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## ABOUT THE COVER

The importance of collaboration and communication among various agencies in building disaster preparedness in the communities they serve is explored in our feature article this month, "Building Capacity for Community Disaster Preparedness: A Call for Collaboration Between Public Environmental Health and Emergency Preparedness and Response Programs." The authors' goal was to explore the capacity of environmental health and emergency preparedness and response programs to facilitate participatory relationships between themselves and their communities. Multiple parties, including the communities themselves, contribute to successful disaster preparedness capacity.

*See page 24.*

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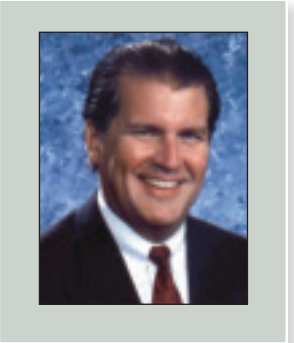


Brian Collins,
MS, REHS, DAAS

# Ethics and Integrity: Capstone Professional Tools

Almost 20 years ago I read an article in *Environmental News Digest* (e.n.d.) titled, "Be an Environmental Health Paragon." I could not find a citation so I apologize to you and the author. The author professed that as environmental health professionals, we must establish ourselves as paragons in order to insure a positive future for environmental health. (A paragon is a model or pattern of excellence.) As a new environmental health department manager, I was curious and contemplated as to how a person, organization, or profession could become a "model of excellence." I was motivated to study leaders, businesses, and certain professions to determine attributes of commonality and differentiation that support or impede growth and success.

Retrospectively, subsequent to study and a career of more than 25 years in environmental health, I can attest that two attributes that enable growth and success rise above others. These two attributes confirm trust—ethical behavior builds trust and integrity sustains it. Ethics and integrity facilitate growth, success, and excellence!

"Ethical" derives from the Greek word "ethos"—meaning "character" or "sentiment of the community." Ayn Rand, the revered 20th century author of classic business fiction such as *The Fountainhead* and *Atlas Shrugged*, mused that ethics are a "code of values which guide our choices and actions and determine the purpose of our lives."

Contemporary ethics discussion often invokes reference to decisions, choices, actions, and behaviors that reflect and enact what we believe is right or what we believe is fair or has worth or

> ***Ethics and integrity facilitate growth, success, and excellence!***

importance. Extending the discussion of ethics from personal to professional, one could surmise professional ethics as standards of conduct and behavior that come with a yet higher standard of expectation—professionalism.

Exercising personal and professional ethics within the "sentiment of the community" earns trust. When a person, organization, or profession earns trust, certain values are expected. Values that earn trust include honesty, integrity, accountability, pursuit of excellence, and courage that is not only physical but moral and ethical. Of these, the value that sustains trust is integrity.

In an ideal world, acting ethically with utmost integrity would be the norm—a way of living or conducting business consistent with values and the guiding beliefs of the community. Everyone would make decisions and take action based on a commitment to honesty, ethics, and fairness. In itself, this would promote and sustain trust. However, as you know, in the real world this is not always the case.

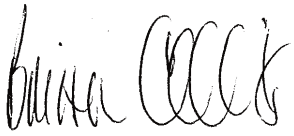
Many recent and obvious examples of integrity lapses are grand in scale—the majority of which are catastrophic to individuals and organizations with reach that has potential to jade an entire profession. My focus, however, is on individuals who choose to act on temptations and pressures that at the time of occurrence are easily rationalized.

It starts with the individual. Such lapses are compromises of personal ethics that extend to organizational and professional integrity. Such compromises come with a dear price to what one may profess is acceptable at the moment. (I recently had the unfortunate task of managing and ultimately terminating and prosecuting an employee for a catastrophic lapse in ethics and integrity. Not only did the employee suffer loss of career and a bright future, but integrity of the department and profession were equally called into question.)

In this time of distrust and cynicism, environmental health professionals must hold ethics and integrity as unimpeachable and paramount to personal and professional identity. If potential for dilemma occurs, work through these six questions summarized by the Bentley College Center for Business Ethics: 1) Is it right? (Theory of Ethics); 2) Is it fair? (Theory of Justice); 3) Who gets hurt? (Greatest Good for the Greatest Number); 4) How will it look? (Principle of Disclosure); 5) Would you tell your children or family? (Principle of Reversibility); and 6) How does it smell? (Principle of Intuition). If your sixth sense causes trepidation with any of one of the six questions, regroup, refocus, and redirect.

Dov Seidman stated in his book, *How: Why **How** We Do Anything Means Everything*, we must "outbehave" detractors and competition. We must "create value and differentiation through our behavior both individually and

organizationally." I would add "professionally" to end the axiom. It all starts with a personal commitment to honesty, objectivity, and fairness that is beyond reproach. Professionals must earn and sustain the trust and confidence of those with whom, and for whom, we live and work. This is how you achieve excellence!



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As an environmental professional, credentialed by the National Environmental Health Association, I hereby acknowledge, accept, and profess to abide by the following code of conduct and ethics:

- As long as my credential is in active status, I shall endeavor to keep myself current and informed and satisfy any continuing education requirements that may be in effect for my credential.
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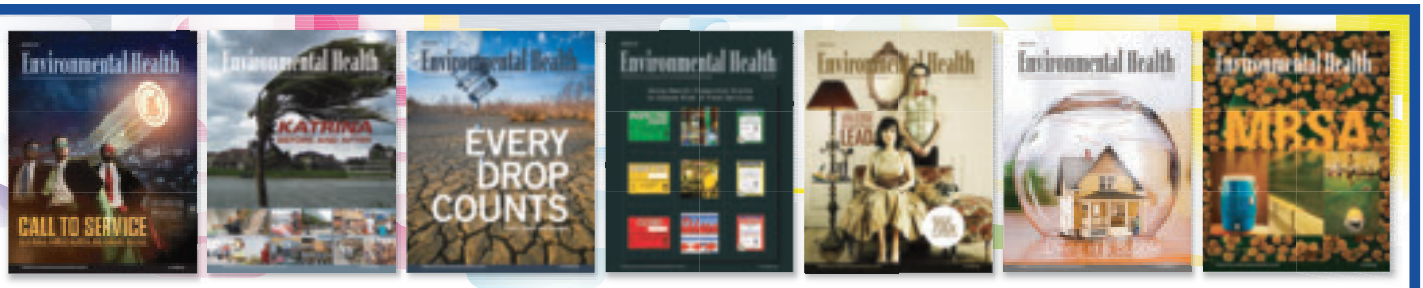
- In the course of performing my duties, I will conduct myself in a professional manner befitting of my credentialed status.
- For the sake of elevating the recognition and status of my field, I will actively encourage my professional colleagues to consider earning this credential for themselves.
- I will do nothing to undermine, detract from, or otherwise cause to develop any damaging associations with respect to this credential. I accept that any activity on my part that will cause this credential any measure of injury serves as a breach and a failure on my part to uphold this code of ethics. Moreover, I accept that such action, for which I might be responsible, could result in the revocation of my credential.
- I commit that my professional goal is to serve humankind by doing whatever I am able to do in the course of carrying out my professional responsibilities to maintain and provide a healthful environment for all.

*Source:* NEHA credential Web site (www.neha.org/pdf/cred/Code_of_Ethics.pdf).

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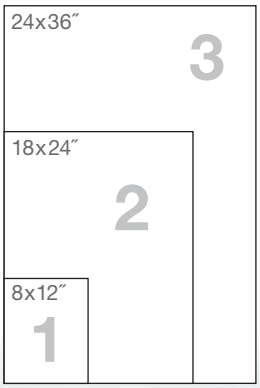


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# An Investigation to Determine Association Between Foodborne Illness and Number of Citations in a Food Establishment

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Abstract **This article analyzes the inspectional data for the food protection program at the Cincinnati Health Department prior to the implementation of a standardization program for food inspections and food inspection training. The main objectives of the authors' study were to assess if current foodborne illness risk factors were associated with different risk classes of food establishments and the relationships between foodborne illness risk factors using non-Centers for Disease Control and Prevention (CDC) foodborne illness risk factors and CDC foodborne illness risk factor criteria. Additionally the authors' study provides information on whether the standardization of staff reduced the number of risk factors at food establishments, reducing the opportunity for a foodborne illness. This research compares the mean number of violations cited per inspection at food establishments of various risk classes. The authors' findings show that both CDC and non-CDC foodborne illness risk factors were positively associated to the risk class of the food establishment; however, more non-CDC than CDC foodborne illness risk factors were cited by the sanitarians at each level of risk class.**

## Introduction

The Cincinnati Health Department (CHD) embarked on the standardization initiative of their food safety program staff as part of Standard 2 in the Food and Drug Administration's (FDA's) Voluntary National Retail Food Regulatory Program Standards (VNRFRPS) (FDA, 2007). The department continually conducts the assessment of its food safety program to determine where the organization stands in relation to FDA's nine program standards. CHD has 25 staff members assigned to the food protection program including 17 field sanitarians who are responsible for the inspections of food service operations (FSO) and retail food establishments (RFE) within their assigned jurisdiction.

The primary objective in standardizing the staff was to identify the training needs and to begin the department's total quality improvement process of the food protection program required in Standard 2 of the FDA VNRFRPS. The staff standardization is currently ongoing and proceeds as the schedules of the sanitarian and the certified training officer allow. The standardization of both the field sanitarians and the training officer requires an estimated 50 to 75 hours. This estimate is based upon the sanitarians' understanding and knowledge of the Ohio Uniform Food Safety Code and their field experience in the food protection program. The inspection by a trainee is considered as a standard inspection by the Ohio Department of Health and the Ohio Department of Agriculture. The current budget for the food protection program is approximately $1 million with about 85%–90% of the program cost covered by licensing fees.

At the conclusion of the project, a policy/guidance document will be developed for CHD's food safety program that will bring uniformity in the way sanitarians conduct their inspections of FSO and grocery stores.

The Ohio Department of Health and the Ohio Department of Agriculture have classified FSO and RFE into four risk categories in the Ohio Revised Code 3717 and Ohio Administrative Code 3701 (License Fees and Categories, 2010), as illustrated in Table 1.

The *Report on the Occurrence of Foodborne Illness Risk Factors in Selected Institutional Food Service, Restaurant, and Retail Food Store Facility Type* (FDA, 2004) has enumerated several risk factors that can cause foodborne illnesses. Food from an unsafe source, inadequate cooking time/temperature control for safety (TCS) of food, inadequate hot/cold holding of TCS food, employee hygiene, and contamination are the most common causes of foodborne illnesses. The report incorpo-

TABLE **1**

**Description of the Different Risk Classes**

| Risk Class | Description | Food Examples |
|---|---|---|
| 1 | Poses potential risk to public in terms of sanitation, storage practices, labeling, and sources of food | Coffee, prepackaged food items, and baby food and formula |
| 2 | Poses higher risk than class 1 because of hand contact and employee health; minimal pathogenic growth exists | Holding TCS[a] foods at the temperatures received and heating individual packaged portions of TCS foods |
| 3 | Proper cooking temperatures of TCS foods, processing raw food items; cook and serve establishment | Hamburgers, deli sandwiches, cutting or grinding raw meats |
| 4 | Preparing TCS foods requiring several steps including reheating and serving ready-to-eat raw TCS foods | Soups, sushi, reheated food items, and catered foods |

[a]Time/temperature controlled for safety.

rates details from inspections for compliance/noncompliance of approximately 900 facilities across the country by 21 FDA standardized food safety specialists. The results from these inspections were classified into nine types of establishments: hospitals, nursing homes, elementary schools, fast food, full service, produce, deli, seafood, and meat and poultry. These establishments were further divided into two groups: group one facilities had someone on the premises who was certified in food protection at the time of inspection, while group two facilities did not have a person certified in food protection on site during the inspection.

The objectives of our study were to assess the association between risk classes of food establishments and foodborne illness risk factors and the association of foodborne illness risk factors between CDC and non-CDC criteria. After an exhaustive literature search, no studies addressing similar issues came to our attention. The results of our study illustrate the associations using evidence-based approaches and could provide useful information to decision makers and inspectors working in food safety institutions.

## Methods

CHD inspections of FSO and RFE establishments utilize an electronic inspection program. Sanitarians are required to record electronically inspection reports and violations observed during an inspection. All violations are printed and the sanitarian reviews the printed document with the person in charge (PIC) of the food establishment. After returning back to their offices, sanitarians download the information to the Cincinnati Area GIS (CAGIS). The CAGIS-generated data collected from January 1, 2009, to December 31, 2009, were analyzed.

All violations were grouped either by CDC foodborne illness risk factors or non-CDC foodborne illness risk factors, risk class of the operation, and the name of the inspector. The certified training officer identified which sections of the Ohio Uniform Food Safety Code were CDC or non-CDC foodborne illness risk factors cited by the sanitarian. Examples of non-CDC foodborne illness risk factors are dirty floors, walls, and ceiling. Examples of CDC foodborne illness risk factors are food-service-employee behaviors such as not washing hands prior to putting on gloves, not wearing gloves when handling ready-to-eat food, or failing to maintain temperatures of 41°F and below or 135°F and above on TCS food items.

Identifiable information of facilities and inspectors involved were removed before analyzing the data. Numbers or counts of foodborne illness risk factors using CDC and non-CDC criteria individually as well as using the summation of both criteria were collected at facility levels during inspection and they became the primary numerical variables of interest. Each numerical variable was assessed for its association to the fixed effect of food establishments and a categorical variable with four risk classes using an ANOVA model. Post hoc comparisons of means were performed under the ANOVA model framework and adjusted for multiple comparisons using Tukey's method.

At each risk class of food establishments, means of foodborne illness risk factor numbers were compared between CDC and non-CDC criteria using a paired *t*-test. In addition, nonparametric methods were used to validate and cross examine findings from the parametric analyses. Specifically, nonparametric Kruskal-Wallis tests and Wilcoxon rank-sum tests were used to examine results from ANOVA models and their post hoc comparisons, and nonparametric Wilcoxon signed rank tests were used to examine results from paired *t*-tests, respectively. Only results from parametric methods are reported in the final study as no discrepant findings were noticed between parametric and nonparametric methods. All statistical analyses were performed using the PASW 18 package. *P*-values < .05 were considered statistically significant.

## Results

A total of 2,657 facilities were inspected in the study by 20 sanitarians during 2009. Facilities were found to be 182 (7%), 266 (10%), 1,215 (46%), and 994 (37%) in the risk classes of 1–4, respectively. One sanitarian inspected only risk class 1 facilities, another sanitarian inspected facilities of all classes except risk class 1, and the rest of the 18 sanitarians inspected facilities of all classes.

The mean ± standard deviation (*SD*) of facilities inspected per sanitarian was 133 ± 82. A total of 9,614 foodborne illness risk factors, with 3,535 CDC risk factors and 6,079 non-CDC risk factors, were identified from inspections on all the facilities. This yielded an average 3.62 foodborne illness risk factors with 1.33 CDC foodborne illness risk factors and 2.29 non-CDC foodborne illness risk factors per facility per inspection.

The number of foodborne illness risk factors was found positively associated to the risk class of food establishments ($p < .05$). In

particular, the mean ± *SD* of number of foodborne illness risk factors was 4.98 ± 1.07 in risk class 4, higher than those of 3.25 ± .55, 1.90 ± .75, and 2.33 ± .87 at risk classes 3, 2, and 1, respectively ($p < .05$); while the mean in class 3 was higher than those of classes 2 and 1, respectively ($p < .05$) (Table 2).

Similar results were found in numbers of foodborne illness risk factors using CDC and non-CDC criteria individually. At each level of risk classes, the mean number of foodborne illness risk factors using non-CDC criteria was higher than that of CDC criteria ($p < .05$, Table 2). Differences of number of foodborne illness risk factors between non-CDC and CDC criteria were found ranging from 0.66 to 0.93; however, they were not statistically significant among the four risk classes ($p > .05$).

TABLE **2**

**Summary of Foodborne Illness Risk Factors by Risk Class**

| Risk Class[a] | CDC[b] and Non-CDC Combined[c] | (I) CDC[c] | (II) Non-CDC[c] | (II)-(I)§ | *p*-Value* (II) vs. (I) |
|---|---|---|---|---|---|
| 1 | 2.33 ± 0.87 | 0.79 ± 0.69 | 1.54 ± 1.30 | 0.75 ± 0.87 | .001 |
| 2 | 1.9 ± 0.75 | 0.62 ± 0.40 | 1.28 ± 0.94 | 0.66 ± 0.77 | .001 |
| 3 | 3.25 ± 0.55[d] | 1.19 ± 0.59[d] | 2.06 ± 0.98[d] | 0.87 ± 0.55 | <.001 |
| 4 | 4.98 ± 1.07[t] | 2.02 ± 1.00[t] | 2.95 ± 1.04[t] | 0.93 ± 1.09 | .001 |

*Note.* Source: Cincinnati Health Department. Superscript letters of "d" and "t" indicate means in the current risk class are significantly higher than those in the lower risk classes respectively, with *p*-values < .05.

[a]Risk classes were defined using food service operations and retail food establishments; $n = 25$ facilities for each risk class.

[b]CDC = Centers for Disease Control and Prevention.

[c]Values in cells are mean ± standard deviation of number of foodborne illness risk factors.

§Values in cells are difference of mean ± standard deviation of (II) and (I).

**p*-Values are used to compare means of number of foodborne illness risk factors between CDC (I) and non-CDC (II) criteria.

## Discussion

In a risk class 1 establishment, the health concerns are sanitation, food labeling, sources of food, storage practices, and food expiration dates. Because of the limited food handling in a risk class 1 establishment, the number of CDC foodborne illness risk factors is quite low. In many of these operations, selling of food items is secondary to their primary business and is usually considered a courtesy for their customers. Therefore, sanitation and storage practices would take a back seat in their business operation. This could explain the higher number of violations in a risk class 1 facility vs. a risk class 2 facility. Further investigation into the violations cited would help explain if they were due to contamination, food storage, or due to the establishment receiving unwholesome food.

Risk class 2 facilities have a greater potential for violations of foodborne illness risk factors and associated adverse effects on the public health as compared to the risk class 1 facilities. Employee health and hygiene start to become risk factors in addition to the risks considered in risk class 1 operations. In many of these operations, food represents a greater proportion of the sales in the establishment. Hence, a greater focus on employee training in food safety is present in this risk class.

Risk class 3 establishments are commonly referred to as cook and serve operations. These types of operations handle and prepare TCS food items for sale or service. Our analysis shows that these factors are the reason the number of CDC and non-CDC foodborne illness risk factors and associated violations cited increased in this risk class. In a risk class 3 establishment food sales are frequently the main focus of the business.

Risk class 4 establishments are complex food operations. Food preparation in this class typically requires several steps that involve multiple temperature controls to minimize bacterial growth or includes service to high-risk clientele. Because of the complexity of the food preparation, the chance of a mistake increases and results in the increased number of violations cited per inspection.

Further studies are needed to verify if sanitarian standardization impacts the number and type of violations cited during a standard inspection. This goal can be accomplished by critically evaluating the staff practices after these practices are uniformly standardized.

## Conclusion

Based upon our findings, we have recommended that CHD consider training food program sanitarians so that they will consistently utilize the Ohio Uniform Food Safety Code when conducting risk assessments of the foods served or offered for sale at FSO and RFE. During the food inspection training, the sanitarians will apply CDC foodborne illness risk factors. These CDC foodborne illness risk factors are found in *The Report of Retail Food Program Database of Foodborne Illness Risk Factors* (FDA, 2000), in the section on food flow through an establishment. The CDC foodborne illness risk factors are food from unsafe sources, improper holding/time and temperature, inadequate cooking, poor personal hygiene, and contaminated equipment/prevention of contamination. The sanitarian will observe and verify the PIC's demonstration of knowledge in food safety, their duties and responsibilities, and also verify their certification in food safety. Currently, CHD has standardized more than 50% of its food safety staff.

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# Are We Aware of Microbial Hotspots in Our Household?

Robert S. Donofrio, PhD
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Abstract **Household microorganisms are found in unexpected places. Therefore, the authors conducted a study to investigate the microbial hotspots and reveal the misconceptions regarding the most contaminated objects in the household. In the authors' study, 26 daily use objects in 22 households were sampled to determine the levels of heterotrophic plate count (HPC), coliforms, *E. coli*, yeast and mold, and *Staphylococcus aureus*. High microbial concentration was found in the kitchen area and the dish sponge was the most contaminated item in the household, followed by the toothbrush holder. Coliforms were most prevalent in the kitchen on items such as sponges, sinks, and cutting boards. Yeast and molds were found on leather, fabric, porcelain, and laminate, and *S. aureus* was found on personal objects and pet's items. Overall, HPC and the presence of coliforms were significantly related to surface type ($p < .05$). In the kitchen, cleaning frequency ($p < .03$) and type of cleaning ($p < .0003$) had significant effects on HPC. The authors' study provides information that will help the general population to make an educated decision in developing a proper and routine cleaning regime in their homes. This baseline data might contribute to designing appropriate sanitation guidelines or standards that will help to implement proper sanitation practices in households and to conducting further research in the area of foodborne and household communicable diseases.**

## Introduction

Microorganisms such as bacteria and fungi are ubiquitous in the environment and we are continuously interacting with them. Human activities can influence the level and diversity of microorganisms associated within a particular environment (Hunter, 2007; Paerl et al., 2002). The household is one such environment where we live, interact, and spend most of our time apart from our workplace. Based on our routine activities and common knowledge we tend to pay more attention to certain areas and neglect others in the household in terms of cleanliness and cleaning activities; therefore, we unknowingly become prone to infections and transmit pathogens or opportunistic pathogens. Understanding our own environment such as the household and its objects in terms of microorganisms is crucial to improving overall health and safety and also in revealing some of our misconceptions about the habitat of these microorganisms within the household.

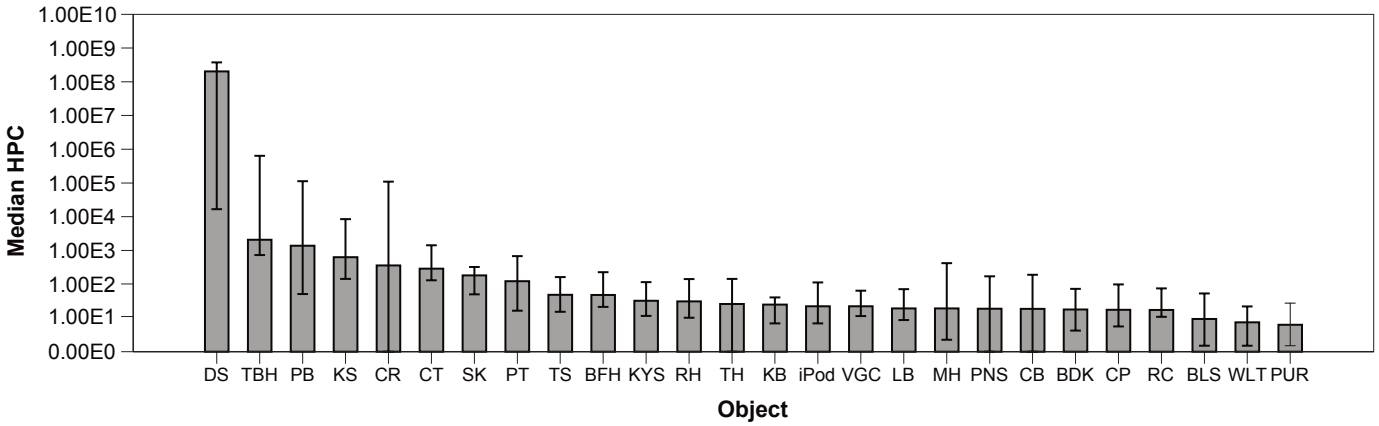
With the advent of globalization, we use a wide variety of household products including food items from different parts of the world that might expose us to different types of microbial strains with atypical characteristics (Kaferstein, Motarjemi, & Bettcher, 1997). It has been previously reported that fomites contribute to the transmission of pathogens and outbreak of foodborne illnesses at home (Boone & Gerba, 2007; Cogan, Bloomfield, & Humphrey, 2002).

The recent media exposure of outbreaks of microbial infections has led to an increase in the practice of using antimicrobial agents in the form of hand sanitizers, dishwashing solutions, disinfection wipes, and several other kitchen and bathroom items, which might impact the levels and diversity of different microorganisms. Due to the lack of proper guidelines and knowledge regarding home sanitation and hygiene, the overuse of wide varieties of these antimicrobial products available might give rise to more resistant organisms (Levy, 2001).

Given the over 48 million incidences (Centers for Disease Control and Prevention [CDC], 2012a) of food safety illness reported each year, it is important to note where microorganisms are most prevalent (i.e., hotspots) within our homes so that we can take proper steps to regularly sanitize them and safeguard against foodborne illness. We therefore conducted a study to investigate the "hotspots" for microorganisms in household objects and to reveal the general public's certain misconceptions about the most contaminated areas in their households. The baseline data generated in our study are expected to contribute to further research for the risk assessment of various transmissible and foodborne illnesses.

FIGURE **1**

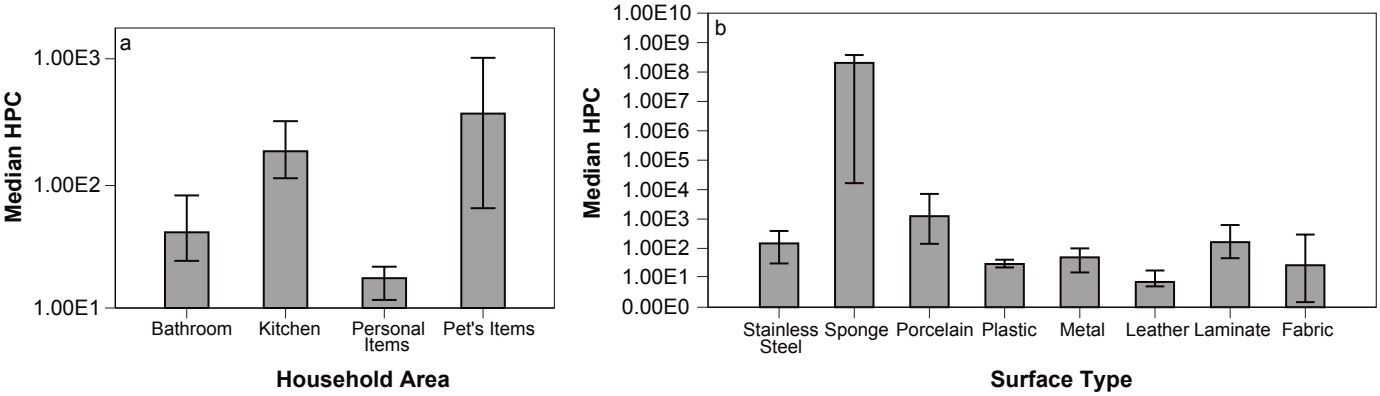
**Median (95% Confidence Interval) Heterotrophic Plate Count Bacteria (HPC) of Different Household Objects Sampled**




HPC values are presented in CFUs/10 cm$^2$. DS = dish sponge, TBH = toothbrush holder, PB = pet's bowl, KS = kitchen sink, CR = coffee reservoir, CT = countertop, SK = stove knob, PT = pet's toy, TS = toilet seat, BFH = bathroom faucet handle, KYS = keys, RH = refrigerator handle, TH = toilet handle, KB = keyboard, VGC = video game control, LB = lunch box, MH = microwave handle, PNS = pens, CB = cutting board, BDK = bathroom door knob, CP = cellular phone, RC = remote control, BLS = bathroom light switch, WLT = wallet, PUR = purse.

FIGURE **2**

**Median (95% Confidence Interval) Heterotrophic Plate Count Bacteria (HPC) Values**




Represented on a log scale. Based on household area (a) and type of surface (b). HPC values are presented in CFUs/10 cm$^2$.

The specific objectives of our study were a) to determine the levels of heterotrophic plate count (HPC), coliforms, *E. coli*, yeast and molds, and *Staphylococcus aureus* in different household objects and personal items and b) to make a comparative analysis of the overall levels of microbial contamination in household environments based on different parameters such as type of surface, frequency of cleaning, type of cleaning agents, and method of cleaning. Our study is expected to aid the general public in understanding better household sanitation issues and in making educated decisions to implement proper household sanitation practices.

## Materials and Methods

### The Study Design

Twenty-two households in southeast Michigan were selected for inclusion for a microbial survey. The volunteer households were selected randomly. Ethnicity and economic status of the volunteers did not factor into their

selection for the study. Households possessing children and pet(s) were targeted in our study. Four main classifications of objects and surfaces were focused on within the research project: kitchen, bathroom, pet's objects, and personal items. Twenty-six locations that were considered "high-touch" areas, given the activity of the typical household population, were subjected to microbiological sampling. The locations were as follows: kitchen (eight surfaces—dish sponge, kitchen sink, coffee reservoir, countertop, stove knobs, cutting board, microwave handle, and refrigerator handle); bathroom (six surfaces—toothbrush holder, faucet handle, toilet seat, door knob, light switch, and toilet handle); pet items (two surfaces—drinking bowl and toy [includes balls and rubber toys]); and personal objects (10 surfaces—pen, keys, cellular phone, iPod, lunch box, video game controller, remote control, bottom of purse, wallet, and keyboard. Each item or surface was sampled for microbiological bioburden and characterization as described below.

### Collection of Samples

A laboratory representative trained in aseptic sampling was responsible for procuring microbiological swab samples from each of the 26 locations listed previously. Sampling occurred during the months of December 2010 and January 2011. The swabs utilized in this study were 3M Quick Swabs, rayon-tipped swabs containing letheen neutralizing buffer. For the sponge samples, the entire sponge was transferred to a sterile Whirl-Pak bag. The analyst obtained swabs from the 26 locations per the directions provided by swab manufacturer (3M Microbiology, 2002).

Following surface sampling, the swabs were flooded with letheen neutralizer and placed at 4°C for transport back to the NSF International laboratory for processing. If delivery could not be achieved the same day as sampling, the samples were held overnight at 4°C and then delivered. At the time of sampling, the analyst recorded the surface area sampled in $cm^2$. The following additional data per each surface location were recorded: surface type (sponge, stainless steel, plastic, laminate, porcelain, fabrics, leather, or metal); cleaning frequency (never, daily, weekly, or monthly); type of cleaning agent used (quaternary ammonium, chlorine, or other); type of cleaning (aggressive scrub, light wipes, or other).

TABLE **1**

**Results of Univariate ANOVA, Showing the Effects of Predictor Variables on Heterotrophic Plate Count Bacteria**

| Source[a] | Mean Square | *df* | *F* | *p*-Value |
|---|---|---|---|---|
| CA | 0.99 | 4 | 0.47 | .76 |
| CF | 2.72 | 4 | 1.30 | .27 |
| ST | 40.95 | 8 | 19.65 | .01 |
| CT | 2.78 | 4 | 1.33 | .26 |
| CA*CF | 3.20 | 9 | 1.54 | .13 |
| CA*ST | 2.03 | 12 | 0.97 | .47 |
| CA*CT | 0.82 | 4 | 0.39 | .81 |
| CF*ST | 4.95 | 13 | 2.37 | .00 |
| CF*CT | 3.64 | 6 | 1.75 | .11 |
| ST*CT | 3.23 | 11 | 1.55 | .11 |
| CA*CF*ST | 1.71 | 13 | 0.82 | .64 |
| CA*CF*CT | 2.20 | 4 | 1.06 | .38 |
| CA*ST*CT | 6.33 | 5 | 3.04 | .01 |
| CF*ST*CT | 6.42 | 5 | 3.08 | .01 |
| CA*CF*ST*CT | 13.40 | 1 | 6.43 | .01 |
| Error | 2.08 | 441 | – | – |

[a]CA = cleaning agent; CF = cleaning frequency; ST = surface type; CT = type of cleaning.

### Microbiological Analysis of the Samples

A 4-mL aliquot of phosphate-buffered saline with 0.05% Tween 20 was added to each swab container to bring the total volume within the container to 5 mL. Unless otherwise noted, all reagents and chemicals were American Chemical Society reagent grade or higher. The swab samples were vortexed for three durations of 30 seconds each. The swabs were removed and disposed of. The eluent was serial diluted in phosphate-buffered saline. The dilutions were processed for microbial content using the following nonselective and selective media: total aerobic plate count bacteria used R2A agar; total coliforms and *E. coli* used the 3M Petrifilm *E. coli*/Coliform Count Plate; total yeast and mold used the 3M Petrifilm Yeast and Mold Count Plate; and *S. aureus* used the 3M Petrifilm Staph Express Count Plates.

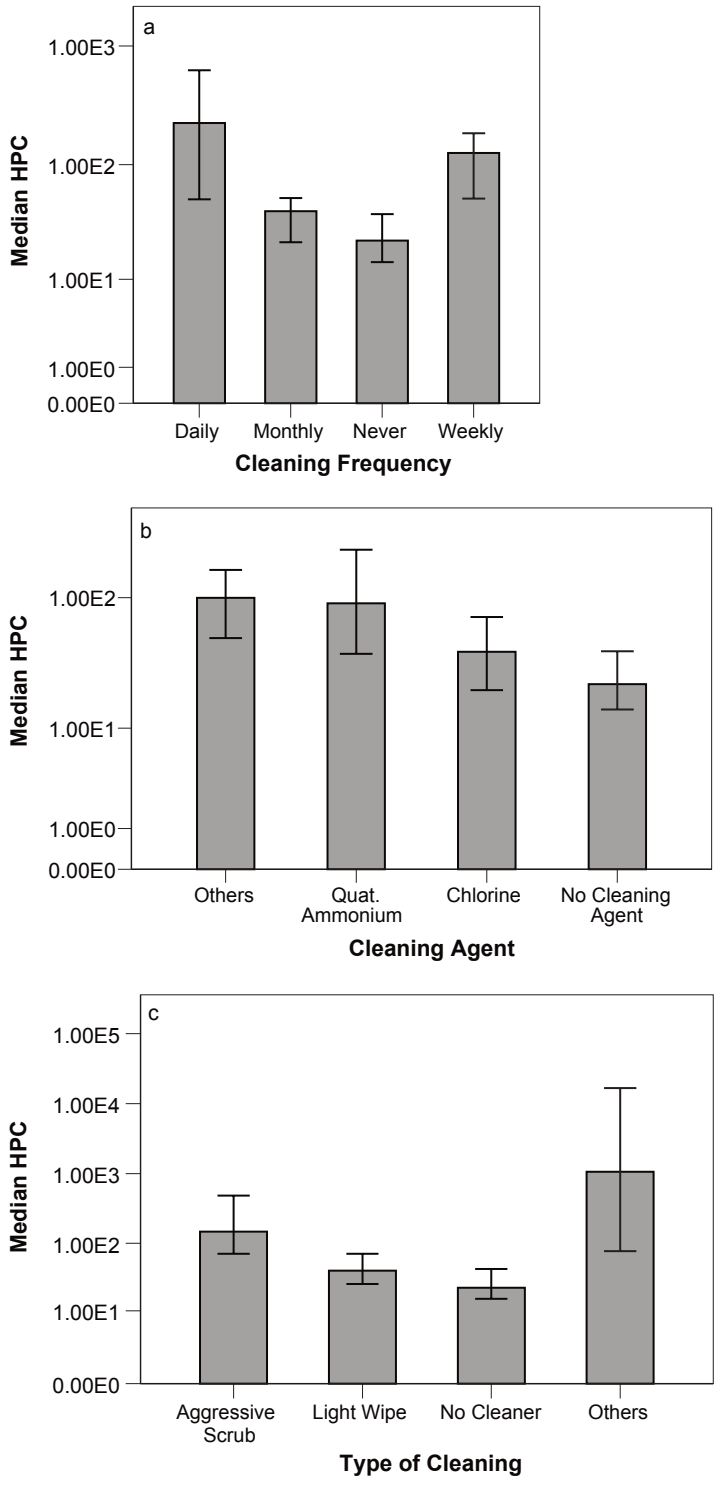
For the sponge sample, a 1-g subsample was aseptically removed and placed into phosphate-buffered saline with 0.05% Tween 20. The volume of eluent buffer varied depending on the absorbency of the sponge. The final volume amended was recorded for use in calculating observed bacterial and fungal densities. Serial dilution and organism plating for the sponge samples were carried out as specified for the swab samples. The R2A plates were incubated for 72 ± 4 hours at 30°C ± 1°C.

The yeast and mold plates were incubated for five days at 30°C ± 1°C. The coliform/*E. coli* and *S. aureus* plates were incubated for 24 hours ± 2 hours at 37°C ± 1°C. Confirmation of presumptive positive *S. aureus* colonies was performed through the addition of a 3M Petrifilm Staph Express Disk and incubation of the plate for three hours at 37°C ± 1°C. Following incubation, the plates were enumerated and the bacterial and fungal concentrations for each sample were calculated. All plates possessing growth were stored at 4°C for future isolate identification and examination.

To confirm adequate performance of the swabs and growth media, the following bacteria and fungi were utilized as control organisms: *S. aureus* American Type Culture Collection (ATCC) 6853, *E. coli* ATCC 11229, *Saccharomyces cerevisiae* ATCC 18824, and *Aspergillus niger* ATCC 6275. All cultures were obtained from ATCC. The microorganism strains were grown according to ATCC's instructions. Individually, 0.1-mL aliquots of 24-hour-old bacterial and yeast strain suspensions were inocu-

FIGURE **3**

**Median (95% Confidence Interval) Heterotrophic Plate Count Bacteria (HPC) Values Found in Kitchen Area**




Based on cleaning frequency (a) and cleaning agent (b) and type of cleaning (c). HPC values are presented in CFUs/10 cm$^2$.

lated onto sterile glass carrier slides. The protocol for slide preparation presented in Official Method 961.02 was adhered to (Association of Analytical Communities International, 2010). A spore suspension for the fungi control was also applied. The glass carriers were sampled with the swab and the swabs were processed concurrently with the samples.

### Data Analysis and Statistical Methods

The median HPC, rather than the mean values, are represented in the figures because the HPC had levels of contamination that varied from <1 up to $10^9$ CFU/10 cm$^2$, and the data failed to meet the assumptions of normal distribution (Kolmogorov-Smirnov test, $p < .05$). Univariate ANOVA was carried out with the log-transformed HPC data as response variable and surface type, cleaning frequency, cleaning agent, and type of cleaning as independent variables to see if these predictors had any effect on HPC. The predictor variables considered in our study were in the form of nominal categorical data. The bacterial count data of coliforms, yeast and molds, and *S. aureus* were converted into binary response variables (presence-absence). For each of coliform, yeast and mold, and *S. aureus*, separate logistic regression was used to determine the relationship, if any, between presence of these microbes and the independent variables. All statistical analyses were done using the SPSS 17 software package.

## Results

HPC from the surfaces of different household items sampled in our study exhibited large variations: values obtained ranged from <1 to 1.8 X $10^9$ CFU/10 cm$^2$. The median (95% confidence interval [*CI*]) HPC values for each of the objects sampled are represented in Figure 1. The figure illustrates that the bacterial counts were highest in the dishwashing sponges in the kitchen followed by toothbrush holder, pet bowls, and kitchen sinks, whereas personal items such as purse, wallet, and cellular phone reported the lowest counts. An overall comparison of HPC showed that the median bacterial counts were highest in the pet's items followed by kitchen and bathroom (Figure 2a). It is interesting to note that even though a majority of the fomites that exhibited high levels of contamination belonged either to the kitchen or bath-

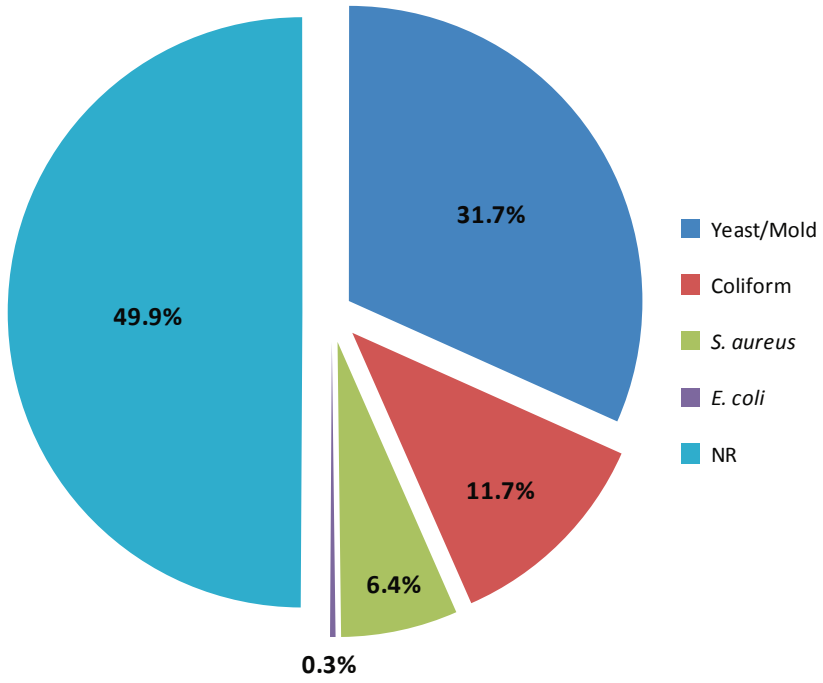
room, the light switch in the bathroom and microwave handle in the kitchen had comparatively lower levels of HPC in our study sample. When HPC was categorized based on surface type, porcelain and laminate topped the list apart from sponges (Figure 2b).

Results of univariate ANOVA on the log-transformed data revealed that only surface type ($F$ = 19.6, $df$ = 8, $p$ < .05) had a significant effect on HPC (Table 1). Even though HPC was lower on the surfaces that were cleaned with chlorine-based cleaner (3.9 x $10^1$ CFU/10 $cm^2$), compared to quaternary ammonium (9.0 x $10^1$ CFU/10 $cm^2$), the overall differences were not significant. Interestingly, the use of light wipes showed a lower HPC value than an aggressive scrub. An ANOVA was performed separately on the kitchen data to see if the cleaning parameters had any effect on HPC (Figure 3). The kitchen was a focal point given that a majority of the kitchen surface locations ranked in the top 10 in terms of highest bacterial concentration. The results indicated that cleaning frequency ($p$ < .03) and type of cleaning ($p$ < .0003) had significant effects on HPC.

A total of 572 surfaces were sampled, of which yeast and molds were found to be positive for a maximum number of surfaces, followed by coliforms, *S. aureus*, and *E. coli* (Figure 4). For each of the objects sampled, the percentage of surfaces positive for coliforms, yeasts and molds, and *S. aureus* is presented in Figure 5. We observed that coliforms were more prevalent on the kitchen surfaces (Figure 6a), including dish sponges/rags (22.7%), kitchen sinks (13.3%), countertops (9.3%), and cutting boards (5.3%). Yeasts and molds were predominant on fabric (85.7%), leather (45.4%), plastic (58.0%), porcelain (61.5%), and stainless steel surfaces (49.7%), whereas *S. aureus* was found mostly on pets' items (39.5%) and personal objects (23.3%) (Figures 6a, 6b). Only two factors showed highly significant ($p$ < .001) associations with the presence of coliform bacteria: surface type and cleaning agent (Table 2). The isolation of coliform colonies was significantly higher in dish sponges (odds ratio [$OR$] = 122.07, $p$ < .05) and porcelain ($OR$ = 23.65, $p$ < .01). The presence of yeast and molds and *S. aureus* was not significantly related to any of the factors except for *S. aureus*, in which cleaning frequency had a significant relation ($p$ < .03) (Table 2).

FIGURE **4**

**Percentage of Surfaces Positive for Yeast and Mold, Coliform, *Staphylococcus aureus*, and *E. coli* of the Total Number of Surfaces Sampled**




NR = the percentages of surfaces negative for the above group of microorganisms.

## Discussion

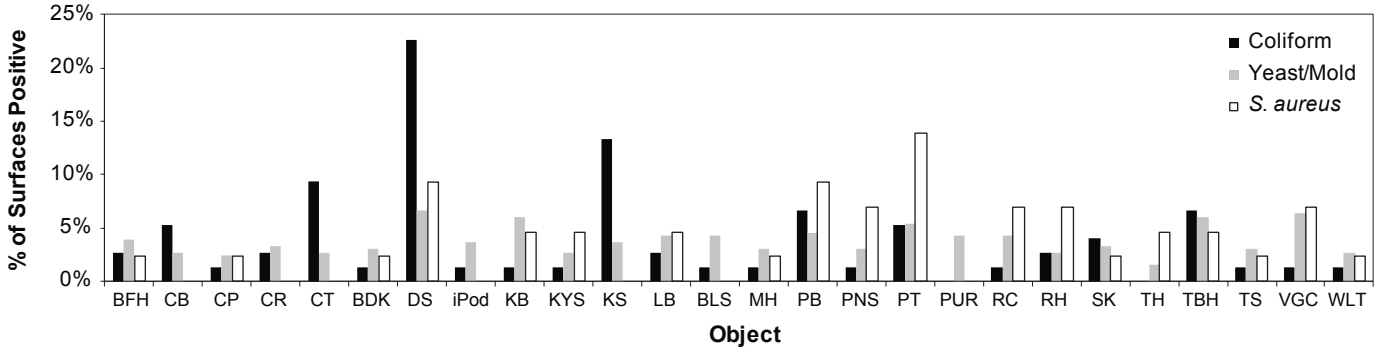
Our study was conducted to help identify the microbial "hotspots" in an average person's home, with an intention to help people understand how they can better protect themselves from different household microorganisms, some of which might be pathogens or opportunistic pathogens. Not all of the microorganisms that we interact with are harmful; some are beneficial and vital for our existence. A typical human microbiota has been estimated to have 10 times as many microbial cells as the human body (Sekirov, Russell, Antunes, & Finlay, 2010) and many of these bacteria are critical to our health in that they actually help us fight off disease and chronic conditions (Ley, Turnbaugh, Klein, & Gordon, 2006).

Before conducting the swab analysis, NSF International asked a member of each volunteer household to rank the items they thought would have the most contamination in their home. The survey revealed misconceptions about which household items have the most microorganisms. Items found in the bathroom were most frequently ranked by survey respondents to be most contaminated in the home. The swab analysis, however, revealed that kitchen items actually had higher HPC compared to the bathroom items. More specifically, the volunteers perceived the rank of contamination in the following order (from highest to lowest): toothbrush holder, dish sponge, money, pet toy, kitchen countertop, bathroom door knob, kitchen sink, pet bowl, toilet handle, and bathroom light switch. On the contrary, the top 10 items in our study that exhibited HPC (highest to lowest) were dish sponge, toothbrush holder, pet bowl, kitchen sink, coffee reservoir, kitchen countertop, stove knob, pet's toy, toilet seat, and bathroom faucet handle (Figure 1).

The results indicated that the kitchen area, where sanitation is an important concern, had the highest HPC. In fact, sponges and dishrags, the very items used to clean the kitchen, topped the list. The high HPC could probably

FIGURE **5**

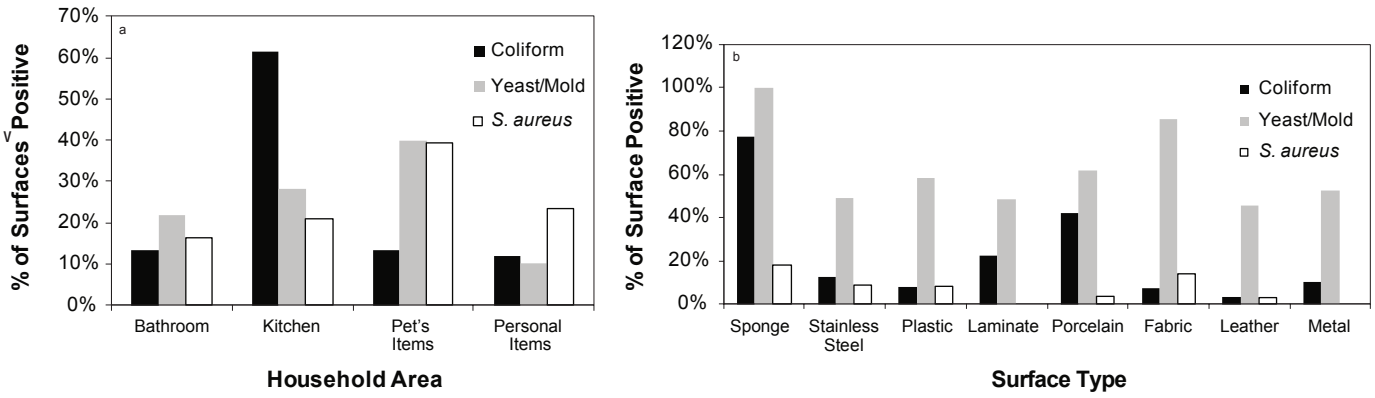
**Percentage of Surfaces Positive for Coliform, Yeast and Mold, and *Staphylococcus aureus* in Each of the Household Objects Sampled**




The abbreviations used are same as in Figure 1.

FIGURE **6**

**Percentage of Surfaces Positive for Coliform, Yeast and Mold, and *Staphylococcus aureus* based on Household Area (A) and Surface Type (B)**




be a function of their use. The porous nature of sponges allows them to pick up and hold bacteria and nutrients through the cleaning process. They are often not properly left to dry and instead are left in damp areas, which provide an optimal environment for microbial growth. Additionally, they are not properly sanitized before their next use. The results obtained in our study are also supported by other works that have demonstrated that despite the use of dishwashing liquid agents, it was difficult to reduce contamination levels in used dish sponges (Kusumaningrum, van Putten, Rombouts, & Beumer, 2002).

The kitchen was also the area of the home where coliform bacteria were most prevalent, probably due to the presence of raw food products such as poultry, fruits, and vegetables. Because of cross contamination, the high coliform count on these surfaces can cause potential foodborne illnesses at home (CDC, 2012b). This generally occurs when hands or items are not properly sanitized after coming in contact with a contaminated surface. Similar results were reported in other studies irrespective of geographic locations and lifestyle (Chaidez & Gerba, 2000; Ojima et al., 2010; Shruti, Pankaj, Shekhar, & Ruchica, 2011).

Our study showed that porcelain, laminate, and stainless steel had high numbers of positive surfaces for coliforms along with yeast and molds (Figure 6b). This result is well supported by other works that have highlighted that pathogens can remain viable on dry utensils and stainless steel surfaces in the kitchen environment for considerable periods of time (Kusumaningrum, Riboldi, Hazeleger, & Beumer, 2003; Scott, Bloomfield, & Barlow, 1982). While certain household items like the kitchen sink and sponge are "hotspots" for microorganisms because of their function in the home, others allow for

TABLE **2**

**Logistic Regression Model of Coliform, Yeast and Mold, and *Staphylococcus aureus* in Different Household Objects**

| Variables | *df* | Coliform | | | Yeast and Mold | | | *S. aureus* | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | B[a] | *p*-Value | *OR*[a] | B | *p*-Value | *OR* | B | *p*-Value | *OR* |
| Surface type | 7 | – | .001 | – | – | .27 | – | – | .48 | – |
| Stainless steel | 1 | 1.27 | .33 | 3.55 | 0.15 | .76 | 1.16 | 2.98 | .02 | 19.65 |
| Plastic | 1 | 1.22 | .31 | 3.40 | 0.59 | .12 | 1.80 | 1.53 | .14 | 4.63 |
| Laminate | 1 | 1.96 | .13 | 7.06 | 0.53 | .35 | 1.70 | -16.10 | 1.00 | 0.00 |
| Porcelain | 1 | 3.16 | **.01**[b] | 23.66 | 0.80 | .18 | 2.23 | 1.39 | .36 | 4.03 |
| Fabric | 1 | 1.57 | .32 | 4.83 | 1.98 | .02 | 7.26 | 1.61 | .21 | 5.02 |
| Metal | 1 | 1.40 | .30 | 4.05 | 0.25 | .61 | 1.28 | -17.26 | 1.00 | 0.00 |
| Sponge | 1 | 4.80 | **.001**[b] | 122.07 | 21.82 | .998 | 3.01E+09 | 2.00 | .12 | 7.39 |
| Cleaning frequency | 3 | – | .14 | – | – | .22 | – | – | .03 | – |
| Daily | 1 | -2.31 | .04 | 0.10 | -0.47 | .56 | 0.62 | -2.85 | .23 | 0.06 |
| Weekly | 1 | -2.18 | .05 | 0.11 | 0.30 | .70 | 1.35 | -1.41 | .51 | 0.24 |
| Monthly | 1 | -2.54 | .02 | 0.08 | 0.17 | .82 | 1.19 | -0.08 | .97 | 0.92 |
| Cleaning agent | 3 | – | .01 | – | – | .21 | – | – | .46 | – |
| Others[c] | 1 | 5.27 | .00 | 0.01 | 0.39 | .57 | 1.47 | 1.87 | .38 | 6.49 |
| Ammonium based | 1 | 0.76 | .07 | 2.15 | 0.88 | .20 | 2.41 | -17.66 | 1.00 | 0.00 |
| Chlorine based | 1 | -0.16 | .74 | 0.85 | 0.87 | .20 | 2.39 | 1.03 | .63 | 2.79 |
| Type of cleaning | 3 | – | .35 | – | – | .54 | – | – | .36 | – |
| Aggressive scrub | 1 | -2.16 | .09 | 0.12 | -0.89 | .25 | 0.41 | -1.29 | .47 | 0.28 |
| Light wipe | 1 | -2.21 | .07 | 0.11 | -0.98 | .18 | 0.37 | -1.30 | .43 | 0.27 |
| Others[d] | 1 | -2.06 | .10 | 0.13 | -1.16 | .15 | 0.31 | -0.06 | .97 | 0.94 |
| Constant | 1 | 0.97 | .57 | 2.63 | -0.18 | .60 | 0.83 | -3.55 | .00 | 0.03 |

[a]B = variable coefficient; *OR* = odds ratio.
[b]The values in bold indicate significant effect.
[c]For the category "cleaning agent," the group "others" included natural products.
[d]For the category "type of cleaning," the group "others" included rinsing by hand in water.

substantial microbial growth because they are easily overlooked. This holds true for the coffee reservoir (where water is held in the coffee maker before brewing), which contained high counts of yeast and mold. Another example of a neglected item that showed high levels of bacteria was the toothbrush holder. In smaller bathrooms, it is generally placed in close proximity to the toilet and flushing often causes aerosols, containing fecal bacteria, to land on items near the toilet (Gerba, Wallis, & Melnick, 1975). Microbes quickly multiply because the toothbrush holder sits in a damp area and is often neglected in the cleaning process, since it often just gets a quick rinse after daily use.

Our study highlighted that cleaning frequency, agent, type of cleaning, and their interactions did not have any significant effect on HPC values (Table 1). This was also evident from the fact that objects like the dish sponge, countertop, cutting board, kitchen sink, pet's bowl, toilet seat, toilet handle, and bathroom faucet handle, which were cleaned frequently (either daily or weekly), exhibited high HPC values. Possible explanations could be that a) cleaning procedures were not effective against microorganisms in the households sampled in this study; b) these items had greater probability of cross contamination compared to personal items like remote controls, cellular phones, and purses (the items never/rarely cleaned); c) kitchen and bathroom items provide a moist and damp environment, conducive for microbial growth compared to personal items; or d) the more aggressive cleaning method may result in liberating higher concentrations of bacteria to the surface.

Earlier studies conducted by Rusin and coauthors (1998) demonstrated that frequent cleaning following a strict regimen with a combination of different hypochlorite products was successful in reducing the levels of microbial contamination in different kitchen and bathroom objects. Our study group was randomly selected, however, with an aim to evaluate the real-time scenario of microbial contamination in an average household. Also, we tested the effects of the different factors on the pooled HPC data obtained from all the objects sampled in our study. Further studies with increased sample size are required to specifically investigate if cleaning frequency, cleaning agent along with contact time, and proper cleaning procedure could influence the overall levels of microbial contamination in household environments. Additional

studies also could be performed to examine if microbial concentrations are reduced over time if a more routine, aggressive cleaning regimen is implemented for these hotspots.

## Conclusion

Our study was successful in indicating the microbial hotspots in a general household and also clarified some of the misconceptions regarding the most contaminated areas in a household. The findings of our study will help environmental health professionals to a) educate the general population in understanding the importance of the overall household hygiene and sanitation practices, b) perform risk assessment and help to identify areas and objects contributing to household communicable and foodborne illnesses, c) implement appropriate measures to reduce transmission of diseases through fomites, d) establish a standard or guidelines to implement an effective household environmental monitoring program, and e) identify the main reservoirs or carriers of microorganisms in the household. This will help to investigate further and identify some of the dominant microorganisms, including their source, role, and interactions in household environments such as biofilm-forming capabilities and potential resistance to disinfectant and sanitization agents. Additionally, the risk assessment strategy detailed in this article can be directly applied to other environments and workplace settings. Overall, the baseline data will help to increase awareness and protect public health and safety.

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INTERNATIONAL PERSPECTIVES

# Microbial Contamination in 20-Peso Banknotes in Monterrey, Mexico

*Although most of the information presented in the Journal refers to situations within the United States, environmental health and protection know no boundaries. The Journal periodically runs International Perspectives to ensure that issues relevant to our international membership, representing over 20 countries worldwide, are addressed. Our goal is to raise diverse issues of interest to all our readers, irrespective of origin.*

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**Abstract** **The authors' aim was to isolate and identify bacteria or yeast that may be present on the surface of 20-peso banknotes from the metropolitan area of Monterrey, Mexico. They randomly studied a total of 70 20-peso banknotes for the presence of bacteria and species of *Candida* by conventional methods. Out of the 70 banknotes, 48 (69%) were found to be contaminated. The most prevalent species observed was *Candida kruseii* (19 bills, 27%) followed by *Burkholderia cepacia* (9 bills, 13%); 22 (31%) bills showed no growth. Of the 48 contaminated bills, four (5.7%) yielded bacteria considered pathogenic and the other 44 bills (63%) yielded bacteria considered potentially pathogenic. Eleven bills showed more than one microbial species. The results of the authors' study show that contamination occurs on paper currency in the metropolitan area of Monterrey. The authors' findings provide evidence that currency banknotes may represent a threat to human health.**

## Introduction

Microbial contaminants can be transmitted directly by hand-to-hand contact or indirectly via food or inanimate objects like banknotes and doorknobs or other objects that come into contact with multiple human hands. Banknotes may be contaminated during storage and exchange, with lower-denomination banknotes receiving the most handling and therefore more contamination (Abrams & Waterman, 1972).

Publications regarding the degree to which paper money is contaminated with bacteria are few and include the use of traditional microbial culture (El-Dars & Hassan, 2005; Khin Nwe, Phyu Phyu Win, Aung Myo Han, & Aye, 1989; Pope, Ender, Woelk, Koroscil, & Koroscil, 2002; Singh, Goering, Simjee, Foley, & Zervos, 2006; Singh, Thakur, Kalpana, & Goel, 2002; Shukla, 1980) and molecular methods (Xu, Moore, & Millar, 2005). In general, a greater number of bacteria have been reported on banknotes than on coins.

Twenty-peso Mexican banknotes are made from a polymer substrate. Although the primary purpose for the development of this substrate was to enhance security, it has been proven that this material provides other advantages, i.e., it has a higher tear resistance than paper, it is nonporous, and it does not absorb water or sweat. Given these characteristics, polymer banknotes may be cleaner than paper currency.

Publications regarding the degree to which polymer guardian banknotes are contaminated with bacteria are few. The aim of our study was to isolate and identify bacteria or yeast that may be present on the surface of 20-peso banknotes from the metropolitan area of Monterrey, Mexico.

## Methods

### Sampling Technique

A total of 70 samples of Mexican banknotes were studied from February to May 2007. The serial number of each bill was registered in order to differentiate and identify the source of each banknote. The banknotes came from 25 different sources (four municipalities from the metropolitan area of Monterrey: Monterrey, Guadalupe, San Pedro, and San Nicolas de los Garza). Banknotes from Benito Juarez and Santiago, which are municipalities located less than 50 km from the metropolitan area, were also included.

The banknotes came from various sources, including banks, toll booths, convenience stores, restaurants, cafeterias, and yogurt stores, among others. Samples were randomly obtained and banknotes were placed in a sterile polyethylene bag. The bag was sealed and the sample was taken to the laboratory. All currency banknotes were in good physical condition.

TABLE **1**

**Results of 70 Banknotes Analyzed With Distribution of Collection Sites, Municipalities, and Week of Collection**

| Species | Collection Site[a] (# of Notes) | Municipality[b] (# of Notes) | Week (# of Notes) |
|---|---|---|---|
| *C. kruseii* | 6, 8, 12, 21 (1 each); 5, 13 (2 each); 14 (6) | MTY (13), SAN (1) | 3 (2); 7, 10 (3 each); 5 (6) |
| *B. cepacia* | 5, 13, 14, 24 (1 each); 11 (2) | JUA (1), MTY (5) | 3 (2), 4 (3), 10 (1) |
| *P. putrida* | 22 (2) | CAD (2) | 1 (2) |
| *A. baumannii* | 11, 23, 25 (1 each) | GPE (3) | 4 (2), 10 (1) |
| *Bacillus spp.* | 15 (1) | MTY (1) | 5 (1) |
| *C. freundii* | 5, 22 (1 each) | CAD (1), MTY (1) | 1 (2) |
| *K. oxytoca* | 19 (1) | SAP (1) | 4 (1) |
| *K. pneumoniae* | 13 (1) | MTY (1) | 4 (1) |
| *P. stutzeri* | 1, 5, 9, 13 (1 each) | MTY (4) | 1 (1), 4 (3) |
| *S. aureus* | 10 (1) | MTY (1) | 1(1) |
| *C. tropicalis* | 20 (1) | SAP(1) | 10 (1) |
| *C. violaceum* | 9 (1) | MTY (1) | 1 (1) |
| *B. cepacia* and *P. stutzeri* | 5, 23 (1 each) | MTY (1), GPE (1) | 3 (1), 4 (1) |
| *C. kruseii* and *S. epidermidis* | 6, 18 (1 each) | SNG (1), MTY (1) | 10 (2) |
| *C. kruseii* and *P. stutzeri* | 16 (1) | MTY (1) | 10 (1) |
| *B. cepacia* and *C. violaceum* | 4 (1) | MTY (1) | 7 (1) |
| *C. kruseii* and *E. faecalis* | 14 (1) | MTY (1) | 7 (1) |
| *C. kruseii* and *S. aureus* | 15 (1) | MTY (1) | 5 (1) |
| *P. aeruginosa* and *C. freudii* | 22 (1) | CAD (1) | 1 (1) |
| *S. aureus* and *Bacillus spp.* | 5 (1) | MTY (1) | 4 (1) |
| *S. aureus* and *E. agglomerans* | 2 (1) | MTY (1) | 7 (1) |
| Negative | 3, 6, 11, 13, 15–17, 21 (1 each); 7, 9 (2 each); 14 (3), 5 (7) | SAN (1), MTY (19), SNG (2) | 1, 5 (2 each); 3 (5); 4 (8); 7 (4); 10 (1) |

[a]Bank (1–3, 6), toll booth (22 and 23), convenience store (12–15, 24, 25), gas station (8), hairdresser (7), tourist area (4 and 21), mall (9 and 16), restaurant (18 and 19), restaurant near hospital (11), high school cafeteria (5), electronics store (17), yogurt store (10 and 20).

[b]MTY = Monterrey; SAN = San Nicolas de los Garza; GPE = Guadalupe City; CAD = Cadereyta Jiménez; JUA = Juárez; SAP = San Pedro.

### Culture

Each banknote was placed in 5-mL sterile saline for 24 hours. A sterile, cotton-tipped swab was briefly introduced in the saline and the swab was seeded with a portion of the saline homogenized in blood agar plates and incubated for 48 hours at 37°C in aerobic conditions. Plates were then examined for bacterial growth and the colonies underwent Gram stain. Gram-negative colonies were grown on Eosin methylene blue agar plates and identified with the Crystal Identification System (Becton Dickinson). Gram-positive cocci were grown on azide agar plates and identified by conventional biochemical tests. Identification of yeasts was performed with CHROMagar *Candida* (Becton Dickinson).

## Results

### Culture of Banknotes

Of the 70 currency banknotes on which bacteriological analysis was conducted, 48 (69%) were found to be contaminated with several microbial species (Table 1). Sixteen species isolates were obtained from the banknotes: 14 bacterial species (four [23%] Gram positive and 10 [63%] Gram negative) and two (13%) yeast species. The most prevalent species observed was *Candida kruseii* (19 banknotes, 27%) followed by *Burkholderia cepacia* (nine banknotes, 13%). Of the 70 banknotes included, 22 (31%) showed no growth.

Four bills (5.7%) yielded bacteria considered pathogenic to healthy hosts and the other 44 contaminated bills (63%) yielded bacteria considered potentially pathogenic to hospitalized or immunocompromised hosts. Additionally, 11 bills showed more than one microbial species.

### Distribution of Positives

A wide distribution of pathogens occurred from the different points included. The majority of *Candida* isolates were detected on banknotes from a convenience store in Monterrey. *C. kruseii* was detected at nine different points and *Staphylococcus aureus* was detected at three different points: a bank, a school cafeteria, and a yogurt store (Table 1).

An interesting result was the isolation of *Acinetobacter baumannii* and *Burkholderia cepacia* in three banknotes obtained from a restaurant in front of a third-level hospital. At

that point, four banknotes were cultured and three were positive. Other pathogens detected in restaurants, cafeterias, or yogurt stores were *Klebsiella oxytoca, C. kruseii, Staphylococcus epidermidis, Pseudomonas stzutzeri, Citrobacter freundii, B. cepacia, S. aureus,* and *C. tropicalis.*

## Discussion

Banknotes are an excellent transport medium for different types of microorganisms because they are commonly passed among individuals. Thus, handling money may be a route for transmission of infections (Xu et al., 2005). We analyzed a sample of 70 20-peso bills to isolate and identify bacteria or yeast that may be present on the surface of these banknotes.

Pope and co-authors analyzed 68 $1 bills collected from a school and a grocery store and found that five (7%) were contaminated with pathogenic bacteria, 59 (87%) were contaminated with opportunistic pathogens, and just four (6%) were free of bacteria (Pope et al., 2002). Unlike the study by Pope and co-authors, in our study 31% of the banknotes were negative. Our results are similar to a previous publication (Abrams & Waterman, 1972), in which 70% of banknotes were contaminated with bacteria. Of these banknotes, 60% contained pathogens, including *S. aureus, E. coli,* and *P. aeruginosa.*

Medical personnel seem to play an important role in contamination of paper currency, since it has been reported that 13% of coins and 42% of currency collected from laboratory personnel were contaminated with *S. aureus, E. coli, Klebsiella* sp., and *Proteus mirabilis* (Abrams & Waterman, 1972). Additionally, the culture of 100 banknotes and 102 coins collected from medical personnel showed that 3% of coins and 11% of banknotes were contaminated with opportunistic pathogens (Khin Nwe et al., 1989). In our study, we did not include banknotes collected in any hospital, but banknotes collected near hospital facilities were contaminated with opportunistic pathogens such as *B. cepacia* and *A. baumannii*.

In our study, 16 different microbial species were identified, including the true pathogen *S. aureus*, some frequent opportunistic pathogens (*A. baumannii, C. freundii, E. faecalis, K. oxytoca, K. pneumoniae,* and *P. aeruginosa*), some less frequently found opportunistic pathogens (*E. agglomerans, P. putrida, P. stutzeri, C. kruseii, C. tropicalis, S. epidermidis,* and *C. violaceum*), and extremely rare opportunistic pathogens (*Bacillus* spp.). The non-*aeruginosa* species of *Pseudomonas* detected in our study are ubiquitous environmental organisms. These species rarely cause primary human disease in healthy hosts but have been reported to cause serious nosocomial infections or infections in immunocompromised hosts. The isolation of *P. aeruginosa* and *A. baumannii* deserves special attention because for some of these species, antibiotic resistance is well documented, which can make infection by these organisms difficult to treat if they infect a susceptible host.

A recent study that included 1,280 banknotes from 10 countries, including Mexico, reported that pathogens could only be isolated after enrichment and their mere presence did not appear to be alarming (Vriesekoop et al., 2010). The authors discussed that the presence of bacteria on banknotes is influenced by the material used for the banknotes (polymer based vs. cotton based) and the age of the banknotes. They stated that the average number of bacteria encountered on the polymer banknotes was approximately 25% of that found on cotton-based banknotes (Vriesekoop et al., 2010). That study showed a lower percentage of contamination in Mexican banknotes in comparison to banknotes from China, the U.S., the UK, and the Netherlands, among others. We analyzed only polymer-based banknotes in good condition, but the presence of contamination was detected in most banknotes analyzed without any enrichment procedure.

In that study, the only contaminations detected in Mexican banknotes were *E. coli, S. aureus*, and a low percentage of *Bacillus cereus*, which were interpreted as an indicator of poor hygiene, background microorganism, and the ability of spore-forming bacteria to persist on banknotes, respectively. In our study, we detected *S. aureus* and *Bacillus* spp. but we did not detect *E. coli*. It is important to point out that the 10-country study included currencies obtained only from food outlets and for this reason the results from that study and ours cannot strictly be compared.

Our results showed the presence of pathogens in banknotes. To reduce risks for health, some recommendations can be made as follows: a) in establishments that manipulate large amounts of banknotes, such as banks or exchange establishments, employees should wash hands before and after counting money or irradiation of bills should be performed periodically; b) in restaurants or establishments that serve food, the personnel who prepare or serve food must never touch money while working, or if they must receive money, they must practice proper hand washing procedures before handling food again; and c) the general population should never put money in their mouths and they should wash hands after handling money and always be aware that money may be contaminated with potentially infectious microorganisms.

Some limitations of our study that should be taken into account are that we performed only a qualitative analysis; a quantitative study could have given a better idea of the degree of contamination. Also, sampling was not uniform because we did not include the same number of banknotes from the same collection site, from the same municipality, in the same week, and this could have an impact on our results.

More research is also needed to include the study of some viruses, especially those that may persist on fomites such as influenza virus, rotavirus, and others. In addition, banknotes of other denominations should be included, such as 50-peso banknotes or the study of particular populations such as hospital neighborhoods, which according to the results of our study, are universes that deserve special attention.

## Conclusion

Our results show that contamination of paper currency occurs in the metropolitan area of Monterrey. Our findings provide evidence that currency banknotes should be managed with care in order to reduce the potential health risk they represent for humans.

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# Building Capacity for Community Disaster Preparedness: A Call for Collaboration Between Public Environmental Health and Emergency Preparedness and Response Programs

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**Abstract** **Partnerships among local public environmental health (EH), emergency preparedness and response (EPR) programs, and the communities they serve have great potential to build community environmental health emergency preparedness (EHEP) capacity. In the study described in this article, the beliefs and organizational practices pertaining to community EHEP outreach and capacity were explored through key informant (KI) interviews (*N* = 14) with a sample of governmental EH and EPR administrators and top-level managers from Riverside and San Bernardino counties in Southern California. The results indicate that KIs were highly confident in their workforces' efficacy, ability, willingness, and motivation to directly engage local communities in EHEP. Best practices to combat organizational and systematic barriers to community EHEP outreach were identified. Based on the authors' results, training in participatory methods is needed to bridge technical knowledge in emergency management to daily practice. The lessons learned will form the basis of future interventions aimed to prepare EH and EPR professions to implement community-focused emergency preparedness strategies.**

## Introduction

Disasters have the potential for negative long-lasting repercussions on the environment and environmental health services (e.g., food, water, shelter, sanitation and hygiene, and vector control) of affected areas (Miller, 2006; World Health Organization, 2011). Partnerships among local public environmental health (EH), emergency preparedness and response (EPR) programs, and the communities they serve have great potential to build community environmental health emergency preparedness (EHEP) capacity because of the expertise of the first two groups in protecting the public's health from harmful elements in the environment (Berg, 2004; Elderidge & Tenkate, 2006; Forsting, 2004; Miller, 2006) and their ability to coordinate efforts with first responders during response activities (Dyjack, Case, Marlow, Soret, & Montgomery, 2007; Miller, 2006). Our study goal was to explore the capacity of EH and EPR programs to facilitate participatory relationships between themselves and with the community members they serve and to assess past levels of community emergency preparedness outreach (Abbot, 2002; Berg, 2004; Blessman et al., 2007; Elderidge & Tenkate, 2006; Miller, 2006). We posit that this is best done using community-based participatory research (CBPR) methodologies to foster the reciprocal transfer of knowledge and skills that may lead to system-wide disaster resilience (National Academy of Sciences, 2010).

### Public Health Emergency Preparedness—It Is Everyone's Responsibility

Traditionally, public health departments and agencies are responsible for protecting the food supply, safeguarding against infectious diseases, and ensuring safe and healthful living conditions (American Public Health Association, National Center for Environmental Health, & Centers for Disease Control and Prevention [CDC], 2001; CDC Foundation, 2001; Goldman & Coussens, 2007).

In response to domestic incidents such as the 9/11 terrorist attacks and subsequent anthrax attacks, Congress enacted the 2002 Public Health Security and Bioterrorism Act, thereby clearly articulating the role of public health in emergency and disaster preparedness (Brand, Kerby, Elledge, Johnson, & Magas, 2006; Gebbie & Qureshi, 2002; Qureshi et al., 2004). The act authorized funding for the Public Health Emergency Preparedness (PHEP) cooperative agreement to support preparedness nationwide in state, local, tribal, and territorial public health departments. The intent was to build the capacity and capability of public health departments to effectively respond to the public health consequences of terrorist threats; infectious disease outbreaks; natural disasters; and biological, chemical, nuclear, and radiological emergencies (CDC, 2011a; Field Costich & Scutchfield, 2004).

More than a decade later our nation has recovered from the events of 2001, and public health systems are stronger, but as citizens we continue to experience sudden natural and human-made disasters. Lessons learned from notable domestic and international disaster situations emphasize the urgent need to be prepared to prevent, respond to, and rapidly recover from constant public health threats. While responsibility begins at the local level, public health preparedness requires a concerted effort, involving every level of government, the private sector, nongovernmental organizations, and individuals. Responsibility for the preparedness of the nation's communities lies not only with governmental agencies but also with active, engaged, and mobilized community residents, businesses, and nongovernmental organizations (Goldman & Coussens, 2007; Henestra, Kovacs, McBean, & Sweeting, 2004). Nelson and co-authors (2007) define public health preparedness as

> [T]he capability of the public health and health-care systems, communities, and individuals to prevent, protect against, quickly respond to, and recover from health emergencies, particularly those whose scale, timing, or unpredictability threatens to overwhelm routine capabilities. Aside from coordination, preparedness involves continuous planning and implementation that relies on measuring performance and taking corrective action.

### Partnerships for Environmental Health Emergency Preparedness—A Community-Based Participatory Approach

Environmental health lessons learned in the aftermath of major disasters, such as Hurricane Katrina, indicate that "professional-only" approaches were not effective in engaging the community (Goldman & Coussens, 2007). CBPR has been identified as an effective strategy to involve members of vulnerable communities in a collaborative approach to emergency preparedness, response, and recovery (Goldman & Coussens, 2007). A CBPR strategy emphasizes respectful colearning and empowering partnerships among researchers, practitioners, and communities (Goldman & Coussens, 2007). Partnerships can be strengthened by joint development of research agreements regarding design, implementation, analysis, and dissemination of the results. It is therefore critical to develop effective training of the EH and EPR workforce on community-based participatory methodologies that would prepare them to engage communities by building partnerships for disaster resilience capacity (Gaddis, Miles, Morse, & Lewis, 2007; Goldman & Coussens, 2007; United Nations, 2004).

A community-focused approach to emergency preparedness is in line with the Environmental Public Health Performance Standards, which describe how to optimize performance and capacity of environmental public health systems and programs (CDC, 2011b). The standards assess how programs provide communities with the 10 Essential Environmental Health Services (CDC, 2011c).

Our study aims in particular to understand how EH and EPR programs can provide essential service #4, or how to "mobilize community partnerships and actions to identify and solve EH problems" by investigating what EH and EPR workforce members think about their role regarding emergency preparedness, community engagement, partnership building, and about the need to involve members of the community in preparedness efforts.

## Methods

### Study Location

Our study was conducted in partnership with the Riverside County Community Health Agency and the County of San Bernardino Department of Public Health of Southern California. Home to over four million people, Riverside and San Bernardino counties have the greatest land mass in the nation but are two of the most resource poor (California Employee Development Department, 2010; U.S. Census Bureau, 2011). Almost half of the population is Latino, many of whom are low in English proficiency. Residents of this area are vulnerable to natural and human-made environmental hazards including earthquakes, train derailments, seasonal wildfires, floods, and landslides. Additionally, communities are directly impacted by extreme levels of air pollution and, in some areas, lack of access to safe drinking water (California Department of Transportation, 2010).

### Study Design and Sample

In our qualitative study, in-depth semistructured interviews were conducted with top-level EH ($n$ = 8) and EPR ($n$ = 6) administrators and managers. Participants were selected by nonprobability purposive sampling methods.

*Measures*

The semistructured key informant guide created and used to guide the interviews was based on constructs of social cognitive theory (Bandura, 1982, 2000; Sampson, 2003; Sampson, Raudenbush, & Earls, 1997), social cohesion (Fone, Dunstan, Lloyd, Williams, & Watkins, 2007; Rosenstock, Strecher, & Becker, 1988), health belief model (Kreuter, 2002), social capital (Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008), and community resilience (Glaser, 2002). The interviews explored six main topics: 1) existing community EHEP outreach and activities; 2) readiness to engage communities in EHEP outreach; 3) benefits, barriers, and risks to engaging communities in EHEP outreach; 4) perceived community emergency and disaster resilience; 5) the role of social capital and social cohesion in disaster preparedness and response; and 6) personal emergency preparedness.

*Data Collection*

The key informant interviews were conducted by trained interviewers at EH or EPR administrative offices in June to August 2010. Prior to being interviewed, participants were asked to read and sign an informed consent approved by the Loma Linda University institutional review board. Each interviewer was

accompanied by one or two note takers and the interview was audiotaped. Confidentiality was protected by deidentifying transcripts, notes, and audio recordings. Each participant was assigned a code that was used as the sole identification of each participant. The files are stored in a locked file cabinet located in a locked room.

*Content Analysis*

Each interview was transcribed verbatim and analyzed with field notes using grounded theory methods of emerging line-by-line coding to first develop and apply a resulting codebook to all text using NVivo 8, a qualitative data analysis software, to categorize, query, and examine the data. The transcripts were analyzed for emergent themes and supported by critical quotes.

## Results

Four central themes emerged from the key informant interviews. The themes along with corresponding quotations are presented below.

### Theme 1: Community Outreach—Yes, We Do That!

The EH and EPR administrators were very confident in the community partnerships they foster. It must be noted, however, that the "community" stakeholders they identified include the American Red Cross, County Office of Emergency Services (OES), local and county fire departments, city emergency managers, other public health departments and programs, the transportation department, law enforcement, political decision makers, hospital systems, health care provider networks, county schools, businesses (especially restaurants), and universities, not community citizens themselves. Direct citizen engagement is generally only practiced in emergency response situations and not in preparedness efforts. Overall, the administrators firmly believe that preparing their partners to relay health messages to the general populace is the best method of information transmission to the community because these partners "know" their communities' assets and needs best. They did note, though, that working with nontraditional community partners (e.g., schools, faith-based and community-based organizations, and homeless shelters) was key in spreading the word regarding H1N1 prevention and vaccination.

- "Unlike other programs in public health, I believe that this program has a different client than your typical HIV or WIC [Women, Infants, and Children]. Typically our clients are the cities and towns and their emergency managers. Emergency preparedness and planning uses [the cities and towns] to get to their larger client base which would be their citizens."—EPR Professional
- "Unfortunately, because of funding cuts, we haven't been doing as much of that direct outreach. We've been going through other organizations at this point."—EH Professional

Despite their confidence in being connected to the community, respondents recognize that their direct engagement is limited. For the most part, the EH and EPR programs do not have a formal community outreach plan. Community outreach mainly consists of providing health education in the form of print and audiovisual media such as via their Web sites and mass e-mails and through public service announcements made on the radio or on television. Social media, such as blogs, was also described as a new form of reaching out to the general public.

Common environmental health education topics include 1) how to go potty without a potty, 2) what to do when a boil-water order is issued, 3) the truth about illegal food vendors, and 4) how to properly dispose of food after a long-term power outage. Common emergency preparedness and response topics include 1) generic preparedness tips including how to create a 72-hour survival kit, 2) bioterrorism preparedness, 3) pandemic flu prevention, 4) importance of getting the flu vaccine, and 5) proper hand-washing techniques. Direct community outreach is rarely initiated from within the department and occurs usually when requested by community organizations or other public health programs. Planning sessions, table top exercises, and trainings are typically reserved for the traditional "expert" community partners mentioned above.

- "We provide public education and printed materials . . . so during the H1N1 outbreak we provided a lot of information that was delivered through radio, movie theater advertisements that came before the movie, bus shelters, nonpharmaceutical interventions such as wash your hands."—EPR Professional

Finally, both workforces feel competent to educate and engage the community in emergency preparedness principles. Ambiguity exists, however, as to who the lead agency is or should be, thus leaving preparedness coordination largely fluid. EPR administrators identified EH departments, health education programs, or OES as the lead agencies. EH administrators identified EPR programs and the American Red Cross as the lead agencies. In general, EH administrators believe that their main role is to respond to communities' needs *after* a disastrous event and to help communities "bounce back." With respect to prevention, they feel that the extent of their function is to offer technical guidance in creating community emergency preparedness outreach materials.

- "Environmental health is the code enforcement section. They do the vector control, restaurant inspections, and wastewater inspections and treatment. So when we talk about environmental health emergency preparedness, I believe that means the type of work that environmental health services do and I describe. This program is the preparedness and response program. We do bioterrorism and pandemic flu preparedness."—EPR Professional
- "We leave the preventive things to other groups, because in the environmental health department we're the responders. We can take on that additional role, but we don't have the resources to just go and do that kind of outreach."—EH Professional

### Theme 2: Barriers to Direct Community Engagement

The EH and EPR administrators and managers identified several barriers that impede direct community engagement about environmental health emergency preparedness.

*Barrier #1: Limited Traditional Roles and Funding Streams*

Traditionally, the EH workforce has been largely a fee-for-service, code-enforcing entity. Their primary responsibility is to monitor, inspect, and regulate food and water safety, air quality, sewage disposal, and vector management. In general, Riverside and San Bernardino county EH departments receive only a few county general funds to support activities such as direct community outreach. Thus, although EH administrators acknowledge the importance of this work, they feel that it is inappropriate to spend resources on an "unfunded" side project.

- "Our funding comes specifically from the regulated industry and it wouldn't be right to use those monies for something that is not related to that facility that we are regulating. Actually, it is restricted by law in many cases."—EH Professional

The EPR workforce is limited in its ability to directly engage community members in environmental health emergency preparedness because it is largely supported by categorical grant funding including funds to prepare for bioterrorism threats and pandemic flu (avian flu [H5N1] and swine flu [H1N1]). Categorical grants also limit the EPR scope of work by specifying what community or population must be targeted.

- "After 9/11, a funding stream was developed from Homeland Security and the CDC to provide monies and the efforts of planning more activities for each local health department to better prepare and respond to the threat of bioterrorism. Shortly thereafter, the CDC began placing emphasis on avian flu, H5N1, and wanted to provide a funding stream to local health departments in that effort as well. They realized that mechanism was already there for bioterrorism. So the program has these two primary goals in mind: bioterrorism and pandemic influenza planning."—EPR Professional

*Barrier #2: Lack of Interdepartmental Collaboration*

Collaboration between the two departments generally occurs for disease surveillance and emergency response, not for emergency preparedness. Large governmental establishments were quoted as contributing to this barrier.

- "As far as working a lot with environmental health . . . I haven't seen that happen too much yet in our program. I know we work a lot with various partners in the hospitals, with law enforcement."—EPR Professional

*Barrier #3: Communicating With Community Residents*

EH and EPR administrators recognize diversity in ethnic, cultural, linguistic, and literacy levels of the residents of the "Inland Empire." Language barriers and technical jargon make it difficult to communicate with many community residents. Different people have different ideas about the origin of disease, which can limit their understanding of disease outbreaks after an emergency. Thus, the need exists to translate scientific principles into layman's terms, while at the same time staying as true as possible to the original science. Having connections with key community opinion leaders, who are fluent in the local languages and comfortable with local culture, is vital for successful community entry.

- "When we are talking to the community about how to disinfect this water they might not have a clue what 'parts per million' is but they might understand caps of bleach."—EH Professional
- "When you are talking about germ theory, or anything else that can go with that, it will be important to make it appropriate for the audience."—EH Professional

*Barrier #4: Perceived Lack of Community Trust for Government Entities*

The administrators perceive that some communities in their service area do not trust governmental agencies due to past social injustices, persisting inequities, and fear of government control, or deportation. The programs overcome some of these barriers by training key community stakeholders and opinion leaders to transfer knowledge and skills using the best modality for their community.

- "Just giving the message in their language is one thing, but overcoming their fear or their resistance is also another barrier. They're naturally suspicious sometimes of strangers trying to provide them help. A lot of them have felt at some points that they've been taken advantage of, or they feel mistreated and have frustration with the system."—EH Professional
- "Regarding community mistrust: it has nothing to do with public health. This could be something that has happened in the last 20 or 30 years."—EH Professional

*Barrier #5: Perceived Community Message Fatigue (Risk Communication)*

The administrators perceive that the general public is desensitized to emergency preparedness messages. These messages make the most impact after local or global emergencies or disasters and then lose their effect. They feel that many put off investing time, effort, and money in emergency preparedness and instead focus on more pressing issues like feeding the family or paying the bills.

- "With general disaster preparedness, I think it's a real challenge because I think you get things like message fatigue. We can't get people in this field to buy disaster preparedness supplies, so how do you make that argument to somebody where they can't touch it and see the reality of it?"—EPR Professional

**Theme 3: Best Practices**

The EH and EPR administrators recognize many barriers to direct community engagement in general. They are optimistic, however, and offered several solutions or best practice ideas. The art of listening was described as key to reaching a clear understanding of people's challenges; programs, education, and outreach must be customized to the audience thereby eliminating the "one-size-fits-all" mentality. Simple and inexpensive preparedness techniques were emphasized because of their increased accessibility and greater likelihood for success. The use of community participatory strategies and partnering with local lay community health worker networks were also identified as ways to incorporate community members in planning, creating, and implementing outreach.

- "We have two ears and one mouth for a reason. And when you go and want to partner with someone about anything, the most important thing is to listen and really hear what the other is saying and really respond to that."—EH Professional
- "Especially with environmental health, we're so much in the regulatory mode. We can't just go out there and spout orders and say it's because the code says so. We try to educate and listen and rationalize and we would try the same approach in this arena [emergency preparedness] to gather information and analyze it."—EH Professional

**Theme 4: High Motivation for Community-Centered Outreach**

EH and EPR administrators are cautiously optimistic about their workforces' willingness to participate facilitating community emergency preparedness capacity. They believe their workforce is used to community engagement but would need some training in environmental health–focused emergency preparedness outreach. Regarding departmental readiness for this type of work, one manager said it best: "It comes from the top down."

- "My commitment is to protect public health. And that happens through train-

ing, through what I've done, and through compassion, 'cause when somebody needs help, you help that person. Regardless of what your role is, so I'm committed and I'm ready."—EH Professional

## Discussion

The EH and EPR workforces' professional knowledge, skill set, and partnership building capabilities and capacity suit them well as natural leaders in community disaster preparedness. While EH and EPR administrators and leaders identified significant organizational barriers to effectively engage communities in preparedness, they nevertheless were confident in their workforces' abilities, were motivated to practice a community-centered approach, and identified solutions to moving their workforce toward this through training and role clarification. Will this high collective efficacy translate to organizational readiness to change? Are they, collectively as an organization, ready to change the status quo and traditional functioning?

Our results corroborate and extend the published literature that describes the work of EH and EPR professionals in emergency preparedness efforts: EH professionals feel disconnected from preparedness planning and see themselves as too busy conducting fee-for-service activities (Dyjack et al., 2007); ambiguity exists about environmental health functions in disasters (Forsting, 2004); EH is not well represented in disaster planning; power and politics within agencies result in a narrow assignment of the environmental health role (Elderidge & Tenkate, 2006); and a top-down approach exists to disaster management (Perlino, 2006).

Given that EH professionals will likely play important emergency response roles in nearly all disasters impacting human health, it is surprising that so little attention has been paid to their training needs for responding to bioterrorism and other public health emergencies (Office of Workforce and Career Development, 2009). Public health program directors can combat organizational challenges such as those described in our study by seeking noncategorical, general fund, and grant money in order to provide more flexibility and the option to support applied research, community outreach, the provision of comprehensive services, and to provide support for the expanding scope of certain mandated programs (Dyjack et al., 2007).

Our study provided much needed in-depth insight into how the leadership of the EHEP programs of these two Southern California counties perceives the state of community partnership building and community emergency preparedness capacity. The results of our management-centered qualitative study informed a workforce-wide survey tool that was designed to evaluate the line staff workforce's perceptions on the effectiveness, accessibility, and quality of personal and population-based environmental emergency preparedness public health services, or essential service # 9 (CDC, 2011c).

The results have been instrumental in the development of a CBPR program to train EH and EPR professions in the fundamentals of community partnership building and capacity building. We envision that this training will provide the current preparedness workforce with tools to overcome organizational barriers and strategies to engage in partnership-based EHEP education with their local communities and thus essential service #3, which is to "inform, educate, and empower people about environmental health issues (CDC, 2011c)."

## Conclusion

As public health departments aim to model their programs in accordance with national standards such as the Environmental Public Health Performance Standards, it is crucial to understand how they fare in providing communities with the 10 Essential Public Health Services. We recommend using a CBPR approach to assess performance, build partnerships, evaluate performance, and build capacity for sustainability.

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**DIRECT FROM CDC** ENVIRONMENTAL HEALTH SERVICES BRANCH

Laura Green Brown

Pamela S. Wigington

# Plain Language Summaries: A New EHS-Net Tool to Share Our Published Findings

**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 this column, EHSB and guest authors from across CDC will highlight a variety of concerns, opportunities, challenges, and successes that we all share in environmental public health. EHSB's objective is to strengthen the role of state, local, and national environmental health programs and professionals to anticipate, identify, and respond to adverse environmental exposures and the consequences of these exposures for human health. The services being developed through EHSB include access to topical, relevant, and scientific information; consultation; and assistance to environmental health specialists, sanitarians, and environmental health professionals and practitioners.**

**The conclusions in this article are those of the author(s) and do not necessarily represent the views of the CDC.**

**Laura Green Brown is a behavioral scientist with the EHSB. She helps the branch's Environmental Health Specialists Network (EHS-Net) with the design and implementation of restaurant food safety studies. Pamela S. Wigington is the lead health communications specialist in the Division of Emergency and Environmental Health Services. She helps program staff identify communication priorities, implement communication strategies, and communicate with varied audiences.**

The Centers for Disease Control and Prevention's (CDC's) Environmental Health Specialists Network (EHS-Net) is a collaborative network focused on understanding contributing factors to foodborne illness and improving environmental public health practice (www.cdc.gov/nceh/ehs/EHSNet/index.htm). EHS-Net includes environmental public health and food safety professionals from CDC, Food and Drug Administration, U.S. Department of Agriculture, and six state and local health departments (California, Minnesota, New York, New York City, Rhode Island, and Tennessee). EHS-Net's composition means it is uniquely positioned to conduct high-quality research on food safety, particularly restaurant food safety.

In its 10-plus years, EHS-Net has conducted 15 studies on restaurant food safety (www.cdc.gov/nceh/ehs/EHSNet/publications/pubs-by-citation.htm). These studies collected data on a variety of restaurant food safety topics. Topics include the following:

- food worker hand hygiene practices,
- ill food worker practices,
- restaurant egg handling practices, and
- differences between restaurants linked with outbreaks and restaurants not linked with outbreaks.

These EHS-Net studies have yielded valuable findings that can be used to improve food safety practices and policies. Examples of EHS-Net findings include the following:

- Food workers were more likely to wash their hands when they should when they were less busy and when they have had food safety training.
- More than 10% of food workers interviewed said they had worked while sick with vomiting or diarrhea.
- The high-risk practices of improper storage of eggs before cooking and pooling of eggs were commonly observed in restaurants.
- Restaurants linked with outbreaks were less likely to have certified kitchen managers on staff than restaurants not linked with outbreaks.

EHS-Net publishes results from its studies in scientific journals such as the *Journal of Food Protection* and the *Journal of Environmental Health*. Two publications based on these studies have been nominated for CDC's prestigious Charles C. Shepard Science Award (www.cdc.gov/od/science/aboutus/shepard/).

These publications are "Factors Related to Food Worker Hand Hygiene Practices" (www.cdc.gov/nceh/ehs/EHSNet/Docs/JFP_Food_Worker_Hand_Hygiene.pdf) and "Tomato Handling Practices in Restaurants" (www.cdc.gov/nceh/ehs/EHSNet/Docs/Tomato_Handling_Practices_in_Restaurants.pdf).

We also post our journal publications on the EHS-Net Web site (www.cdc.gov/nceh/ehs/EHSNet/publications/pubs-by-topic.htm).

## Improved Availability

Despite these efforts to broadcast our study findings, we have felt that accessibility of our study findings was lacking. Our data and findings could be very useful to food safety professionals, but they rarely have time to read 10-page journal articles. To address this issue, we now summarize EHS-Net journal articles in plain language and post them on our Web site (www.cdc.gov/nceh/ehs/EHSNet/plain_language/index.htm) so that they are accessible to anyone who can access the Internet. The summaries contain brief descriptions of each study's purpose, method, findings, conclusions, and recommendations.

Each summary also includes a Study Findings in Brief section that highlights the major findings of the article. We also created a printable fact sheet for each summary that focuses only on the purpose, findings, and recommendations. The summaries and fact sheets are easy to print and distribute.

As of April 2012, 11 summaries are posted on our Web site in four categories:

- Restaurant-related foodborne illness outbreaks
  - » Food safety differences between restaurants linked and not linked to outbreaks
- General public's beliefs about gastrointestinal illness
  - » Beliefs that restaurant meals made people sick
- Restaurant food handling and food safety practices
  - » Beef grinding records kept by retail stores
  - » Factors affecting safe food preparation by food workers and managers
  - » Food worker hand washing and food preparation
  - » Food worker hand washing and restaurant factors
  - » Food workers working when they are sick
  - » How restaurants handle tomatoes
  - » How restaurants prepare eggs
- Retail food safety programs
  - » How environmental health specialists investigate outbreaks
  - » Kitchen manager certification study and food safety

We hope these summaries will be of value to you, and we would love to hear your thoughts on them. So please visit the Web site today, review our summaries, and tell us what you think! E-mail us at NVEAIS@cdc.gov with any comments, questions, or suggestions.

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### What Is Plain Language?

Plain language is one way to make sure that information is accessible and understandable for its intended audiences. It is language written so those audiences can understand it the first time they read it.

Materials written in plain language are easy to understand and presented in an easy-to-read format. These materials benefit everyone. The average person receives hundreds—if not thousands—of bits of information every day. Plain language is one way to help people deal with this information.

Plain language also helps address health literacy. The Patient Protection and Affordable Care Act of 2010, Title V, defines health literacy as the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions.

To improve health literacy, CDC and others can do much better in designing and presenting health information and services that people can use effectively. For more information about health literacy at CDC, visit the CDC Health Literacy Web site (www.cdc.gov/healthliteracy/).

## Thank You for Supporting the NEHA/AAS Scholarship Fund

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**Thanks!**

**DEMYSTIFYING THE FUTURE**

Thomas Frey

# Micro Jobs and the Emerging Underground Economy

**Editor's Note: Significant and fast-paced change is occurring across society in general and our profession in particular. With so much confusion in the air, NEHA is looking for a way to help our profession better understand what the future is likely to look like. The clearer our sense for the future is, the more able we are to both understand and take advantage of trends working their way through virtually every aspect of our lives today. To help us see what these trends are and where they appear to be taking us, NEHA has made arrangements to publish the critical thinking of the highly regarded futurist, Thomas Frey.**

**The opinions expressed in this column are solely that of the author and do not in any way reflect the policies and positions of NEHA and the *Journal of Environmental Health*.**

**Thomas Frey is Google's top-rated futurist speaker and the executive director of the DaVinci Institute®. At the Institute, he has developed original research studies enabling him to speak on unusual topics, translating trends into unique opportunities. Frey continually pushes the envelope of understanding, creating fascinating images of the world to come. His talks on futurist topics have captivated people ranging from high-level government officials to executives in Fortune 500 companies. He has also authored the book *Communicating with the Future*. Frey is a powerful visionary who is revolutionizing our thinking about the future.**

As the musical chairs game of unemployment money runs out, and an increasingly large number of people are left without a seat at the jobs table, desperation begins to set in.

For them, it becomes painfully obvious that their lackluster effort to find a job, which often involves playing video games and watching TV interspersed with sending an occasional resume or making a phone call, has left them with few options as the end of their financial rope draws ever closer.

Panic begins to set in.

Human-to-human social skills are vastly different than online social skills and the ability of the unemployed to interact with others has atrophied to a point where their entire circle of friends consists of a few relatives and some high school classmates who have somehow turned beer drinking into a profession.

They have already been suckered into several network marketing get-rich-quick schemes and looked at going back to college but couldn't see a quick enough payback. With few options left, they find themselves slipping into survival mode.

Welcome to the underground economy.

## The Global Perspective

There are no good numbers to describe the size and characteristics of the underground economy, but it is most certainly growing.

From the government's standpoint, when there's no crisis, no one worries about it. As national debt skyrockets and an even more troubling international debt crisis looms, however, the declining balance sheet causes many people to go into finger-pointing mode.

A recent article in the London-based *Financial Times* took a close look at this growing problem.

Pietro Reichlin is an economics professor at Rome's Luiss University who has studied the underground economy (sometimes referred to as the "black" economy) extensively.

"When wages go down, there is more incentive to move towards the black economy. It is almost a form of insurance, a way out," says Reichlin.

Europe's shift towards an underground economy is happening far faster than in the U.S.

According to Friedrich Schneider, economics professor at Johannes Kepler University in Linz, Austria, the size of the Spanish black economy is equivalent to 19.2% of official gross domestic product. That happens to be the same proportion as the average he calculates for 31 European countries, with Bulgaria the highest at 32.3% and Switzerland the lowest at 8.1%.

Schneider estimates the size of the underground economy in the U.S. is in the range of 7%.

But that 7% represents a far greater dollar amount than most of the other counties combined.

"Among the main causes of the black economy is the level of taxation. The higher the tax and the regulatory burden the bigger the shadow economy of the country," Prof. Reichlin says.

## The Online Underground

Business is becoming very fluid in how it operates, and the driving force behind this liquefaction is a digital network that connects business or personal needs with solution providers and buyers with sellers faster and more efficiently than ever in the past.

But the effect of our flowing digital business world does not stop with how transactions are performed. Instead, it has begun to morph and change virtually every aspect of how business is conducted including the duration and permanency of work assignments, the employer-worker relationship, and the organizing principles around which work assignments and talent coalesce.

At the center of the underground economy is a set of tools that makes working from home or a local coffee shop far easier than finding a job.

Here are a few examples of unusual home-based and personal enterprise businesses:

1. **Home Laundry Service:** For those who don't mind doing laundry, it only requires a washer, dryer, ironing board, a few bottles of detergent, and fabric softener. A few hours spent hanging flyers in local neighborhoods and you're in business.
2. **Divorce Counseling/Mediation Business:** Rather than turning every divorce into a rip-your-genitalia-out-through-your-wallet exercise, far better ways are available to create solutions without spending all the money on high-priced attorneys.
3. **Pedicab Business:** Every one of these pedal-powered rickshaws is a stand-alone business enterprise (www.pedicab.com) that can move from market to market to meet the short-distance transportation needs of the people.
4. **Online Storefront:** It is now easier than ever before to create your own retail operation on Amazon, eBay, Facebook, Half, Abe, Alibris, Biblio, direct, Tomfolio, Volare, and Zvab. Many products can even be drop-shipped directly to the customer from the manufacturer so there is no need to manage any inventory.
5. **Pet Counseling:** People love their pets, but not all pets are a good fit for their owners. Bridging that gap creates room for a wide variety of new services that an enterprising person can leverage.
6. **Professional Testimonial Writer:** A growing population is searching for ways to shore up their online reputation and the solutions can be a simple as writing good testimonials or as elaborate as offering a complete set of reputation management services.
7. **Donation Services:** We all own too much stuff. But when it comes time to get rid of our stuff, we somehow want it to go to a good place but we don't know the options and we don't want to spend a lot of time handling it. Any good donation service will find themselves quickly in demand both by the donors and the recipients.
8. **YouTube Video Services:** Managing your online video reputation can be very time consuming. As each of the online video services adds features and becomes more sophisticated, both individuals and businesses need help.

According to the U.S. Bureau of Labor Statistics, the number of home-based businesses in the U.S. exceeds 18.3 million.

Although difficult to track, it is estimated that nearly 70% of home-based businesses succeed for at least a three-year period (compared to 29% of outside-the-home business ventures). The higher success rate is due to the ability of home businesses to be operated part time around a day job.

These types of enterprises lend themselves well to an off-the-books underground operation.

## Micro Jobs

If there's one thing you can learn from Timothy Ferriss and his book *The 4-Hour Work Week*, it's the value of outsourcing. You can gain all sorts of time and freedom by getting someone else to do the work.

But what about from the worker standpoint? Will it always be a competition to see who can underbid whom?

Micro jobs are short-term tasks that create an opening. They can either be the starting point for a longer work relationship or just one in a series of one-off projects to bring in a little income.

As most employers know, the quality of the work is far more important than the price paid for it. So while many will experiment with low-cost workers, a longer-term relationship with someone who is a consistent performer is far more valuable.

Micro job sites like Ffiver, Dollar3, MyntMarket, GigHour, and 7Freelance do a good job of connecting talent with the needs of business. But building a long-term relationship is highly dependent on the individual.

## Youth Employment

A recent edition of the *Wall Street Journal* took an in-depth look at the declining trend in youth employment.

> "Perhaps you've already noticed around the neighborhood, but this is a rotten summer for young Americans to find a job. The Department of Labor reported last week that a smaller share of 16–19 year-olds are working than at anytime since records began to be kept in 1948. Only 24% of teens, one in four, have jobs, compared to 42% as recently as the summer of 2001. So instead of learning valuable job skills—getting out of bed before noon, showing up on time, being courteous to customers, operating a cash register or fork lift—millions of kids will spend the summer playing computer games or hanging out."

As young people try to enter the job market at an older age, they will have already gained some awareness of the advantages afforded by the underground economy.

## Long-Term Trends

The U.S. government has become increasingly inept in its ability to work with the emerging digital economy in the midst of the global financial problems.

The number of miscues and disconnects are all but guaranteeing the size of the underground economy will grow.

Is this a bad thing? It depends on which side of the fence you're on.

Interested in sharing your thoughts? Go to www.FuturistSpeaker.com.

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LEGAL BRIEFS

Colin B. Caywood, JD

# The Rights of Environmental Health Specialists to Conduct On-Site Inspections

**Editor's Note:** **The *Journal* recognizes the importance of providing readers with practical and relevant legal information and is pleased to bring back the popular Legal Briefs column. In every other issue of the *Journal* this information will be presented by the attorneys at Seattle-based Marler Clark, LLP, PS (www.marlerclark.com). Marler Clark has developed a nationally known practice in the field of food safety. They represent people who have been seriously injured or the families of those who have died after becoming ill with foodborne illness during outbreaks traced to restaurants, grocery chains, and other food suppliers.**

**Colin Caywood received his BA from the University of Washington. He worked at a number of Seattle-area law firms before joining Marler Clark as a paralegal and has worked extensively on cases involving foodborne illness litigation. He received his JD from Seattle University's School of Law.**

On one fine, spring morning, Environmental Health Specialist Jill Jones was preparing for a busy work day. Before walking to her county-issued work vehicle, she grabbed her badge, clipboard, inspection checklist forms, and still-steaming cup of coffee. As she readied to pull out of the parking garage, she confirmed the address of the first of six local restaurants she was scheduled to inspect that day. After a short drive, she pulled up at an establishment new to her, Bob's BBQ Palace.

Jill gathered her things and walked into the restaurant. She politely asked to speak with the person in charge to introduce herself. She was eager to begin the inspection to confirm the restaurant's compliance with her state's local and state health rules governing restaurant operations. But before she could begin, the manager came rushing from the kitchen doorway, yelling as he walked, "No, no, no! I was just inspected a few weeks ago by your people after some folks complained they got sick from eating at my restaurant and I am NOT in the mood to go through another inspection. You can just turn right around and go back to your car."

Ever the professional, Jill politely indicated that she understood the manager's concerns, explained who she was and why she was there that day (a routine biannual inspection), and provided her government-issued badge detailing her credentials. After quickly glancing at the badge, the manager again stated he was refusing her access to any part of his restaurant. He then walked her to the doorway and demanded that she leave.

As she stood outside assessing what had just occurred, Jill was at a loss. She had never been refused entry at an inspection and was frankly unsure what to do next.

Could the restaurant manager effectively prevent her from carrying out her duties? What right did Jill really have to inspect the restaurant in the first place? And what right did the restaurant manager have to forbid her access?

It may sound like an improbable fiction, but for many environmental health specialists this scenario highlights an all-too-real concern. Over the past several years I have presented to a large variety of environmental health groups around the country. A question pertaining to the subject of inspectors' rights to carry out their job duties has been asked nearly every time.

The idea may seem odd that people hired to inspect food establishments, child care facilities, wastewater treatment facilities, and the like could be prevented from carrying out their mandated duties by noncooperation, refusal of access to an inspection site, or outright hostility from those entities they are legally required to inspect. Nonetheless, as any seasoned environmental health specialist will attest, the concern is very real.

Thankfully most, if not all, states have enacted statutes and promulgated regulations to provide environmental health specialists with the legal framework necessary to fulfill their duties of inspection and enforcement.

Every state has an agency tasked with the responsibility for promoting and protecting the health, safety, and well-being of the public through the prevention of the spread of disease through food. In order to carry out this mandate, lawmakers have recognized the need for certain legal protections.

For example, in Washington State, the Revised Code of Washington 43.20.050 outlines the delegation of authority granted to the Washington State Board of Health to carry out its

mandate of disease prevention throughout the state. The board achieves this mandate through its rule making and enforcement authority.

The authority of an environmental health specialist to inspect a restaurant is granted by the following language[1]:

After the regulatory authority presents official credentials and provides notice of the purpose of, and an intent to conduct, an inspection, **the person in charge shall allow the regulatory authority to determine if the food establishment is in compliance with this Code by allowing access to the establishment**, allowing inspection, and providing information and records specified in this Code and to which the regulatory authority is entitled according to law, during the food establishment's hours of operation and other reasonable times.

If the environmental health specialist is still refused access after providing notice to the entity to be inspected, then the specialist must

(A) inform the person that

(1) the **permit holder is required to allow access** to the regulatory authority as specified under § 8-402.11 of this Code; and

(2) **access is a condition of the acceptance and retention of a food establishment permit** to operate as specified under ¶ 8-304.11(F) [Amended by WAC 246-215-181(7)]; and

(B) make a final request for access.[2]

If after following this process, the permit holder continues to deny the specialist access to conduct the inspection, the specialist's health agency has the authority to suspend the permit, thereby effectively stopping the restaurant from legally operating its business.[3] If the food establishment continues to operate after its license has been suspended, it is operating without a valid permit, which is a criminal offense under Washington law.

The steps outlined under Washington's laws provide a good, universal framework for dealing with a scenario like the one confronted by Jill Jones. While every state law is different, environmental health specialists should feel comfortable in carrying out their job duties knowing that they have legal authority to perform their inspections and that refusal of access by a regulated entity has firm legal consequences.

1 *See* Washington Food Code Working Document at 8-402.11.

2 *See also* Washington Food Code Working Document at 8-402.20.

3 WAC 246-215-181(7) makes clear that "[t]he regulatory authority may suspend a person's permit to operate a food establishment if a representative of the regulatory authority, after showing proper credentials, is denied access to conduct an inspection of the food establishment."

*Disclaimer:* Legal Briefs is published for information purposes only; none of the information is intended to be, nor is, formal legal advice. NEHA and the *Journal of Environmental Health* are not liable or responsible for actions taken on the basis of the information contained in these columns.

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# CAREER **OPPORTUNITIES**

### Food Safety Inspector

Everclean Services is the leader in the restaurant inspections market. We offer opportunities throughout the country. We currently have openings for professionals to conduct Q.A. audits of restaurants.

| | |
|---|---|
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| Butte, MT | Pittsburgh, PA |
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| Indianapolis, IN | Spearfish, SD |
| Lincoln, NE | Tulsa, OK |
| Little Rock, AR | White Plains, NY |
| Mobile, AL | |

Past or current food safety inspecting is required.
Interested applicants can send their resume to: Bill Flynn at Fax: 818-865-0465. E-mail: bflynn@evercleanservices.com.

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# Did You Know?

You can sign up to receive more information about the new credential NEHA is developing to meet the increasing need for highly qualified food safety professionals to provide oversight in preventing food safety breaches at U.S. facilities and abroad. Sign up today to receive the latest news and information: http://neha.org/credential/CPFSC.html.

# EH CALENDAR

## UPCOMING NEHA CONFERENCES

**July 9–11, 2013: Hyatt Regency Crystal City at Reagan National Airport, Washington, DC.** For more information visit www.neha2013aec.org

## NEHA AFFILIATE AND REGIONAL LISTINGS

**Colorado**
**September 26–28, 2012: 2012 Annual Education Conference & Exhibition,** sponsored by the Colorado Environmental Health Association, Keystone Lodge & Spa, Keystone, CO. For more information, visit www.cehaweb.com/aec.html.

**Connecticut**
**September 26–28, 2012: 50th Annual Yankee Conference on Environmental Health,** hosted by the Connecticut Environmental Health Association, Mystic Marriott, Groton, CT. For more information, visit www.cteha.org.

**Florida**
**September 6–8, 2012: FEHA Annual Education Meeting and Trade Show,** sponsored by the Florida Environmental Health Association, Royal Plaza Resort, Lake Buena Vista, FL. For more information, visit www.feha.org/2012AEM.

**Illinois**
**November 8–9, 2012: IEHA Annual Education Conference,** sponsored by the Illinois Environmental Health Association, Parke Hotel, Bloomington, IL. For more information, visit www.iehaonline.org.

**Indiana**
**September 23–26, 2012: IEHA Annual Fall Educational Conference,** sponsored by the Indiana Environmental Health Association, Inc., Bloomington Monroe County Convention Center, Bloomington, IN. For more information, visit www.iehaind.org/conference/html.

**Iowa**
**October 23–24, 2012: 2012 Environmental Health Fall Conference,** sponsored by the Iowa Environmental Health Association, Marshalltown, IA. For more information, visit www.ieha.net.

**Minnesota**
**October 11, 2012: MEHA Fall Education Conference,** sponsored by the Minnesota Environmental Health Association, Chase on the Lake, Walker, MN. For more information, visit www.mehaonline.org/events.

**Missouri**
**October 3–5, 2012: 2012 Annual Education Conference,** sponsored by the Missouri Environmental Health Association, The Resort at Port Arrowhead, Lake Ozark, MO. For more information, visit www.mmfeha.org.

**Montana**
**October 2–3, 2012: MEHA/MPHA Fall Conference: "Healthier People in a Healthier Environment,"** co-sponsored by the Montana Environmental Health and Public Health Associations, Copper King Hotel and Convention Center, Butte, MT. For more information, visit www.mehaweb.org.

**Oregon**
**October 8–9, 2012: 2012 Annual Education Conference,** sponsored by the Oregon Environmental Health Association, Oregon State University, Corvallis, OR. For more information, visit www.oregoneha.org/aec.htm.

**Texas**
**October 9–12, 2012: 57th Annual Education Conference,** sponsored by the Texas Environmental Health Association, Double Tree Hotel, Austin, TX. For more information, visit www.myteha.org.

**Utah**
**September 19–21, 2012: 2012 Fall Conference,** sponsored by the Utah Environmental Health Association, Utah County Health Department, Provo, UT. For more information, visit www.ueha.org.

**Wyoming**
**September 18–20, 2012: 2012 WEHA Annual Education Conference,** sponsored by the Wyoming Environmental Health Association, Best Western Tower West Lodge, Gillette, WY. For more information, visit www.wehaonline.net.

## TOPICAL LISTINGS

**Water Quality**
**September 10–12, 2012: International Conference on Hydrology and Ground Water Expo,** sponsored by the OMICS Group, San Antonio, TX. For more information, visit www.omicsonline.org/hydrology2012/.

## INTERNATIONAL LISTINGS

**Jamaica**
**October 21–28, 2012: 66th Annual Conference and Exhibition,** sponsored by the Jamaica Association of Public Health Inspectors, Jamaica (location TBD). For more information, e-mail info@japhi.org.jm.

# neha.org



**Information and opportunities abound behind the research and development button on NEHA's homepage. Visit neha.org/research to obtain the latest on the following NEHA federally funded programs, many of which include free or low-cost training and educational opportunities:**

- Biology and Control of Vectors and Public Health Pests Program
- Environmental Public Health Tracking Program
- Epi-Ready Team Training Program
- Food Safe Schools Program
- Industry-Foodborne Illness Investigation Training (I-FIIT) Program
- Land Use Planning and Design Program
- Onsite Wastewater Treatment Systems Program
- Radon/Indoor Air Quality Program
- Workforce Development Program

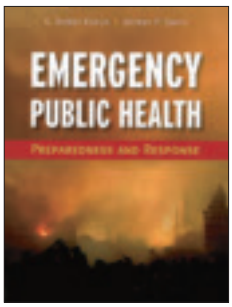
# RESOURCE CORNER

*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!*

NEHA BOOKSTORE
www.neha.org/store

## Emergency Public Health: Preparedness and Response

*G. Bobby Kapur and Jeffrey P. Smith (2011)*

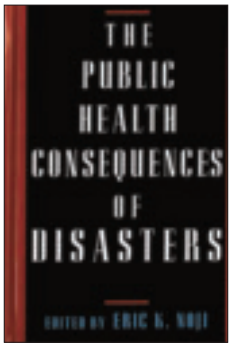



New! Provides a unique and practical framework for disaster response planning at local, state, and national levels. This is the first book of its kind to systematically address the issues in a range of environmental public health emergencies brought on by natural calamity, terrorism, industrial accident, or infectious disease. Authored by experts with diverse backgrounds in emergency medicine and public health, each chapter features historical perspectives on a public health crisis, an analysis of preparedness, and a practical, relevant case study on the emergency response. The book also features special sections on mental health and children's health during environmental public health emergencies, practical information on public health law and government regulations, and analysis of public health tools including surveillance and rapid needs assessment. Study reference for NEHA's REHS/RS exam.

*568 pages / Paperback / Catalog #1121*
*Member: $88 / Nonmember: $92*

## The Public Health Consequences of Disasters

*Edited by Eric K. Noji (1997)*

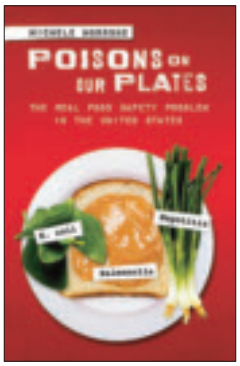



Illustrated with examples from research in the field, this book summarizes the most pertinent and useful information about the public health impact of natural and man-made disasters. It is divided into four sections dealing with general concerns, geophysical events, weather-related problems, and human-generated disasters. The author starts with a comprehensive discussion of the concepts and role of surveillance and epidemiology, highlighting general environmental health concerns, such as sanitation, water, shelter, and sewage. The other chapters cover discrete types of natural and technological hazards, addressing their history, origin, nature, observation, and control.

*468 pages / Hardback / Catalog #583*
*Member: $78 / Nonmember: $83*

## Poisons on Our Plates: The Real Food Safety Problem in the United States

*Michele Morrone (2008)*

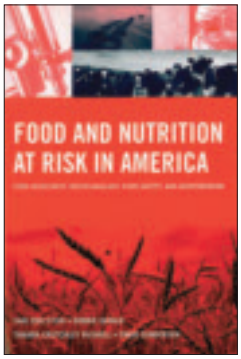



The safety of our food supply is an environmental health issue that affects every American citizen. Drawing on disturbing stories told by food safety professionals as well as on statistical studies, the author paints a grimly fascinating picture of the impact of bacteria and viruses on our food supply and how they can make us sick. She advocates major changes to our nation's environmental health policies in order to control the growing dangers that foodborne illnesses pose to public health.

*169 pages / Hardback / Catalog #1083*
*Member: $44 / Nonmember: $49*

## Food and Nutrition at Risk in America: Food Insecurity, Biotechnology, Food Safety, and Bioterrorism

*Sari Edelstein, Bonnie Gerald, Tamara Crutchley Bushell, and Craig Gunderson (2009)*




This book addresses the major food and nutrition issues of our time. Each section covers the latest threats to our nation's food systems, such as international and unintentional contamination of the food supply, food insecurity issues within our borders, and the effect of crop manipulation on human health. This groundbreaking and thought-provoking text offers readers the opportunity to consider the current status of pressing food safety issues, as well as the types of assistance and policies needed in the future to ensure the health and welfare of Americans.

*315 pages / Paperback / Catalog #1085*
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# 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 fill out the pledge card or call NEHA at 303.756.9090.

*Thank you.*

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*Name in the* Journal *for one year and endowment pin.*

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Darryl Booth
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www.diversey.com

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www.dupagehealth.org

**Ecolab**
Robert Casey
robert.casey@ecolab.com
www.ecolab.com

**EcoSure**
charlesa.arnold@ecolab.com

**English Sewage Disposal, Inc.**
(756) 358-4771

**Environmental Health, Chesapeake Health Department**
Yunice Bellinger
(757) 382-8672

**Evansville in Water & Sewer Utility**
Jeff Merrick
jmerrick@ewsu.com

**FDA Food Defense Oversight Team**
Jason Bashura
www.fda.gov/Food/FoodDefense/default.htm

**Food Safety News**
info@foodsafetynews.com

**Giant Microbes**
Jeff Elsner
www.giantmicrobes.com

**GLO GERM/Food Safety First**
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www.healthspace.com

**Intertek**
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**Jefferson County Health Department**
Joe Hainline
www.jeffcohealth.org

**Kansas Department of Health & Environmental**
jrhoads@kdheks.gov

**Kenosha County Division of Health**
www.kenosha.wi.us/dhs/divisions/health

**LaMotte Company**
Sue Byerly
sbyerly@lamotte.com

**Linn County Public Health**
health@linncounty.org

**Living Machine Systems**
www.livingmachines.com

**Macomb County Environmental Health Association**
jarrod.murphy@macombcounty.gov

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**National Environmental Health Science Protection & Accreditation Council**
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**National Registry of Food Safety Professionals**
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www.nrfsp.com

**National Restaurant Association**
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www.restaurant.org

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www.healthunit.biz

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**Steton Technology Group Inc.**
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# NEHA **NEWS**

## Note of Thanks to Departing Board Member

We would be remiss if we did not acknowledge the dedication, hard work, and efforts of a member of the NEHA board of directors on the occasion of his departure from the board.

Immediate Past President Keith Krinn leaves the board after five years of dedicated service and leadership. In 2007, he was elected second vice president and served as president of NEHA in 2010–2011. Keith has 36 years of environmental health experience and is currently the administrator of the environmental health division of Columbus Public Health, which was the 2009 recipient of the Samuel J. Crumbine Consumer Protection Award. Besides his service to NEHA, Keith has been very involved in other environmental health groups. He served as president of the Michigan Environmental Health Association in 2000–2001 and chair of the National Conference of Local Environmental Health Administrators from 2005–2006. He has also been a council member of the National Environmental Health Science and Protection Accreditation Council and has serviced as a site visitor for 12 years in the accreditation or reaccreditation of environmental health undergraduate programs. Keith was awarded the Ohio Environmental Health Association's (OEHA's) President's Award in 2006 and the OEHA Southeast District Membership Award. He recently became the president of NEHA's Past President's Affiliate.

Regarding his service to NEHA, Keith states, "The five years I served on the NEHA board of directors and as NEHA president were the pinnacle of my environmental health career. I met so many wonderful professionals, including my fellow board members and the NEHA staff, and during that time in my travels as president, so many of our affiliate members. It reaffirmed my belief that our profession is strong, serves a vital function in our society, and will endeavor to adapt to emerging issues and changing work climates. I will always be proud to call myself an environmental health professional!" NEHA warmly thanks Keith for his service to the association and wishes him the best in his future endeavors.

## NEHA Recognizes Long-Time REHS/RS Credential Holder

The Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) is the premiere NEHA credential. Individuals holding the REHS/RS credential have demonstrated the knowledge, skills, and abilities that enable them to competently practice environmental health. Continuing education is required to maintain the credential. These individuals are dedicated to the advancement of the profession and their careers, as well as to protecting the environmental health of the communities and people they serve. REHS/RS holders make up some of the very best of the environmental health profession.

Kenneth Holt is one such professional and has held an active REHS/RS credential for 38 years. Mr. Holt submitted his application for the RS credential (renamed REHS/RS in the 1980s) in May 1974. He attended East Tennessee State University, where he obtained both his bachelor's and master's degrees in environmental health. He even listed Dr. Monroe T. Morgan, NEHA president in 1974–1975, as one of his references. Mr. Holt's first job in environmental health was for the U.S Public Health Service's Indian Health Service, where he worked in Alaska providing environmental health programs and support to Alaskan natives. He worked for the federal government, specifically the Centers for Disease Control and Prevention, for most of his career. He retired 10 years ago and kept emeritus status of his credential until this year.

NEHA commends Mr. Holt for his dedication to excellence in the field of environmental health and congratulates him on holding his REHS/RS credential for so long. His pursuit of continued excellence is something that all environmental health professionals should strive for. NEHA also salutes the dedication of all REHS/RS holders—past and present. It is a great accomplishment to earn and maintain the REHS/RS credential.

Finally, NEHA also is very grateful to those who have been longtime members of the association. Check out the November issue of the *Journal* for a list of members who have been with NEHA for 25 years or longer. If you have a story of someone excelling in the environmental field and would like to share that with the *Journal*'s readership, please contact Kristen Ruby at kruby@neha.org.

## Did You Know?

NEHA is collaborating with CDC/NCEH on the development and implementation of the Environmental Public Health Tracking (EPHT) Network, which aims to better protect communities from adverse health effects through collection, analysis, integration, and interpretation of data about environmental hazards, exposure to environmental hazards, and human health effects potentially related to exposures. Visit www.neha.org/research/pub_health_tracking.html for more information.

# NEHA Food Safety Program

## Your Food Safety Solution for Training and Certification

**Save 50% on your food safety training costs vs. the competition.**

**You have a choice. Choose wisely.**

**Protect your customers. Protect your brand.**

Working together to bring you a better choice in food safety training and certification.

Anyone who works in the food industry knows how critical an issue it is for food handling and safety protocol to be followed. Yet foodborne illness continues to attract attention on a global stage. Prometric, MindLeaders, and the National Environmental Health Association (NEHA) have joined forces to combat this issue by partnering to provide stronger, richer manual content; fast, reliable online training; and secure test delivery services.

This world-class partnership of experts brings together three unique strengths to provide you with one premiere food safety training and certification program.

NEHA
EDUCATION & TRAINING

MindLeaders®

PROMETRIC

# NEHA's Annual Financial Statement

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INDEPENDENT AUDITORS' REPORT

To the Board of Directors
National Environmental Health Association
Denver, Colorado

We have audited the accompanying statements of financial position of National Environmental Health Association (the "Association") (a Colorado non-profit corporation) as of September 30, 2011 and 2010 and the related statements of activities and cash flows for the years then ended. These financial statements are the responsibility of the Association's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Association's internal control over financial reporting. Accordingly, we express no such opinion. An audit also includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the Association as of September 30, 2011 and 2010 and the changes in its net assets and its cash flows for the years then ended in conformity with accounting principles generally accepted in the United States of America.

Eberhardt Keefe Steiner & Hottman PC

January 27, 2012
Denver, Colorado

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## NATIONAL ENVIRONMENTAL HEALTH ASSOCIATION

### Statements of Activities

| | For the Years Ended | | | | | |
|---|---|---|---|---|---|---|
| | September 30, 2011 | | | September 30, 2010 | | |
| | Unrestricted | Temporarily Restricted | Total | Unrestricted | Temporarily Restricted | Total |
| Revenues and gains | | | | | | |
| Research and development | $ 3,187,523 | $ - | $ 3,187,523 | $ 3,527,765 | $ - | $ 3,527,765 |
| Annual Educational Conference | 452,065 | - | 452,065 | 524,919 | - | 524,919 |
| Credentialing and education | 580,803 | - | 580,803 | 613,523 | - | 613,523 |
| Membership dues | 331,163 | - | 331,163 | 356,002 | - | 356,002 |
| Journal of Environmental Health | 185,300 | - | 185,300 | 143,363 | - | 143,363 |
| Special projects | 738,671 | - | 738,671 | 555,348 | - | 555,348 |
| Scholarship contributions | - | 8,975 | 8,975 | - | 2,850 | 2,850 |
| Global Environmental Health Fund contributions | - | 2,500 | 2,500 | - | - | - |
| Publications and module contracts | 92,335 | - | 92,335 | 75,391 | - | 75,391 |
| Miscellaneous income | 113,929 | - | 113,929 | 35,721 | - | 35,721 |
| Investment income | 41 | 5 | 46 | 3,334 | 72 | 3,406 |
| Total revenues and gains | 5,681,830 | 11,480 | 5,693,310 | 5,835,366 | 2,922 | 5,838,288 |
| Expenses | | | | | | |
| Research and development | 3,036,302 | - | 3,036,302 | 3,336,586 | - | 3,336,586 |
| Annual Educational Conference | 442,504 | - | 442,504 | 481,943 | - | 481,943 |
| Journal of Environmental Health | 321,347 | - | 321,347 | 335,653 | - | 335,653 |
| Credentialing and education | 297,536 | - | 297,536 | 281,310 | - | 281,310 |
| Membership | 148,458 | - | 148,458 | 132,531 | - | 132,531 |
| Publications and module contracts | 150,044 | - | 150,044 | 150,795 | - | 150,795 |
| Special projects | 731,489 | - | 731,489 | 499,271 | - | 499,271 |
| Continuing education | 76,558 | - | 76,558 | 71,559 | - | 71,559 |
| ARC | 25,528 | - | 25,528 | 32,249 | - | 32,249 |
| Administration and general | 379,520 | - | 379,520 | 284,601 | - | 284,601 |
| Total expenses | 5,609,286 | - | 5,609,286 | 5,606,498 | - | 5,606,498 |
| Change in net assets | 72,544 | 11,480 | 84,024 | 228,868 | 2,922 | 231,790 |
| Net assets at beginning of year | 970,776 | 67,692 | 1,038,468 | 741,908 | 64,770 | 806,678 |
| Net assets at end of year | $ 1,043,320 | $ 79,172 | $ 1,122,492 | $ 970,776 | $ 67,692 | $ 1,038,468 |

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

**Managing Editor's Desk**
*continued from page 54*

tions with environmental health colleagues from more nations than I have the space here to enumerate. I can also truly say that I've enjoyed and valued every second of each such conversation.

While it would be easy for me to encourage every NEHA member to seriously consider attending one of these events for the richness it offers in understanding, relationships, and even affirmation (as a member of a special worldwide community), I understand only too well that the expense and time that would be necessary to make one of these meetings doesn't come easy—especially given the economic environment within which we all work today. However … *I have some good news for you!*

One of the reasons that your president and I are here is because we have been hard at work to encourage attendees at this event to seriously consider coming to the U.S. in two years when NEHA will host the next IFEH Congress! Yes, you will soon be able to tap into the excitement of a veritable international environmental health event that will be held in our country.

Last fall NEHA learned that its bid to host the 2014 IFEH Congress had been accepted. Ever since, we have been hard at work to develop momentum and worldwide interest in this event.

To sweeten up the pot even more, our board made the decision to hold our Annual Educational Conference (AEC)–IFEH Congress in one of the most unique cities in the world: Las Vegas. As with most other associations, NEHA's attendance always goes up when we meet in Las Vegas. Plus, Las Vegas is arguably one of the world's most unique and well-known cities. And judging by the reactions that we are seeing on people's faces here when we tell them about the venue for the next IFEH Congress, I think I can safely say that our international attendance at our Vegas AEC will be very significant—thereby making this conference an extra-special event for all NEHA members able to attend—and we genuinely hope that you can.

I should add that our board didn't make the decision to take our AEC–IFEH Congress to Las Vegas lightly. Some argue that Las Vegas doesn't exactly show off America at its finest. Then again, no venue in the world has better entertainment, food, hotels (and meeting facilities), and people watching than Vegas. Moreover, judging by the reactions we are getting here, it would seem that our selection is a home run—if not an out-of-the park home run!

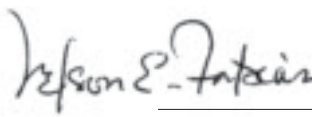
And by the way, we will be housing this conference at the Cosmopolitan (a Marriott branded hotel) which is brand-new, on the Strip, and easily one of the most spectacular hotels in that city of spectacular hotels.

Before signing off, I have one more thought I find necessary to share.

As of late, I have written a lot about the virtue of listening and how much can be learned by shutting down that desire to talk to instead carefully and empathetically listen to others. I say the following not to plug the Vegas conference but to plug our humanity.

My life will never be the same, given all that I have learned here. To hear from members of our international family the heartfelt stories of their environmental health odysseys is to be touched in a way that is lasting. It drives home the point that whether we are students or veterans, Easterners or Westerners, food safety or disaster experts, we are all united by our reverence for the environment and our responsibility for the health of humanity. To have that affirmed through the smiles, handshakes, and excitement to be found in the interactions of a meeting like this makes the experience not only rewarding but also a life-impacting moment that will forever affirm the work that we do.

Please mark your calendars now for this special meeting in Las Vegas in 2014 (July 7–10). (And don't forget the next NEHA AEC in Washington, DC, in July of next year!)



nfabian@neha.org

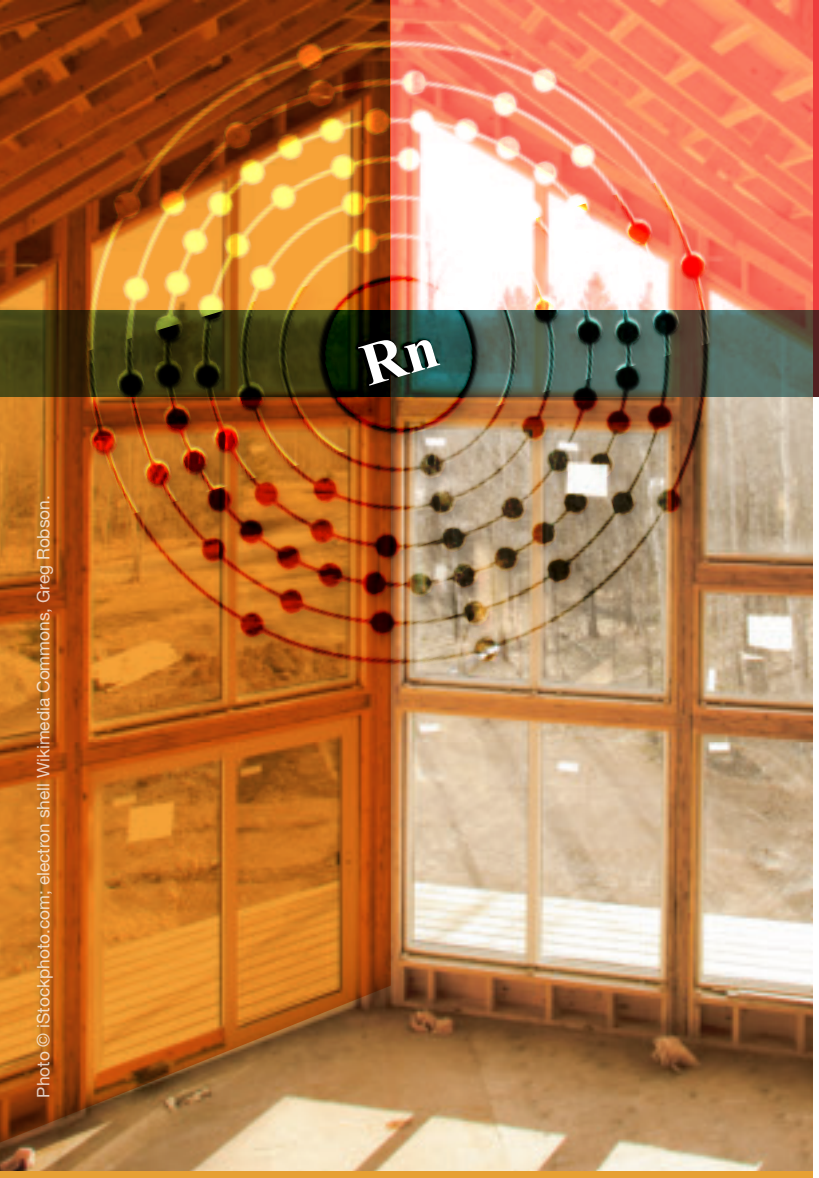



Photo © iStockphoto.com; electron shell Wikimedia Commons, Greg Robson.

# NEHA Radon Resistant New Construction (RRNC) Training

**November 27–29, 2012 ■ Washington, DC**

## Are you interested in expanding your knowledge and commitment in radon resistant techniques? If so, then this training opportunity is for you!

The National Environmental Health Association (NEHA), in cooperation with U.S. EPA Indoor Environments Division, is sponsoring a 2½ day **all-expenses-paid** training for environmental health (EH) professionals to implement radon resistant new construction (RRNC). **Attendees are expected to serve as NEHA field partners who will be resources for residential construction activities in their community for a minimum of one year.**

The training includes

- technical information on components of RRNC,
- state and local building code processes, and
- risk assessment and risk communication information about the health effects of long-term exposure to elevated levels of radon gas.

Attendees will

- work with U.S. EPA staff, local code officials and builders, other affiliate partners, nationally recognized instructors, and NEHA field partners—past attendees of this training—who have successfully implemented RRNC in their communities;
- learn new skills to increase consumer awareness of radon hazards, build local coalitions, and collaborate with other stakeholders and nonprofit organizations such as Habitat for Humanity and homebuilder associations; and
- assist in developing an action plan with specific and measurable goals for a RRNC program appropriate for their community.

## How to Apply

**Please e-mail an application to Vanessa De Arman at vdearman@neha.org by October 15, 2012.** Participants will be notified by October 19, 2012, if selected.

Applications must be on agency letterhead and include

- *each* attendee name, position title, complete mailing address, phone, fax, and e-mail address;
- community and/or industry partners that will be attending;
- description of current or planned radon activities including partner organizations;
- description of the area to be served, approximate number of new residential construction building permits in the past year, and the radon zone classification, if known;
- information on previous radon or RRNC training; and
- a statement indicating the support of management to undertake this program.

NEHA strongly encourages joint applications from the same community—teaming public/EH professionals with building code, zoning, or planning department officials, and/or interested builders or homebuilder association representatives.

NATIONAL ENVIRONMENTAL HEALTH ASSOCIATION

For more information, please contact Vanessa De Arman, Project Coordinator, at vdearman@neha.org or 303.756.9090, ext. 311.

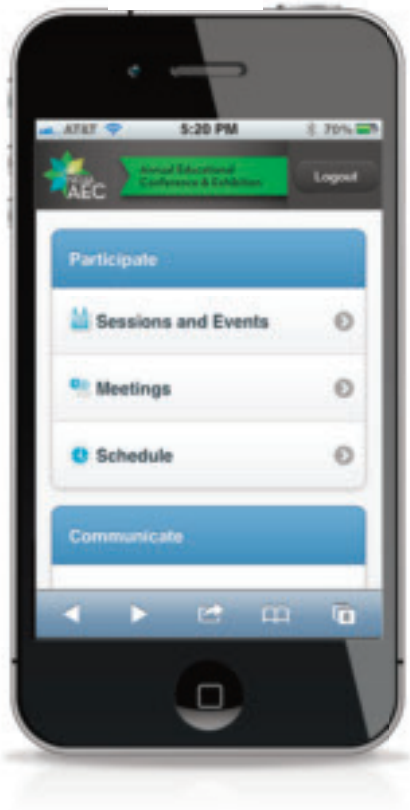
VIRTUAL AEC

# Access Valuable Educational Content
## from the NEHA 2012 AEC

NEHA AEC 76th

Though the NEHA 2012 AEC has ended in San Diego, you can still access valuable educational content from this event using the Virtual AEC. The Virtual AEC provides you with:

- An archive of over 30 educational sessions that were recorded live from San Diego, which can now be viewed on-demand
- Access to speaker presentations, hand-outs, and other materials
- The opportunity to earn continuing education credits
- A way to connect to a professional network of environmental health professionals, speakers, and exhibitors that attended the AEC




Whether or not you attended the NEHA 2012 AEC in San Diego, the Virtual AEC serves as an important resource for you to review valuable educational content over and over again, and to continue networking and conversing with other professionals!

**Visit neha2012aec.org for more information.**

# ANNOUNCING THE

77th National Environmental Health Association (NEHA)
Annual Educational Conference (AEC) & Exhibition

## July 9-11, 2013 ♦ Washington, DC

Photo © Uschools University Images

## SAVE-THE-DATES

neha2013aec.org

The NEHA AEC is the premier event for environmental health training, education, networking, advancement, and more!

# NEHA 2013 AEC
# CALL FOR ABSTRACTS

The National Environmental Health Association presents its 77th Annual Educational Conference & Exhibition in Washington, DC, July 9-11, 2013.

The NEHA AEC is designed to train, educate, and advance people who have an interest or career in environmental health and protection, as well as to bring people together to build a professional network of environmental health colleagues, exchange information, and discover new and practical solutions to environmental health issues.

## AEC Format

Directed and sequenced programming will be presented in simultaneous training and educational tracks. NEHA is seeking abstracts that bring to a national and international audience the latest advances in environmental health, as well as unique responses to environmental health and protection problems. Practical applications in both the public and private sectors should be emphasized along with the latest in proven emerging technologies.

NEHA offers two different types of training and educational sessions at the AEC—the Lecture and the Learning Lab. For Lectures, applications for single or multiple speaker presentations that are educational in nature are being accepted. However, presentations that are more interactive will be given first consideration. For Learning Labs, NEHA is accepting applications for hands-on demonstrations, tabletop exercises, poster presentations, drop-in learning labs, roundtable discussions, and other types of interactive and innovative presentation formats that will help train the attendees.

## Ensuring Attendees a Return on Investment

Additionally, the NEHA AEC is being rationalized according to return on investment (ROI) principles. Emphasis will be given to those abstracts that have the potential to impart knowledge to attendees, which enables them to make cost effective program improvements in their workplaces as a result of what they learn by attending the event, and thereby helping to pay for the investment made for their attendance to the NEHA AEC.

## Virtual AEC

NEHA continues to offer attendees the opportunity to access the AEC online with a number of educational sessions being streamed as they happen live at the AEC. Thus, abstract submitters should be aware that if accepted, their abstracts and presentations may also be part of the Virtual AEC. Certain presentations on particularly pertinent issues will be selected for live webcasting during the event, and presenters are required to engage with attendees on the Virtual AEC as well.

## Submission Process

Individuals and groups involved in all aspects of environmental health and public health are strongly encouraged to participate in this Call for Abstracts. If you have a presentation, please submit your abstract electronically at neha2013aec.org.

**The deadline for submission is October 1, 2012.**

## MANAGING EDITOR'S DESK

Nelson Fabian, MS

# From Vilnius, Lithuania, to Las Vegas, Nevada!

NEHA President Mel Knight and I are both participating in the meetings and Congress of the International Federation of Environmental Health (IFEH) as I write. This meeting and what we are learning from our involvement in it offer me a platform for sharing some thoughts on international environmental health, your association's deepening engagement of it, and the rewards that will be available to you because of all of this.

To begin—as a testament to our interest in international environmental health, some 20-odd years ago NEHA joined with like associations from several other countries to jointly found IFEH. IFEH is essentially an association of associations (i.e., the environmental health associations of various nations). Today, the institutional membership of IFEH stands at some 39 countries and counting.

More than anything else, IFEH offers a desperately needed forum for the leadership of the worldwide environmental health community to come together both to explore issues of mutual concern and to affirm the importance of this line of work worldwide. In fact, as I have participated in IFEH discussions, my appreciation for the issues and people of environmental health has done nothing but grow.

I have long been stimulated by the stories of NEHA members who have found amazing ways under difficult circumstances to solve pressing problems. As I continue to meet environmental health professionals from all over the world, that appreciation has grown exponentially. In my many interactions with the environmental health professionals from around the world that I am meeting here in Vilnius, Lithuania, I am taken in by that same "fire in the belly" and environmental and public health ethic. It is compellingly clear to me that this same fire and ethic drives the work of our brothers and sisters in lands far away and on issues that range from the similar (like food safety) to the different (like the provision of safe water in nations in Africa).

> *" … You will soon be able to tap into the excitement of a veritable international environmental health event that will be held in our country."*

IFEH serves to provide the world's environmental health community with a forum for our collective voice and action. At this meeting in Vilnius, for example, we debated a policy position that related to social and environmental justice. We also combined forces to move forward with a special series of disaster training workshops in the Asian Pacific region of the world. In addition, we are together working on finding ways to bring environmental health values and perspectives into the activities and policies of the World Health Organization, the World Bank, the International Monetary Fund, and the United Nations.

IFEH also offers a unique opportunity for the world's environmental health practitioners to learn about environmental health issues from around the world and to develop personal relationships within our worldwide community of colleagues. This is done through the tradition of declaring a global or IFEH "Congress" meeting every two years. IFEH manages a bidding process that offers each of its association members the opportunity to host such a Congress. The bid winner then makes arrangements to host the IFEH business meetings as an adjunct to their annual meeting.

Here in Vilnius, for example, our NEHA delegation spent two days in IFEH business meetings. That was then followed by the annual conference of the Lithuanian Union of Hygienists and Epidemiologists—this country's IFEH member.

As with all previous IFEH meeting hosts, the Lithuanian association altered its annual meeting to feature much more of an international agenda. The conference design also comes replete with enhanced opportunities for the attendees of this conference to meet and interact with others.

What is especially nice about this experience is that it has drawn participants from some 45 countries from around the world. I've had incredibly stimulating conversa-

*continued on page 49*


## For 25 years we've worked with the best and the brightest environmental health organizations in America.

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Angie Clark is a fictitious character, however, the numbers shown above are taken from actual activity generated by inspectors recorded in HealthSpace EnviroIntel.