatient healthcare, emergency care, and hospitalization.

Previous studies have illustrated that norovirus disease results in significant health expenditures in terms of direct medical, direct nonmedical, and indirect costs associated with the disease. The economic burden for norovirus is considerable, with costs for supportive care at \$255.4 million, healthcare provider visits at \$283.7 million, and hospitalization at \$285.9 million (Batz et al., 2012; CDC, 2013; Debbink et al., 2012; Mast, DeMuro-Mercon, Kelly, Floyd, & Walter, 2009). Among the health interventions for norovirus illness, supportive care represented the lowest cost of all health outcomes, while outpatient healthcare, emergency care, and hospitalization resulted in progressively higher costs for medical treatment, respectively.

Direct Medical, Direct Nonmedical, and Indirect Costs

A majority of the norovirus cases among the school-age population required supportive care, followed by outpatient healthcare, emergency care, and hospitalization. The cost for supportive care is relatively inexpensive when considering treating the symptoms of the infection with oral rehydration fluid and over-the-counter medications. The total direct medical costs for an episode of norovirus infection are largely due to hospitalizations, followed by emergency care, outpatient healthcare, and finally supportive care. When

TABLE 4

Indirect Cost Estimates

Cost Category	Quantity	Average Weekly Earnings	Unit Cost Mean	Cost/Episode	Source
Supportive care, outpatient healthcare, and emergency care: Caregiver lost productivity	2 days (= 16 hr)	\$691 (women) \$768 (men)	\$17/hr \$19/hr	\$276 \$308 (mean = \$292)	Constenla et al., 2008; Lorgelly et al., 2008; Mast, DeMuro-Mercon, Kelly, Floyd, & Walter, 2009; U.S. Bureau of Labor Statistics, 2013
Hospitalization: Caregiver lost productivity during hospitalization	2 days (= 16 hr)	\$691 (women) \$768 (men)	\$17/hr \$19/hr	\$276 \$308	Constenla et al., 2008; Lorgelly et al., 2008; Mast et al., 2009; U.S. Bureau of Labor Statistics, 2013
Caregiver lost productivity following hospitalization	2 days (= 16 hr)	\$691 (women) \$768 (men)	\$17/hr \$19/hr	\$276 \$308 (mean = \$292)	

Note. Costs expressed as 2013 U.S. dollars.

direct nonmedical and indirect costs were factored in, however, the economic burden for all health outcomes was much higher. As other study findings indicate, indirect costs typically account for a sizable proportion of all costs: mainly due to caregiver loss of productivity while caring for a child afflicted with norovirus infection.

In the present study, indirect costs accounted for a sizable proportion of the expenditures for all categories of costs and were only second to and slightly less than direct medical costs (Belliot, Lopman, Ambert-Balay & Pothier, 2014; Navas et al., 2015; Payne et al., 2013). Lower norovirus health outcome estimates were obtained in the present study compared with previous cited research findings related to norovirus disease in children 5–17 years of age. One reason for the difference is that previous studies obtained estimates from confirmed norovirus hospitalizations, emergency care, and outpatient healthcare in all types of settings, whereas the present study obtained estimates from surveillance data.

The NORS passive surveillance system contains data on outbreaks among school-age children and data are often incomplete; the NORS data spanning 2009–2013 were obtained from outbreaks that occurred in 34 states rather than all 50 states. Furthermore, states differ in reporting procedures, and it has been established that there is an underreporting factor of 1.7 in the early phase of norovirus outbreaks (Bernard, Werber, & Höhle, 2014).

TABLE 5

Cost of Norovirus Infection by Health Outcomes (2009–2013)

Healthcare Intervention	Cost Items	Cost/Case Mean	Total Cases (n = 4,114)	Total Cost for Health Outcome
Supportive care	Oral rehydration therapy, over-the-counter medications, lost productivity	\$621	3,999	\$2,483,379
Outpatient healthcare	Visit, transportation, fuel, lost productivity	\$801	72	\$57,672
Emergency care	Visit, transportation, fuel, lost productivity	\$1,198	32	\$38,336
Hospitalization	Caregiver, transportation, fuel, meals, lost productivity	\$4,867	10	\$48,670
Total				\$2,628,057

Note. Costs expressed as 2013 U.S. dollars.

Strengths and Limitations

This study is the first attempt to estimate the total economic burden of norovirus disease using surveillance data, which was derived from norovirus outbreaks among the school-age population—that is, data not derived solely from a healthcare source. As previous studies have indicated, only a small proportion of those individuals ill with norovirus seek the care of a healthcare provider or undergo laboratory testing to confirm norovirus. Thus, the majority of the supportive care cases go undetected and unreported (Bernard, et al.,

2014). Although use of surveillance data has limitations, which underestimates the burden of disease and consequently may not be generalizable to the school-age population at large, the results provide insights into the large proportion of cases and high expenses for cases that require supportive care.

Moreover, there are limitations to using cost data from various study findings identified in a literature review to estimate the economic burden of norovirus because there are methodological differences across studies. The present study did not measure all pos-

sible costs associated with norovirus disease. Other costs associated with norovirus include costs of staff and student absenteeism, school closures, environmental decontamination, and sanitation.

The results of a simulation study on the cost of a norovirus case in a healthcare facility were estimated to be \$6,237 plus or minus \$3,211 (Virox Technologies, Inc., 2011). Clorox bleach estimated that student absenteeism costs on average \$125 per student per episode of norovirus infection (Clorox, 2017). Intangible costs such as pain and suffering were not included in the study.

Conclusion

The present study illustrates that the economic burden of norovirus disease is substantial and encompasses more than the cost to treat the disease. Both direct medical and direct nonmedical costs are high; indirect

costs, however, are comparatively higher, especially when considering lost productivity for a caregiver. Indirect costs, which were almost as much as direct medical costs, therefore contribute a considerable and sizable portion of all costs for an episode of disease. The inclusion of other costs, such as those involved in caring for a child, are also important to accurately estimate the total cost of the disease. In addition, in terms of costs, it is clear that more than 50% of the economic burden comes from the direct nonmedical and indirect costs. These findings suggest that the economic burden costs found in the literature, based only on direct medical costs, are underestimated by 50%.

Vaccination could reduce the incidence of norovirus infection and consequently reduce and lessen the economic burden of disease, as witnessed by the introduction of rotavirus vaccination among chil-

dren (Laidman, 2014). Future research efforts on the economic impact of norovirus should incorporate costs of school closures in terms of student and staff absenteeism. In addition, costs should also include the cost of environmental decontamination and sanitation. Norovirus remains a nonreportable disease except for those in the military service (Armed Forces Health Surveillance Branch, 2009). Designating norovirus a reportable disease should be considered by policy makers. 🐼

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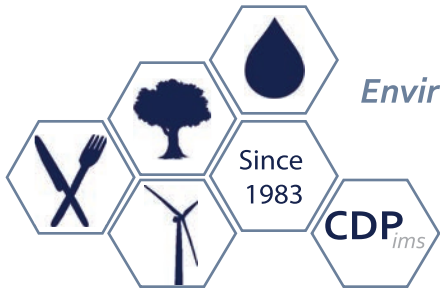
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Did You Know?

NEHA has recently launched a new credential! The Certified Foodborne Outbreak Investigator (CFOI) credential is for individuals who utilize environmental health principles and food safety knowledge in collaboration with outbreak response partners to assess foodborne illness risks. The CFOI will prepare individuals to also perform environmental assessments, identify contributing factors and antecedents, and implement control measures to prevent the spread of foodborne illness and protect the public. Learn more at www.neha.org/credentials.



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Effective Recruitment Strategies for Lead Hazard Control and Healthy Homes Programs

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Abstract Recruitment of participants into any community-based project can be a significant challenge, particularly for Lead Hazard Control and Healthy Homes grantees funded by the U.S. Department of Housing and Urban Development. One of these grantees, the 2013–2016 Henderson Lead Hazard Control and Healthy Homes Program, implemented six recruitment strategies: 1) person-to-person referrals, 2) direct mail, 3) door-to-door neighborhood canvassing, 4) child-oriented community event outreach, 5) passive program information, and 6) general event outreach. Program staff reached more than 10,000 individuals via these methods, and 136 participants ultimately were enrolled. The success of each method was determined by its percentage yield of enrolled participants. Community event outreach resulted in the greatest number of contacts, while person-to-person referrals and direct mailings yielded the most enrolled participants with minimal staff time required. Landlords were essential to the enrollment of rental units. These results might help provide insight to some of the most effective strategies for recruitment into Lead Hazard Control and Healthy Homes programs.

Introduction

The success of a community-based research study or program often depends on its ability to engage the community and meet participant enrollment objectives. Recruitment strategies vary depending on the specific population or goals of a project, but similarities have been observed among health-related projects seeking to engage, describe, and/or assist target populations. UyBico and coauthors (2007) conducted a systematic review of 56 studies evaluating recruitment interventions specific to certain populations, such as minority and low socioeconomic status communities. Pas-

kett and coauthors (2008) similarly reviewed recruitment methods utilized by 21 health-focused studies involving minority and underserved populations. Both research teams reported the frequent use of outreach strategies focused on community healthcare providers, organizations, churches, events, referrals, and door-to-door canvassing (Paskett et al., 2008; UyBico, Pavel, & Gross, 2007). Both reviews also included multiple examples of recruitment strategies using mail and the media to distribute program information. Many of these methods can also be utilized in community-based participatory research,

which involves community partners in planning every stage of the recruitment process (Horowitz, Brenner, Lachapelle, Amara, & Arniella, 2009).

Background

Understanding successful recruitment strategies is particularly relevant for grant-funded projects with specific participant eligibility requirements, including grants funded by the U.S. Department of Housing and Urban Development (HUD). Since 1999, HUD has funded research and demonstration efforts aimed at addressing lead-based paint, asthma triggers, and other in-home health hazards through its Office of Lead Hazard Control and Healthy Homes (OLHCHH) (Ashley, 2015). Published literature regarding recruitment methods for OLHCHH grantees is limited. Published methodologies of select OLHCHH-funded grants provide brief insights into their approaches to community-based outreach and recruitment; there are multiple common strategies (Table 1). Prominent recruitment strategies include communication with community partners and leaders, outreach at community events and faith-based organizations, clinic or healthcare provider referrals, elevated blood lead level testing referrals, local government office collaboration/referrals, and passive program information dispersal (Brand, Caine, Rhodes, & Ravenscroft, 2016; Dixon et al., 2009; Galke et al., 2005; Polivka, Chaudry, Crawford, Bouton, & Sweet, 2011; Turcotte, Alker, Chaves, Gore, & Woskie, 2014). While these grantees each had different specific objectives and populations, they share the goal

TABLE 1

Methods of Recruitment and Community Outreach Employed by Published U.S. Department of Housing and Urban Development Office of Lead Hazard Control and Healthy Homes (OLHCHH) Grantees

OLHCHH Grantee	Recruitment Strategies
Marion County Public Health Department, Indianapolis, Indiana • Healthy Homes Demonstration Grant (Brand, Caine, Rhodes, & Ravenscroft, 2016)	<ul style="list-style-type: none"> • Communication with community partners and leaders • Outreach at community events • Outreach at faith-based organizations • Target populations based on income
City of Phoenix, Arizona • Healthy Homes Demonstration Grant (Dixon et al., 2009)	<ul style="list-style-type: none"> • Arizona Head Start • Clinic or healthcare provider referrals • Local government office collaboration/referrals • Elevated blood lead level testing referrals
14 state/local agencies throughout the U.S. • Lead Hazard Control Grant (Galke et al., 2005)	<ul style="list-style-type: none"> • Clinic or healthcare provider referrals • Communication with community partners and leaders • Door-to-door canvassing • Target populations based on income
Columbus Public Health, Columbus, Ohio • Healthy Homes Demonstration Grant (Polivka, Chaudry, Crawford, Bouton, & Sweet, 2011)	<ul style="list-style-type: none"> • Clinic or healthcare provider referrals • Elevated blood lead level testing referrals • Local government office collaboration/referrals • Passive program information dispersal (e.g., phone number) • Outreach at faith-based organizations • Target populations based on income
Lowell Healthy Homes Program, University of Massachusetts, Lowell, Massachusetts • Healthy Homes Demonstration Grant (Turcotte, Alker, Chaves, Gore, & Woskie, 2014)	<ul style="list-style-type: none"> • Clinic or healthcare provider referrals • Communication with community partners and leaders • Door-to-door canvassing • Media publication(s) • Outreach at community events • Passive program information dispersal (e.g., flyers)

of improving the health of residents in low-income housing.

In 2013, the City of Henderson, Nevada, was awarded a Lead Hazard Control and Healthy Homes grant (NVLHB0558-13) with the University of Nevada, Las Vegas, as a subgrantee. The resulting Henderson Lead Hazard Control and Healthy Homes Program (HLHCHHP) was restricted to participants living within the City of Henderson in housing constructed before 1978, the year the Consumer Product Safety Commission ban on the use of lead-based paint in residential structures took effect (Consumer Product Safety Commission, 1977). Additionally, homes had to include at least one bedroom, be a permanent structure, and be located within Henderson city limits. For owner-occupied properties, the program required either a) the presence of a child who lives in or frequently visits the home or b) the presence of a pregnant woman in the

home. Following a November 2014 change in HUD policy for these grants, rental units did not have to meet these requirements regarding children and/or pregnant women (U.S. Department of Housing and Urban Development, 2014). Finally, residents of the home were required to meet HUD income guidelines requiring the total household income (aged 18 or older) to fall below 80% of annual median income for Clark County, adjusted to household size.

In 2010, the City of Henderson had approximately 260,000 residents, 23.1% of which were racial and ethnic minorities, and an annual median income of \$63,830 in 2014 U.S. dollars (U.S. Census Bureau, 2014). Target census tracts were selected using the City of Henderson Consolidated Plan (City of Henderson Neighborhood Services, 2010) for their low-income and very low-income residents, as well as their high percentage of older housing stock (Figure 1).

A unique characteristic of southern Nevada is its historically limited blood lead testing (Burns, 2010). To address low blood lead level testing rates in 2006, the Southern Nevada Health District implemented the Southern Nevada Childhood Lead Poisoning Prevention Program with grant funding from the Centers for Disease Control and Prevention (Southern Nevada Health District, 2006). Though blood lead testing rates increased substantially during this program, lead screening remains relatively low in southern Nevada (Breunig & Gerstenberger, 2013). In the absence of referrals to the program from blood lead testing, the HLHCHHP was forced to focus on other recruitment and outreach strategies in Henderson.

Methods

Recruitment Strategies

HLHCHHP recruitment strategies included 1) person-to-person referrals, 2) direct mail, 3) door-to-door neighborhood canvassing, 4) outreach at child-oriented community events, 5) passive program information, and 6) outreach at general events. Each effort is described in detail as follows:

Person-to-person referrals: HLHCHHP staff encouraged all interested and enrolled community members to refer additional individuals to the program. Participants were considered to be recruited via person-to-person referral if they contacted the HLHCHHP after a referral from their landlord, an acquaintance, or a community or social-service partner. HLHCHHP staff members were unable to quantify the total number of estimated community contacts by this method, as some individuals might have been referred to the program, but never contacted the program.

Direct mail: A total of three direct mailing attempts were made during the HLHCHHP. The first mailer was sent to past and current participants, encouraging them to recommend this program to friends, neighbors, and others. This letter also included additional flyers for them to disseminate. The second and third direct mailings targeted landlords who participated in the HLHCHHP and/or owned a property constructed prior to 1978, as identified using publicly available records from the Clark County Assessor's Office. Direct mail sent to landlords included less educational information and focused more

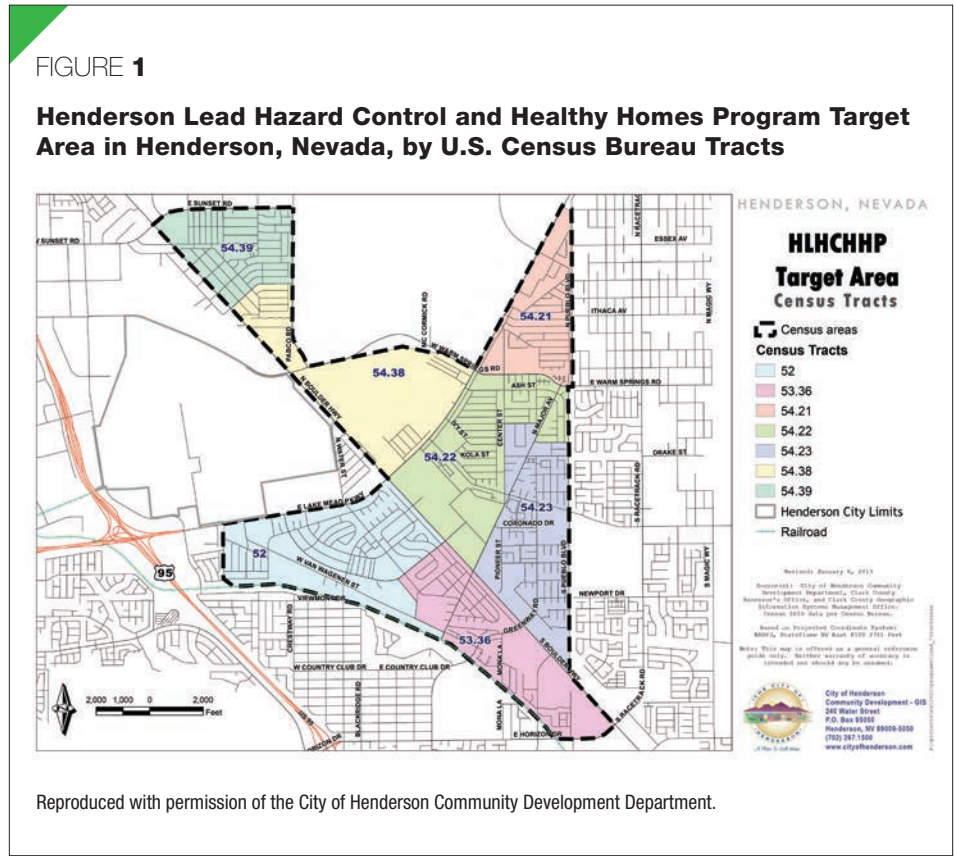
on the long-term benefits of the program for property owners and their tenants.

Door-to-door neighborhood canvassing: Door-to-door outreach was conducted primarily in select census tracts (Figure 1) contained within postal codes 89011 and 89015. At each home, a staff member engaged with the resident if the resident answered the door, or left a flyer attached to the front door knob if the resident did not answer. Properties excluded from this recruitment method were those displaying a “No Soliciting” sign, those fenced with a locked gate, and those fenced with dogs in the front yard.

Outreach at child-oriented community events: Child-oriented community events took place in target neighborhoods providing resources or entertainment to children and their families. To spread program information at these locations, HLHCHHP staff provided an information/activity table and gave educational presentations at local schools, child care centers, recreation centers, and public and private social-service centers offering child-focused services.

Passive program information: Passive provision of program information constituted a major outreach strategy for the HLHCHHP. This outreach strategy included program yard signage, contact with local media outlets, and mass dissemination of program flyers, all of which did not involve in-person interaction with staff.

As a condition of the HLHCHHP, contractors performing lead hazard control work on participating homes were required to design and provide a sign for the participating property’s front yard to be displayed for 90 days postconstruction. The signs listed a brief description of the program and relevant contact information and were clearly visible from the street. Program participants had the right to decline the placement of the yard sign. Due to the placement of the signs along a variety of participant streets for this extended period of time, there was no reliable way to quantify the total number of people who saw the signs. HLHCHHP program information was also the focus of online and print news articles in 2013 and 2014, and the HLHCHHP was also featured on a television news segment that aired in December 2013. Each of these local media outlets has a substantial potential audience in the Henderson area, but HLHCHHP staff members



were unable to obtain reliable data regarding total views for each media item. Program flyers were disseminated at community partner locations. Flyers were also placed in a clear box attached to HLHCHHP yard signage. Each flyer included a description of the program, its requirements, and the relevant contact information. HLHCHHP staff maintained records of how many flyers were given to local businesses and community partners.

Outreach at general community events: These events included events of general community interest in the target area. Similar to the child-oriented events, these general events provided staff with an opportunity to engage the community and communicate the benefits of the HLHCHHP.

Prescreening and Enrollment

Once a participant expressed interest in the program and indicated that he or she met eligibility requirements (i.e., property, occupancy, and income requirements), HLHCHHP staff visited the participant’s home to complete the application and verify program eligibility by obtaining identification documents and proof of income (i.e., tax returns,

pay stubs, documentation of benefits, etc.). Once applications were complete and all required documents were received, the participant was considered enrolled.

Data Collection and Analysis

Data were collected and analyzed with the approval of the University of Nevada, Las Vegas (UNLV) Institutional Review Board (Protocol 710692-4) for biomedical and social-behavioral human subjects research. HLHCHHP staff maintained records of recruitment efforts and asked all prescreened and enrolled applicants how they heard about the program. This analysis evaluated the success of each method based on its percentage of participant enrollment.

Results

Extensive data were collected for each participating property under the terms of the program (Table 2). The majority of enrolled properties were rental units, with nearly 98% of them located in the 89015 ZIP code. Of the 123 occupied, enrolled units, the median annual income was \$23,145, and the average household size was four people. Enrolled

TABLE 2

Demographic Data for Enrolled Henderson Lead Hazard Control and Healthy Homes Properties and Participants

Property Characteristics (N = 136)	
	n (%)
Occupant type	
Owner occupied	43 (31.6)
Renter occupied	80 (58.8)
Vacant	13 (9.6)
ZIP code	
89015	133 (97.8)
89011	2 (1.5)
89002	1 (0.7)
Decade of construction	
1940–1949	37 (27.2)
1950–1959	44 (32.3)
1960–1969	36 (26.5)
1970–1977	19 (14.0)
Housing unit type	
Single family	106 (77.9)
Apartment	22 (16.2)
Duplex	6 (4.4)
Manufactured home	2 (1.5)

Participant Characteristics (N = 123)*	
	n (%)
Primary participant gender	
Female	65 (52.8)
Male	58 (47.2)
Race	
American Indian/Alaska Native	4 (3.3)
Black	6 (4.9)
Native Hawaiian/Pacific Islander	3 (2.4)
White	99 (80.4)
Black and White	1 (0.8)
Other/multi-race	6 (4.9)
Refused to answer	4 (3.3)
Ethnicity	
Hispanic/Latino	20 (16.3)
Non-Hispanic/Latino	102 (82.9)
Declined to answer	1 (0.8)
U.S. Department of Housing and Urban Development income limits	
≤30% (extremely low)	37 (30.1)
≤50% (very low)	38 (30.9)
≤80% (low)	48 (39.0)
# of children assisted	
≤5 years old	124
6–17 years old	98
Median income	\$23,145
# of families assisted	123
Average household size	4 people
Median primary participant age	47 years
# of expectant mothers	10

*Excludes 13 vacant units.

participants were largely representative of the Henderson community, particularly with respect to race and ethnicity.

More than 10,000 individual community contacts in the target area were completed using the six recruitment strategies employed at 32 individual community events and through 52 community partnerships involving community centers, businesses, government offices, schools, child care programs, and healthcare centers. Five local media out-

lets collaborated to share program information as well. Table 3 details the community contacts, prescreened, and enrolled participants by each method.

Person-to-person referrals accounted for the greatest portion (45.6%) of total enrollment. These referrals typically occurred between landlords, tenants, neighbors, friends, and family members. Direct mailings, which yielded almost 23% of HLH-CHHP enrollment, included one direct mail-

ing attempt to 50 past participants, as well as two direct mailing attempts to 1,120 landlords in the area. Door-to-door canvassing was conducted on 56 streets in the target area and included 1,394 homes, 20 of which were ultimately enrolled. Program staff attended 22 child-oriented community events, including community health fairs, City of Henderson-sponsored seasonal events, a nonprofit organization awareness walk, and a Salvation Army holiday toy drive. On multiple occa-

sions, program staff also visited several elementary schools, after-school learning centers, and child care facilities; 14 participants were recruited by targeting child-oriented events and community partners. Though passive program information potentially reached a large population, it produced only 6% of enrolled program participants. It is important to note that six of the eight individuals in this category indicated that they had seen program yard signs, and the other two individuals had learned of the program through local media outlets. Despite the dissemination of 2,634 flyers, no participants indicated that a program flyer contributed to their enrollment. The 10 general community events attended allowed program staff to contact nearly 1,000 individuals, but this method produced only one enrolled participant. General events included a women’s clinic and local neighborhood meetings and forums, as well as additional events hosted by the City of Henderson. Program staff also volunteered numerous times at two local food pantries and volunteered to teach a class on in-home hazards to health at a local recreation center.

Discussion

Recruitment and community outreach are important concerns of programs such as HUD-funded Lead Hazard Control and Healthy Homes grants, which have multiple, highly specific participant eligibility requirements. Although all grant objectives were met or exceeded during the HLHCHHP, outreach and recruitment constituted a significant challenge throughout the grant.

Based upon the enrollment data, it is clear that person-to-person referrals yielded the most enrolled participants. These referrals likely were successful because they relied on a trusted community connection with program participants or between landlords and their tenants. Landlords were particularly integral to the referral process, as multiple participating landlords referred several of their properties. Though program staff strongly encouraged participants to refer others, the person-to-person referral method ultimately relied on the past participants and landlords to take the initiative. Program staff time investment for this method, therefore, was minimal, making it highly efficient in terms of staff effort.

TABLE 3

Percent of Henderson Lead Hazard Control and Healthy Homes Program Participants Enrolled by Outreach Method

Outreach Method	Estimated Community Contacts	Prescreened Individuals ^a	Enrolled Participants ^b	% Enrolled by Outreach Method
Referrals	*	135	62	45.6
Direct mail	1,170	186	31	22.8
Door-to-door	1,394	54	20	14.7
Child-oriented events	3,938	126	14	10.3
Program information	2,634 ^c	14	8	5.9
General events	994	3	1	0.7
Total	10,130	521	136	100

^aThe total number of referrals within the Henderson community could not be estimated reliably.
^bPrescreened individuals are those who expressed interest in the program and met initial eligibility requirements, but had not yet completed an application or verified their eligibility.
^cEnrolled participants are those who completed an application and provided documentation verifying their eligibility for the program.
^dLocal businesses and community partners were provided 2,634 flyers. Total community contacts could not be estimated reliably for the yard signs or media coverage.

The integral role of landlords also contributed to the success of the direct mailing efforts. The program letter mailings simultaneously reinforced the benefits of the program and encouraged the recipients to refer others to the program. This outreach method was also efficient with respect to staff effort, as it did not require travel to the target area or in-person meetings. There are, however, unavoidable limitations associated with mailing efforts, including incorrect addresses and individuals who did not read the letter sent to them.

Although door-to-door neighborhood canvassing allowed for clear documentation of contact with potential participants, it was time-intensive for program staff, and it yielded only 15% of total enrollment. Canvassing 56 streets required significant staff time, including time spent to prepare and travel to the area.

Outreach at both child-oriented and general community events offered a useful opportunity for personal interaction between many potential participants and program staff. Participation in these events also strengthened the relationship between program staff and community partners, which translated into additional support for the program. Outreach at events, however, often required signifi-

cant staff time for scheduling and preparation, travel, and participation in the events. Finally, many of these events were scheduled during the evening or weekends, further adding to the total amount of staff time required.

Compared with the door-to-door canvassing and event outreach strategies, passive dissemination of program information required little recurring staff effort once the materials were developed. The flyers likely contributed to the community’s familiarity with the program, and aided the other outreach strategies. The yard signs themselves were more successful, as they contributed to awareness of the program while also facilitating exchange of program information between neighbors. Though a select few participants declined the sign, the vast majority of participants accepted the sign placement in their yards. Though many of the signs likely reached only grant target neighborhoods, the local media announcements of program information had much greater audiences in the larger metropolitan community. These announcements in the media, however, could have been improved; the television news segment on the HLHCHHP contained an incorrect phone number, for example. Like the other information outreach strategies, the local media out-

lets ultimately helped to increase awareness of the program.

It is important to note that there were several challenges to data collection for this study. The very nature of some of the outreach strategies, such as the referrals and yard signs, made it difficult to quantify the total reach of the method in the community. Additionally, prescreened and enrolled participants self-reported which outreach method ultimately contributed to their enrollment. There also may have been overlap of HLHCHHP outreach methods for certain individuals in the community, as a resident of the grant target area might have encountered program information multiple times through multiple strategies. HLHCHHP staff members assumed that whichever method the participant indicated was the most meaningful or relevant to them.

Conclusion

The recruitment methods detailed in this analysis and their relative successes provide potential models to HUD-funded Lead Hazard Control and Healthy Homes grantees. Encour-

aging person-to-person referrals and directly mailing landlords proved to be the most effective strategies in terms of eventual enrollment and staff involvement, though the other methods have the potential to increase awareness of the program in the community. The strategies detailed here are particularly relevant for communities such as Henderson, Nevada, where many of the homes were built in the 1940s or later and child blood lead testing is rare.

Outreach required substantial staff time and effort, including one part-time position entirely devoted to tracking outreach attempts, following up with interested individuals, and ensuring all property, occupancy, and income requirements were met as mandated by HUD. Though HUD altered eligibility requirements for rental units throughout the course of the grant, program requirements remained very specific. Only one fifth of prescreened individuals eventually progressed to enrollment; individuals were excluded typically as a result of failure to meet a basic requirement or failure to provide adequate documentation to complete the application process.

Future grantees should consider implementing a community-based participatory research strategy that engages community members at every step in the recruitment and research process, similar to the work of Horowitz and coauthors (2009). The results presented here, however, are specific to the City of Henderson, and all grantees must consider the unique demographics, property characteristics, and needs of their communities in developing recruitment strategies. 🐼

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The National Environmental Public Health Internship Program: Facilitating Student Internships at Health Departments

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 will provide AEHAP with the opportunity to share current trends within undergraduate and graduate environmental health programs, as well as their efforts to further the environmental health field and available resources and information.

Anne Marie Zimeri is an assistant professor and the bachelor of science in environmental health program director for the Department of Environmental Health Science at the University of Georgia. Her research focuses on persistent environmental agents in the food system and undergraduate environmental education.

As part of the training and preparation for environmental health majors who attend National Environmental Health Science and Protection Accreditation Council (EHAC)-accredited schools, students must complete an environmental health internship prior to graduation. EHAC schools have a rigorous set of science and environmental health courses designed to prepare students for internships in the public and private sectors. These internships can vary and are based on student future interests in order to gain experience in the field of their choosing. Student can also develop re-

lationships with mentors who can guide their careers and serve as advocates as they move up the ranks in their chosen field. Minimal internship requirements include progression in environmental health coursework and working at least 180 hours, which translates to 20 hr/week in the summer. Many students find full-time internships and work 40 hr/week during the summer.

Many of these student internships are with public health departments near their respective universities or in their home towns. Health department internships are especially valid as the work is varied and students can

learn many aspects of environmental health in just one summer. Also, summer often has exciting seasonal issues to address, such as West Nile/Zika control and swimming pool inspections.

It can be difficult to find an environmental health internship with health departments outside of a student's geographic area or an EHAC-accredited university program director's field of contacts. To expand their opportunities, students can apply to the National Environmental Public Health Internship Program (NEPHIP) to facilitate an internship match. NEPHIP is administered by the National Environmental Health Association (NEHA) with funding from the Centers for Disease Control and Prevention's Environmental Health Services Branch. The purpose of NEPHIP is to encourage environmental health students to consider careers at local, state, or tribal environmental public health departments following graduation. Through this internship program, students are exposed to the exciting career opportunities, benefits, and challenges of working with environmental public health agencies throughout the U.S.

NEPHIP internships are nationally competitive positions for students attending EHAC-accredited schools. In 2017, there were more than 50 applicants for 22 NEPHIP internships that were spread across 20 states (including Alaska)! Summer 2018 will have more than 35 internships available. Health departments not located near an EHAC-accredited undergraduate program may find it difficult to secure qualified students for internship opportunities and NEPHIP alleviates many of these difficulties by developing internships and recruiting students.

The University of Georgia (UGA) has an EHAC-accredited bachelors of science in environmental health program with 100 enrolled students. Last summer, two students from UGA participated in NEHIP—Evan Cooper and Chelsea Cary.

Evan Cooper relocated across the country to Farmington, New Mexico, to work with public health professionals at the New Mexico Environmental Health Bureau (NMEHB). He was assigned to a group that primarily performs public health inspections for swimming pools, food establishments, and septic systems. Cooper was thrilled with the challenge of learning codes for three types of inspections. He spent the first hours of each day working in an office and the remainder of the day in the field performing septic, food/restaurant, and pool inspections. He began by shadowing his mentor, Sherman Paranandi, who taught him about their roles as inspectors, followed by the inspection itself. Cooper was able to make all of the relevant connections to the codes, which enabled him to conduct inspections and make his own observations under Paranandi's supervision.

During his internship, Cooper attended the 2nd Annual Conference on Environmental Conditions of the Animas and San Juan Watersheds, and was struck by the magnitude of the spill at the Gold King Mine. As a result of the conference, he chose the mine spill as the topic of his internship's required independent project. Cooper used a sediment sample location tool to map the number of samples collected over a 2-month period after the spill. He ultimately compared 2016 monsoon and snowmelt displacement of metals to the initial spill and reported on his analysis.

Cooper learned a myriad of things over the course of his 10-week internship that he plans to apply to his future environmental health career. His internship activities reinforced his education and included many surprises along the way, such as realizing the lack

of safe food handling knowledge within the public and some upper management at food establishments. Overall, this NEHIP internship solidified his interest in public health and introduced him to rewarding fieldwork.

Chelsea Cary relocated to Raleigh, North Carolina, to intern with the North Carolina Division of Public Health (NC DPH). She was tasked by NC DPH Epidemiologist Kim Gaetz to establish a referral clearinghouse for clinicians and parents to use for children with elevated blood lead levels. She identified resources for all 100 counties in North Carolina that included information on infant health, housing assistance, legal aid, and lead abatement. By including these sources in the database, families affected by elevated blood lead levels, whether at the mandatory or voluntary investigation thresholds, now have access to resources needed to improve their domestic health. In addition to the database, Cary assisted environmental health specialists with organizing investigations, writing reports, and inputting data in the North Carolina Electronic Lead Surveillance System.

Fieldwork and site visits were also a part of Cary's internship. She went with Wake County Environmental Services Lead Program Coordinator Christy Klaus to commercial and residential sites flagged for elevated child blood lead levels. Klaus, along with Jason Dunn, trained Cary to use lead sampling and detection equipment to determine the sources of lead contamination to facilitate the development of remediation plans. These experiences and others showed Cary that part of assisting with public health is understanding the barriers that prevent families and businesses from being able to live in healthier environments.

For more examples of past student experiences through NEHIP, please visit www.neha.org/professional-development/students/internships.

For a public health department to be considered a host for NEHIP, it must be able to provide multiple environmental health opportunities during the 10-week internship period. The department must also supply an independent project for the student, as well as an assigned mentor who is expected to be available to the student daily. Departments do not need to be a NEHA member to apply. Other considerations include whether the department is engaged in national performance management and quality improvement initiatives, or is attaining accreditation through the Public Health Accreditation Board. The 2018 NEHIP application period for health departments closed on January 31.

Student recruitment is primarily handled by the Association of Environmental Health Academic Programs, which markets these internships to EHAC-accredited schools. The student application period was open from November 15, 2017, to February 12, 2018. Along with the thrilling hands-on environmental health experience of working in a health department, students are supported with a \$4,000 stipend to cover expenses for the 10-week internship. In addition, students are provided with up to \$2,000 for relocation costs based on need and the cost of living in the host city location. NEHA and the host health departments collaborate to assist students in finding safe, affordable housing. 🏠

Acknowledgement: The author would like to thank Christine Ortiz Gumina, project coordinator for NEHA's Program and Partnership Development, for providing information about NEHIP.

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Did You Know?

NEHA offers different membership options to suit your professional needs. From students and those just starting the profession all the way up to those retiring, NEHA has a membership for everyone. And you can select multiple year options and how you want to receive the *Journal*. Visit www.neha.org/membership-communities/join for more information.

► DIRECT FROM CDC ENVIRONMENTAL HEALTH SERVICES BRANCH



CDR Adam Kramer, MPH, ScD, RS, CFS



Maggie Byrne



Elaine Curtiss, MEd

Capturing Data on Contributing Factors to Outbreaks With the National Environmental Assessment Reporting System

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 a column from the Environmental Health Services Branch (EHSB) of the Centers for Disease Control and Prevention (CDC) in every issue of the *Journal*.

In these columns, EHSB and guest authors share insights and information about environmental health programs, trends, issues, and resources. The conclusions in this column are those of the author(s) and do not necessarily represent the official position of CDC.

CDR Adam Kramer is an environmental health officer in the National Center for Environmental Health. Maggie Byrne and Elaine Curtiss work in communications in the National Center for Environmental Health.

Every year, roughly 1 in 6 Americans (48 million people) get sick, 128,000 are hospitalized, and 3,000 die of foodborne diseases (Centers for Disease Control and Prevention [CDC], 2016). Furthermore, more than half of all foodborne illness outbreaks in the U.S. are associated with restaurants (CDC, 2017). During outbreak investigations, environmental health and food safety staff conduct environmental assessments that identify contributing factors to help us learn how pathogens are spread in the environment. Data on contributing factors to outbreaks are critical to outbreak prevention. The Centers for Disease Control and Prevention's (CDC) National Environmental Assessment Reporting System (NEARS) is a surveillance system that captures environmental assessment data, including information about contributing factors.

What Are Contributing Factors?

In food safety, contributing factors are food preparation practices that lead to food getting contaminated, or that lead to pathogens growing or surviving in food. CDC identified 32 contributing factors and they fall into three types: contamination, proliferation, and survival (Figure 1).

The top contributing factors for NEARS-reported outbreaks in restaurants are when

- sick food workers contaminate ready-to-eat food through bare hand contact;
- sick food workers contaminate food through a method other than hand contact, such as with a contaminated utensil;
- sick food workers contaminate ready-to-eat food through glove-hand contact, such as touching a raw hamburger with gloves on and then touching the bun with the contaminated gloves; and

- food handling practices lead to growth of pathogens, such as food not kept cold enough.

What Does NEARS Data Tell Us About Contributing Factors?

Contributing factors were identified for 194 of 297 (3 out of every 5) outbreaks reported to NEARS during 2009–2013 from 11 participating jurisdictions (Brown, Hoover, Selman, Coleman, & Rogers, 2017). Contributing factors were more likely to be identified for outbreaks if

- the pathogen linked to the outbreak was known,
- the outbreak establishment prepared all meals on site,
- the outbreak establishment served more meals daily,
- investigators quickly (within a day of learning about the outbreak) contacted the establishment thought to be linked with an outbreak to schedule their assessment visit, or
- investigators made multiple visits to the outbreak establishment to complete their assessment.

Timely and complete outbreak assessments are important to identifying contributing factors. These findings highlight the need for strong environmental health and food safety programs with the capacity to complete such assessments.

How Can State and Local Food Regulatory Programs Identify Contributing Factors?

To identify contributing factors for foodborne illness outbreaks, environmental health and food safety staff should

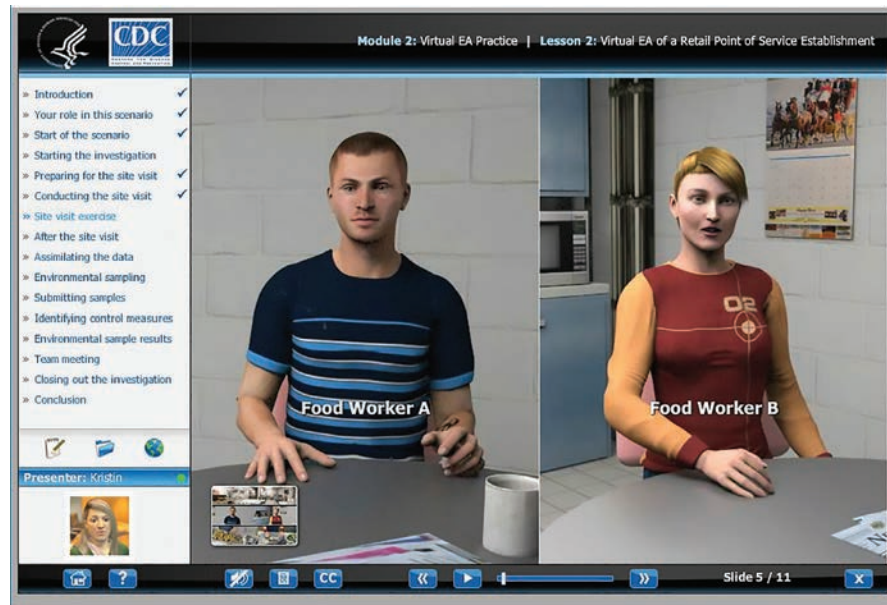
FIGURE 1

The Three Types of Contributing Factors

THERE ARE THREE TYPES OF CONTRIBUTING FACTORS	FOOD PREPARATION PRACTICES THAT CONTRIBUTE TO	FOR EXAMPLE
Contamination	Pathogens and other hazards getting into food	A sick food worker handles food with their bare hands
Proliferation	Pathogens in food growing faster	Food is held in a refrigerator that is too warm
Survival	Pathogens surviving process to kill or reduce them	Food is not cooked long enough or to a hot enough temperature

FIGURE 2

Environmental Assessment Training Screenshot of an Interview With Food Workers



- use their knowledge about the pathogen linked to the outbreak to guide their environmental assessment (e.g., if hepatitis A is the suspected pathogen, the investigator would seek information on whether food workers were sick and their food handling practices);
- conduct their assessment as soon as they learn of a potential outbreak; and
- conduct a complete assessment that might require multiple visits to the outbreak establishment.

Quick Links

- National Environmental Assessment Reporting System: www.cdc.gov/nceh/ehs/nears
- Contributing factors: www.cdc.gov/nceh/ehs/nears/what-are-contributing-factors.htm
- More food safety resources: www.cdc.gov/nceh/ehs/activities/food.html

In addition, investigators can take CDC's free, interactive training on conducting environmental assessments (Figure 2). This training covers key activities of environmental assessments such as

- interviewing kitchen managers and food workers;
- observing how restaurants prepare food (e.g., food temperatures);
- reviewing or collecting records (e.g., records of food cooking temperatures and trace back records); and
- sampling for pathogens in the restaurant kitchen.

Is Your Program Registered for NEARS?

NEARS is available for all state, local, tribal, and territorial food safety and environmental health programs (Figure 3). Participants provide critical data from environmental assessments to prevent and reduce future outbreaks. Your program can access and use your NEARS data at any time to

- identify environmental causes of outbreaks in your jurisdiction,
- take follow-up action to reduce or prevent future foodborne illness outbreaks,
- develop or modify program policies or regulations, and
- help your program meet the Food and Drug Administration's (FDA) Voluntary National Retail Food Regulatory Program Standards.

CDC and its national food safety partners use NEARS to analyze standardized data to understand how and why outbreaks occur and share findings to better respond to outbreaks and prevent future ones. In addition, regulatory agencies such as FDA use information from NEARS to develop interven-

tion strategies and recommended regulations such as the *Food Code*. CDC and national food safety partners recommend that all food safety programs use NEARS to improve food safety in the U.S. To learn more about NEARS, contributing factors, and environmental assessments, visit www.cdc.gov/nceh/ehs/nears.

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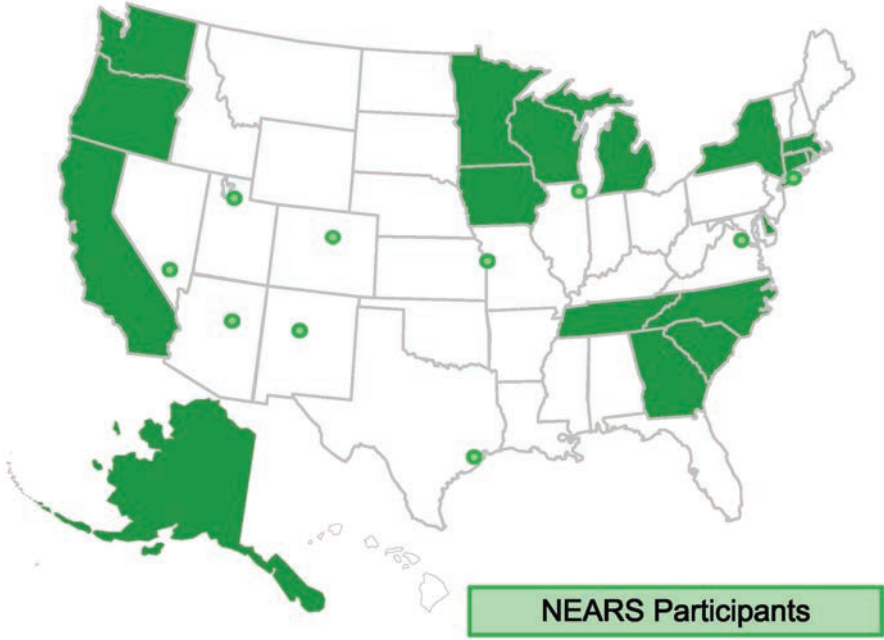
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Centers for Disease Control and Prevention. (2017). *Surveillance for foodborne disease outbreaks, United States, 2015: Annual report*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/foodsafety/pdfs/2015FoodBorneOutbreaks_508.pdf

FIGURE 3

National Environmental Assessment Reporting System (NEARS) Participants as of December 2017



Participating state agencies: Alaska Department of Environmental Conservation; California Department of Public Health; Connecticut Department of Public Health; Delaware Division of Public Health; Georgia Department of Public Health; Iowa Department of Public Health; Massachusetts Department of Public Health; Michigan Department of Agriculture and Rural Development; Minnesota Department of Health; New York State Department of Health; North Carolina Department of Health and Human Services; Oregon Health Authority; Rhode Island Department of Health; South Carolina Department of Health and Environmental Control; Tennessee Department of Health; Washington State Department of Health; and Wisconsin Department of Agriculture, Trade, and Consumer Protection.

Participating local agencies: Albuquerque Environmental Health Department (New Mexico); Chicago Department of Public Health (Illinois); Coconino County Public Health Services District (Arizona); Davis County Health Department (Utah); Fairfax County Health Department (Virginia); Harris County Health Department (Texas); Jefferson County Public Health (Colorado); Kansas City Health Department (Missouri); New York City Department of Health and Mental Hygiene (New York); and Southern Nevada Health District (Nevada).



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Albuquerque, NM	Charleston, SC	Houston, TX	Owatonna, MN	Santa Monica, CA	Calgary
Allentown, PA	Chicago, IL	Idaho Falls, ID	Pasadena, CA	Seattle, WA	Montreal
Amarillo, TX	Cincinnati, OH	Little Rock, AR	Philadelphia, PA	Shreveport, LA	Toronto
Anaheim, CA	Coeur d'Alene, ID	Long Beach, CA	Phoenix, AZ	Sioux Falls, SD	Vancouver
Bakersfield, CA	Corpus Christi, TX	Los Angeles, CA	Portland, OR	Syracuse, NY	Winnipeg
Billings, MT	Eureka, CA	Lubbock, TX	Providence, RI	Tulsa, OK	
Birmingham, AL	Galveston, TX	Midland, TX	Rapid City, SD	Wichita, KS	
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Boston, MA	Grand Rapids, MI	Oakland, CA	Rochester, NY		

If you are interested in an opportunity near you, please send your resume to ATTN: Sethany Dogra at [ATTN: Sethany Dogra at LST.RAS.RESUMES@UL.COM](mailto:ATTN:SethanyDogra@LST.RAS.RESUMES@UL.COM) or visit our website at www.evercleanservices.com.

Did You Know?

The Samuel J. Crumbine Consumer Protection Award was established in 1954 and was first awarded in 1955. The award is named in honor of Dr. Samuel J. Crumbine, a sanitarian-physician and public health pioneer who was renowned for his innovative methods of improving public health protection. The deadline to submit an application for 2018 is March 15. Learn more at www.crumbineaward.com.

STUDENTS Don't Miss This Opportunity!

Applications for the 2018 National Environmental Health Association/American Academy of Sanitarians (NEHA/AAS) Scholarship Program are now available.

Last year, \$4,000 was awarded to three students who demonstrated the highest levels of achievement in their respective environmental public health degree programs. If you would like an application or information about the NEHA/AAS Scholarship, do one of the following before the deadline:

VISIT

www.neha.org/professional-development/students/scholarship.

Application and qualification information are available to download online.

CONTACT

Jonna Ashley
with a request for an application and 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 15, 2018

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visit [neha.org/professional-
development/careers](http://neha.org/professional-development/careers)

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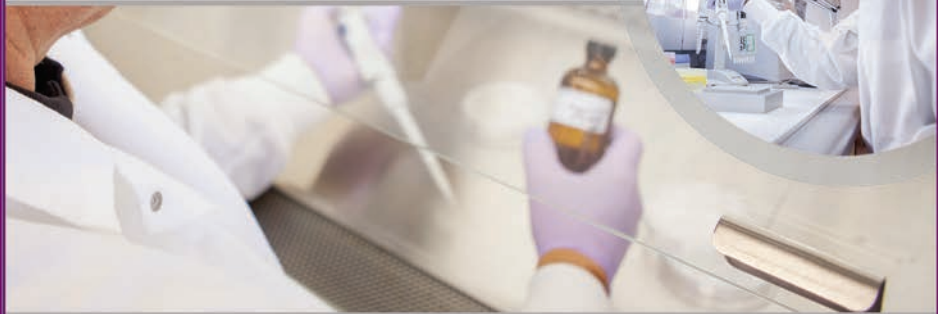
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Did You Know?

National Groundwater Awareness Week is March 11–17.

Forty-four percent of the U.S. population depends on
groundwater for its drinking water supply. This year's theme is
“Test. Tend. Treat.” Learn more about this observance and how
you can get involved at www.groundwaterawarenessweek.com.

EH CALENDAR

UPCOMING NEHA CONFERENCES

June 25–28, 2018: NEHA 2018 Annual Educational Conference & Exhibition and HUD Healthy Homes Conference, Anaheim, CA. For more information, visit www.neha.org/aec.

July 8–11, 2019: NEHA 2019 Annual Educational Conference & Exhibition, Nashville, TN.

July 13–16, 2020: NEHA 2020 Annual Educational Conference & Exhibition, New York, NY.

NEHA AFFILIATE AND REGIONAL LISTINGS

California

March 12–15, 2018: Annual Educational Symposium, hosted by the Superior Chapter of the California Environmental Health Association, Sacramento, CA. For more information, visit www.ceha.org.

Florida

July 24–27, 2018: Annual Education Meeting, hosted by the Florida Environmental Health Association, Cape Canaveral, FL. For more information, visit www.feha.org.

Idaho

March 5–7, 2018: Annual Educational Conference, hosted by the Idaho Environmental Health and Solid Waste Associations, Boise, ID. For more information, visit www.ieha.wildapricot.org.

Michigan

March 21–23, 2018: Annual Education Conference, hosted by the Michigan Environmental Health Association, Pontiac, MI. For more information, visit www.meha.net/AEC.

Minnesota

May 10–11, 2018: Spring Conference, hosted by the Minnesota Environmental Health Association. For more information, visit www.mehaonline.org.

Missouri

April 3–6, 2018: Annual Education Conference, hosted by the Missouri Milk, Food, and Environmental Health Association, Springfield, MO. For more information, visit www.mmfeha.org.

New Jersey

March 4–6, 2018: Educational Conference & Exhibition, hosted by the New Jersey Environmental Health Association, Atlantic City, NJ. For more information, visit www.njeha.org.

Ohio

April 17–18, 2018: 72nd Annual Education Conference, hosted by the Ohio Environmental Health Association, Columbus, OH. For more information, visit www.ohioeha.org.

Oregon

April 4–6, 2018: Annual Education Conference, hosted by the Oregon Environmental Health Association, Bend, OR. For more information, visit www.oregoneha.org.

Utah

May 2–4, 2018: Spring Conference, hosted by the Utah Environmental Health Association, Vernal, UT. For more information, visit www.ueha.org/events.html.

Washington

May 7–9, 2018: 66th Annual Educational Conference—Environmental Public Health: Partnering, Protecting, & Planning, hosted by the Washington State Environmental Health Association, Olympia, WA. For more information, visit www.wseha.org.

TOPICAL LISTING

International

March 20–23, 2018: 15th IFEH World Congress on Environmental Health, hosted by the New Zealand Institute of Environmental Health, Auckland, New Zealand. For more information, visit www.2018wceh.org.

Public Health

April 10–11, 2018: Iowa Governor's Conference on Public Health, Des Moines, IA. For more information, visit www.ieha.net/IGCPH.

Water Quality

May 9–11, 2018: Managing Legionella and Other Pathogens in Building Water Systems 2018 Conference, hosted by NSF International, Baltimore, MD. For more information, visit www.legionella2018.org.

Did You Know?

You can share your event with the environmental health community by posting it directly on NEHA's community calendar at www.neha.org/news-events/community-calendar. Posting is easy and free, and a great way to bring attention to your event. You can also find listings for upcoming conferences, webinars, and trainings from NEHA and other organizations.

2018 Walter F. Snyder Award

Call for Nominations Nomination deadline is April 30, 2018.

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 2018 *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:

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

The 2018 Walter F. Snyder Award will be presented during NEHA's 82nd Annual Educational Conference (AEC) & Exhibition to be held in Anaheim, CA, June 25–28, 2018.

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) 2018 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, 2018.

Nomination packages should be e-mailed to

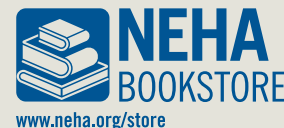
Craig A. Shepherd at shep1578@gmail.com.

Files should be in Word or PDF format.

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

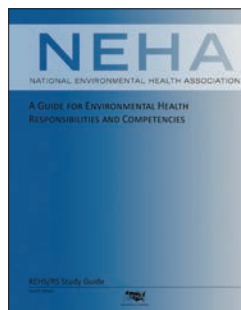
RESOURCE CORNER

Resource Corner highlights different resources that NEHA has available to meet your education and training needs. These timely 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!



REHS/RS Study Guide, 4th Edition

National Environmental Health Association (2014)



The Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) credential is NEHA's 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

Healthy & Safe Homes: Research, Practice, & Policy

Edited by Rebecca L. Morley, MSPP, Angela D. Mickalide, PhD, CHES, and Karin A. Mack, PhD (2011)



This book marks an exciting advance in the effort to ensure that people across all socioeconomic levels have access to healthy and affordable housing. It provides practical tools and information to make the connection between health and housing conditions relatable to everyone. *Healthy & Safe Homes* brings together perspectives from noted scientists, public health experts, housing advocates, and policy leaders to fully explain the problem

of substandard housing that plagues our nation and offers holistic, strategic, and long-term solutions to fix it. The many experts who have contributed to this book lay out smart approaches to help achieve the goal of making healthy housing accessible to all. Expanding access to healthy and affordable housing is a first step to creating a country of healthier people.

225 pages / Paperback

Member: \$52 / Nonmember: \$55

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

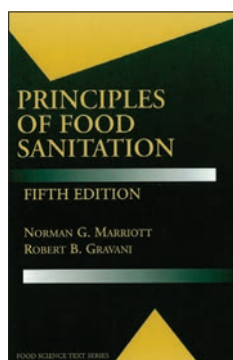
foodborne illness, HACCP plans and active managerial control, cleaning and sanitizing, conducting facility plan reviews, pest control, risk-based inspections, sampling food for laboratory analysis, food defense, responding to food emergencies and foodborne illness outbreaks, and legal aspects of food safety.

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Principles of Food Sanitation (Fifth Edition)

Norman G. Marriott and Robert B. Gravani (2006)



This book provides sanitation information needed to ensure hygienic practices and safe food for food industry and regulatory professionals. It addresses the principles related to contamination, cleaning compounds, sanitizing, and cleaning equipment. It also presents specific directions for applying these concepts to attain hygienic conditions in food processing or preparation operations. The book includes chapters that address

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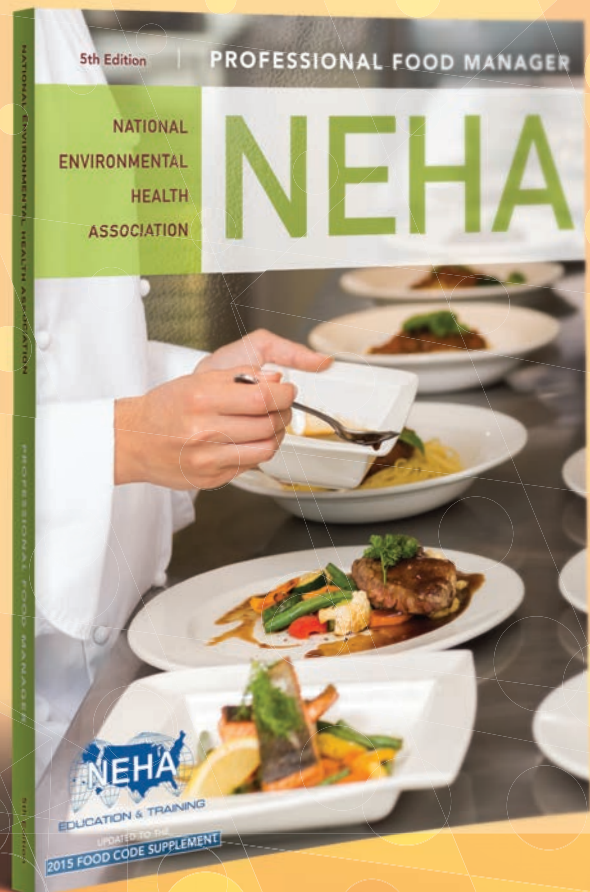
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JEH QUIZ

FEATURED ARTICLE QUIZ #5

An Estimate of the Economic Burden of Norovirus Disease Among School-Age Children in the United States (2009–2013)

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) credits toward maintaining your NEHA credentials.

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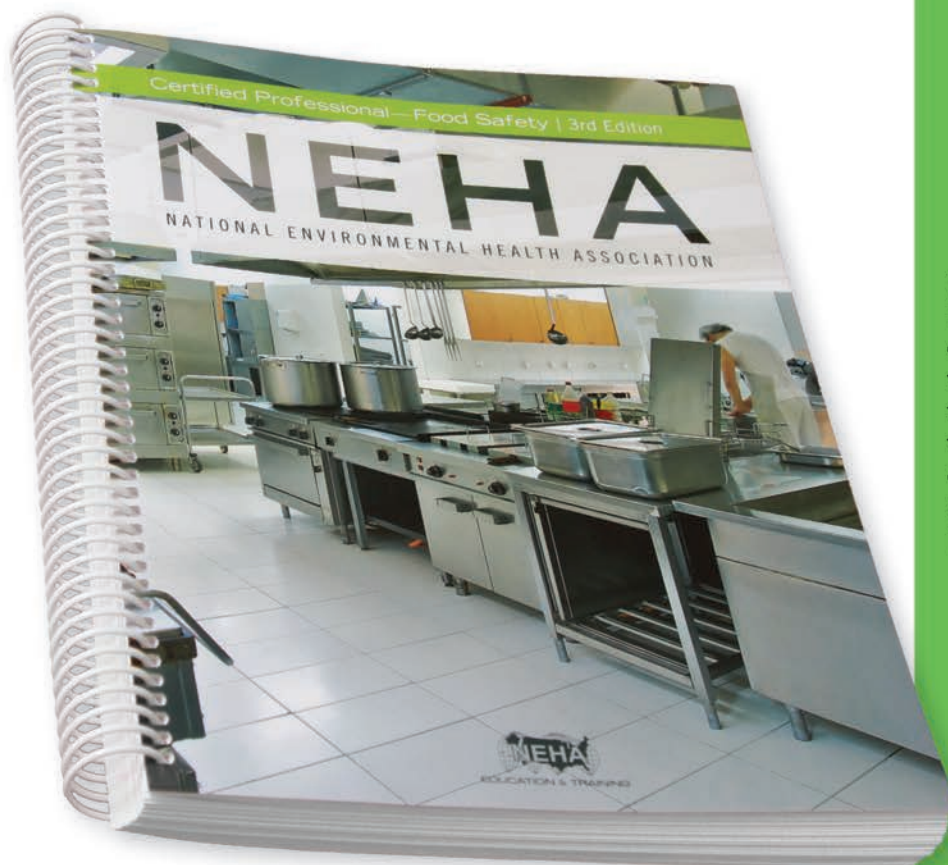
JEH Quiz #3 Answers December 2017

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

→ Quiz deadline: June 1, 2018

1. Research evidence suggests that norovirus and 13 other foodborne pathogens account for ___ of all confirmed foodborne illnesses and associated hospitalizations.
 - a. 80%
 - b. 85%
 - c. 90%
 - d. 95%
2. These 14 foodborne pathogens account for ___ of foodborne deaths in the U.S.
 - a. 95%
 - b. 96%
 - c. 98%
 - d. 99%
3. In a study that analyzed incident data from 1979–2009, it was estimated that the annual healthcare cost of acute gastroenteritis associated with norovirus was approximately
 - a. \$570 million.
 - b. \$777 million.
 - c. \$2 billion.
 - d. \$5.5 billion.
4. From 1999–2008 outbreak data, researchers found that the annual mean number of norovirus illnesses for all ages was estimated to be
 - a. 3,227,012.
 - b. 4,430,987.
 - c. 5,461,731.
 - d. 8,309,164.
5. Total direct medical costs for an episode of norovirus infection are largely due to
 - a. supportive care.
 - b. hospitalization.
 - c. emergency care.
 - d. outpatient care.
6. Based on the surveillance data used for this study, the estimated cost of supportive care is
 - a. \$38,348.
 - b. \$48,674.
 - c. \$57,699.
 - d. \$2,483,379.
7. Emergency care costs make up ___ of the total cost of norovirus infection.
 - a. 1.5%
 - b. 1.9%
 - c. 2.2%
 - d. 94.5%
8. The cost per case mean of norovirus infection for hospitalization is
 - a. \$621.
 - b. \$801.
 - c. \$1,198.
 - d. \$4,867.
9. The cost per case mean of norovirus infection for supportive care is
 - a. \$621.
 - b. \$801.
 - c. \$1,198.
 - d. \$4,867.
10. Clorox estimated that student absenteeism costs on average ___ per student per episode of norovirus infection.
 - a. \$100
 - b. \$125
 - c. \$150
 - d. \$175
11. In terms of cost, it is clear that more than 50% of the economic burden comes from the direct nonmedical and indirect costs.
 - a. True.
 - b. False.
12. Future research efforts on the economic impact of norovirus should incorporate costs of
 - a. school closures in terms of student and staff absenteeism.
 - b. environmental decontamination and sanitation.
 - c. all the above.
 - d. none of the above.

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http://health.baltimorecity.gov/programs/health-resources-topic

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StateFoodSafety.com
www.statefoodsafety.com

Steritech Group, Inc.
www.steritech.com

Sweeps Software, Inc.
www.sweepssoftware.com

Taylor Technologies, Inc.
www.taylor technologies.com

Texas Roadhouse
www.texasroadhouse.com

Tri-County Health Department
www.tchd.org

Tyler Technologies
www.tylertech.com

UL
www.ul.com

Waco-McLennan County Public Health District
www.waco-texas.com/cms-healthdepartment

Waukesha County Environmental Health Division
www.waukeshacounty.gov/ehcontact

Wegmans Food Markets, Inc.
www.wegmans.com

West Virginia Department of Health and Human Resources, Office of Environmental Health Services
www.dhhr.wv.gov

Yakima Health District
www.yakimacounty.us/275/Health-District

Educational Members

Baylor University
www.baylor.edu

Colorado State University
http://csu-cvms.colostate.edu/academics/erhs

Eastern Kentucky University
http://ehs.eku.edu

Michigan State University Extension
www.msue.anr.msu.edu

Michigan State University, Online Master of Science in Food Safety
www.online.foodsafety.msu.edu

Old Dominion University
www.odu.edu/commhealth

The University of Findlay
www.findlay.edu

University of Georgia, College of Public Health
www.publichealth.uga.edu

University of Illinois Department of Public Health
www.uis.edu/publichealth

University of Illinois, Illinois State Water Survey
www.isws.illinois.edu

University of Washington, Department of Environmental & Occupational Health Sciences
www.deohs.washington.edu

University of Wisconsin-Madison, University Health Services
www.uhs.wisc.edu

University of Wisconsin-Oshkosh, Lifelong Learning & Community Engagement
www.uwosh.edu/lfce

University of Wisconsin-Stout, College of Science, Technology, Engineering, and Mathematics
www.uwstout.edu 

2018

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, 2018.**



To access the online application, visit www.neha.org/about-neha/awards/walter-s-mangold-award.



2018 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, 2018.

To access the online application, visit
www.neha.org/about-neha/awards/joe-beck-educational-contribution-award.





NEHA 2018 AEC and HUD Healthy Homes Conference

JUNE 25-28, 2018
Marriott Anaheim Hotel
Anaheim, California

Learn how your peers are working with multiple agencies, industries, and levels of government to build **Bridges, Bonds, and Benefits** to ensure the safety of the public and environment, and to further the environmental health profession.



Registration

Early pricing ends on March 30! Register today at neha.org/aec/register.

	Member	Nonmember
Early Registration: Full Conference	\$615	\$790
Early Registration: Full Conference + 1-year NEHA Membership	\$710	
Single Day Registration	\$320	\$375



Reservations

Hotel reservations now available at neha.org/aec/hotel.



Keynote Address: Frank Yiannas, Walmart Vice President of Food Safety and Health, June 25, 2018

As environmental health professionals, getting others to comply with what you're asking is critical, but it's not always easy. When it comes to food safety, people's attitudes, choices, and behaviors are some of the most important factors influencing the overall safety of our food supply. If you're trying to improve the food safety performance of an organization, industry, or region, what you're really trying to do is change people's behaviors. In this innovative presentation, "Food Safety = Behavior," Frank Yiannas, Walmart Vice President of Food Safety and Health, will provide fascinating insight into proven behavioral science principles with suggested applications on how they might be used to advance food safety and environmental health.

Exhibition

Exhibitors, be sure to reserve your booth now to take advantage of the best booth selection!

Exhibiting at the AEC allows you to meet face-to-face with over 1,000 environmental health professionals from all over the nation.

Exhibit booth purchase now available at neha.org/aec/exhibition.



Sponsorships

Elevate your profile and commitment to environmental health through a sponsorship at the NEHA 2018 AEC and HUD Healthy Homes Conference. More information is now available at neha.org/aec/sponsorships OR contact Soni Fink at 303.756.9090, ext. 314.

REGISTER NOW!

NEHA SECOND VICE-PRESIDENTIAL CANDIDATE PROFILE

NEHA is governed by a corporate board of directors that oversees 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 five-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 one candidate for the office of second vice-president.



Roy Kroeger, REHS

Roy Kroeger believes that being an environmental health professional gives him the opportunity to protect people's health through practice, policy and most importantly education. Americans and people around the world want to do the right thing as it pertains to protecting our health and the environment around us. Obstacles are often incurred while trying

to do what is right, specifically cost, time and knowledge. After serving four years in the US Army's Corps of Engineers he enrolled at Colorado State University where he graduated with his BS in Environmental Health in 1993.

Roy has spent over a quarter of a century learning, practicing and educating others in the field of Environmental Health.

Roy believes NEHA is improving its representation of the Environmental Health professional and would like to continue that momentum by working with the Board of Directors, staff, membership and NEHA's many partners to make NEHA a more prominent voice in Washington and around the environmental health world.

To prepare for this future, Roy proposes a platform and a vision consisting of:

- Educating and pushing students and young professionals to lead NEHA and Environmental Health into the future.
- Giving all Environmental Health professionals a voice in the association from our historical core to those in emerging EH fields such as Sustainability, Built Environment and Public Health Preparedness.
- Building a stronger network of professionals so that everyone has the opportunity to lean on their peers when necessary to make Environmental Health more responsive to our public's needs.
- Creating an atmosphere and opportunity in which Environmental Health professionals can learn the new skills, techniques and scientific methods needed to protect the public and environment.

- Soliciting input and ideas from the policy makers/decision makers that shape our Environmental Health framework.

Roy Kroeger is a Registered Environmental Health Specialist and Environmental Health Supervisor with the Cheyenne-Laramie County Health Department in Cheyenne, Wyoming. Roy has worked as an Environmental Health professional for over twenty-four years at the local level providing public health to the citizens of the community. He has had the good fortune of working in multiple programs from food safety to mosquito and vector control and from wastewater treatment to recreational water quality. As a supervisor, he has wide-ranging experience managing budgets and staff, creating the department's first strategic plan, developing policy, and advocating for environmental health. He understands that the profession is critically important to the lives of countless people. He also believes that NEHA has a unique ability to serve these professionals and to further our cause at the national and even international level. Roy has served as the Regional Vice President for Region Three representing Colorado, Montana, Utah and Wyoming since 2007. He has served on multiple NEHA committees including sustainability, finance, and is currently chairing the AEC committee. He has worked on both the REHS and CP-FS teams to update and improve these credentials.

Roy has made a commitment to improving Environmental Health outside of NEHA as well, working on the retail curriculum team for FDA and IFPTI to develop a training curriculum for food safety professionals from the time they start their careers to the time they retire. Continuing education has been one of his passions, and the activities he has been associated with clearly show that interest.

Roy is currently serving on the FDA's Partnership for Food Protection Governing Council where he represents the local food safety professional in building an integrated food safety system. He has also served on the Environmental Health Accreditation Council (EHAC), and even though he is not currently a voting council member, he has agreed to review university programs for accreditation as well as make on-site visits to those universities when needed.

NEHA SECOND VICE-PRESIDENTIAL CANDIDATE PROFILE

Roy has served environmental health in numerous ways during his twenty-four year career including serving as the President for the Wyoming Environmental Health Association for two years and as the President for the Wyoming Food Safety Coalition concurrently. He has been awarded the Outstanding Environmental Health Specialist and the Arthur Williamson Award by the Wyoming affiliate for his contributions to the profession and the association.

He and his wife, Cecilia, have raised three wonderful children ranging in age between 20 and 32 years old. Each of them are in

or have finished college and are ready to do their part to make this a better world. Roy believes that the quality of their future is largely dependent on the work that we all do to protect our environmental health.

Please support Roy Kroeger for 2nd Vice-President in the 2018 election. You can find Roy on most of the social media sites including Facebook, LinkedIn, Twitter, Instagram, Snapchat and more. 🐼

Did You Know?

Ninety percent of NEHA 2017 AEC attendees surveyed said they came to the conference to learn about the most current trends in environmental health. Seventy-five percent said they wanted to connect with environmental health professionals. Don't miss out on the exciting opportunity to attend the 2018 AEC taking place June 25–28 in Anaheim, California. Early rate registration closes on March 30, so don't delay and register now! You can also register now for credential review courses and exams, as well as for our preconference workshops. Learn more at www.neha.org/aec.

Professional Food Handler Online Certificate Course

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- ▶ Two-hour course

Please contact nehatraining@neha.org or call 303-802-2166 to learn more.



NEHA REGIONAL VICE-PRESIDENTIAL CANDIDATE PROFILES

NEHA is governed by a corporate board of directors that oversees 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 42 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 three-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. The candidates are listed alphabetically by region.

Region 2

**Jacqueline L. Reszetar**

Major (Ret.) Jacqueline L. Reszetar is the Director of Environmental Health for the Southern Nevada Health District. Her responsibilities include leadership of 160 Environmental Health staff, who sustain basic core functions of Public Health; promoting the health and well-being of over 2 million residents and visitors working and living in Las Vegas, Nevada.

Jacqueline's leadership style and industry-friendly problem-solving skills empowers her staff to teach, coach and mentor a diverse population of stakeholders, business owners, and community members. This much needed, innovative approach was introduced merely four years ago, but already the community is gaining a better understanding how to implement and comply with federal, state and local regulations without fear of unfair or excessive punitive consequences.

In 2013, Jacqueline retired from the United States Army Medical Department with 22 years of service. Her leadership and knowledge of public health is credited to a dynamic career as an Environmental Science Officer Engineer (ESEO).

Region 3

**Rachelle Blackham, MPH, LEHS**

Deputy Director, Environmental Health Services Division
Davis County Health Department

Rachelle Blackham is a trailblazer that has a passion for public health. She is regularly asked by others for her insightful input on mentorship, goal making and environmental health fieldwork. Rachelle is a proven leader that is able to think "outside the box" and isn't afraid to work hard.

Recently appointed Deputy Director for the Davis County Environmental Health Services Division in Clearfield, Utah, Rachelle has established a new way of tackling issues and set a standard of excellence. Attending graduate school on the weekends and at night, she graduated as the valedictorian of the Public Health pro-

gram. She is a team player that has successfully worked on a number of large projects and programs throughout the environmental health field. Rachelle firmly believes that environmental health can make a real difference in the lives of people and she would be honored to be the NEHA Region 3 Vice-President.

**Thomas (Tom) J. Butts, MSc, REHS**

I have been a NEHA member since 1985. I have always valued the support and systems NEHA worked to provide its membership. I believe that need today is greater than ever and would be humbled to represent the western/mountain perspective.

Key areas I would focus on are:

- Support for Environmental Health (EH) practitioners
- Articulate a clear role for EH as a policy advocate
- Increase recognition of EH practice as foundational in every community

I have a long history of serving EH in Colorado via the Colorado Directors of Environmental Health and Colorado Environmental Health Association. I worked diligently in each of these roles to represent the challenges and opportunities both urban and rural/frontier organizations face in various forums. I have presented at numerous local, state and national conferences, and to elected official's meetings and the state legislature.

I worked for Tri-County Health Department for 32 years in a wide range of roles from general EH practitioner and hazardous waste specialist to Deputy Director until retiring in February 2017. I now serve the organization as a Senior Environmental Health Consultant (part time).

Additionally, I regularly spend time in Colorado, Utah, Wyoming, Montana and Idaho as a hiker, fisherman and hunter.

Work History

- Deputy Director (June 2012–February 2017): Oversee Human Resources, Administration & Finance, Environmental Health, and Emergency Preparedness and Response. Work closely with the Executive Director to address overarching agency issues as well as specific programmatic needs. Managed the agency strategic planning process and supported agency accreditation effort (Accredited November 2017).
- Director of Environmental Health (September 2008–June 2012).

NEHA REGIONAL VICE-PRESIDENTIAL CANDIDATE PROFILES

- Coordinator/Director of Emergency Preparedness (October 2002–2008).

Organizational Affiliations/Leadership

- National Environmental Health Association: Member since 1985; Terrorism and All-Hazard Preparedness Technical Section Co-chair 2003–2005.
- Colorado Directors of Environmental Health (CDEH): Vice-President, President and the CDEH representative to the Colorado Association of Local Public Health Officials, respectively (2008–2013).
- Colorado Environmental Health Association: Member since 1984; Regional Board Member 2007–2009; Treasurer 2009–2011; President Elect, President, Past President 2016–2018.
- Colorado Public Health Association: Member; NACCHO EH Committee July 2014 to present.
- Regional Institute for Health and Environmental Leadership: Fellow 2003. (This program included Colorado, Wyoming, Utah and New Mexico representatives and provided a great opportunity to get to know how those state/local EH and public health systems worked.)

Education

- Colorado State University: B.S. in Environmental Health, Minor in Chemistry
- Colorado School of Mines: MSc in Environmental Science & Engineering

Region 8



LCDR James Speckhart, MS

LCDR James Speckhart has served since 2008 as an Environmental Health Officer with the U.S. Public Health Service, first within the U.S. Coast Guard and currently at the Food and Drug Administration (FDA) in Silver Spring, MD. He conducts regulatory inspections at the federal research labs to ensure bio-safety compliance and ensuring annual lab safety training.

LCDR Speckhart has been a NEHA member since 2004 when he was a graduate student. He has been privileged to serve since 2012 on the Board of Directors (BOD) as NEHA Region 8 Vice President. He leads the BOD Global Engagement Committee to develop partnerships with related public health organizations, participating in the Affiliate Engagement and AEC Planning Committees. He has actively participated in chapter meetings in VA, WV, National Capital, and the Uniformed Services (USEHA) section. He is a member of the NCAEHA and USEHA. During these meetings, he has provided updates about NEHA's website resources and the annual education conference.

LCDR Speckhart is an active alumnus of the Old Dominion University Environmental Health program in Norfolk, VA. In addition to mentoring current students, he is frequently invited to campus as a guest speaker for the program. In 2016, ODU's College of Health Sciences recognized him as a Distinguished Alumnus.

LCDR Speckhart presented on the topic of innovation, invention, and the patent seeking process during the AEC 2017. It is recognized that our profession rightly emphasizes inspection and regulation duties to protect the public and prevent disease outbreaks. He believes providing an understanding about the invention seeking process will further this goal via technological application and be a creative outlet for our members. Their creativity would enhance our public health vocation. His goal is to share invention related resources in appropriate ways using the NEHA media platforms.

LCDR Speckhart welcomes to serve another three-year term (2018–2020) to enhance outreach efforts to include: inspiring younger members entering the profession; encouraging veteran NEHA members to mentor; re-emphasizing member involvement with inactive state chapters in PA, DE and MD; fostering environmental sustainability concepts; strengthening communication with the U.S. Defense Department's Global Health Engagement; partnering with allied public health associations; cultivating global relationships in the Americas; and creatively engaging the public utilizing citizen science education methods. We should harness every reasonable and valid pathway to advocate for and advance the profoundly vital environmental health profession. 🐼

Did You Know?

Understanding hazard analysis and critical control point (HACCP) principles can mean the difference between safe and unsafe facilities. NEHA's HACCP courses provide a roadmap for writing and implementing a food safety management system. We offer HACCP courses for those at the retail and processing/manufacturing levels, as well as for food handlers, bottled water processors, and the fresh and fresh-cut produce industry. Learn more about NEHA's online HACCP courses at <http://nehahaccp.org>.

Food Safety and Cannabis Infused-Products: Focus on NEHA Activities to Address the Emerging Issue

By Elizabeth Landeen (elandeen@neha.org)

NEHA is leading the charge to bridge the educational and training gaps that exist for local and state food safety programs and regulators related to the safety of cannabis-infused products for consumer consumption. As of January 2, 2018, 29 states and Washington, DC, have legalized medicinal cannabis and eight of those states and Washington, DC, have additionally legalized recreational cannabis (Figure 1). As the legalization of cannabis continues to expand, NEHA has been actively engaged in this topic to better understand the needs of local and state food safety programs, as well as build new and relevant partnerships, develop resources and tools, and provide educational opportunities that are useful and easy to access.

Below are our key priorities and the projects we have been working on to provide local and state food safety programs with needed tools and information to help bridge the gap between regulators and the cannabis industry.

Provide Timely and Easily Assessible Information

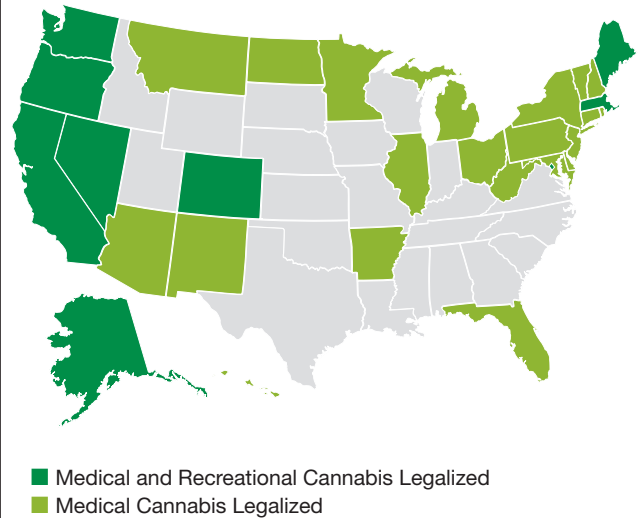
Edible Cannabis Products Webinar Series: Edibles are produced and consumed in communities many local and state food safety agencies serve and protect. With cannabis use growing in acceptability across the country and changing state regulations, legalization of cannabis for medicinal and recreational purposes is becoming more common. While these times are exciting for many, they raise questions about the safety of cannabis-infused products and how they should be regulated and inspected.

NEHA has hosted three different webinars over the past year that address the growing concern about ensuring the safety of cannabis-infused products.

- **Webinar #1—Wonderful World of Edibles...Are They Safe?:** This informative webinar provided participants with a general understanding of edibles. Toxicology, food safety, and environmental health experts talked about the environmental health considerations surrounding edibles, highlighted regulatory challenges, and discussed preventive controls and best practices to minimize food safety risks.
- **Webinar #2—State-Level Variation in the Regulation of Edible Cannabis Products:** Webinar presenters from RTI International focused on emerging policy areas in response to the growing legalization of cannabis. One area of emerging policy is the regulation of cannabis-infused edible products. The other area is how dispensary staff communicate the health and safety risks of edible products to consumers. The webinar was held in collaboration with NEHA, the National Association of County and City Health Officials, and RTI International.
- **Webinar #3—Development of Standards for Cannabis-Infused Products:** Held in collaboration with ASTM International, this webinar focused on ASTM's work in taking the lead to develop

FIGURE 1

States That Have Legalized Cannabis for Medical and Recreational Use



Source: www.newsweek.com/marijuana-legalization-2018-which-states-will-consider-cannabis-laws-year-755282.

standards related to cannabis and cannabis-infused products. Participants learned about ASTM's work to develop standards, the areas in which standards are being developed, the timeline expected for standard development, and how they can get involved. NEHA presented on the cannabis-infused product tools and resources currently under development for state and local regulatory programs.

You can access recordings of these webinars on NEHA's Food Safety website at www.neha.org/node/59142.

Development of Needed Resources

Cannabis-Infused Products Handbook: In the process of being developed, this "101" handbook will provide an overview of cannabis-infused product concepts and a glossary of terms. This useful tool is being created to give food safety professionals not familiar with edibles a better understanding of the terminology, language, acronyms, and concepts.

Guidance for Food Safety Regulations of Cannabis-Infused Products: Does your state or local jurisdiction need to create a cannabis food safety program? Are you looking to improve your current program? NEHA is compiling and developing a guidance document that will serve as a resource and a preliminary document to the development of ASTM's standards. The guidance will include a scan of how states across the country are implementing and regulating edible cannabis products and ensuring food safety

and public health, the pros and cons of these programs, recommendations, and best and model practices. Completion date for the guidance is July 2018.

Edibles Webinars Questions and Answers (Q&A) Documents: With so much interest in the three webinars previously mentioned, NEHA felt it would be useful to generate a Q&A document based on the questions submitted during the webinars. These Q&A documents can be accessed with the webinar recordings at www.neha.org/node/59142.

Lead the Way for Food Safety Professionals

Policy Statement on Consumption of Cannabis-Infused Food Products and Food Safety: NEHA neither endorses nor repudiates the use of cannabis. If a jurisdiction is considering enactment of this type of regulation, however, NEHA supports the implementation of regulations that contain sufficient regulatory authority to prevent illness from these items, as well as supports the inclusion of the policies and actions as outline in the policy statement. NEHA's Food Safety Workgroup is in the process of finalizing the statement. Once finalized, the policy will require approval of NEHA's board of directors prior to distribution. If approved, the policy will be distributed in April 2018.

Participation on ASTM's Cannabis Standards Development Committees: NEHA is a leading voice for environmental health and food safety, which is especially important when it comes to creating standards. ASTM has established the Committee D37 on Cannabis (www.astm.org/COMMITTEE/D37.htm) that is made up of several subcommittees. NEHA has representation on each of these subcommittees. Committee members will help to shape the content of standards, hence why it's important to have NEHA at the table as these discussions evolve.

Supporting Organization of the 3rd Annual CannaEast Compliance Summit, January 17–19, 2018: NEHA facilitated a focus group on developing guidance for food safety regulations of cannabis-infused products. The aim of the focus group was to bring together state and local health agencies, which are already addressing these issues and have well established food safety systems in place to address the production and sale of edibles, with those agencies that are in the process of addressing these issues or need to do so in the future. The information gathered from the focus group will provide the framework for the development of NEHA's Guidance for Food Safety Regulations of Cannabis-Infused Products. Based on the focus group findings, NEHA then facilitated a panel session at the conference. The session provided a high-level overview and summary of findings from the focus group; discussed key issues, model practices identified, and other themes that emerged from the focus group; and defined next steps toward the development of the guidance document based on the needs of the regulator community.

NEHA's Annual Educational Conference (AEC) & Exhibition: The NEHA 2017 AEC hosted two sessions focused on the issue of

food safety in cannabis edibles. These sessions were highly attended, which substantiated that this topic is an emerging area for the environmental health professional. Looking forward to the NEHA 2018 AEC and HUD Healthy Homes Conference taking place June 25–28, 2018, in Anaheim, California, the issue of food safety in cannabis edibles will again be a featured topic. Planned sessions will cover topics on cannabis policy, regulations, and standards, as well as unintentional highs and keeping products out of the hands of children. NEHA's Guidance for Food Safety Regulations of Cannabis-Infused Products and the Cannabis-Infused Products Handbook will be launched at the conference. More information about the 2018 AEC can be found at www.neha.org/aec.

Questions and Answers From NEHA's First Edibles Webinar

On June 16, 2017, NEHA hosted the Wonderful World of Edibles...Are They Safe? webinar. Marc A. Nascarella, chief toxicologist and director of the environmental toxicology program at the Massachusetts Department of Public Health, described environmental public health considerations when evaluating cannabis products for levels of cannabinoids, as well as environmental contaminants such as heavy metals, pesticides, residual solvents, and microbial growth. Marlene Gaither, environmental health program manager with the Coconino County Public Health Services District, shared details about the edibles recall in their jurisdiction and the challenges the regulatory system experienced during this highly charged food recall (see this issue's cover article on page 8). Cindy Rice, owner of Eastern Food Safety, Inc., covered preventive controls and best practices that edible producers can put in place to minimize food safety risks and keep consumers safe. These controls and practices can also aid regulators tasked with enforcing regulations and food safety.

With so much interest in this webinar, NEHA felt it would be useful to generate a questions and answers (Q&A) document based on the questions submitted during the webinar. We have also posted the Q&A documents from the other two webinars held on cannabis. These Q&A documents can be accessed with the webinar recordings at www.neha.org/node/59142.

We thought it would be of interest to our readers to print the Q&A from the first webinar.

Q: Do your state regulations require testing for any analytes with maximum allowable limits?

Gaither: Arizona does not require testing for analytes nor are there standards for limits. The only reference in the current rule requires dispensaries to list analytes (herbicides, pesticides, etc.) on the label.

Nascarella: Massachusetts defines testing requirements based on the product type and production process. Finished plant material that is considered a finished medical marijuana product (FMMP) is required to meet defined upper limits for heavy

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metals, pesticides, plant growth regulators, and microbiological contaminants. Concentrates and resins that are produced from dried plant material with the use of residual solvents are required to meet defined upper limits for residual solvents. All FMMP, including cannabis-infused products, resins, and concentrates, are required to meet defined upper limits for microbiological contaminants. For additional information, refer to the Protocol for Sampling and Analysis of Finished Medical Marijuana Products and Marijuana-Infused Products for Massachusetts Registered Medical Marijuana Dispensaries at www.mass.gov/service-details/medical-use-of-marijuana-program-product-testing.

Q: Over 90% of all cannabinoids in plant materials are found in the acid form. Do the manufacturers of edibles properly heat extracted cannabinoids to convert the acid forms to neutral forms? For example, tetrahydrocannabinolic acid (THCA) to tetrahydrocannabinol (THC)?

Gaither: Yes, dispensaries that process edibles (medical marijuana edibles) heat the active ingredients so that THC is the primary form.

Q: Could THC be viewed as an unapproved food additive in your state, and thus be embargoed as an adulterated food?

Gaither: Arizona does not consider edibles as an approved food additive, although Coconino County has included edibles in its food code.

Q: How many commercial cannabis analytical laboratories does Arizona have?

Gaither: The number of labs has varied. Currently there are four labs in Arizona that analyze edibles.

Q: Do you require all producers and manufacturers to produce hazard analysis and critical control point (HACCP) plans?

Gaither: Those that only produce low acid foods are required to submit HACCP plans.

Rice: This requirement would vary from state to state. Massachusetts regulations currently recommend producers to develop a food safety plan based on HACCP principles as a best practice. Cannabis-infused products are not recognized by the Food and Drug Administration as a legitimate product, so federal laws do not apply here as they do to other food manufacturers.

Q: Does THC affect the final pH of the processed food?

Gaither: We are currently waiting to receive results from the voluntary recall. Testing results from other states, however, indicate that extractant pH is usually below 4.6.

Q: Would it have been possible to test pH and water activity of the suspected edible products while they were on hold in order to prevent destruction?

Gaither: Yes, if the dispensary had sent it to a lab that tests for THC. The dispensary decided not to do so, however, and recalled all the products.

Rice: Yes, product testing could have been done. Lab testing can take time though, and the product is in jeopardy while the results are being evaluated. The same is true with pathogen testing.

Q: Were the laboratories that tested these products certified in analysis of edibles in Arizona?

Gaither: There are currently no existing standards or third-party certification available for labs that test edibles.

Q: How do processors account for the change in strength of THC (from delta-9-THC to 11-hydroxy-THC) in the gut?

Nascarella: Massachusetts does not define any potency or dosing limits for medical use of cannabis products. Massachusetts requires that all product labels contain the cannabinoid profile, the percentage by dry weight of delta-9-THC (i.e., the weight of the material remaining after it has been thoroughly dried), cannabidiol (CBD), tetrahydrocannabinolic acid (THCa), and cannabidiolic acid (CBDa). It is important to note that not all individuals metabolize delta-9-THC to 11-hydroxy-THC the same due sensitivity differences (e.g., liver function).

Q: Do you have a THC/CBD threshold percentage before you start regulating?

Gaither: No. The edible ordinance is part of Coconino County's food code and all types of food operations are required to be regulated.

Q: Do you feel that microbes can be introduced at the retail level from selling plant material from jars?

Nascarella: Microbiological contaminants are inevitably present in our daily environments. Appropriate packaging and storage principles (e.g., HACCP) should be practiced to prevent the unwanted introduction of microbiological contaminants.

Q: Do you test for mycotoxins in Massachusetts?

Nascarella: Massachusetts requires that all products meet defined upper limits for mycotoxins, including aflatoxin B1, aflatoxin B2, aflatoxin G1, aflatoxin G2, and ochratoxin A. For additional information, refer to the Protocol for Sampling and Analysis of Finished Medical Marijuana Products and Marijuana-Infused Products for Massachusetts Registered Medical Marijuana Dispensaries at www.mass.gov/service-details/medical-use-of-marijuana-program-product-testing.

Q: Cannabis and hemp are known to uptake radiation. Have you seen any instances of this uptake or is it tested?

Nascarella: Massachusetts does not require radionuclide testing in cannabis products.

Q: Could you briefly discuss the changes that led to the decrease of heavy metals in the plant?

Nascarella: The observed reduction of heavy metals in Massachusetts cannabis products is likely the result of both operational improvements in cultivation (e.g., improved grow media), as well as enhanced analytical testing methods and analysis practices to meet the defined upper limit standards.

Q: Is there a difference in heavy metal absorption depending on the grow medium, e.g., hydroponics, aeroponic, or aquaponic?

Nascarella: This difference has not been investigated by the Massachusetts Department of Public Health.

Q: Do you plan to increase the number of pesticides that you test for to be similar to the list that California tests for?

Nascarella: Massachusetts does not allow the use of pesticides or plant growth regulators during the cultivation of cannabis. At a minimum, products must meet the defined upper limit for pesticides and plant growth regulators for the nine most commonly abused pesticides in cannabis cultivation. For additional information, refer to the Protocol for Sampling and Analysis of Finished Medical Marijuana Products and Marijuana-Infused Products for Massachusetts Registered Medical Marijuana Dispensaries at www.mass.gov/service-details/medical-use-of-marijuana-program-product-testing.

Q: Are biological residues, such as rust mite bodies, tested?

Nascarella: Massachusetts does not require biological residue testing related to cannabis products.

Q: Do laboratories have validated methods for each cannabis matrix tested, such as the plant, concentrates, dermal products, and edibles?

Nascarella: All medical use of cannabis products intended for dispensation in Massachusetts must be tested at an independent analytical testing laboratory that is accredited to International Organization for Standardization (ISO) 17025 by a third-party accrediting body and in compliance with the analytical testing requirements in the Protocol for Sampling and Analysis of Finished Medical Marijuana Products and Marijuana-Infused Products for Massachusetts Registered Medical Marijuana Dispensaries at www.mass.gov/service-details/medical-use-of-marijuana-program-product-testing. Independent testing laboratories are responsible for validating their own methods in accordance with Massachusetts regulation.

Q: What part of the plant accumulates the most heavy metals?

Nascarella: Some studies have found that the leaves of the plant tend to accumulate the highest concentration of heavy metals when compared to other plant parts (e.g., seeds, fibers, and hurds) (Eboh & Thomas, 2005; Linger, Müssig, Fischer, & Kobert, 2002). Another study found that the roots of the plant contained higher

concentrations of cadmium compared to the leaves (Linger, Ostwald, & Haensler, 2005).

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Linger, P., Ostwald, A., & Haensler, J. (2005). *Cannabis sativa* L. growing on heavy metal contaminated soil: Growth, cadmium uptake and photosynthesis. *Biologia Plantarum*, 49(4), 567–576.

Q: Leafy greens and other produce products have been implicated in many recent foodborne illness outbreaks. You discussed mold in the webinar, but do you conduct any bacterial speciation on microbial contamination of cannabis?

Nascarella: Massachusetts requires that all products meet the defined upper limits for total viable aerobic bacteria, total yeast and mold, total coliforms, bile tolerant gram-negative bacteria, *E. coli* (pathogenic strains), and *Salmonella* species. For additional information, refer to the Protocol for Sampling and Analysis of Finished Medical Marijuana Products and Marijuana-Infused Products for Massachusetts Registered Medical Marijuana Dispensaries at www.mass.gov/service-details/medical-use-of-marijuana-program-product-testing.

Q: Do you feel that cannabis-infused products would better be regulated by food or nutraceutical regulations?

Rice: It seems that it would be best to incorporate the two areas, if possible. Food handling and testing procedures are critical to the safety of the food products, which would come under the jurisdiction of food regulators. Dosage controls are also important, however, in the case of medicinal applications, which would be typical controls and regulations of the nutraceutical industry.

Q: Do state inspections apply to retail products as well as medicinal product?

Rice: In Massachusetts, the state inspections apply to the medicinal products currently sold in the retail dispensaries. 🐼

Did You Know?

You can get more involved with NEHA by checking out www.neha.org/membership-communities/get-involved. Volunteering is a good way to make a positive contribution to the profession and get to know your association. Volunteers can serve NEHA in a variety of ways, such as a subject matter expert, peer reviewer for the *Journal*, credential exam reviewer, and social media contributor.

NEHA NEWS

Promoting the Sustainable Growth of Cannabis

By Kristen Ruby-Cisneros (kruby@neha.org)

The legalization of cannabis for either medical or recreational purposes is growing (pardon the pun) in the U.S. Currently, 29 states and Washington, DC, have legalized cannabis for medical use. Eight of those states and Washington, DC, have legalized cannabis for recreational use (see Figure 1 on page 52). Vermont recently passed legislation to legalize recreational cannabis, which will go into effect July 1, 2018. Six other states—New Jersey, Michigan, Delaware, Rhode Island, Connecticut, and Ohio—are currently considering legislation to legalize recreational cannabis. Five other states—Oklahoma, Kentucky, South Dakota, Utah, and Missouri—are looking into the legalization of cannabis for medical use (Sanders, 2018).

It is estimated that there was a total of 20,000–28,000 cannabis business in the U.S. in 2017. Of that number, there are an estimated 2,500–3,500 wholesale cultivators (cannabis growers) (Statista, 2018). The cultivation of cannabis is energy intensive and expensive, which is driving industry leaders to strive for environmental sustainability. In terms of energy use, legalized indoor cultivation of cannabis accounts for an estimated 1% of total electricity use in the U.S. (Andrle, 2017). On a per-square-foot basis, it takes 356% more energy to run a cannabis operation than it takes to operate a hospital (Mills, 2012). Along with high energy consumption, the cultivation of cannabis raises concerns about water consumption, pests and pesticide use, odor control, and waste generation.

I had the opportunity to meet one industry leader who is advocating for sustainability in the cultivation industry, and who is implementing these practices into her business. Amy Andrle, co-owner of LEagle Services (www.leagledenver.com), is leading the way in providing a sustainability framework for other cultivators to follow. LEagle is the first and only cannabis retail facility to receive the city of Denver's Certifiably Green certification. Their business is also a zero-waste facility. I spoke with Andrle and toured the LEagle Services facility last year to learn more about what they are doing to be sustainable.

The cultivation operation at LEagle is fascinating. The facility is located in a warehouse outside of downtown Denver. The front of the building is occupied by the retail operations of the business. Stepping beyond the retail store, you find yourself entering the cultivation facilities of the warehouse. Prior to entering the grow room, I had to wipe my shoes on a biocide mat to remove any outside biological contaminants. The grow room is broken down into different sections and separate rooms, depending on the current lifecycle stage of the plants. Learning about cannabis cultivation was interesting, but what is of interest to those in environmental health is the work they are doing to strive towards sustainability.

Their sustainability efforts focus on energy conservation (specifically lighting); heating, ventilating, and air conditioning (HVAC) systems for odor control, integrated pest management (IPM), water conservation, recycling, and resource management. For example, they use Organic Materials Review Institute rated pesticides that are derived from all-natural ingredients and contain no synthetics.



Cannabis plants in the vegetation stage of growth. Photo courtesy of LEagle Services/Shawna McGregor, The Rosen Group.

Their IPM system is rooted in these nonsynthetic pesticides and clean cultural practices.

One novel way they conserve energy is by storing overnight the water they intend to use for plant application. Water temperature is important to the cultivation of cannabis and should be around 70° F. Cold water is hosed into their storage tanks in the evening so that the water will be at room temperature the next day when applied to the plants. This practice saves energy by not having to heat the water to the desired temperature.

Local government agencies are also stepping in to promote sustainability within this industry. In early 2016, the Denver Department of Public Health and Environment (DDPHE) developed the Cannabis Sustainability Workgroup to determine best practices and develop educational resources for the industry. The workgroup released the Cannabis Environmental Best Practices Guide in October 2017. The purpose of the guide is to provide cannabis cultivation businesses with a snapshot of relevant sustainable practices and a starting point for process optimization techniques that facilitate continual improvement. The guide is posted online at www.denvergov.org/content/denvergov/en/environmental-health/environmental-quality/cannabis-sustainability.html.

While environmental health professionals might not have a voice in terms of regulating the cannabis cultivation industry, they can promote sustainability to the industry. As DDPHE is showing, environmental health can take the lead in providing education and training to this industry to support sustainability. 🐾

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DirecTalk

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we possess today. I foresee a time that clinicians will search out our data as they move upstream to identify the roots of their patient's health challenges. I dream of the day where there is an API that threads electronic health records with environmental data and public services data in support of standards of living improvements so that everyone can reach their potential.

I've seen glimpses of the architecture of this preferred future. The Centers for Disease Control and Prevention's Environmental Public Health Tracking Network provides a preview of the possibilities. Tennessee has or will soon migrate to a digital environmental health inspection and reporting system. El Paso County, Colorado, employs a sophisticated data management system for its land use planning activities. The GIS-mapping company ESRI has templates for digital story mapping.

Certainly there are many other initiatives underway. I sense each is a noble, not so random act of kindness that incrementally adds to the body of knowledge about what works and what doesn't work in industry and government. I sadly recognize this system is the fragmented nature of the decentralized, federated model of governance. At the same time, I feel an urgency to create a vision for what an environmental health system should



Taliesin West, winter home of architect Frank Lloyd Wright. Photo courtesy of David Dyjack

ideally look like. How will a data system inform practitioners with the right information at the right time and in the right place?

Frank Lloyd Wright felt it was imperative to shine a light on the subtle, rich details in our living environment. Our job is to illuminate the seemingly insignificant details of that environment before they become detrimental. I don't desire to change the core of the profession. I desire to preserve the integrity of our profession without it becoming

frozen in time. Let's move the center of gravity of the environmental health profession to harness the power of data and analytics.

Now then, back to the more mundane but essential business of those darn NEHA APIs. 🐛

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► **DirecTalk** MUSINGS FROM THE 10TH FLOOR

David Dyjack, DrPH, CIH

API Blues

Compress and release. Compress and release. Frank Lloyd Wright's winter home is special, so unique that it comes with its own name: Taliesin West. Located in Scottsdale, Arizona, it is universally considered an architectural gem. The residence is constructed largely of local materials that are thoughtfully assembled in a manner that ebbs and flows, reminiscent of a meandering stream. The doorways and entries into each section of the home are tiny, misleading the visitor into believing that they are entering the fictional home of a hobbit. That is the case until the true brilliance of the space reveals itself. Each room is thoughtfully designed to embrace the social nature of the human condition, a release from the confines of the entryway.

NEHA, too, is in an organizational compression moment, one defined by application programming interfaces (APIs). These software interfaces ostensibly thread together the various software systems we have in place: membership, credentialing, continuing education, and our annual conference content, among others. We are aggressively pursuing a single association website login for you to enhance your member experience. The aim is to ensure your user experience is frictionless and efficient. We are almost there (I can taste it) and now with the backbone program in place, we patiently wait for the APIs to be written, beta tested, and uploaded. The promise on the back end of this process is to release you and our staff from manual, time consuming transactions associated with NEHA so we can collectively spend more of our time on things we enjoy.

*Our job is
to illuminate
the seemingly
insignificant
details.*

I'm struck by how Frank Lloyd Wright captured it: art imitating life. He was not, however, alone. Enter Moore's law. The law was first postulated in 1965 by Intel cofounder Gordon Moore. It suggests that the computational power of microchips would double every two years. The guy was prescient. Not only has the law proven true, it is changing the nature of the world in which we live. Half of the Fortune 500 corporations that have failed in the last 20 years did so because they could not keep pace with changing technology. Think about it. In my lifetime I typed my undergraduate term papers on a typewriter; saved my master's thesis on a 5.25-inch floppy disk; and saved my doctoral dissertation on a 3-inch hard disk. Today I mosey around town with a 128-gigabyte thumb drive slung around my neck.

It's not just technology, it's the manner in which the world operates. Consider that the largest taxi service in the world (Uber) owns no vehicles. The largest retailer in the world (Alibaba) owns no goods. The largest provider

of sleeping rooms (Airbnb) owns no hotels. Cryptocurrency such as bitcoin belongs to no country. The changes we have witnessed since Moore's law was coined, as well as the speed of these transformations, lead me to believe that on most days I have "aged out."

I'm also left with the sober impression that each of us must wake each morning with the entrepreneurial mindset of a start-up business, scraping and fighting for every customer. But first we need to be in the game. To that end, NEHA recently submitted a formal request to become a member of the Joint Public Health Informatics Taskforce (JPHIT). JPHIT is comprised of nine national public health associations that help U.S. governmental public health agencies build modern information systems across a spectrum of public health programs. It attempts to integrate the expertise and reach of national associations to advance public health information systems. Environmental health is a foundational constituent of the public health enterprise and we feel our profession's contributions are essential to the health of the nation. We aim to become the 10th member of JPHIT.

I call on our members, the informatics vendor community, and the funding community to assist our profession in advancing its use of technology toward the greater good of timely decision making and public health. I envision data collection, analysis, and reporting that move beyond compliance and are used to predict, dare I say prophesize, where environmental health risks will exist in the future because of meta-analysis of trends conducted with data

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Inspect2GOTM

■ Easy ■ Powerful ■ Affordable

Environmental Health Software

The image displays the Inspect2GO software interface. On the left is a desktop dashboard with a sidebar menu containing: Dashboard, Scheduler, Forms, Inspections, Food, Sewage, Well, Pool, Child Care, Complaints, Permitting, Accounting, and Reports. The main dashboard area shows '22 Users' and '823 Food Inspections (past 30 days)' with a pie chart below. On the right, a tablet shows the mobile app interface for a location at '533 Maple Ave., Irvine, CA 92673'. The app screen lists inspection items with status buttons: '20. Proper cooling time and tempera....' (IN, OUT, N/A, R, N/O, COS), '21. Proper hot holding temperatures' (IN, OUT, N/A, R, N/O, COS), '22. Proper cold holding temperatures' (IN, OUT, N/A, R, N/O, COS) with a note 'Cut tomatoes stored at 68.6 deg', '23. Proper date marking a' (OUT, N/A, N/O, COS), and '24. Time as a Public Health' (OUT, N/A, N/O, COS). A temperature sensor is overlaid on the tablet screen showing a reading of 68.6.

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