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Volume 76, No. 7 March 2014



A Green Renewal

*health and housing outcomes from green
improvements of low-income housing*

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ABOUT THE COVER



In this month's cover feature, "Health and Housing Outcomes From Green Renovation of Low-Income Housing in Washington, DC," the authors investigated the

connection between health outcomes and environmentally conscious renovation of apartments in the nation's capital. They found significant improvements from baseline to one year after renovation in health, housing, and allergens. The authors' results suggest that widespread implementation of green housing principles will likely result in substantial health gains and housing improvements, especially for low-income at-risk populations where disparities are most pronounced. The housing pictured on our cover is from a similar project in Chicago, the Rosa Parks Apartments in the West Humboldt Park neighborhood. That project was also completed with green principles in mind.

See page 8.

Cover photo © Rosa Parks Apartments, Landon Bone Baker Architects, Ballogg Photography

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For more information, please contact Jill Schnipke at jschnipke@neha.org.



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- An Outbreak of Bed Bug Infestation in an Office Building
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- Prepublished online article: Exposure to Cyanide Among a Community Living Near a Gold Mine in Malaysia

Erratum

In "Effects of Centralized and Onsite Wastewater Treatment on the Occurrence of Traditional and Emerging Contaminants in Streams," published in the *Journal of Environmental Health*, 76(6), 18–27, the U.S. Geological Survey (USGS) site number and stream location for site 3 in Table 1 are incorrect. The correct USGS site number is 02085067. The correct stream location is Black Meadow Run at Argonne Drive near Durham, North Carolina.

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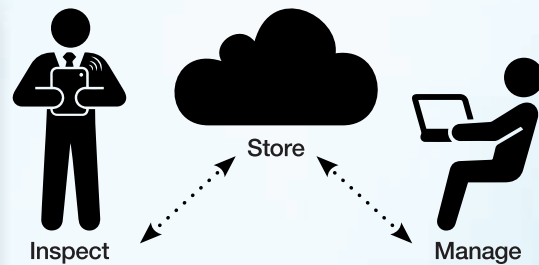
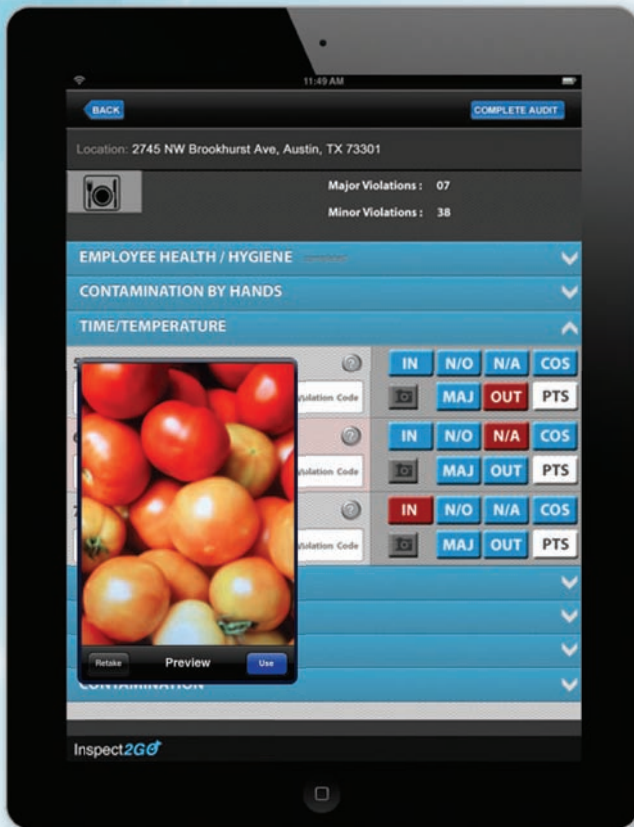
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McDonalds	4030 Fountain
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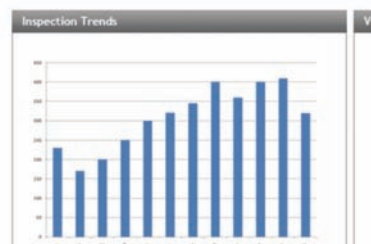
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October 2013

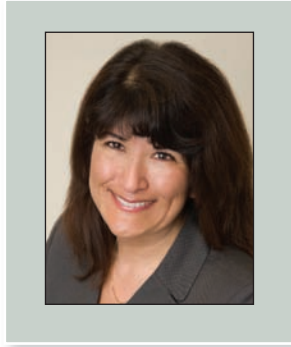
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13	14	15	16	17	18
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REPORTING

- Inspections
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- Establishments
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▶ PRESIDENT'S MESSAGE



Alicia Enriquez Collins,
REHS

The World Is in Our Hands

2014 is a special year for NEHA! We have the honor of partnering with the International Federation of Environmental Health (IFEH) to host this year's World Congress in conjunction with our 78th Annual Educational Conference (AEC) & Exhibition in Las Vegas, Nevada. After years of preparation for this year's unique educational event, the NEHA staff and our technical advisors are in the final stages of planning our program and combing through the details. It is with distinct pleasure that we anticipate convening with environmental health professionals from around the world, July 7–10, 2014, at The Cosmopolitan of Las Vegas.

IFEH

IFEH was envisioned by a friend and colleague from England, Mr. Eric Foskett (1920–2001). In 1982, Eric took his idea to his professional organization, the Chartered Institute of Environmental Health, and by 1985, IFEH was formed. The original four member associations of IFEH included Australia, England, Wales/Northern Ireland, and Republic of Ireland/Scotland. Nearly 30 years later, IFEH now has 42 member environmental health organizations (including NEHA) and 23 academic associate members from various parts of the world.

Here is just a sampling of the aims of the federation:

- provide a focal point for national organizations of practitioners, whether in state or local government, or private employment, whose concern is the care of the environment in the interests of the public health;

Having the opportunity to host and participate in an environmental health meeting with an international focus is extraordinary.

- provide a means of exchanging information on environmental health matters, including systems of organization and management;
- publish an international journal of environmental health and other publications relating to environmental health;
- hold congresses and other meetings for the consideration and discussion of subjects relating to environmental health;
- represent the interests of environmental health to national governments, state agencies, and international organizations; and
- promote the study of environmental health and exchange information about training and educational methods.

Last July, we had the honor of meeting Dr. Peter Davey, IFEH president. He traveled from

Australia to Washington, DC, to participate in our conference, strengthen our partnership, and promote collaboration for the World Congress. For additional information regarding IFEH, visit their Web site at www.ifeh.org.

Hosting the World Congress!

For each World Congress, IFEH accepts bids to host the event. Four years ago, NEHA submitted a bid to host this year's conference. Once we were notified that our bid was accepted, the NEHA staff initiated a magnificent collaborative effort to plan an educational event and gathering place for environmental health professionals from over 40 countries.

Each year, NEHA strives to stay abreast of the latest trends in environmental health and provide conference attendees with the most up-to-date technical information available. I am very excited to report that NEHA's outreach efforts during the call for abstracts last year resulted in the submission of nearly 275 abstracts and posters for consideration. This provided a welcome challenge to our education coordinator and technical advisors as they culled through hundreds of proposals in preparation for the technical agenda. With this response and the scrutiny needed to determine a final agenda, we can anticipate a high-caliber program. Abstracts were posted online and people were encouraged to view the proposed abstracts and leave comments. Sessions for the 2014 AEC are being confirmed and you can view the agenda at www.neha2014aec.org. NEHA will update the online session listings as the educational program moves towards being finalized.

In addition to the educational sessions and events offered at the combined AEC and World Congress, IFEH will also host its Annual IFEH Council and Regional Group meetings, the IFEH Annual General Meetings, and the IFEH International Faculty Forum for academics and students on July 5–7.

Keynote Speaker

We are also pleased to welcome our guest and keynote presenter, Mark Keim, MD. Dr. Keim is the associate director for science in the Office for Environmental Health Emergencies, National Center for Environmental Health/Agency for Toxic Substances and Disease Registry at the Centers for Disease Control and Prevention. He is also an adjunct professor at the Emory University Rollins School of Public Health and guest faculty at the Harvard University School of Medicine.

Dr. Keim twice received the U.S. Department of Health and Human Services Secretary's Award for Distinguished Service for his work as co-lead of CDC's emergency operations during the World Trade Center and anthrax letter emergencies in 2001 and again for Hurricane Katrina. In 2005, he also received the CDC's Special Act or Service Award for leading the U.S. health sector response after the Indian Ocean tsunami.

Message From the IFEH President

As president of IFEH I would like to promote the 13th IFEH World Congress on Environmental Health, July 7–10, 2014, in Las Vegas, jointly run by NEHA and IFEH. I encourage all country members, academic associations, and individual members and sponsors to attend and work together to promote this 13th IFEH World Congress event to colleagues and nonmembers. I attended the NEHA 2013 Annual Educational Conference & Exhibition in Washington, DC, and it was one of the best conferences I've attended for environmental health science and policy content and networking.

Hope to see you all in Las Vegas in 2014.

Dr. Peter Davey, MIFEH
President, IFEH

NEHA's Conference Planning Team

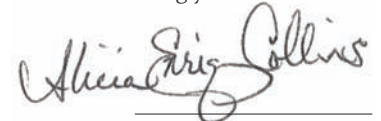
On behalf of the board of directors and our entire membership, I would like to extend our sincere appreciation and gratitude to both NEHA's conference planning team (Laura Brister, Jill Cruickshank, Nelson Fabian, Matthew Lieber, Terry Osner, Barry Porter, Jill Schnipke, and Clare Sinacori) and our technical advisors (see page 65 for a complete listing) for their hard work, diligence, and attention to detail while planning NEHA's 78th AEC and World Congress.

See You There!

Having the opportunity to host and participate in an environmental health meeting with an international focus is extraordinary. The tech-

nical program will be comprised of a combination of educational lectures, hands-on demonstrations, tabletop exercises, panel discussions, poster presentations, roundtable discussions, and other types of interactive and innovative presentation formats. The venue is easily accessible and has much to offer first-time or returning visitors. So, if you haven't yet registered for the conference or haven't yet made your decision to attend, I invite you to visit the event Web site at www.neha2014aec.org for more information and to register.

I look forward to seeing you there! 🐼



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Health and Housing Outcomes From Green Renovation of Low-Income Housing in Washington, DC

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Abstract Green building systems have proliferated recently, but studies are limited of associated health and housing outcomes. The authors measured self-reported resident physical and mental health, allergens, and building conditions at baseline and one-year follow-up in a low-income housing development being renovated in accordance with green healthy housing improvements (Enterprise Green Communities standards and Leadership in Energy & Environmental Design [LEED] gold certification). Self-reported general health in adults significantly improved from 59% to 67% ($p = .026$), with large statistically significant improvements in water/dampness problems, cockroaches and rodents, and reduced pesticide use. Median cockroach (*Blattella germanica*) and mouse (*Mus musculus*) allergen dust loadings showed large and statistically significant reductions from baseline to three months postintervention and were sustained at one year (both $p < .05$). Energy and water cost savings were 16% and 54%, respectively. Incorporating Enterprise Green Communities and LEED standards in low-income housing renovation improves health and housing conditions and can help to reduce disparities. All green housing standards should include health-related requirements.

Introduction

The connection between housing quality and health has received renewed attention in recent years because the environmental burden of disease associated with inad-

equate housing is large (Braubach, Jacobs, & Ormandy, 2011; Surgeon General, 2009). Housing affects health directly and indirectly (World Health Organization, 2005), and disparities in housing quality and health

outcomes are persistent, especially in low-income and minority communities (Jacobs, 2011). Physical, chemical, and biological exposures in the home that produce adverse health outcomes and those housing interventions that are known to be effective have been reviewed elsewhere (DiGiuseppi, Jacobs, Phelan, Mickalide, & Ormandy, 2010; Jacobs et al., 2010; Krieger et al., 2010; Sandel et al., 2010). Yet actual investment in housing improvements associated with health gains and environmental sustainability has been limited, in part due to lack of standardization and inadequately quantified health and housing outcomes. We conducted this study to quantify such outcomes.

Background

Several new “labeling” systems for housing have appeared recently, including the Enterprise Green Communities criteria (Enterprise Community Partners, 2005), the U.S. Environmental Protection Agency’s (U.S. EPA’s) Energy Star Plus Indoor Air Program (U.S. EPA, 2011), and the U.S. Green Building Council’s Leadership in Energy & Environmental Design (LEED) program (LEED, 2008). The systems treat health requirements differently: the Enterprise standards used in this renovation include required

TABLE 1

Demographics

Characteristic	Baseline		One Year Post		p-Value
	N	Result, n (%)	N	Result, n (%)	
Born in the U.S.					
Adults	57	54 (95)	27	24 (89)	.331 ^a
Children	62	60 (97)	31	29 (94)	.470 ^a
Age at baseline (in years) (mean)					
Adults	57	36	27	38	.450 ^b
Children	62	7	31	8	.278 ^b
Highest level of adult education at baseline (median)	57	GED or equivalent	27	GED or equivalent	.953 ^c
Female gender					
Adults	57	45 (79)	27	25 (93)	.117 ^a
Children	62	41 (66)	31	20 (65)	.877 ^a
Ethnicity					
Adults	57		27		1.0 ^d
Black/African-American		55 (96)		26 (96)	
White/other race		2 (4)		1 (4)	
Children	62		31		1.0 ^d
Black/African-American		60 (97)		30 (97)	
White/other race		2 (4)		1 (3)	
Number of people living in each apartment (mean)	44	2.8 (1.3 Adult; 1.4 Child)	25	2.3 (1.1 Adult; 1.2 Child)	.493 (All) .244 (Adult) .784 (Child) ^e
Annual household income (in dollars) (median)	44	<\$10,000	25	<\$10,000	1.0
^a Chi-square test of inequality of proportions. ^b Two-sample t-test of inequality of means. ^c Wilcoxon test of inequality of medians. ^d Chi-square test of inequality of the proportions black/African-American vs. white/other race at two time periods.					

health-related specifications, while LEED only provides a certain number of optional points for health items. This project is also one of the first projects to comply with the new green building law in the District of Columbia (2006).

While such systems may improve health, evidence to support this claim is sparse in both new housing construction (Takaro, Krieger, Song, Sharify, & Beaudet, 2011) and housing rehabilitation (Breyse et al., 2011). Studies show significant improvements in asthma and other respiratory symptoms in new construction that meets energy efficiency and other green housing standards (Krieger, 2010; Leech, Raizene, & Gusdorf, 2004; Takaro et al., 2011), such as large

improvements in number of trips to emergency rooms for asthma attacks, caregiver quality of life, and asthma trigger reductions using home-based asthma intervention. Leech and co-authors (2004) found important health gains in wheeze (10%), headache (23%), and fatigue (30%).

Only two studies have been conducted so far of rehabilitation of existing housing, where housing improvements and compliance with green healthy housing systems may be more constrained by existing housing conditions. A randomized controlled trial in New Zealand showed a 9% improvement in general self-reported health, 15% improvement in lost workdays, and an 11% improvement in school absences (Howden-

Chapman et al., 2008). A smaller study in Minnesota showed statistically significant improvements in general health, chronic bronchitis, sinusitis, and asthma, all in adults following green renovation of low-income housing (Breyse et al., 2011). The Minnesota study showed large statistically significant improvements in excellent, very good, and good general health one year after renovation in adults.

Methods

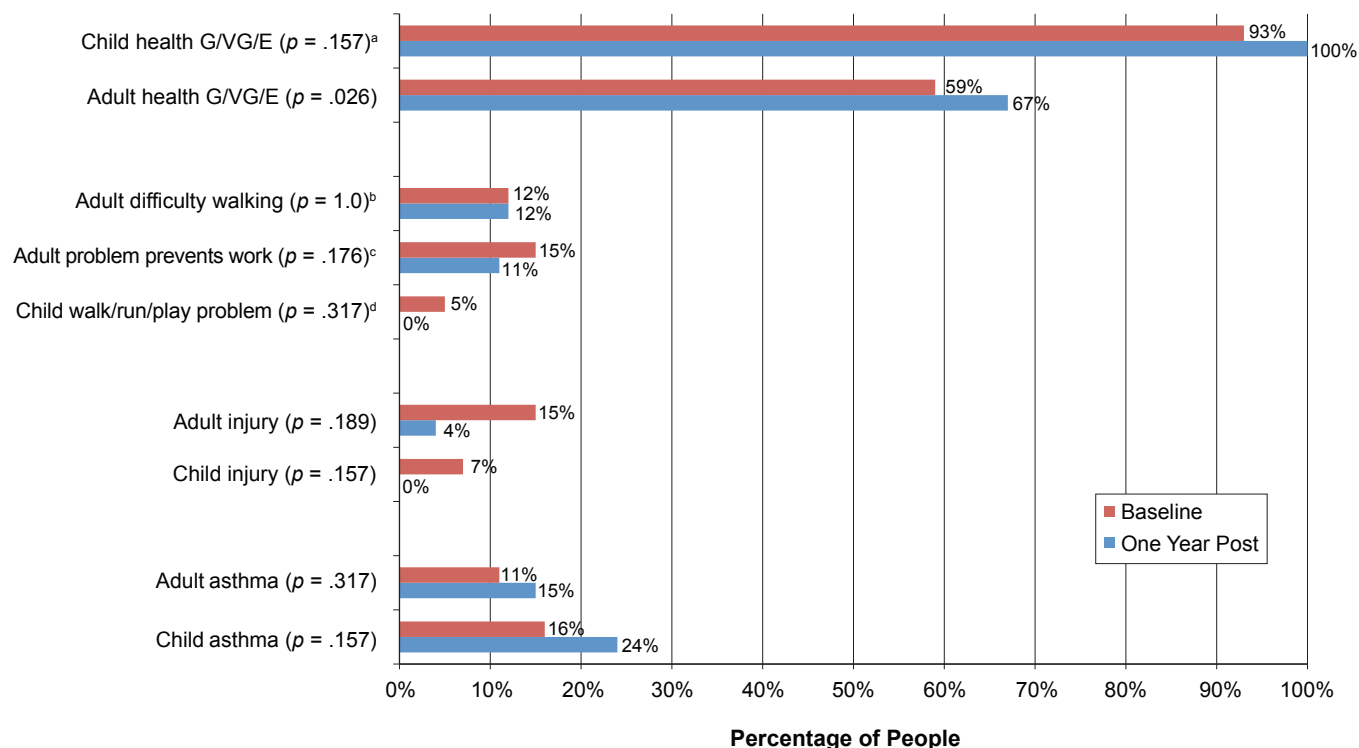
Participants and Procedures

Of the 102 occupied housing units available, 44 units containing 57 adults and 64 children were enrolled at baseline, with 25 units containing 27 adults and 31 children completing the follow-up approximately one year after the rehabilitation was completed (retention rate = 57%). To be eligible for the follow-up, the same participants in each unit must have completed the baseline. Persons lost to follow-up either moved away from the study housing or could not be contacted at follow-up. Study participants were primarily African-American, very low-income U.S. citizens, with female heads of households (Table 1). No significant demographic differences existed between the baseline and follow-up groups.

The rehabilitation complied with the Enterprise Green Communities criteria, which include integrated design, location and neighborhood fabric, site, water conservation, energy conservation, use of sustainable and environmentally friendly materials and resources, healthy living environment, and operations and maintenance. The housing improvements likely to influence health included a mechanical ventilation system that delivered fresh air to each apartment in compliance with American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) standard 62.2 (ASHRAE, 2007), control of pests, repair of leaks, elimination of mold, elimination of holes and injury hazards, and other improvements. The project architects and developers conducted a unique green charrette to facilitate a multidisciplinary approach that included development, architectural, engineering, construction, mechanical, electrical, and public health professionals, and residents.

FIGURE 1

Health Outcomes



^aG/VG/E = good/very good/excellent (versus fair/poor).

^bFull question: Because of a health problem, does the person have difficulty walking without using special equipment?

^cFull question: Does a physical, mental, or emotional problem keep a person from working at a job or business?

^dFull question: Does child have an impairment or health problem that limits his/her ability to crawl, walk, run, or play?

Data Collection

Before renovation and again one year after the renovation was completed, the study team administered a structured health interview, allergen sampling in settled house dust, and a visual assessment. The interview used an adaptation of the National Health Interview Survey (Centers for Disease Control and Prevention [CDC], 2005a), the Behavioral Risk Factor Surveillance System (CDC, 2005b), and the National Survey of Lead and Allergens in Housing (U.S. Department of Housing and Urban Development [HUD] & National Institute of Environmental Health Sciences, 2001). The interview also asked about physical and mental health and perceptions of building quality. We assessed housing quality visually before and after the reha-

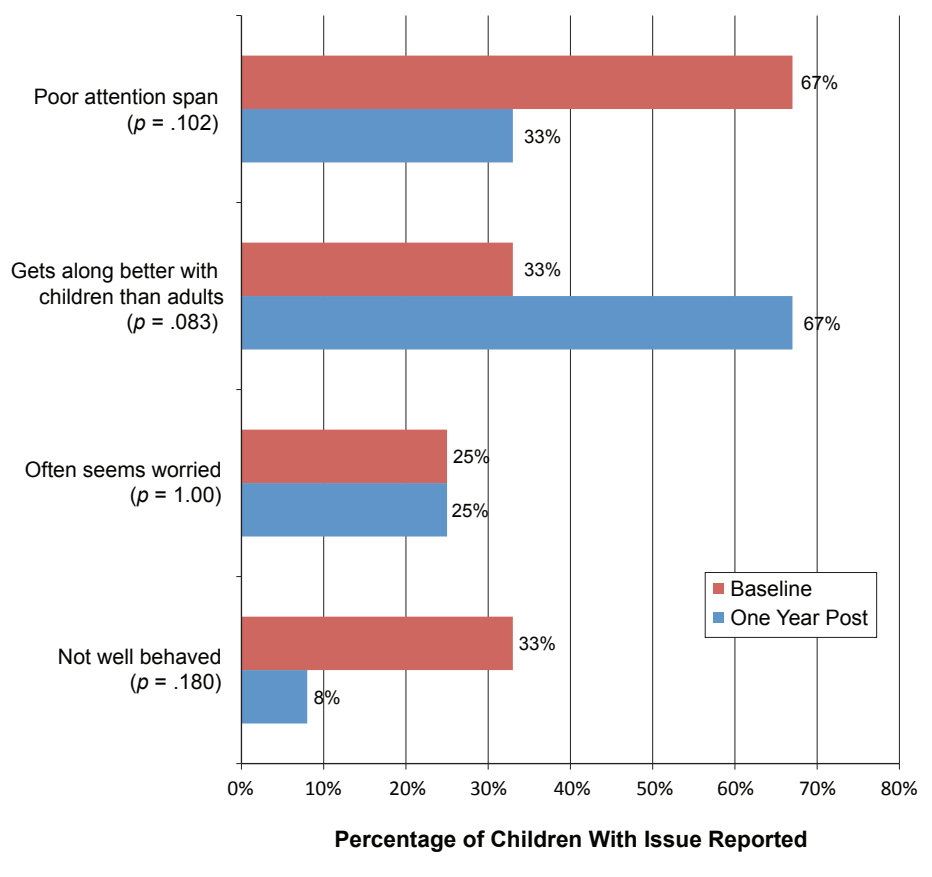
bilitation using an adaptation of the CDC/ Department of Housing and Urban Development (HUD) *Healthy Housing Inspection Manual* (CDC & HUD, 2005). Settled dust sampling was completed in a random sample of the units (using a random numbers generator) to estimate allergen levels using the standard HUD method (HUD, 2008) at baseline (1–6 months before renovation), again at 4–9 months after renovation, and a third time at 12–17 months after renovation.

Samples were collected from the floor of each of three rooms: the living room, kitchen, and youngest child’s bedroom. We collected samples from the predominant floor surface type (e.g., bare or carpeted) within each room. Each floor dust sample was collected using a canister vacuum cleaner fitted with a dust

collection sleeve. Samples were prepared and analyzed using enzyme-linked immunosorbent assays for cockroach (Bla g1), dust mite (Der f1 and Der p1), mouse (Mus m1), and rat (Rat n1) allergens and results were sent to residents. The laboratory reported sample results in micrograms of allergen per gram of dust (µg/g) for all allergens except Bla g1, which was reported in units of allergen per gram of dust (U/g). Allergen dust loadings (µg/ft²) were calculated by multiplying allergen concentrations by sieved dust mass divided by square footage of floor area sampled in each room at each visit. Limits of detection varied among samples, ranging from 0.02 to 0.09 µg/ft² for both Der f1 and Der p1, 0.4 to 2.2 U/ft² for Bla g1, 0.001 to 0.06 µg/ft² for Mus m1, and 0.02 to 0.1 µg/ft² for Rat n1.

FIGURE 2

Child Mental Health



Statistical Analysis

For interview questions that were asked for only one person in a unit and that could be answered either yes or no, McNemar’s test was used to test the hypothesis that the percentage of people answering yes changed. McNemar’s test was also used for visual assessment questions. For interview questions that were asked for multiple people in a given unit and could be answered either yes or no, a generalized estimating equation (GEE) model was used to test if a change occurred in response from baseline to follow-up. If all people had the same response at one time, the GEE model did not converge; therefore, McNemar’s test was used.

For questions that could be answered with a multiple list of options representing an order of intensity (e.g., whether general health was “excellent,” “very good,” “good,” “fair,” or “poor”), the Cochran-Mantel-Haenszel row

mean score test for ordinal variables was used to test the hypothesis that the means at two specific times were different. When comparing interview results at two different time periods, data were first matched for both participants and apartments. Statistical significance was defined as $p < .05$ and marginal significance as $.05 \leq p < .1$. Allergen concentrations below the limit of detection (LOD) were replaced by the LOD to calculate dwelling unit averages. The Cochran-Mantel-Haenszel test of association was used to determine if the percentage of samples less than the LOD differed between two or more visits.

Results

Health

Adults reporting excellent, very good, or good health significantly improved from 59% at baseline to 67% at follow-up ($p =$

.026) (Figure 1). Ninety-three percent and 100% of children were reported to be in good/very good/excellent health at baseline and one year postintervention, respectively ($p = .157$). Only a few children (16%) and adults (11%) had asthma at the baseline visit, and no significant change occurred in the percentage of either adults or children with current asthma. Injuries decreased in children from 7% to 0% and in adults from 15% to 4%, but both of these changes did not attain statistical significance ($p = .157$ and $p = .189$, respectively). No significant changes occurred in other physical health conditions from baseline to one year after intervention.

The percentage of children reported as not well behaved improved from 33% to 8%, and those reported to have poor attention spans decreased from 67% to 33%, although neither change was statistically significant (Figure 2). Adult mental health did not change significantly (Figure 3).

Housing

After one year, residents reported that their renovated homes were more comfortable (43% vs. 91%; $p < .001$) and easier to clean (80% vs. 96%; $p = .102$) (Figure 4). Large improvements occurred in reported water/dampness problems (80% vs. 16%; $p < .001$); mildew odor/musty smells were eliminated (61% vs. 0%; $p < .001$); cockroach problems improved (56% vs. 8%; $p = .003$); and rodent problems improved (64% vs. 12%; $p = .002$), with resulting reductions in residential pesticide use (44% vs. 8%; $p = .007$).

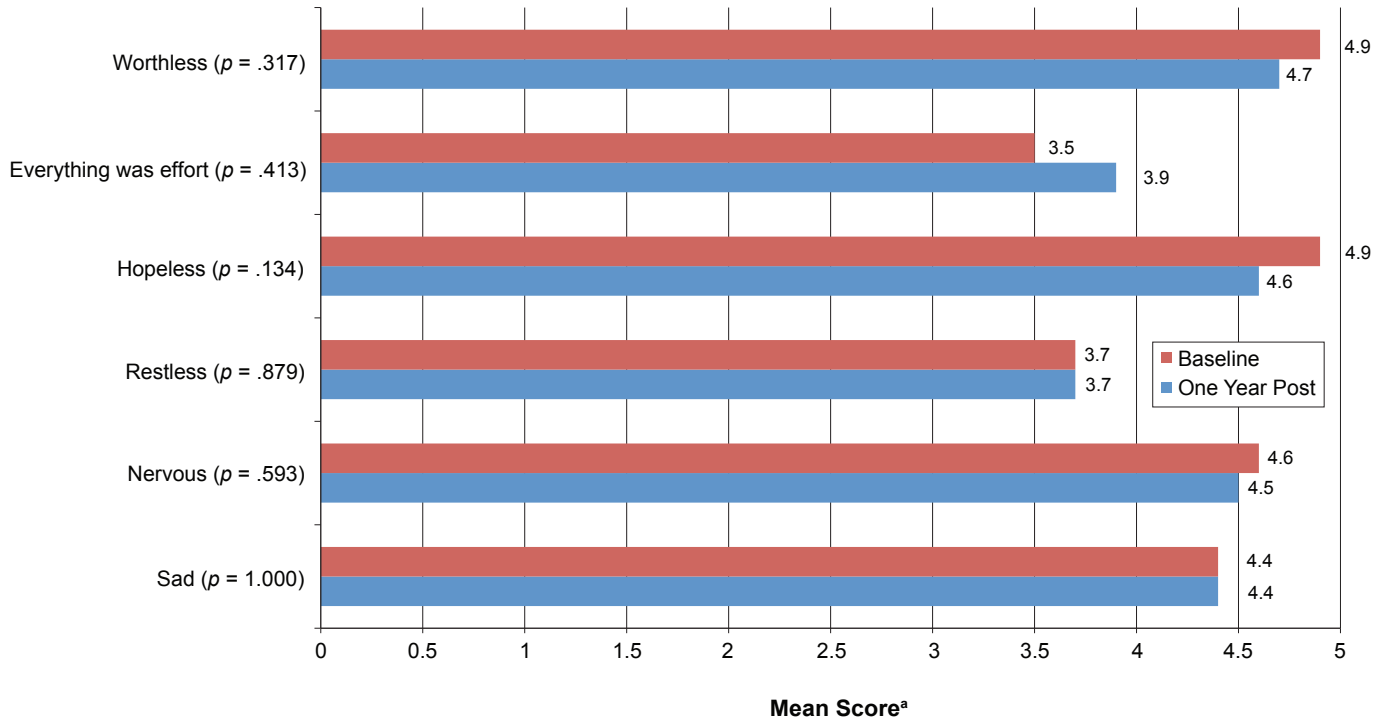
Apartments were generally in very bad condition at baseline. Almost a quarter of apartments had plumbing problems; ceilings, walls, and floors in almost all apartments had water staining/damage, mold, or peeling paint; and many doors and windows were damaged (Table 2). These issues were resolved, however, after the renovations were complete, with significantly improved housing conditions at one year postrenovation.

Allergens

Mouse allergen (Mus m1) was the most frequently detected allergen at baseline, found in 100% of kitchens and living rooms, followed by cockroach (Bla g1) and dust mite (Der f1) allergens (Table 3). In each room

FIGURE 3

Adult Mental Health



^aMean scores are based on the following scale: 1 = all of the time; 2 = most of the time; 3 = some of the time; 4 = a little of the time; and 5 = none of the time.

tested, the percentage of units with *Mus m1* and *Bla g1* below the LOD significantly improved across the three visits. *Der p1* was rarely detected at any visit, and no *Rat n1* was detected in any samples at any visit. The percentage of units with *Der f1* below the LOD did not significantly change across visits. Median cockroach (*Bla g1*) and mouse (*Mus m1*) allergen dust loadings showed large and statistically significant reductions from baseline to three months postintervention, and were sustained at one year (both $p < .05$) (Table 3).

Energy and Water Savings

Energy efficiency and water-saving measures reduced energy consumption by an estimated 16% (measured as cost per kilowatt hour per square foot) and water consumption was reduced by 54% compared to baseline.

Discussion

Although standards that incorporate green healthy housing principles are relatively new and for the most part voluntary, our results suggest that widespread implementation through local laws will likely result in significant health gains and housing improvements, especially for low-income at-risk populations where disparities are most pronounced. A recent review of housing disparities that influence health showed that they have remained persistent for decades, with the notable exception of childhood lead-poisoning prevention (Jacobs, 2011), where policy changes have helped to reduce (but not entirely eliminate) lead-poisoning disparities.

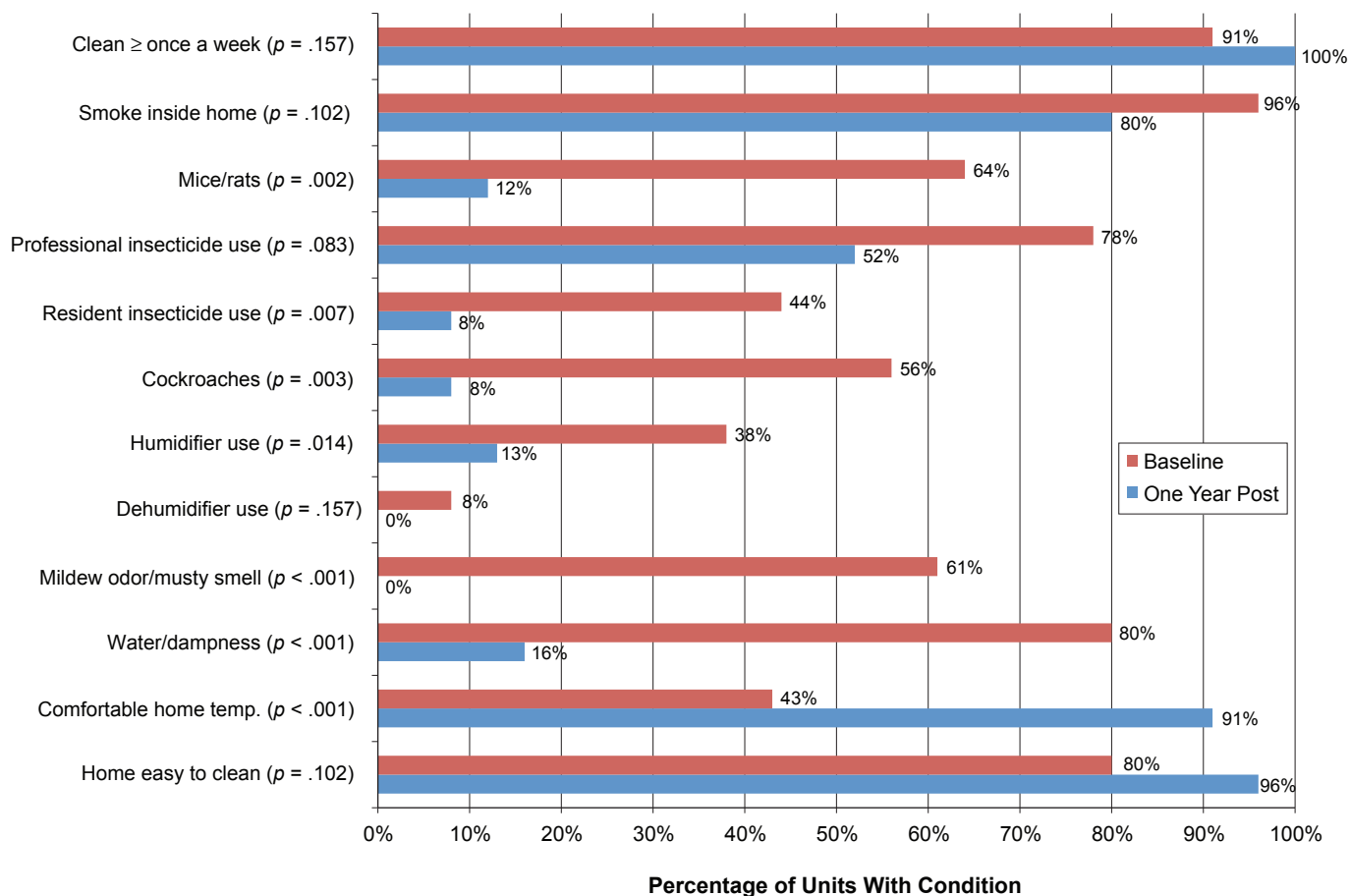
A study of housing renovation in London also showed important health improvements following substantial renovation (Ambrose, 2001). Together with other work, this has enabled Great Britain to estimate the health

costs of inadequate housing, which is at least £1.5 billion annually (U.S. \$1.6 billion) (Nichol, Roys, Davidson, Ormandy, & Ambrose, 2010). A cost/benefit study of unhealthy housing (or the monetized benefit of healthy housing) in the U.S. has not yet been completed, although the net monetized benefit of lead-safe housing in the U.S. has been shown to be substantial (Nevin, Jacobs, Berg, & Cohen, 2008), as has the benefit of multifaceted home interventions for asthmatic children. For example, CDC showed that for every one dollar spent on asthma intervention, the monetary value of the resulting benefits, such as averted medical costs or averted productivity losses, was \$5.30–\$14.00 (Tursynbek et al., 2011).

A strength of our study is that the ability to sustain low allergen loadings for at least a one-year period underscores the importance of providing smooth and cleanable sur-

FIGURE 4

Apartment Condition



faces. Another is that it used several different ways to estimate both the housing and health improvements. The use of a structured health interview, visual assessment, and allergen sampling in settled house dust enabled us to quantify improvements. The residents' perception of housing quality is an important metric that should be included in future studies of health outcomes associated with green housing improvements and is an important element of community-engaged research. The residents reported their renovated homes were more comfortable, easier to clean, less damp and less moldy, and far less likely to have pest problems. Our study underscores the need for longer and larger studies to improve the quantification

of health gains associated with housing improvements. Finally, our study trained community leaders to help educate residents about how to maintain a healthy home.

Our study has limitations. It is difficult to discern whether health improvements are due to the nature of "green" renovation versus "normal" renovation. A loss of participants to follow-up occurred, primarily because they moved away from study housing, although the demographics of the baseline and follow-up groups were not significantly different. One adult answered the health questions for both themselves and the children in the household, potentially introducing bias. Cultural differences between interviewers and interviewees may have caused misun-

derstanding of some questions. Self-reported health at two points in time may be subject to recall bias and uncertainty.

Although recall reports are reasonably well correlated with actual health (Miilunpalo, Oja, Pasanen, & Urponen, 1997), future studies should endeavor to collect objective medical data as well as self-reported health data. Ideally, our study would have included households that underwent housing renovation that was not "green," in order to estimate the incremental health and housing benefits associated with green renovation, although the District of Columbia law made such a study design impossible, because virtually all housing renovation was required to comply with the new law.

Conclusion

Incorporating Enterprise Green Communities and LEED standards in low-income housing renovation improves health and housing conditions. Such standards should be included in designs and, where required, implemented through local law or incentives to help contain avoidable medical care expenses and reduce the suffering from poor health associated with inadequate housing. These standards may also help to reduce long-standing housing and health disparities. Quantifying avoidable medical care costs from improved housing should be completed in the U.S., as has been done in Great Britain to help inform health care reform as well as housing policy. All green housing standards should include health-related requirements. 🐛

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TABLE 2

Visual Assessment of Building Conditions

System/Characteristic	#	% With Condition at Baseline	% With Condition at One Year Post	p-Value
Bathroom				
Plumbing leaks	25	24	4	.025
Exhaust fan not working/not present	25	100	0	<.001
Ceilings/floors/walls of apartment				
Holes/missing tiles/panels/cracks	25	96	20	<.001
Peeling/needs paint	25	96	4	<.001
Water stains/water damage/visible mold	25	92	0	<.001
Kitchen				
Cabinets/countertops missing/damaged	24	71	4	<.001
Plumbing: leaking faucets/pipes	25	12	0	.083
Stove/sink missing/damaged/inoperable	21	43	5	.011
Apartment				
Damaged doors	24	58	4	<.001
Light fixtures: missing or not working	23	30	8	.198
Smoke detector: not working	20	15	10	.564
Paint damage on windows	24	67	0	<.001
Window glass cracked/missing	24	8	0	.157
Sharp edges	24	54	17	.013
Tripping hazards	24	67	29	.013
Pests (cockroaches, rodents, other insects/vermin)	22	50	41	.527
Building/common areas				
Foundation: cracks/gaps	7	14	0	.317
Water stains/peeling paint on walls	7	57	0	.046
Visible mold on floors	7	29	0	.157
Water stains/water damage/visible mold on ceilings	7	43	0	.083

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TABLE 3

Allergen Dust Loadings

Allergen Type and Location	n	Baseline		Three Months Post		One Year Post		p-Value
		% <LOD ^a	Median	% <LOD	Median	% <LOD	Median	
Bla g1 (U/ft ²)								
Kitchen	11	27	6	100	<LOD	91	0.8	<.001
Living room	10	50	17.9	100	<LOD	80	2.7	.042
Der f1 (µg/ft ²)								
Bedroom	11	27	3.8	27	6.7	18	12	.779
Living room	10	50	1.2	70	0.07	50	0.3	.513
Der p1 (µg/ft ²)								
Bedroom	11	91	0.1	73	0.4	82	0.4	.549
Living room	10	100	<LOD	80	0.08	80	0.1	.368
Mus m1 (µg/ft ²)								
Kitchen	11	0	2.1	36	0.06	54	0.04	<.001
Living room	10	0	1.8	80	0.03	40	0.06	.005
Rat n1 (µg/ft ²)								
Kitchen	11	100	<LOD	100	<LOD	100	<LOD	N/A
Living room	10	100	<LOD	100	<LOD	100	<LOD	N/A

^aLOD = limit of detection.

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Preventing Diseases and Outbreaks at Child Care Centers Using an Education, Evaluation, and Inspection Method

Jordan Wagner, RN
Altru Health System

Sharon Clodfelter
Renown Health

Abstract From 2005 to 2008, Washoe County, Nevada, child care centers experienced an increase in illnesses from communicable disease outbreaks. The number of ill children and caregivers from these outbreaks went from 26 in 2005 to 266 in 2008, an increase of 923%. A clear need to reverse this trend existed. Therefore, in 2009 Washoe County strengthened its regulations for child care facilities by adding numerous communicable disease prevention standards. In addition, in 2009 a two-year education, evaluation, and inspection program was implemented at Washoe County child care centers. Following the implementation of this program, a decline occurred in the number of illnesses. The number of ill children and caregivers from outbreaks went from 266 in 2008 to 13 in 2011, a decrease of 95%.

Introduction

Children in child care facilities can transmit communicable diseases to other children, staff, and family members. In addition, child care facilities have a known history of increasing a child's risk of contracting diseases. The incidence of diarrhea, for example, has been shown to be significantly higher in children in child care facilities (Reves et al., 1993). Similarly, the use of child care facilities is a major factor contributing to transmission of respiratory tract diseases (Collet et al., 1991; Fleming, Cochi, Hightower, & Broome, 1987). Administrators of child care centers need to have effective infection control procedures in place to prevent and control outbreaks (Lee & Greig, 2008).

In 2007, the Washoe County Health District and the Washoe County Department of Social Services responded to the increasing number of illnesses from outbreaks of

norovirus, influenza, and strep throat at child care centers by setting a goal to strengthen the Washoe County child care regulations on communicable diseases. Washoe County is located in northern Nevada and includes the cities of Reno and Sparks. The proposed regulations covered all licensed child care facilities in Washoe County. The Washoe County Health District also set a goal of developing an education, evaluation, and inspection program at child care facilities. Due to resource availability, however, the education, evaluation, and inspection program was only implemented at larger child care facilities licensed to care for 13 or more children.

Amending the Child Care Regulations

Child care regulations are designed to protect children by striving to prevent the risk of the spread of diseases (National Association for the Education of Young Children, 1997).

As a result of the collaboration between the Washoe County Health District and the Washoe County Department of Social Services, a number of communicable disease prevention requirements were adopted into the Washoe County child care regulations. These regulatory requirements were designed to reduce the number and severity of outbreaks and included 1) requiring exclusion of caregivers and children when they exhibit specific symptoms; 2) requiring a hand-washing training program for children and caregivers; 3) requiring that caregivers monitor children's hand-washing activities; 4) requiring specific hand-washing procedures be followed; 5) requiring a cleaning and sanitizing schedule for specific items; 6) requiring additional steps to the diaper-changing procedure, and 7) requiring all caregivers to take a Washoe County-approved communicable disease prevention course at least once every three years. Overall, the caregivers were very receptive and supportive of these proposed regulations. After a feedback period, these requirements were formally adopted in 2009.

The Education, Evaluation, and Inspection Program

The education, evaluation, and inspection program at child care centers began on February 1, 2009. This program was designed to evaluate and provide educational feedback on communicable disease prevention concepts to child care administrators. The program was also designed to familiarize the child care administrators with the symptoms of communicable diseases, such as diarrhea, vomiting, fever, cough, and sore throat. In

addition, this education, evaluation, and inspection program was designed to determine if any improvements in specific categories of the administrators' knowledge of communicable disease prevention concepts transferred into observed improvements in the child care centers' communicable disease prevention practices.

Previous education and evaluation programs have been effective in reducing illnesses. For example, hand-washing promotion is associated with significantly reduced absenteeism in school (Bowen et al., 2007). Hand-washing monitoring practices and hand-washing training programs also have played a role in reducing infections in children attending daycare centers (Carabin et al., 1999). Hand washing has proven to be one of the most important ways to limit the transmission of diseases in child care centers (Australian Government National Health and Medical Council, 2005). The critical role of hand washing to prevent disease transmission cannot be overemphasized (Mink & Yeh, 2009). Hand washing alone, however, does not always appear to be sufficient to prevent the spread of disease at child care centers. A hand-washing intervention program that resulted in an approximate threefold increase in hand washing among preschool children did not reduce illness absenteeism or overall absenteeism (Rosen et al., 2006). This suggests that a need exists for enhanced approaches for reducing illnesses in preschool settings (Rosen et al., 2006).

Methods

The methods involved a two-part evaluation process consisting of questionnaires and visual inspections. These questionnaires and inspections were conducted by environmentalists who are registered as environmental health specialists both by the state of Nevada and by the National Environmental Health Association. The environmentalists' training included being able to implement health and safety laws as they pertain to child care centers. Their training also equipped them on how to communicate with the child care operators on when to suspect an outbreak is occurring, what interdiction measures to take when a suspected outbreak is occurring, and how to prevent outbreaks.

A 24-item questionnaire was developed to ascertain each child care administrator's base-

line knowledge regarding communicable disease prevention concepts. This questionnaire was administered to the child care administrators during the unannounced annual inspections by the Washoe County Health District environmentalists. If they were unable to answer a question or answered a question incorrectly, it was marked as a negative response. The correct answer was then discussed until the environmentalist determined that the child care administrator understood the communicable disease concept(s) and could now answer the question correctly. The questions were asked in an open-ended format.

After the questionnaire was completed, the environmentalist conducted a visual inspection of the child care center to determine the extent of the center's compliance with the regulations. The environmentalist recorded violations on a 20-point list. If any violation on that list was found to have occurred, then the child care center was marked out of compliance for that category.

Approximately one year following the initial questionnaire and visual inspection, the process was repeated during the following year's unannounced annual inspection. A follow-up questionnaire (identical to the one given during the first inspection) was again asked of the child care center's administrator. In addition, another visual inspection was conducted and violations were once again marked on the 20-point list.

The differences between the first and second visit's answers to the administrative questionnaire were evaluated. In addition, the differences between the first and second visit's visual inspection were evaluated. The Pearson Chi-square test was used to determine any statistically significant differences in the answers to the questions from the first to second visit. The Pearson Chi-square test was also used to determine any statistically significant differences in the visual inspection from the first to the second visit. When a cell had a count of five or less, the Fisher's exact test was used instead of the Pearson Chi-square test. A threshold of $p < .05$ was chosen to identify statistical significance.

The Washoe County Health District also reviewed the yearly number of outbreaks and the yearly number of ill children and caregivers from these outbreaks prior to, during, and after completion of this two

year education, evaluation, and inspection program. The tracking of these outbreaks and illnesses was used to determine whether or not changes occurred in the number of outbreaks and illnesses.

Results

Questionnaires were given and visual inspections were conducted at 111 licensed child care centers in Washoe County. Of these 111 licensed child care centers, 80 of the child care centers had questionnaires and visual inspections conducted twice over a two-year period. Of the questions asked of the child care administrators, 8 of the 24 questions on the questionnaire had statistically significant different responses from the first to the second visits (Table 1). Administrators' correct responses to all eight of these questions increased on the second visit. The questions that had statistically significant different responses from the first to the second visit are as follows: 1) "Were there special precautions to prevent outbreaks in place?" ($p \leq .001$). 2) "Did the administrator have knowledge of the reporting requirements for suspected gastrointestinal (GI) outbreaks?" ($p \leq .038$). 3) "Was the administrator aware of normal, baseline levels of illness?" ($p \leq .002$). 4) "Was the administrator able to determine a suspected illness outbreak—How many sick kids and staff with the same symptoms before they report to the health district?" ($p \leq .001$). 5) "Was there a hand-washing training program for children and staff?" ($p \leq .002$). 6) "Were hand-washing monitoring requirements in place (even when only one child uses the bathroom)?" ($p \leq .005$). 7) "Was there a blood spill cleanup kit in place?" ($p \leq .001$). 8) "Was the cleanup procedure from vomitus acceptable for norovirus prevention?" ($p \leq .001$).

No statistically significant differences were found on the visual inspections of the child care centers from the first to the second visit (Table 2).

From 2008 to 2010 the number of outbreaks at these child care centers decreased from nine to two. More importantly, illnesses associated with these outbreaks declined from 266 in 2008 to 61 in 2010, a decrease of 77%. Although data collection on the education, evaluation, and inspection program ended on February 28, 2011, the number of illnesses from outbreaks at these child care centers continued to decline. The

TABLE 1

Responses to Questionnaires by the Child Care Administrators

Question	Environmental Inspection Visit 1			Environmental Inspection Visit 2			p-Value**
	n	# Correct Response	% Correct Response	n	# Correct Response	% Correct Response	
1. Facility has a history of outbreak(s)?	80	8	10.0	80	11	13.8	≤.463
2. Special precautions to prevent outbreaks in place?	80	60	75.0	80	80	100	≤.001**
3. Understanding of exclusion for gastrointestinal (GI) illnesses?	80	73	91.3	80	78	97.5	≤.167
4. Backup employee substitute plan in place?	80	70	87.5	80	77	96.3	≤.079
5. Sick children isolated during wait for parent pickup?	80	75	93.8	80	80	100	≤.059
6. Knowledge of reporting requirements suspected GI outbreaks?	80	67	83.8	80	76	95.0	≤.038**
7. Awareness of normal, baseline levels of illness?	80	68	85.0	80	79	98.8	≤.002**
8. Illness tallied/tracked/or informally noted daily?	80	57	71.3	80	59	73.8	≤.723
9. Able to determine suspected illness outbreak—"How many sick kids and staff with the same symptoms before you report to the health district?"	80	67	83.8	80	79	98.8	≤.001**
10. Have hand-washing training program for children, staff?	80	68	85.0	80	79	98.8	≤.002**
11. Hand washing occurs at appropriate times?	80	75	93.8	80	79	98.8	≤.210
12. Hand-washing monitoring in place (even when only one child uses bathroom)?	80	67	83.8	80	78	97.5	≤.005**
13. If hand sanitizer is used, is it used correctly?*	51	41	80.4	61	52	85.2	≤.496
14. If gloves are used, does facility have hand-washing policy for glove use?*	64	56	87.5	73	68	93.2	≤.382
15. Review diaper change policy (get a copy, if possible)—adequate?*	52	41	78.8	56	44	78.6	≤.927
16. Child's hands are washed with soap/water or wipes after soiled diaper is removed prior to rediapering?	80	33	41.3	80	45	56.3	≤.058
17. Caregiver washes hands after soiled diaper is removed before clean diaper and clothes are put on?*	47	33	70.2	56	42	75.0	≤.586
18. Child's hands washed at end of diaper change?*	51	48	94.1	56	52	92.9	≤1.00
19. Caregiver washes hands at end of each and every diaper change?*	48	48	100.0	55	53	96.4	≤.497
20. Have blood spill cleanup kit in place?	80	13	16.3	80	31	38.8	≤.001**
21. Cleanup procedure for vomitus acceptable for norovirus prevention?	80	44	55.0	80	73	91.3	≤.001**
22. Infant formula prepared by parents?*	42	32	76.2	45	36	80.0	≤.667
23. Infant formula mixed or remixed by caregivers?*	39	21	53.8	44	21	47.7	≤.578
24. If caregivers remix formula, are bottles adequately cleaned?*	21	15	71.4	19	14	73.7	≤1.00

Those child care centers that were not involved in the procedure covered under this question were marked "not applicable" and their response was not used in the statistical calculations. If a "not applicable" response was given to any question not marked by an (), it was treated as a negative response.

**Statistically significant at $p < .05$.

number of ill children and caregivers from outbreaks went from 266 in 2008 to 13 in 2011, a decrease of 95% (Table 3).

These education and evaluation type of inspections of child care centers did not place excessive demands on the Washoe County Health District environmentalists. The time

required to conduct an education and evaluation type of inspection of a child care center was nearly identical to the time it took to conduct the previous observational type of child care inspection. It took a mean average of 74 minutes for an environmentalist to complete an education and evaluation type of

inspection verses a mean average of 75 minutes for an environmentalist to complete the observational type of child care inspection.

Discussion

Inspections coupled with education and evaluation of the child care administrators'

TABLE 2

Risk-Based Activities Observed

Risk-Based Activity	Environmental Inspection Visit 1			Environmental Inspection Visit 2			p-Value*
	n	# Compliant	% Compliant	n	# Compliant	% Compliant	
I. Observed diaper change process							
a. Is facility policy being followed?	35	30	85.7	33	25	75.8	≤.363
b. Is there special prep for table (liners, etc.)?	39	20	51.3	34	16	47.1	≤.719
c. Are gloves in use?	38	36	94.7	34	32	94.1	≤1.00
d. Are gloves taken off immediately after diaper is removed and wipes are used?	32	24	75.0	30	21	70.0	≤.659
e. Are child's hands washed with soap or wipes after diaper is removed before rediapering?	38	18	47.4	33	20	60.6	≤.265
f. Are child's hands washed with soap or wipes at end of diaper change?	37	29	78.4	33	28	84.8	≤.551
g. Does employee wash hands with soap/water or wipes after removing soiled diaper before rediapering?	35	22	62.9	33	22	66.7	≤.743
h. Are employee hands washed at end of diapering?	38	33	86.8	31	31	100	≤.060
i. Is sanitizer used on changing table after each child?	38	35	92.1	31	30	96.8	≤.622
j. Can items such as sanitizer bottle, wipes container, etc., be indirectly contaminated during this procedure?	39	22	56.4	30	15	50.0	≤.597
k. Are the soiled diapers correctly disposed of?	39	38	97.4	33	29	87.9	≤.172
l. Is a wash/rinse step for table included if there is visible soil?	29	22	75.9	30	25	83.3	≤.532
m. Is correct hand wash technique used?	41	38	92.7	33	32	97.0	≤.624
n. Is child hand washing monitored by caregivers?	41	36	87.8	35	33	94.3	≤.442
II. Observed general hand washing							
a. Done after every diaper change?	32	29	90.6	31	30	96.8	≤.613
b. After wiping child's nose, etc.?	25	24	96.0	23	21	91.3	≤.601
c. After wiping potentially contaminated surfaces?	29	28	96.6	28	27	96.4	≤1.00
d. Before giving formula/food prep?	31	30	96.8	35	35	100	≤.470
e. At other necessary times?	40	39	97.5	40	39	97.5	≤1.00
III. Observed food handling							
a. Handling empty formula bottles, snack dishes, etc., correctly?	31	29	93.5	37	35	94.6	≤1.00

*Statistically significant at $p < .05$.

knowledge on communicable disease concepts appear to be more effective than inspections alone in reducing illnesses at child care centers. Experts recommend that health departments provide training, written information, and technical consultation to child care programs (American Academy of Pediatrics, 2009). Small, targeted health interventions in child care centers have been associated with improved health knowledge and healthful behavior (Gupta, Shuman, Taveras, Kulldorff, & Finkelstein, 2005). Since preschool-aged children spend increasing time in structured daycare settings, their risk for some communicable diseases has increased

(Thacker, Addiss, Goodman, Holloway & Spencer, 1992). Education about infection control, as a means of reducing transmission of diarrhea, appears to be effective (Roberts et al., 2000).

Child care administrators' increased understanding of a number of communicable diseases prevention concepts likely played a role in reducing the number and severity of outbreaks at Washoe County child care centers. This was evidenced by the administrators' significant improvement in correct responses to a number of questions on the questionnaire. To answer these questions correctly the administrators needed to understand the fol-

lowing communicable disease prevention concepts: 1) special precautions to take, including exclusion of ill individuals, to prevent outbreaks from occurring; 2) when to suspect an outbreak is occurring, including understanding the baseline level of illness, and 3) what interdiction measures the administrator should immediately take, including calling the health department when he or she suspects an outbreak is occurring. These communicable disease prevention concepts are not likely to be observed being implemented during routine inspections.

Since environmentalists conducting routine inspections will normally not observe if a child

care center is implementing the three communicable disease prevention concepts listed above, it is important to incorporate method(s) into the child care center inspections to teach and evaluate the administrators' understanding of these concepts. One method to teach and evaluate administrators' understanding of communicable disease prevention concepts is to have the health department environmentalists ask them questions on these concepts and educate them on the correct responses to these questions when their answers are either incorrect or vague. These questions should also be incorporated into the inspection forms.

Another area of significant improvement was in administrators' responses that they had implemented hand-washing training programs and hand-washing monitoring practices. The increase in hand-washing training programs and hand-washing monitoring practices could have also played a role in reducing the number and severity of outbreaks at Washoe County child care centers. Implementing these training programs and monitoring practices, however, did not translate into observed significant changes in the following: 1) proper hand washing in general, 2) proper hand washing after diaper removal, and 3) proper monitoring by caregivers of children's hand washing. This suggests that the hand-washing portion of the intervention program was not the primary cause of the decrease in the number of outbreaks and illnesses at child care centers during this study period.

The limitations of our study are inherent in its design. After the education, evaluation, and inspection program was completed, a significant increase occurred in the child care administrators' knowledge on a number of communicable disease prevention concepts. Other factors, however, both known and unknown, could have played a role in the increase in their knowledge. For example, the 2009 amendments to Washoe County's child care regulations contained a number of requirements designed to help prevent communicable diseases from occurring, including the requirement that all caregivers take a communicable disease prevention class at least once every three years. These new regulations and perhaps other unknown factors could have played a role in reducing the number and severity of outbreaks in child care centers.

In addition, a limitation of our study was its small sample size. A decrease occurred in

TABLE 3

Washoe County Child Care Center Outbreaks and Number Ill From Outbreaks

Year	Outbreaks	Number Ill	Mean Average Ill per Outbreak
2005	3	26	9
2006	7	243	35
2007	6	375	63
2008	9	266	30
2009*	3	49	16
2010	2	61	31
2011**	3	13	4

*February 1, 2009: education, evaluation, and inspection program begins.

**February 28, 2011: education, evaluation, and inspection program ends.

the number and severity of outbreaks following the education, evaluation, and inspection program. It would require a larger sample size, however, to determine if this trend was statistically significant.

Finally, of the 111 child care centers inspected, only 80 had their questionnaires and surveys conducted twice. The remaining 31 child care centers had their questionnaires and surveys conducted only once due to a variety of factors, including the following: 1) a newly licensed child care center opened from one annual inspection to the next, 2) the child care center went out of business from one annual inspection to the next, and 3) the environmentalist only conducted one questionnaire and one 20-point visual inspection during the child care center's two annual inspections.

Recommendations

The Washoe County Health District makes the following recommendations for other health departments to consider.

- 1) Review current regulations governing child care centers in your jurisdiction to ensure they adequately set standards for hand washing, for exclusion of ill individuals, and for the appropriate interdiction measures to be taken if a suspected outbreak occurs.
- 2) Develop communicable diseases prevention questions for the child care administrators to answer, with an emphasis placed on the administrators' understanding of the correct answers to the following questions.

- a. What special precautions (including isolating and excluding ill individuals) do they have in place to prevent outbreaks from occurring?
 - b. When to suspect an outbreak is occurring (including understanding the baseline level of illness)?
 - c. What interdiction measures (including calling the health department) would they immediately take when they suspect an outbreak is occurring?
- 3) Place these communicable diseases prevention questions on the routine child care inspection report forms and document the administrators' responses.

Conclusion

Benefits exist in conducting an education and evaluation type of child care inspection when compared to conducting the traditional type of observational inspection. For one, it is an excellent method to evaluate the child care administrator's knowledge of communicable disease prevention concepts. This increase in knowledge on specific communicable disease prevention concepts, as determined in our study, likely played a role in reducing the number and severity of outbreaks at Washoe County child care centers. Some of these concepts, such as knowing when to exclude a child and when to suspect an outbreak is occurring, are not readily observable through the traditional observational type of child care inspections. If the child care administrator is not educated on these concepts during these inspections, then they may end up

being educated on these concepts during an outbreak at their child care center.

Lastly, the education, evaluation, and inspection program was cost-effective. The time it took an environmentalist to conduct an education and evaluation inspection was almost identical to the time it took to conduct the traditional observational type of child care inspection. While the Washoe County Health District does not quantify the time spent on responding to outbreaks at licensed child care centers, the time spent in

responding to an outbreak can be extensive, depending on the number of ill people and the length of time the outbreak continues. It has been documented that the reduction in direct medical costs and costs associated with lost parental working time could more than offset the cost of implementing an infection control, education, and evaluation program in preschool settings (Ackerman, Duff, Dennehy, Mafilios, & Krilov, 2001). Therefore, a reduction in the number and severity of outbreaks can save substantial resources. 🐼

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Did You Know?

In its latest step to increase the safety of the American food supply, the Food and Drug Administration has issued the 2013 Voluntary National Retail Food Regulatory Program Standards. Visit www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/ProgramStandards for more information.

Regulations, Policies, and Guidelines Addressing Environmental Exposures in Early Learning Environments: A Review

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Abstract Infants and young children under five years of age are uniquely vulnerable to certain environmental contaminants. Some of these contaminants have been found in early learning environments (ELEs), or child care and family child care settings where children spend an average of 40 hours a week. These contaminants as well as infants' and children's unique physiology, exposures, and behaviors in child care settings are the focus of this article. Current child care and family child care licensing requirements specific to environmental health-related issues are also reviewed. Data were reviewed and analyzed from the following surveys: the 2008 Child Care Licensing Survey, the First National Environmental Health Survey of Child Care Centers, and the Children's Total Exposure to Persistent Pesticides and Other Persistent Organic Pollutants. The authors' analysis suggests that current state licensing programs impose only the most basic environmental health protection requirements. No mandatory federal regulations standardize child care and family child care regulatory efforts nationally. Resources are available, however, from federal agencies and other children's environmental health organizations that may provide guidance for how to establish better environmental health protection measures in ELEs.

Introduction

Children of all ages have unique characteristics that may make them particularly vulnerable to potentially harmful effects of certain environmental contaminants. Children aged 0–5 years are often the population most at risk for these harmful effects because of their unique vulnerabilities (Morgan et al., 2004; Somers, Harvey, & Rusnak, 2011; U.S. Environmental Protection Agency [U.S. EPA], 2006; Wilson et al., 2004). Infants and young children drink, eat, and breathe more

as compared to adults on a per-body-weight basis (U.S. EPA, 2008). Unique behavioral differences such as crawling and mouthing activities further increase the potential for children's exposure to harmful environmental contaminants at home and in the community (Faustman, Silbernagel, Fenske, Burbache, & Ponce, 2000). Infants and children are also rapidly growing and developing within a relatively short time frame and windows of vulnerability to adverse health effects associated with early life stage exposure to toxic

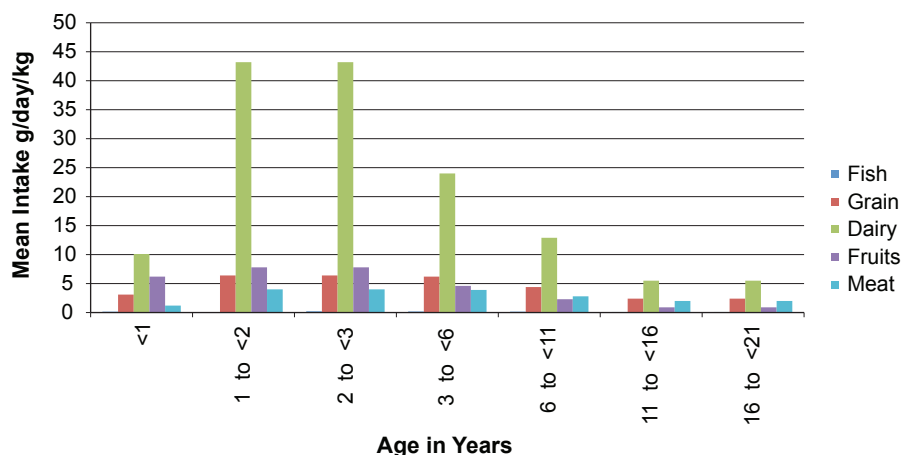
chemicals are more pronounced (Grandjean & Landrigan, 2006; Morgan et al., 2004; Selevan, Kimmel, & Mendola, 2000).

More than 11 million children aged five years and younger are cared for in early learning environments (ELEs), or settings that provide care for young children (American Academy of Pediatrics [AAP], 2012; National Association for Child Care Resources and Referral Agency [NACCRRA], 2010). Children of working parents and guardians spend on average 40 hours a week in child care (AAP, 2012). Over 360,000 licensed ELEs are operating in the U.S., including about 240,000 family child cares (FCCs) or home programs and approximately 120,000 child care centers (CCCs), which are usually housed in nonresidential facilities (NACCRRA, 2012; National Child Care Information and Technical Assistance Center & National Association for Regulatory Administration [NCCIC & NARA], 2010). In some states, FCCs are further categorized into small (up to six children) and large (7–12 children) settings.

No mandatory federal licensing standards exist for ELEs. Oversight of ELEs is generally carried out by state and local governments. Many state and local licensing authorities refer to voluntary guidelines contained in "Caring for Our Children" (CFOC), a publication of the U.S. Department of Health and Human Services (HHS) in collaboration with the American Public Health Association (APHA) and the American Academy of Pediatrics (AAP), to create licensing and regulatory standards. CFOC serves as a guide for establishing basic health and safety requirements for care providers (AAP, APHA, National Resource Center for Health and

FIGURE 1

Mean Intake of Fish, Grain, Dairy, Fruits, and Meats by Age Groups, Birth to 21 Years of Age



Safety in Child Care and Early Education, 2011). The latest edition of CFOC has put a greater emphasis on environmental health in child care settings.

Ensuring the health and safety of children is a key focus of ELE requirements; however, these concerns should be broadened to include greater emphasis on environmental health protection. The purpose of this article is to discuss children's unique vulnerabilities to certain environmental contaminants that may be present in ELEs, including findings from studies of children's exposure and hazard differences and surveys that have collected information about policies and practices currently used to protect children's environmental health in and around licensed facilities. The information gleaned from these resources is important because it helps to highlight risks and suggests opportunities for reducing children's exposure to contaminants.

Materials and Methods

A large number of studies on the topic of environmental exposures and the developing infant and child are available (U.S. EPA, 2011). This information has been compiled and reviewed by the U.S. Environmental Protection Agency (U.S. EPA) to create handbooks for use in performing human health risk assessments and related analyses (U.S. EPA, 2008, 2011).

Very few major research projects have studied environmental exposures in ELEs. Findings were obtained primarily from three federally funded studies:

- The 2008 Child Care Licensing Survey (NCCIC & NARA, 2010), which provides a snapshot of the licensing standards in all 50 states and Washington, DC. The National Child Care Information and Technical Assistance Center and the National Association for Regulatory Administration (NARA) have recently completed the collection of surveys for the 2011 Child Care Licensing Survey; results are not publicly available at this time but will be posted on the NARA Web site (NARA, 2013);
- The First National Environmental Health Survey of Child Care Centers, or the CCC survey (Tulve et al., 2006; U.S. Department of Housing and Urban Development [HUD], 2003). The CCC survey includes an analysis of lead distribution, lead paint presence, and lead content in dust and soil samples in 168 nationally represented child care centers in the 48 contiguous U.S. states; and
- The Children's Total Exposure to Persistent Pesticides and Other Persistent Organic Pollutants (CTEPP) looked for the presence of pesticide residues including residues of neurotoxic organophosphate and organochlorine pesticides and other chemicals including phthalates, polycyclic aromatic

hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) in ELEs (Morgan et al., 2004; Wilson et al., 2004). Exposure data for the CTEPP study were collected from 257 preschool children and caregivers in facilities in North Carolina and Ohio.

This article will present information as a narrative overview using proven methods of analysis (Green, Johnson, & Adams, 2006).

Results and Discussion

Children's Exposures to Environmental Contaminants

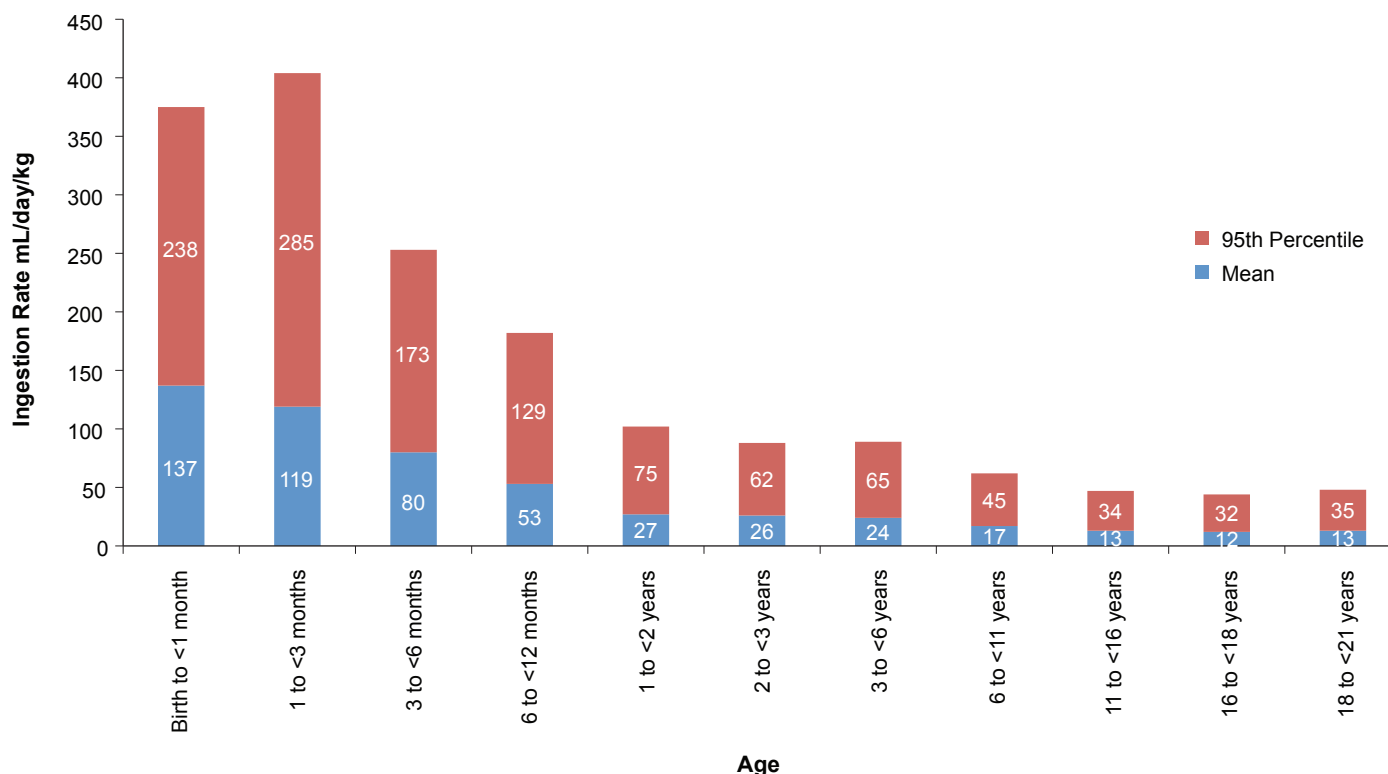
Food and Water Consumption

Children have a less diverse diet compared to adults. Therefore infants and young children may consume greater proportions of certain foods and beverages as well as any chemicals that may be present. For example, children between birth and five months of age consume about 19 g/kg/day of apples, compared to adults who consume approximately 2 g/kg/day, which is almost a 10-fold difference (Firestone, Moya, Cohen-Hubal, Zartarian, & Xue, 2007).

The diet of infants consists primarily of liquids (U.S. EPA, 2011), with a greater proportion of milk compared to teens and adults (Figure 1). Infants less than one month of age have, on average, a daily drinking water intake more than 10 times greater than adults ages 18 to 21 years (Figure 2; Kahn & Stralka, 2009; U.S. EPA, 2011). If the drinking water supply contains environmental contaminants, an infant's exposure to these contaminants could be about 10 times greater than that of a young adult simply because of this relatively larger intake of water. Infants fed reconstituted formula might also be exposed to high amounts of minerals either in the formula, the drinking water, or both, leading to high levels of ingestion of otherwise beneficial minerals. For example, potentially dangerous levels of fluoride and manganese present in both drinking water and some formulas may be ingested (Brown & Foos, 2010; Levy et al., 1995; U.S. EPA, 2008). Excessive exposure to fluoride in the diet may cause tooth pitting, and exposure to high levels of manganese may affect neurological development (Brown & Foos, 2010; Claus Henn et al., 2010; World Health Organization, 2012).

FIGURE 2

Drinking Water Ingestion Rates by Age Groups, Birth to 21 Years of Age



Behavior

Infants and young children spend a great deal of time in active play on the ground and on floors where contaminants can accumulate in soil, dust, and carpet fibers. Soil and household dust have been found to contain environmental contaminants such as pesticide residues, PAHs, phthalates, lead, pests, and pest droppings that when ingested may cause harm to infants and young children (Table 1; Morgan et al., 2004; U.S. EPA, 2010). Unique behaviors, such as mouthing hands and objects, increase children’s exposure to these and other contaminants (Faustman et al., 2000). As a result, children in ELEs may be at risk of exposure to any number of contaminants at any given time.

Breathing Rates

Structural differences in the upper respiratory tract may cause young children to experience greater penetration of contaminants to their lower respiratory tract as compared to

adults (U.S. EPA, 2008). Frequent physical activity of growing children can also lead to increased inhalation rates, which may result in greater exposure risks to environmental contaminants. Even at rest, children have higher breathing rates and increased risks for inhalation of potentially harmful compounds (U.S. EPA, 2011). Children spend 80%–90% more time indoors than adults, and may be at greater risk for exposure to indoor air contaminants (AAP, 2012).

Differences in Children’s Physiology

Children are physiologically different from adults and undergo rapid periods of growth and development from birth to five years of age (Centers for Disease Control and Prevention [CDC], 2011a; Firestone et al., 2007). During the first year of life, the average newborn’s motor skills progress drastically from smiling and controlling head movements to crawling and walking unassisted (Johnson, Moore, & Jeffries, 1978). By the age of three, a child has

all of her/his primary teeth and is able to speak clearly using words in the correct context.

Life stages, or “time frames characterized by unique and relatively stable behavioral and/or physiological characteristics associated with development and growth” occur from birth and into adulthood (Firestone et al., 2007; U.S. EPA, 2006, 2011). Children experience more distinctly different phases of growth and development before the age of five as compared to later years of development. Life stages from birth to age five include periods of immunological development, neurological development, bone growth and ossification including dental, liver enzyme activity, and respiratory development.

Infants and young children may experience serious and sometimes lifelong consequences that adversely impact the developing neurological, immunological, and endocrine systems (Shettler, Stein, Reich, Valenti, & Wallinga, 2000). For example, a child’s developing brain can be extremely sensitive to the

TABLE 1

Existing and Emerging Environmental Contaminants Relevant to Child Care Centers and Family Child Care Programs

Environmental Contaminant	Possible Uses, Products, and Other Sources of Exposure	Potential Health Effects
Arsenic	Drinking water; chromated copper arsenate–treated playground equipment	Known carcinogen; skin irritant (U.S. Environmental Protection Agency [U.S. EPA], 2007c; Grandjean & Murata, 2007)
Asbestos	Building materials (insulation, roofing shingles, old floor tiles, siding); minerals	Asthma trigger; asbestosis; known carcinogen (U.S. EPA, 1996a; Vinikoor, Larson, Bateson, & Birnbaum, 2010)
Carbon monoxide	Unvented or poorly maintained gas-powered appliances and machinery (e.g., space heaters, furnaces, water heaters, stoves, vehicles, fireplaces, smoking, generators)	Asphyxiation; reduced brain function; fatal at high doses (Agency for Toxic Substances and Disease Registry, 2012; U.S. EPA, 1996b)
Environmental tobacco smoke	Tobacco smoke; residues from tobacco smoke	Known carcinogen; asthma trigger; adverse neurological development; ear infections (Becquemin et al., 2010; Centers for Disease Control and Prevention, 2011b; U.S. Department of Health and Human Services, 2006; U.S. EPA, 2004)
Formaldehyde	Insulation and other building materials (pressed wood products, some textiles, adhesives, etc.)	Known carcinogen; eye, skin, and respiratory irritant; may trigger asthma attack or cause development of asthma (U.S. EPA, 2007d)
Mercury (elemental and methyl)	Thermometers; compact fluorescent lighting; foods (seafood); batteries; imported toys and jewelry	Adverse neurological development; renal and respiratory failure (U.S. EPA, 2007a, 2012c)
Lead	Drinking water; soil, dust, paint in older structures; old toys; imported toys and jewelry; food stored in leaded containers	Adverse neurological development; potential chronic effects include cardiovascular disease, osteoporosis, diabetes (Campbell et al., 2004; Jain et al., 2009; Navas-Acien et al., 2007; U.S. Department of Housing and Urban Development, 2003; U.S. EPA, 2012f)
Perfluorochemicals	Building materials; textiles (fabrics and carpets); nonstick coatings for food packaging	Reproductive effects; adverse thyroid gland function (U.S. EPA, 2012b)
Pesticides	Treat unwanted pests including on pets; residues in dust, on outdoor structures, plants, grass, pets, food	Adverse neurological development; some are known carcinogens; skin and respiratory irritants (U.S. EPA, 2007b, 2010a, 2012d)
Phthalates	Plasticizers (softeners for toys, food packaging, teething rings); wood finishes; insect repellents; moisturizers; nail polish; perfumes	Adverse neurological development; reproductive effects (U.S. EPA, 2007e)
Polybrominated diphenyl ethers	Flame retardant compounds found in consumer products such as upholstery, television casings, draperies, etc.	Adverse neurological development; reproductive effects (U.S. EPA, 2012g)
Polychlorinated biphenyls	Degraded lighting fixtures and caulk; paint; joint sealants	Adverse neurological development; skin irritant; affects thyroid hormone levels (U.S. EPA, 2009, 2012e)
Polycyclic aromatic hydrocarbons	Natural and human-made; incomplete combustion of products (coal, oil, gas, garbage, tobacco smoke); found in dyes, plastics, and pesticides	Known and likely carcinogens; reproductive, immunological, kidney, liver, and respiratory effects; skin irritant (U.S. EPA, 2010b)
Radon	Natural environment (decay of uranium in soil and rock); enters foundations, cracks, and walls of homes and buildings	Known carcinogen (U.S. EPA, 2012a)

effects of harmful environmental contaminants (Schettler et al., 2000; U.S. EPA, 2008). Developmental neurotoxicants can directly interfere with any processes required for normal brain development. Different learning or behavioral effects may result from exposure to the same agent at different times in brain development. Exposures to environmental contaminants during early life stages may impact a child's health in early and later years of life (Schettler et al., 2000).

Children Are Uniquely Vulnerable to Certain Environmental Contaminants

Children are not little adults. Exposure to some environmental contaminants, such as mercury, during these rapid growth and development stages in the early years can result in delayed or adverse developmental effects (Grandjean & Murata, 2007; Lanphear et al., 2005; Schettler et al., 2000). Mercury is used in many consumer products that can be found in ELEs (Table 1).

Exposure to the neurotoxicant lead may cause irreparable cognitive, behavioral, and neurological damage (Eubig, Aguiar, & Schantz, 2010; HUD, 2003). Lead may be found in older homes or buildings used as ELEs. Children co-exposed to lead and other chemicals may develop even more severe neurological impairment (Claus Henn et al., 2011; Froelich et al., 2009). Additionally, lead exposure at an early age may predispose children to greater health risks in later life (Table

1; Campbell, Rosier, Novotny, & Puzas, 2004; Jain et al., 2009; Navas-Acien, Guallar, Silbergeld, & Rothenberg, 2007). The Centers for Disease Control and Prevention recently enacted a lower blood lead action level, from the previous 10 µg/L to 5 µg/L, as a greater measure of protection (CDC, 2012a, 2012b). AAP recommends continued lead exposure controls and lead testing of children who may be exposed to lead (Jones et al., 2009).

Radon, a naturally occurring, radioactive, colorless, odorless gas, is the second leading cause of lung cancer (Table 1; CDC, 2011b; U.S. EPA, 2012a). It is found throughout the U.S. in new and old structures including apartments, mobile homes, and commercial properties, including ELE facilities. Children and adults exposed to radon can experience irreparable damage to the respiratory system. Children are more susceptible to radon exposures due to their higher breathing rates and unique behaviors; they also have more years to develop chronic conditions like lung cancer.

Carbon monoxide (CO) is caused by incomplete combustion of fuels. Exposure to CO can cause symptoms ranging from mild headaches and dizziness to death (Agency for Toxic Substances and Disease Registry, 2012). Similar to radon, children's increased inhalation rates may make them more susceptible to effects caused by CO exposure. Some examples of CO sources in and around ELEs are provided in Table 1.

Environmental tobacco smoke (ETS), including secondhand smoke and thirdhand smoke, is an asthma trigger (Table 1; Becquemin et al., 2010; U.S. EPA, 1992). Recent studies (Becquemin et al., 2010; Matt et al., 2011) have found adverse health effects from thirdhand smoke, or residues from smoking that persist on furniture, clothing, hair, and surfaces visited by smokers (Sleiman et al., 2010). Children who live, visit, or are cared for by smokers, even if they do not smoke in or near ELEs, may nonetheless be exposed to thirdhand smoke.

Exposures to pesticides are a concern for children's health because the active ingredients in some pesticides may have neurotoxic, carcinogenic, or endocrine-disrupting effects (Table 1; U.S. EPA, 2007b, 2010a). Though some pesticides are labeled for home use, residues from sprays and foggers can persist on many surfaces with which children come into contact frequently, including, floors, carpets, furniture, toys, eating utensils, bedding, and

TABLE 2
Number of States* Without Regulatory Requirements for Certain Environmental Protection Measures

Regulatory Requirement	Child Care Centers (Total States ¹ N = 50, Including District of Columbia)	Small Family Child Care (Total States ² N = 44, Including District of Columbia)	Large Family Child Care (Total States ³ N = 39, Including District of Columbia)
Environmental testing	AL, AK, AZ, AR, CA, CO, DC, FL, GA, HI, IL, IN, KS, KY, LA, MD, MN, MO, MT, NE, NV, NM, NY, NC, ND, OH, OK, OR, PA, SC, SD, TN, TX, WA, WV, WI, WY (n = 38, 76%)	AL, AK, AR, CA, CO, DC, DE, FL, GA, HI, IN, KS, KY, MD, MO, NC, NM, NV, OR, PA, SC, TN, TX, VT, WA (n = 25, 57%)	AL, AK, AZ, CA, CO, DE, FL, GA, HI, IL, IN, KS, MO, NM, NV, PA, SD, TN, TX, WV, WY (n = 21, 54%)
Environmental health inspections	CA, DE, GA, HI, IN, IA, PA, VT, WA (n = 9, 18%)	AL, AR, CA, CO, CT, DE, FL, GA, HI, IL, IN, IA, KS, KY, MA, MI, MN, MT, NE, NC, ND, NY, OK, OR, PA, RI, SC, TX, VT, WA, WV, WI (n = 32, 73%)	AL, AZ, CA, CO, DE, FL, GA, HI, IL, IN, IA, MA, MI, MN, MT, NE, NY, OK, PA, RI, TX, VA (n = 22, 56%)
Environmental tobacco smoke	MN, SD (n = 2, 4%)	AK, GA, IN, IA, SC (n = 5, 11%)	AK, DE, IN, IA, SD (n = 5, 13%)
Hazardous materials	HI, IA, NV, SD (n = 4, 8%)	AK, KS, NV, SC (n = 4, 9%)	AK, DE, HI, NV, SD (n = 5, 13%)
Pets	CA, CO, LA, MN, NC, NV, SD (n = 8, 16%)	AK, CA, NV, SC, VT (n = 5, 11%)	AK, CA, NV, SD (n = 4, 10%)

*At the time of the 2008 Child Care Licensing Survey (National Child Care Information and Technical Assistance Center, 2010) the state of Idaho did not have mandatory state licensing requirements for child care providers. Idaho has since established administrative codes and statutes mandating licensing for providers caring for seven or more children. Current Idaho regulations are not included in these analyses.

¹Child Care Center states: AL, AK, AZ, AR, CA, CO, CT, DE, DC, FL, GA, HI, IL, IN, IA, KS, KY, LA, ME, MD, MA, MI, MN, MS, MO, MT, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VT, VA, WA, WV, WI, WY.

²Small Family Child Care states: AL, AK, AR, CA, CO, CT, DE, DC, FL, GA, HI, IL, IN, IA, KS, KY, ME, MD, MA, MI, MN, MS, MO, MT, NE, NV, NH, NM, NY, NC, ND, OK, OR, PA, RI, SC, TN, TX, UT, VT, VA, WA, WV, WI, WY.

³Large Family Child Care states: AL, AK, AZ, CA, CO, CT, DE, FL, GA, HI, IL, IN, IA, KS, MA, MI, MN, MS, MO, MT, NE, NV, NH, NM, NY, ND, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, WV, WY.

other fabrics, not to mention the dust that children can inhale and ingest (Morgan et al., 2004; Tulve et al., 2006). Children in ELEs may also be exposed to pesticides from use of flea and tick treatments used on pets. Proper use of all pesticides according to the label is essential for health and safety.

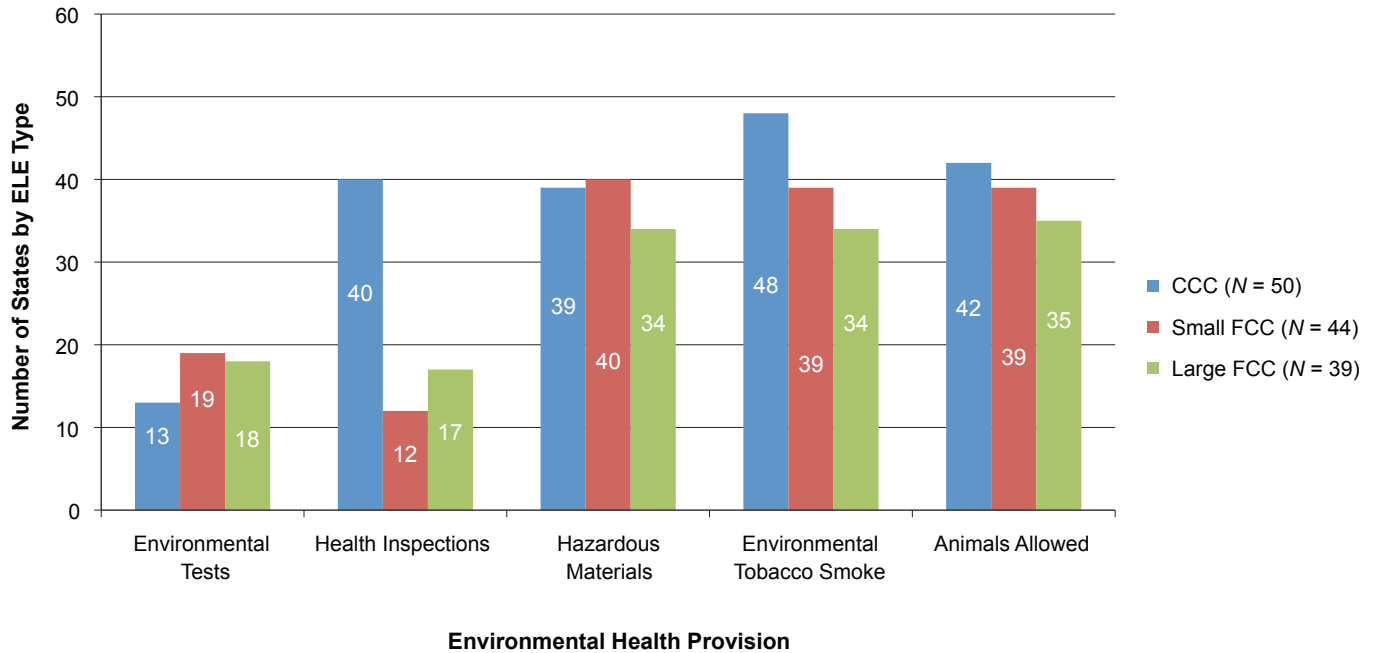
Products such as formaldehyde, asbestos, arsenic, PCBs, perfluorochemicals, polybrominated diphenyl ethers, and phthalates, which are used in the manufacture of building materials and furniture, may also be harmful to children (Table 1). Additionally, products used for learning activities, such as paints used for arts and crafts, can contain lead, asbestos, and other compounds

that may be toxic to children (California Environmental Protection Agency, 2009). Though cleaning and disinfecting products like bleach and aerosolized disinfectants are an inexpensive and convenient means of creating bacteria-free zones and sanitary toys for play, fumes and residues produced by overuse of these products can trigger asthma attacks, irritate the skin, or cause other respiratory-related health effects (AAP, 2012; Agana & Melgoza, 2011). Hazardous substances are associated with health complications, and may even result in the death of a child should these products be used or stored improperly.

Siting or placement of ELEs in proximity to pollution sources, such as industrial areas

FIGURE 3

Environmental Health Provisions Currently Regulated in Statewide Child Care and Family Child Care Licensing Programs



Source: National Child Care Information and Technical Assistance Center & the National Association for Regulatory Administration, 2010. ELE = early learning environment; CCC = child care center; FCC = family child care center.

or Superfund sites, is also an important concern. Studies have shown outdoor air pollution may be associated with infant mortality as well as other health effects (Hajat, Armstrong, Wilkinson, Busby, & Dolk, 2007; Heinrich & Slama, 2007; Klonoff-Cohen, Lam, & Lewis, 2005; Ritz, Wilhelm, & Zhao, 2006; Woodruff, Parker, & Schoendorf, 2006).

Current Regulatory Requirements for Protecting Children's Environmental Health in ELEs
Licensing standards for ELEs vary across states, and not all states choose to license all types of ELEs. All U.S. states and the District of Columbia have statewide licensing programs for CCCs, though not for FCCs (Table 2; NCCIC & NARA, 2010). Most state licensing requirements include measures to protect children from physical hazards and the spread of disease through bodily fluids and require adequate ventilation and thermal controls. Licensing requirements that address the potential for exposure to environmental

contaminants are rare, however, despite the fact that environmental contaminants may be present in ELEs and pose health risks to children (Gratz & Boulton, 1993).

Some states currently include requirements to protect children from exposure to hazardous materials, ETS, and pets (Figure 3; NCCIC & NARA, 2010). Some states also have requirements for performing environmental health inspections and environmental testing for the presence of certain contaminants such as lead and radon (Table 2). Studies of environmental contaminants in ELEs have been performed to better understand exposure levels in care settings (HUD, 2003; Morgan et al., 2004).

Environmental Testing

Environmental tests performed in ELE settings can help detect exposure levels within facilities in an effort to protect children from environmental contaminants. States with environmental testing requirements mandate that licensed facilities test for the pres-

ence and levels of asbestos, radon, and lead (paint and water only). The requirement of environmental testing is not a common mandate for all types of ELEs, and states require this mandate for FCCs rather than for CCCs (Figure 3, Table 2). Even in states where environmental testing requirements are in place, compliance with these requirements is low. The CCC survey on lead hazards found that only about 31 centers (19%) had ever tested for lead (HUD, 2003). Requirements for identifying and abating asbestos in K–12 school settings have been implemented (U.S. EPA, 1996a); however, these same requirements have not been extended to ELEs. An examination of requirements for CO monitoring was not included in any of the surveys reviewed, though CO is also a contributor to poor air quality within ELEs and homes (Kabir, Kim, Sohn, Kweon, & Shin, 2011; Laquatra, Maxwell, & Pierce, 2005). CO levels can easily be detected by installing and properly maintaining a CO monitor.

TABLE 3

Selected U.S. Environmental Protection Agency (U.S. EPA), State, Academic, and Nongovernmental Organization Resources for Addressing Environmental Concerns in Early Learning Environments

Environmental Concerns	Resources—U.S. EPA-Funded Programs and Projects
Multiple	Office of Children’s Health Protection, Healthy Child Care Web site: www.epa.gov/childcare/
Indoor and outdoor air pollution	School siting guidelines—criteria for selecting land and building sites for school locations: www.epa.gov/schools/siting/
Indoor air pollution	“Tools for Schools” program—indoor air quality: www.epa.gov/iaq/schools/index.html
Pesticides, lead, and other industrial chemicals	<i>America’s Children and the Environment, Third Edition</i> “Supplementary Topics—Contaminants in Schools and Child Care Facilities”: www.epa.gov/ace/pdfs/Supplementary-Topics-Schools-and-Child-Care.pdf
Lead	3Ts (Training, Testing, Telling) program—testing lead in drinking water: www.epa.gov/ogwdw/schools/pdfs/lead/toolkit_leadschools_fs_3ts_main.pdf
Pesticides	Integrated Pest Management in Schools Program and healthy school environments: www.epa.gov/opp00001/ipm/
	Resources—State and Academic Institutions
Pesticides	University of California (UC) San Francisco School of Nursing’s Integrated Pest Management (IPM) Toolkit for Early Learning Environments: www.ucsfchildcarehealth.org/pdfs/Curricula/ipm/Curriculum_FINAL%2010.2010.pdf
Pesticides	UC–Berkeley, Center for Environmental Research and Children’s Health—“Environmental Exposures in Early Childhood Education Environments,” “Pesticide Management and Pesticide Use in California Child Care Centers,” and “Environmental Quality in California Child Care”: www.epa.gov/ncer/childrenscenenters/centers/berkeley_chamacos.html
Indoor and outdoor air pollution, pesticides, lead, mercury	Indiana Department of Environmental Management’s Indiana 5 Star Child Care Program: www.in.gov/idem/4180.htm
Indoor air pollution	San Francisco Department of Public Health, Regional Asthma Management and Prevention’s “Bleach Exposure in Child Care Settings: Strategies for Elimination or Reduction”: www.sfgov3.org/Modules/ShowDocument.aspx?documentid=681
	Resources—Nongovernmental Organizations
Lead, radon, pesticides, air quality, art supplies, cleaning products, furniture	Children’s Environmental Health Network’s Eco-Healthy Child Care: www.cehn.org/ehcc
Asthma triggers (pesticides, cleaning products, etc.)	Community Environmental Council’s GreenCare for Children—Measuring Environmental Hazards in the Childcare Industry: www.greencareforchildren.org/greencareforchildren_home
Lead	National Center for Healthy Housing’s Home-Based Child Care Lead Safety Program: www.nchh.org/Research/Archived-Research-Projects/HomeBased-Child-Care-Lead-Safety-Program.aspx

Environmental Health Inspections

Many environmental exposures listed in Table 1 could potentially be discovered during environmental health inspections. Environmental health inspections, performed prior to the licensing authority’s issuance of a facility license and, in some states, in order to maintain or renew the license, consist of a walk-through facility inspection to assess the overall environmental safety of the building (AAP, 2011; NACCRRA, 2010). While the majority of states require environmental health inspections for CCCs (Figure 3), the frequency of inspections varies from zero to four inspections annually (NCCIC & NARA, 2010). Very few states that license small and large FCCs have these same, or similar, requirements (Table 2).

ETS Restrictions

Almost all states that license CCCs require some protection for children against exposure to ETS (Figure 3; Table 2). Those states that have restrictions against ETS vary with regard to their requirements. Some states require employees not to smoke within the facility while other states mandate no smoking by employees during facility operating hours; still other states prohibit smoking on facility grounds and smoking in the presence of children (NCCIC & NARA, 2010). The same variations are true for small and large FCCs, but the vast majority of licensing states appear to have some protective measures in place (Figure 3; Table 2).

Pesticides and Other Hazardous Materials

The potential exists for children to be exposed to pesticides in CCCs with over 60% of studied centers reporting use of up to 10 different types of pesticides throughout the year; further analysis reveals detectable levels of pesticide residues in over 67% of centers (Tulve et al., 2006). Forty states currently have measures to protect children in CCCs and small FCCs against exposures to hazardous substances, and 34 states have similar requirements for children in large FCCs (Figure 3; Table 2). States vary, however, with types of pesticides used in ELEs, frequency of use, and timing of pesticide applications (NCCIC & NARA, 2010; Tulve, 2006). The number of states with regulations to protect children from lesser known hazardous sub-

stances, like those used in consumer products and building materials, is unknown.

Conclusion and Recommendations

Infants and young children are uniquely vulnerable and at times more sensitive to certain environmental contaminants than older children and adults. Their exposure pathways, behaviors, and physiology make them more susceptible to environmental chemicals that can severely impact growth and development and cause irreparable damage to neurological, immune, respiratory, and endocrine systems. It is important that persons responsible for the health and safety of children receiving care away from their homes are aware of the potential dangers of environmental exposures in ELEs. Current regulatory and licensing standards appear to address only the most basic environmental health protections. Not all state governments license and inspect ELEs. For those states that do choose to implement statewide licensing programs, requirements vary considerably to the degree that even the definition of what constitutes a care provider varies from state to state.

No mandatory federal requirements exist to protect children in ELEs from environmental contaminants. Even those providers who receive federal subsidies are not required to meet additional standards for protecting children's environmental health above and beyond those measures imposed by local licensing authorities. A recent review of Head Start programs, performed by the HHS Office of the Inspector General, found that of the 24

Head Start grantees reviewed, none were fully compliant with state and federal requirements for protecting children from unsafe materials and equipment (U.S. Department of Health and Human Services, 2011).

Standards of accrediting bodies are generally more rigorous than those of state licensing requirements; however, very few accrediting bodies for ELEs exist (NACCRRA, 2012). Only 2.4% of CCCs and FCCs are accredited by the National Association for the Education of Young Children (NAEYC) and the National Association for Family Child Care (NAFCC), the largest accrediting bodies for CCCs and FCCs, respectively (NAEYC, 2011; NAFCC, 2011). The accreditation programs run by NAEYC and NAFCC address environmental health issues by requiring ELEs to take steps to minimize exposures. NAEYC requires radon testing, use of integrated pest management techniques for pest control, and maintenance of allergen-free facilities (NAEYC, 2007). Many other exposures and sources of exposures are not covered, however, by the standards of these accrediting bodies. Federal subsidy programs and accreditation bodies could potentially become effective avenues for increasing environmental health and safety requirements in ELEs due to providers' dependence on federal subsidy funds and the prestige accompanied with accreditation.

Another potential resource for improving environmental health in ELEs is the third edition of CFOC released in summer 2011. It contains new standards focused on environmental health issues, including community air pollution, CO, arsenic in chromated cop-

per arsenate-treated playground equipment, pests, and pesticide use.

Many offices and programs within U.S. EPA have drafted guidelines, fact sheets, tools, and other resources for the general public that may be applied in ELEs (Table 3). In addition, the Office of Children's Health Protection (OCHP) and other U.S. EPA offices collaborate with external partners to provide research opportunities and to develop and deliver training targeted towards child care stakeholders.

A healthy ELE promotes development of social skills, shapes a child's personality, and provides basic educational and functional needs. The presence of environmental contaminants such as those identified in this article, however, can pose potentially short- and long-term health risks. By establishing consistent requirements and increasing protective standards for children's environmental health, licensing authorities and accrediting bodies can encourage ELEs to create healthier settings for children in their care. 🌱

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▶ GUEST COMMENTARY

Breathe Easy at Home: A Web-Based Referral System Linking Clinical Sites With Housing Code Enforcement for Patients With Asthma

Prepublished online July/August 2013,
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Abstract Asthma, the most significant cause of pediatric morbidity and mortality, is exacerbated by adverse environmental conditions, especially substandard housing. The clinical care provider is often unable to address housing and environmental trigger issues. In Boston, Massachusetts, a web-based referral system called Breathe Easy At Home has been put in place, through which clinicians can refer patients to have their homes inspected for housing code violations that may be contributing to their asthma. Violations will then be brought to the attention of the landlord, who then has the option of redressing the issue or be taken to housing court. By bringing the local public health department, the city's inspectional services department, and the clinical care provider together with the help of a program coordinator, Breathe Easy At Home is able to provide comprehensive care to asthma patients. This program also serves as a replicable model for other cities and jurisdictions to follow.

Introduction

Asthma, the most significant cause of pediatric morbidity and mortality, is a chronic respiratory disease exacerbated by environmental triggers including rodents, cockroaches, and mold. Many of these environmental triggers may be regulated through state sanitary codes for housing. Boston, Massachusetts, has designed a centralized web-based system that allows doctors or nurses to make referrals for city housing code inspections and to then receive e-mail updates on the status of the case. This system, Breathe Easy at Home,

received a 2008 Model Practice award from the National Association of County and City Health Officials. This article provides a blueprint for city, county, or state health departments who seek to adopt the Breathe Easy at Home approach.

Background

Population Demographics

Boston is a diverse city with 617,594 residents, nearly 20% of whom live in poverty. Over half of the Boston population is non-

Caucasian; 22% of the population is African-American, 17% of the population is Latino, and 9% of the population is of Asian/Pacific Islander descent (U.S. Census Bureau, 2010). Boston's 16 distinct neighborhoods include some of the oldest housing stock in the U.S., including public housing.

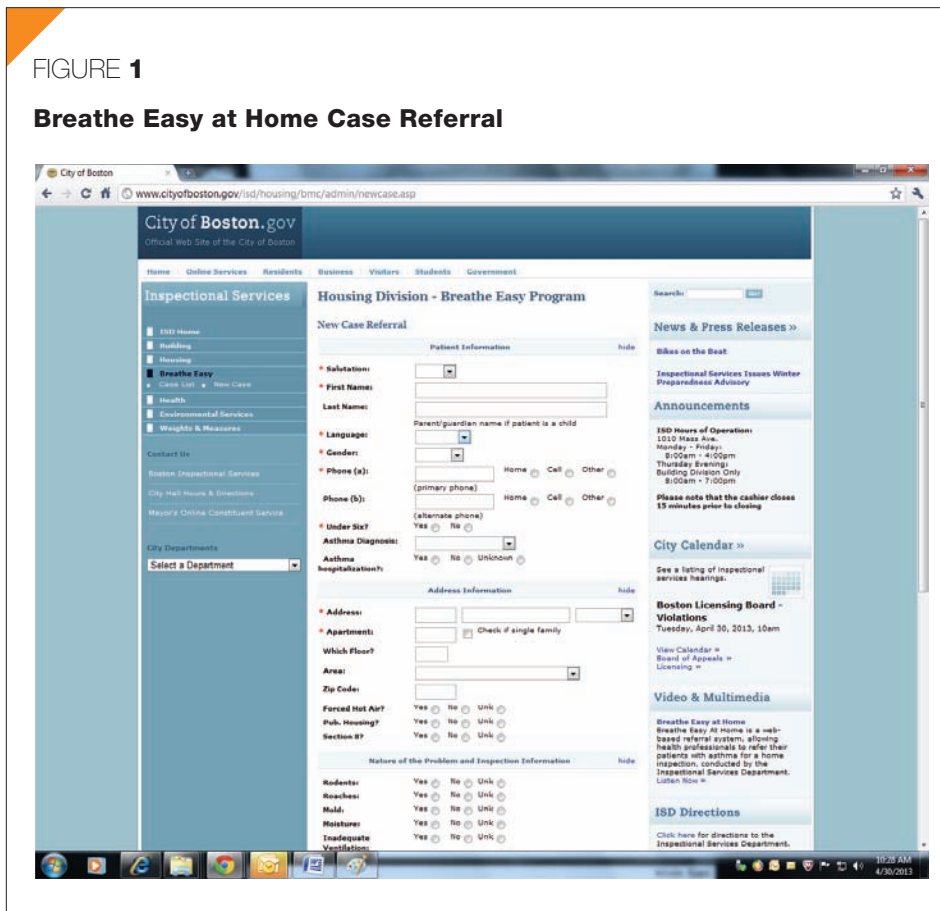
Among both Boston high school students and adults, 11% report having doctor-diagnosed asthma (Boston Public Health Commission [BPHC], 2011). In 2007, the asthma hospitalization rate for African-American children under the age of five was 3.5 times the rate for Caucasian children (BPHC, 2009). Almost 2.5 times as many adult Boston residents living in nonpublic rental assisted housing reported doctor-diagnosed asthma, as compared to residents living in market-rate housing (BPHC, 2010).

Asthma Exacerbations

In the U.S., people spend much of their time indoors; children in particular spend as much as 80%–90% of their time at home, in school, and in other indoor environments (U.S. Environmental Protection Agency, 2002). Several biological and chemical agents in the indoor environment, including bleach, pesticides, and other common household cleaning solutions are linked to asthma exacerbation. Conditions that contribute to asthma exacerbation include rodent and cockroach infestations as well

FIGURE 1

Breathe Easy at Home Case Referral



as chronic dampness, which contributes to mold and mildew growth. All of the above are covered by the Massachusetts state sanitary code for all housing. Exposure to cockroach allergen in sensitized individuals can cause asthma exacerbation (Institute of Medicine [IOM], 2000) and exposure to mold among sensitized individuals is associated with asthma exacerbation (IOM, 2004). Children with asthma, sensitized and exposed to mouse allergen, also have higher rates of hospitalization (Pongracic, Visness, Gruchalla, Evans, & Mitchell, 2008).

Baseline environmental assessments revealed that nearly 80% of children sensitive to cockroach antigen and nearly 90% of children sensitive to dust mites had evidence of these allergens in their bedrooms. Increasing evidence demonstrates that reducing residential exposures to these factors can improve the health of people with asthma (Krieger, 2010). Thus, the home environment has been identified as a key site for primary or secondary prevention interventions. The Inner-City Asthma Study

(ICAS) enrolled 937 children with moderate and severe asthma from seven major U.S. cities in a randomized controlled study of an in-home environmental intervention. The intervention protocol included home environmental assessments, education for families, and provision of supplies and services tailored to the child's skin-test-sensitization profile. Reductions in levels of cockroach and dust mite antigens in bedroom floors correlated with decreases in symptom days, hospitalizations, and unscheduled health care visits (Morgan et al., 2004).

A recent review of in-home environmental intervention studies concluded that multifaceted tailored asthma intervention protocols, like the one in ICAS, are effective at controlling asthma symptoms (National Center for Healthy Housing, 2009). The latest National Asthma Education Prevention Program guidelines urge health care providers to address control of environmental asthma triggers as a key component of asthma care (National Institutes of Health, 2007).

Process

Almost 10 years ago, the city of Boston's Inspectional Services Department (ISD), which enforces the state sanitary code for all housing in the city of Boston, initiated the Breathe Easy at Home (BEAH) initiative. In the early stages of the program, clinicians caring for patients with asthma submitted housing inspection requests by telephone. A message would often be left and may or may not have been returned. If the inspection was done, referring clinicians did not receive information on the findings and status of the case. Clinicians frequently complained that neither they nor their patients knew the results of their inspection.

In 2006, the involvement of a clinical partner led to the design of a web-based system that reflects the needs of busy medical practices and encourages clinicians to address environmental asthma triggers with their patients. Clinicians simply log on to the web-based system to refer a family for a housing inspection. They then receive regular online updates on the status of the referral and violations (Figure 1).

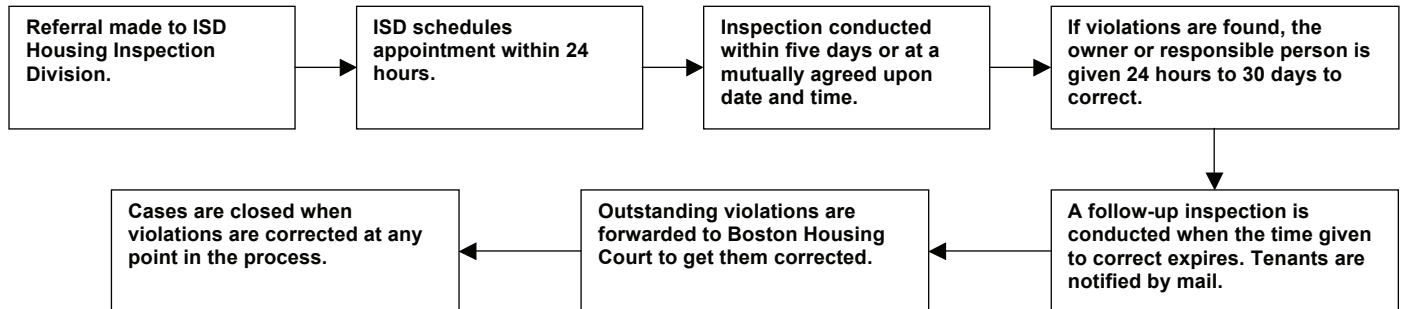
BEAH is a collaborative effort of the ISD and Boston Public Health Commission, the health department for the city of Boston, and Boston Medical Center, the city hospital serving vulnerable and low-income residents. The web-based system was launched with a part-time coordinator, funded with support from the U.S. Environmental Protection Agency. In 2007, city funding made it possible to hire a full-time coordinator. Other BEAH partners include Children's Hospital Boston; the Boston Urban Asthma Coalition; Boston Housing Authority, which provides or administers housing for 10% of Boston's residents; and the Medical-Legal Partnership, which fosters interdisciplinary collaborations to advocate for patients and help ensure that their basic needs (such as health insurance and housing) are met.

Awareness of the BEAH program is promoted through health center and hospital meetings as well as a newsletter to keep clinicians informed of program updates and patient resources. Since BEAH inspections are conducted by staff in the housing inspection division of ISD as part of their sanitary code enforcement responsibilities, they require no additional inspection staff.

The Massachusetts "Housing Code" is officially titled *State Sanitary Code Chapter II:*

FIGURE 2

Breathe Easy at Home Process



ISD = Inspectional Services Department.

Minimum Standards of Fitness for Human Habitation. Housing code inspectors conduct a visual inspection using a standardized form, usually in response to resident complaints. Inspections may result in the issuance of a notice of violation, specified in a “correction order” along with a maximum stipulated time within which to correct the violation. A case is closed when the violation is corrected. If the violation is not corrected, the case may be forwarded to housing court (Figure 2).

Outcomes

Following the pilot, which involved 16 referrals, 1,169 referrals have been made to BEAH (Figure 3) with continual increases in numbers. Rodent infestation is consistently the most frequent housing code violation cited for BEAH cases, followed by cockroach infestation. More than one violation may be present in a home. To date, 70% of BEAH cases have been resolved without going to housing court.

Boston’s largest landlord, the Boston Housing Authority, has agreed to respond to violations uncovered via BEAH within 24 hours. Boston Housing Authority data show a decrease in pest work orders after the implementation of new pest control policies and a public awareness and resident education campaign on safe and effective pest control strategies. This decrease in work orders is consistent with BEAH program data showing reductions in Boston Housing Authority pest-related violations during the same time period.

The neighborhoods of Roxbury and Dorchester are among those with the highest asthma hospitalization rates in Boston for children under five years of age (BPHC, 2009), and are the neighborhoods with the highest number of BEAH referrals. The BEAH program will continue to monitor health outcome data and referral patterns to ensure that the program is serving Boston’s neighborhoods most impacted by asthma.

Discussion

An online survey to solicit feedback from referring clinicians on Web site functionality and program results has led to program improvements. A survey is now underway to gather patient feedback on the program and to monitor improvements in health and environment. A survey of inspectors provided invaluable insight about patients’ difficulties with housekeeping and understanding the BEAH process. In response, the program developed educational materials on safe cleaning products and on the BEAH process. Inspector feedback has also led to the creation of materials for property owners and managers to help them better understand the link between addressing violations and improving the health of residents with asthma.

Improvements to the BEAH Web site are ongoing. Modifications to the Web site are intended to minimize narrative and to increase standardization via pull-down menus and check boxes. Data from BEAH can

be used to develop prevention initiatives, as has happened at Boston Housing Authority. Data are monitored to identify health institutions that are either not registered for or not actively participating in the BEAH network and compared with other data to geographically prioritize outreach efforts.

This web-based tool brings city resources to the busy clinical setting, allowing physicians and nurses to make referral inspections while their patients are in the clinic. Another advantage of this system is it makes a physician or nurse the complainant, not the tenant. This is one of the program designs to reduce tenant-landlord tensions around these housing code issues. Although this is most helpful for those clients who are renters and need intervention in dealing with landlords, the program can be helpful even for nonrenters who need assistance in identifying environmental triggers in and around their homes.

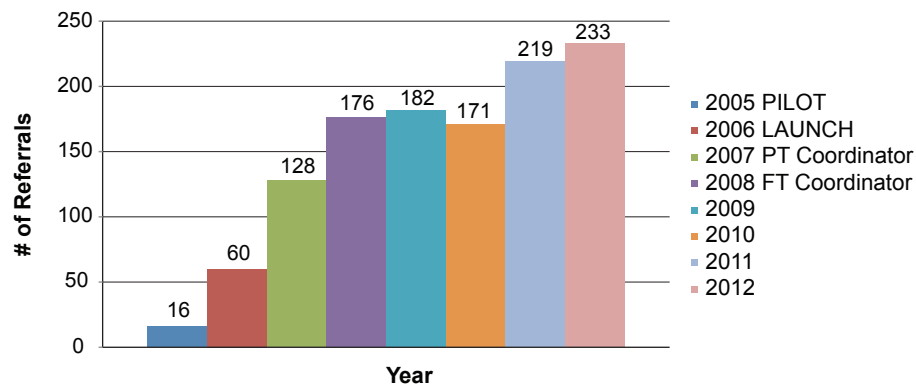
Inspector buy-in is critical to program success. Training the inspectors to understand the health significance of their work, listening to their feedback, and allowing them the opportunity to interact with the health care system directly (e.g., by having medical residents shadow them on inspections) are all strategies that have helped propel the BEAH program forward.

Conclusion

The BEAH program is particularly remarkable in its adaptability and replicability. Key ele-

FIGURE 3

Breathe Easy at Home Referrals, 2005–2012



PT = part-time; FT = full-time.

ments of the program are trained inspectors who conduct environmental assessments and communicate the findings to medical partners. When necessary, the inspectors have the capacity to enforce resolution of issues that are found. The program builds upon existing city capability by providing asthma training to city housing inspection staff, improving two-way communication between inspection staff and clinical care providers, and employ-

ing a program coordinator to oversee this communication. BEAH applies existing sanitary codes for housing using existing staff and is a powerful, low-cost resource in the effort to improve health and quality of life for children and adults with asthma. Although no national health code for housing exists, state and local agencies—mostly in the northeastern part of the U.S.—have adopted health or sanitation codes to respond to housing issues.

In those communities that do not have such codes, any system for assessment and report of environmental conditions will serve the purposes of a similar program. 🏠

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Disclaimer: The views presented here are the views of the authors and do not necessarily represent the views of the U.S. Environmental Protection Agency.

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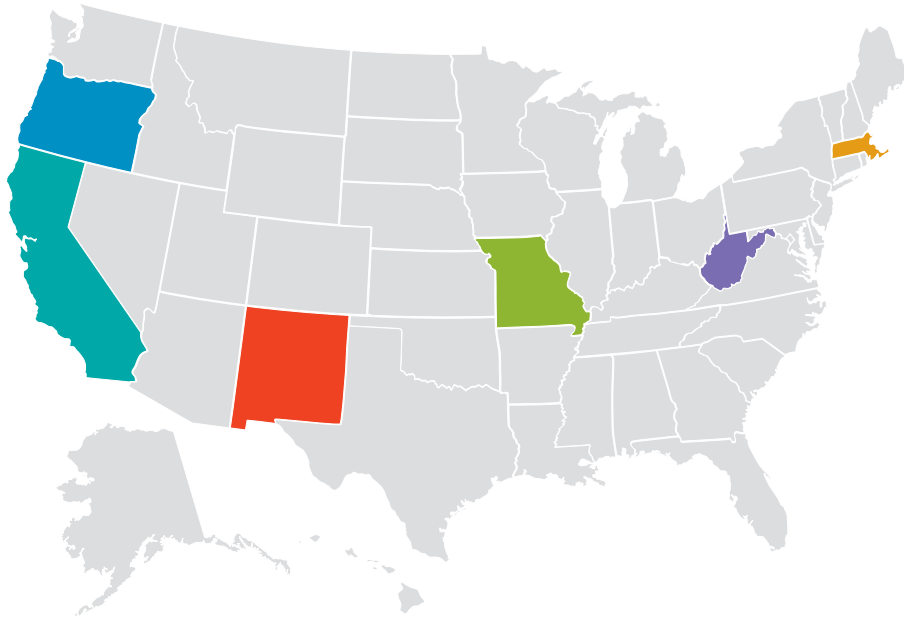
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▶ **ACROSS THE COUNTRY** WHAT'S HAPPENING IN ENVIRONMENTAL HEALTH



Editor's Note: This new feature in the *Journal* is intended to provide readers with interesting and novel stories of environmental health being practiced across the country that offer an avenue for story sharing and community building. It will be published in every other issue of the *Journal*. Do you have a story to share? Please contact Terry Osner at tosner@neha.org.

CALIFORNIA

Egg Plant?

A San Francisco start-up backed by Bill Gates is looking to use plant-based products to replace eggs. Hampton Creek Foods is scouring the planet for plants that can replace chicken eggs in everything from cookies to omelets to French toast. The firm recently displayed products including chocolate chip cookies, cookie dough, and mayonnaise. Funded by prominent Silicon Valley investors, the company seeks to disrupt a global egg industry that backers say wastes energy, pollutes the environment, and causes disease outbreaks, while confining chickens to tiny spaces.

The company, which just started selling its first product—Just Mayo mayonnaise—at Whole Foods Markets, is part of a new gen-

eration of so-called food-tech ventures that aim to change the way we eat.

Plant-based alternatives to eggs, poultry, and other meat could be good for the environment because they could reduce consumption of meat, which requires large amounts of land, water, and crops to produce, backers say. It could also benefit people's health, especially in heavy meat-eating countries like the U.S., and reduce outbreaks of diseases such as avian flu. "The biggest challenge is that people who consume a lot of meat really like meat, and to convince them to try something different may be extremely difficult," said Claire Kremen, faculty co-director of the Berkeley Food Institute at the University of California, Berkeley.

MASSACHUSETTS

Gymnastic Flip Into a Health Hazard?

A recent study by the Department of Environmental Health; Boston University School of Public Health, Boston; the Nicholas School of the Environment; Duke University; and the National Center for Environmental Health, Centers for Disease Control and Prevention suggests that gymnasts are exposed to levels of flame retardants four to six times higher than the general population. Typically, gymnastic training facilities use large volumes of polyurethane foam in large pits to provide a soft landing for gymnasts. Such foam often contains additive flame retardants such as PentaBDE. Previous studies have linked polybrominated diphenyl ethers (PBDEs),

which may persist in the body for years after exposure, to neurological and reproductive effects in children exposed in the womb. The research suggests that young gymnasts may be exposed to hormone-disrupting chemicals from ingesting or inhaling dust created by these polyurethane foam blocks.

Hand-wipe samples from the gymnasts contained two to three times more of the banned PBDEs and newer flame retardants after practice than before practice. Samples of dust and foam taken from the participants' gym and two other U.S. gyms suggest that the foam blocks, some of which were up to 20 years old, were the likely source.

MISSOURI

Lead Astray for 200 Years

Founded in 1798 and named after a Roman city that was buried by the eruption of Mt. Vesuvius, Herculaneum, Missouri, is finally emerging from the “ashes” of lead production. In 1892, the St. Joseph Lead Company picked the town as the site for a large smelter to extract lead from ore. It was home to the nation’s only primary lead smelter, processing raw lead ore into metal to manufacture car batteries, X-ray shields, and other products.

While lead production provided jobs, it also created environmental and health concerns so troublesome that the U.S. Environmental Protection Agency (U.S. EPA) designated Herculaneum as a Superfund site and ordered tons of contaminated dirt to be dug up

and removed. Leslie and Jack Warden lived less than three blocks away and led the effort to convince U.S. EPA to assess the town’s air quality in 2001. U.S. EPA’s testing showed high levels of air pollution, and more than half of preschool-aged children living near the smelter had elevated levels of lead.

On December 31, 2013, the town’s 200-year association with lead production ended. The company that ran the smelter, Doe Run Company, cited rising regulatory costs for its decision to cease its operations.

Source: <http://www.boston.com/news/nation/2013/12/25/endera-smelter-closes-missouri-town/2S3LNqtbhFW5AhOvpGEpl/story.html>.

NEW MEXICO

Taos Pueblo Abandoned, Hand-Dug Well Decommission Project—Mitigation Project for a Healthier, Safer Community

Hand-dug wells were historical sources of water in tribal and rural communities in New Mexico. These old wells are often unsecured, unseen, and forgotten. Some wells are open, exposed, child accessible, and located within well protection zones surrounding the community’s water supply, posing groundwater contamination potential. Injury hazard was initially highlighted when a Taos Pueblo child fell into an open hand-dug well located inside an abandoned adobe home. A fatality was narrowly avoided. These hazards were

validated in a similar incident in a nontribal New Mexico community that did result in a child fatality.

A collaborative mitigation project was developed by the Taos Pueblo, the Indian Health Service Office of Environmental Health and Engineering (IHS OEHE), and community and intergovernmental partners to decommission the abandoned wells in sometimes culturally sensitive areas. The initiative augmented existing resources and the IHS OEHE developed communication tools, the recording criteria for well sites, and backfilling specifications for well decommission. The potential benefits are not limited to wells in Taos Pueblo. The initiative may serve as a model for other groups for addressing the potential hazards of these forgotten features.

OREGON

Oregon: Mastering Recycling!

How does a city increase its recycling? One way is to train individuals to become “Master Recyclers” within their community. Since 1991, more than 1,200 people in the Portland metro area have become Master Recyclers. Lauren Norris, who coordinates the Master Recycler Program for Portland’s Bureau of Planning and Sustainability, says they have put in more than 37,000 hours volunteering at community events and creating projects at schools, businesses, farmers’ markets, and more. The program bridges the gap between awareness and action by motivating people to reduce waste in their homes and workplaces.

Individuals complete an eight-week course including two Saturday half-day field trips to composting, recycling, and landfill locations. “The magic of this program is that when people learn about recycling from their neighbors, coworkers, and friends, they are really inspired to take action,” said Norris. She said that classes feature speakers from throughout the county and topics include composting, making “green” cleaners, and waste prevention. Master Recyclers must volunteer at least 30 hours per year to maintain the Master Recycler designation.

WEST VIRGINIA

Tracking Fracking

Fracking holds the promise of increasing oil production within the U.S. The Wheeling-Ohio County Health Department in West Virginia recently measured high levels of benzene in the air near one of the fracking sites. High levels of airborne benzene near another well site were so bad that “respiratory protection” for those in the area could be recommended. West Virginia law requires wells to be drilled at least 625 feet away from an occupied dwelling. The law does not address air quality in the nearby surroundings. Benzene can be a by-product of diesel machinery that operates for long periods.

The Centers for Disease Control and Prevention warn that short-term symptoms of benzene exposure include dizziness, rapid heartbeat, headaches, and tremors. The U.S. Department of Health and Human Services maintains that high levels of benzene in the air can cause leukemia. According to Wheeling-Ohio County Health Department Administrator Howard Gamble, “This is something that we need to keep track of because we are not sure how it will impact us over the long term.” The public’s concern about fracking has traditionally been about its effect on public water supplies, rather than its impact on air quality. 🗣️

▶ DIRECT FROM AEHAP



Anne Marie Zimeri, PhD

National Environmental Health Science and Protection Accreditation Council Degrees Can Lead to U.S. Public Health Service Commissions Through Accredited Coursework and Internships

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

This column will provide AEHAP with the opportunity to share current trends within undergraduate and graduate environmental health programs, as well as their efforts to further the environmental health field and available resources and information. Furthermore, professors from different EHAC-accredited degree programs will share with the *Journal's* readership the successes of their programs and the work being done within academia to foster the growth of future environmental health leaders.

Anne Marie Zimeri is currently the main lecturer and program director for the Bachelor's of Science in Environmental Health degree program at the University of Georgia, where she has had a faculty position since 2007.

The University of Georgia's (UGA's) Bachelor of Science in environmental health science (EHS) has been accredited with the National Environmental Health Science and Protection Accreditation Council (EHAC) for many years, which assures employers and preprofessional schools of a rigorous, quality degree in EHS and provides eligibility to several select undergraduate internships. Data from our most recent re-ac-

creditation report in 2011 show that students with EHS degrees are extremely successful in securing a job in the field, a spot in graduate school or in professional school (medical school, pharmacy school, etc.), posts with nongovernmental organizations, and government positions. Because of UGA's rigorous science requirements, our students can be classified as "chemists" within the government, which adds a competitive edge to their

applications. Those who enter the field immediately after graduation generally work for public health departments as food safety, swimming pool, or tattoo parlor inspectors (or some combination of all of these). Others enter after a year or two of service in the Peace Corps, Teach for America, Food Corps, or other service programs where EHS knowledge is key.

In this column, I would like to highlight one of the successful tracks that EHS students take upon earning their EHS degree with UGA: a federal job and commission in the U.S. Public Health Service (USPHS). Securing a government job is a multistep process and often begins prior to graduation. Our program, under the guidance of EHAC accreditation and with cooperation from all faculty who instruct, keeps pace with timely issues so that students are engaged in topics relevant to real-world applications throughout their time as an undergraduate. Because of this connection, the USPHS can rely on the high-quality education provided by EHAC programs and in turn provides many internships that are available exclusively to undergraduates from EHAC-accredited programs.

One outstanding example of a student who benefited from an internship opportunity for EHAC-accredited schools is Lieutenant Junior Grade (LTJG) Ariell Lawrence, who graduated in 2012 from UGA's Bachelor of Science in Environmental Health (BSEH) program and recently secured a position with the National Institutes of Health (NIH) followed by a commission in the USPHS. When I asked her about the origin of her interest in EHS, she replied, "Did you watch *The Lorax* when you were a kid?" Her dedication to EHS stems from years of thought about the



Lieutenant Junior Grade Ariell Lawrence

environment throughout her youth sparked by the Dr. Seuss film that features a character who speaks up in the defense of trees against corporate decisions that endanger the environment. She found a perfect match for her interests in both the environment and public health with a BSEH undergraduate degree. Because our degree program is EHAC accredited, students are eligible to compete for Junior Commissioned Officer Student Training and Extern Program (JR-COSTEP) internships, which are opportunities for students to serve their country through the USPHS while earning credit toward their university degree. LTJG Lawrence secured one such internship the summer between her junior and senior year in her degree program.

Her internship took her to Arizona, where she was stationed with the Indian Health Service for the Pascua Yaqui and Tohono O'odham nations. LTJG Lawrence worked closely with an environmental health sanitarian to learn about food safety, injury prevention, safety surveying of schools and swimming pools, and vector animal control. LTJG Lawrence became extremely involved in the annual rabies clinic, which is important in the area because rabid coyotes and other animals pose a significant threat to the populations with whom she worked. Over the course of her summer internship, among

all of her other duties, LTJG Lawrence vaccinated nearly 1,000 animals against rabies. For this work, LTJG Lawrence earned the Public Health Service Citation and Unit Commendation Awards. The remainder of her time, spent in the city of Tucson, taught her more basics of sanitation when she was engaged in inspection of the casino for the Tohono O'odham nation. These experiences built her suite of practical EHS skills and solidified her career interests in EHS and the commissioned corps.

Upon graduation, LTJG Lawrence interned with Georgia Power's environmental affairs department and worked on dealing with the National Pollutant Discharge and Elimination System's general permit compliance for the company's construction projects. During that time she applied for and was offered an NIH position in November of 2012 to work in the department of waste and resource recovery. She got her call to active duty with the USPHS the following April (2013). LTJG Lawrence has said that every course she took during her EHS degree program, especially solid and hazardous waste management and chemistry, helped her both in her current position and in her COSTEP internship. She was even thrilled that her approved electives, like urban entomology, played a role in her adaptation to her life as an EHS professional.

LTJG Lawrence's main duties now include tracking NIH Bethesda recycling and solid waste data and preparing data for monthly distribution, data call requests, and Montgomery County annual reports. She also provides support and monitoring of contract performance for project officers of solid waste contracts and assists and supports the goals of the institute's Green Team Leads Council and Sustainable Lab Practices Working Group. According to LTJG Lawrence, the best part of her job is the customer service aspect, helping people help themselves in their pursuit of environmental stewardship.

BSEH degrees from EHAC-accredited programs set standards that allow students to be competitive in several career paths. The degrees are stringent about several requirements, while at the same time permit the selection of a set of electives that really focus and solidify a student's interest in one or several aspects of EHS. EHAC assists in disseminating pertinent information for program directors regarding new information in the field, accomplishments from programs of peer institutions, conferences, and a wealth of other resources for guiding those who are working to foster the development of new environmental health scientists and practitioners. These customizable yet accredited degrees are not only sufficient for students to function in the field; they are required by several agencies including JRCOSTEP and the USPHS. LTJG Lawrence has a bright future ahead with the USPHS and plans to always continue to advocate for environmental health.

For more information on securing a commission in the USPHS in EHS see www.usphs.gov/profession/environmental/. For information on EHAC and EHAC-accredited programs see www.ehacoffice.org/.

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Did You Know?

AEHAP was formed in 1999 to, among other things, serve as a major force in increasing the environmental health workforce. Learn more about AEHAP at www.aehap.org.

▶ DIRECT FROM CDC ENVIRONMENTAL HEALTH SERVICES BRANCH



Sarah Merkle, MPH

Food Safety Tools and Products for Environmental Health Practitioners

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

Sarah Merkle is the associate director for policy in CDC's Division of Emergency and Environmental Health Services. She provides leadership, expert technical advice, and coordination for the division's policy research and development activities to influence environmental public health practice.

Did you know that more than half of all foodborne illness outbreaks in the U.S. are associated with restaurants? The Centers for Disease Control and Prevention (CDC) are taking action to prevent these outbreaks by improving environmental public health practice, including foodborne outbreak environmental assessments, food worker education and practices, and restaurant inspections.

Surveillance: CDC's New Surveillance System Can Help Prevent Outbreaks

CDC's new National Voluntary Environmental Assessment Information System (NVEAIS;

www.cdc.gov/nceh/ehs/NVEAIS/index.htm) can help state, local, territorial, and tribal health departments figure out what underlying environmental factors (e.g., food handling practices, worker health policies, and food source attribution) caused a foodborne outbreak so they can prevent the next one from happening.

NVEAIS provides data to help food safety programs identify and monitor underlying environmental factors; establish the basis for generating hypotheses about factors that may lead to foodborne outbreaks; and accomplish guide planning, implementation, and evaluation.

Practice-Based Research: Building the Evidence Base

Since 2000, CDC has worked with state and local health departments to identify environmental causes of foodborne outbreaks. CDC and its Environmental Health Specialists Network (EHS-Net)—funded partners have published 18 articles highlighting study findings and evidence-based environmental health practices to reduce the risk of foodborne disease outbreaks and illnesses among restaurant customers (www.cdc.gov/nceh/ehs/EHSNet/publications/pubs-by-topic.htm). These research findings help inform policy and practice changes that can reduce the risk of foodborne disease outbreaks and illnesses among restaurant customers.

The most recent research was published in the *Journal of Food Protection* in December 2013 (www.cdc.gov/nceh/ehs/News/Features/2013/JFP-articles.html). Four new articles highlight retail food safety study findings about ground beef handling, handling of leafy greens, chicken cross contamination, and sick food workers.

Plain language summaries for all of the articles are also available. Food safety programs and the restaurant industry can use these findings to develop effective interventions to improve food safety in restaurants.

Evidence-Based Practice

CDC helps state and local environmental health professionals improve their practices to prevent outbreaks.

Funding Health Departments via EHS-Net

CDC funds eight health departments to participate in EHS-Net. EHS-Net is a collabora-

FIGURE 1

CDC's New Training Course on Environmental Assessment Includes Interviewing, Observation, and Records Review



Why Food Safety Matters and How Environmental Public Health Practice Makes a Difference

Each year, contaminated food consumed in the U.S. results in an estimated 48 million illnesses, more than 128,000 hospitalizations, and 3,000 deaths.

Acute foodborne illnesses cost the U.S. an estimated \$152 billion each year in health care, workplace, and other economic losses.

A 2010 survey by the National Association of County and City Health Officials found that 78% of local health departments conduct restaurant inspections. In the U.S., state and local environmental health practitioners make sure our food stays safe. They issue permits and inspect restaurants and other retail food establishments, investigate outbreaks to identify their environmental causes, and educate restaurants on how to improve their practices and prevent outbreaks.

FIGURE 2

CDC's New Training Uses Simulation Techniques



These new techniques teach environmental health practitioners to identify factors that most likely contributed to an outbreak. For example, in a simulation of an environmental assessment of a restaurant, participants can explore the facility, click on a refrigerator, and get temperature and other information on food items.

tive forum of state and local environmental health specialists whose mission is to improve environmental health practice and prevent foodborne and waterborne illness outbreaks nationwide. The environmental health specialists identify issues, investigate outbreaks, provide training, and collaborate with epidemiologists and laboratorians in their states and counties to identify and prevent underlying factors contributing to outbreaks (e.g., food handling practices, worker health policies, and food source of a particular outbreak or group of outbreaks). EHS-Net brings local, state, and federal regulators (Food and Drug Administration [FDA] and U.S. Department of Agriculture [USDA]) and state disease control authorities together to actively work on a variety of food and water safety activities that require public health science-based inquiry.

Changing Policies

CDC research and funding have spurred the adoption of evidence-based practices. For example, findings from an EHS-Net study contributed to FDA amending its *Food Code* in 2009 to include a ban on the sale of undercooked ground beef in retail food establishments that offer children's menu items.

Providing a New e-Learning Training Course

CDC's new e-Learning training on environmental assessment of foodborne illness outbreaks teaches state, local, territorial, and tribal environmental health professionals and food safety officials how to investigate foodborne illness outbreaks as part of an outbreak response team, identify contributing and underlying factors, and recommend appropriate control measures.

They learn basic skills required to conduct foodborne-illness-outbreak environ-

mental assessments. These include effective interviewing, observation and record review, sampling, critical thinking, and organizing assessment information (Figure 1).

The 10–12 hour e-Learning (www.cdc.gov/nceh/ehs/eLearn/EA_FIO/index.htm) training course was collaboratively developed by CDC with the help of its EHS-Net grantees, FDA, and USDA. The training is free and consists of self-paced, interactive multimedia instruction delivered over the Internet (Figure 2).

To Learn More

For more information about CDC's food-related work in environmental public health practice, visit www.cdc.gov/nceh/ehs/EHSNet.

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Did You Know?

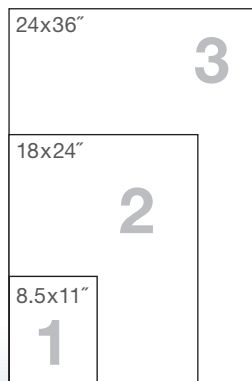
The Environmental Health Support Center sponsors training courses on a wide variety of subjects related to the programs of the Indian Health Service's Office of Environmental Health and Engineering. You can register for a class up to three months before it starts at www.ihs.gov.



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▶ **DIRECT FROM CDC** ENVIRONMENTAL PUBLIC HEALTH TRACKING NETWORK

Lina S. Balluz, MPH, ScD

CDC's Environmental Public Health Tracking Network: An Innovative Dynamic Surveillance System for You

Editor's Note: As part of our continuing effort to highlight innovative approaches and tools to improve the health and environment of communities, the *Journal* is pleased to publish a bimonthly column from the Centers for Disease Control and Prevention's (CDC's) Environmental Public Health Tracking Network (Tracking Network). The Tracking Network is a system of integrated health, exposure, and hazard information and data from a variety of national, state, and city sources. The Tracking Network brings together data concerning health and environmental problems with the goal of providing information to help improve where we live, work, and play.

Environmental causes of chronic diseases are hard to identify. Measuring amounts of hazardous substances in our environment in a standard way, tracing the spread of these over time and area, seeing how they show up in human tissues, and understanding how they may cause illness is critical. The Tracking Network is a tool that can help connect these efforts. Through these columns, readers will learn about the program and the resources, tools, and information available from CDC's Tracking Network.

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

Lina Balluz has been with CDC for over 17 years. Prior to becoming chief of the Environmental Health Tracking Branch in 2012, Dr. Balluz led the Behavior Surveillance Branch and directed the Behavioral Risk Factor Surveillance System at CDC.

The Centers for Disease Control and Prevention's (CDC's) Environmental Public Health Tracking Network

CDC's Environmental Public Health Tracking Program (Tracking Program) began with the idea that health and environmental problems are not always separate issues with unrelated

solutions. When the Tracking Program was funded in 2002, no systems existed at the state or national level to track many of the exposures and health effects that may be related to environmental hazards. In addition, in most cases, existing environmental hazard, exposure, and disease-tracking systems were not linked. Because existing systems were not

linked, studying and monitoring relationships among hazards, exposures, and health effects was difficult. The National Environmental Public Health Tracking Network (Tracking Network) is CDC's solution to these issues.

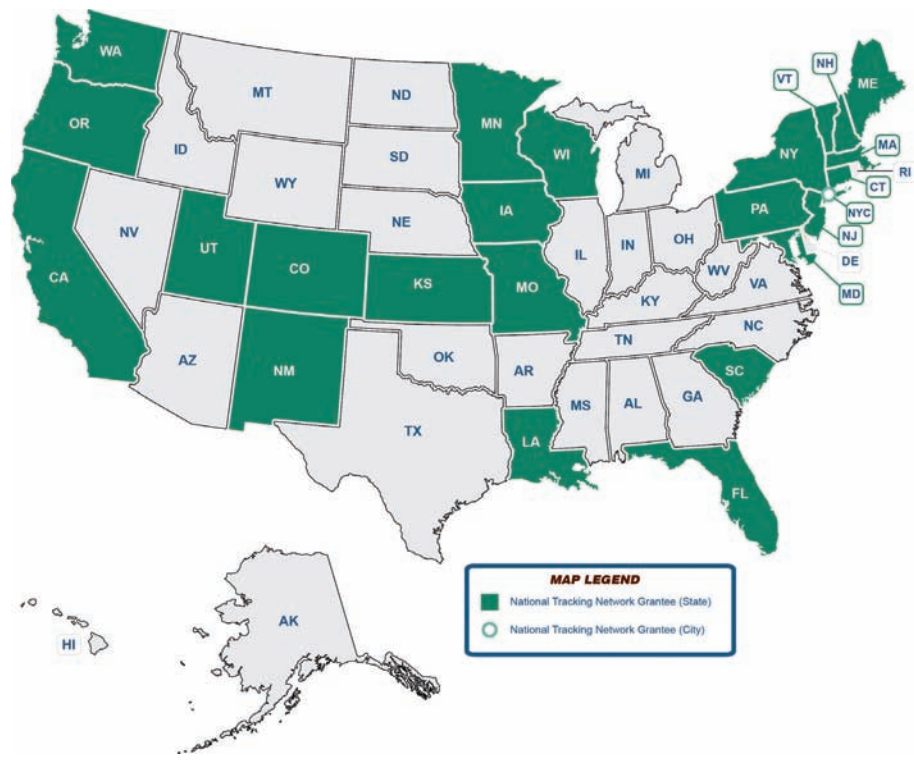
CDC's Tracking Network is a surveillance system that integrates data about environmental hazards and exposures with data about diseases and conditions that are possibly linked to those hazards and exposures. This system allows federal, state, and local agencies and other organizations to

- monitor and distribute information about environmental hazards and disease trends;
- advance research on possible links between environmental hazards and disease; and
- develop, implement, and evaluate regulatory and public health actions to prevent or control environment-related diseases.

The data in this surveillance system come from a variety of national, state, and city sources. CDC funds health departments in 23 states as well as New York City to build and maintain local tracking networks and contribute data to the national system (Figure 1). CDC also works with other federal and professional organizational partners to obtain data from national data sources. These data are accessible in maps, tables, and charts. The Tracking Network's mapping and data-searching features are interactive and highly customizable; data can be organized and viewed in many different ways; and most of the data can be viewed at county as well as state level. The most recent functionality improvements lets users build dynamic, animated maps to easily see trends over time for any content area on the Tracking Network.

FIGURE 1

Tracking Program Grantee Map



Before the Tracking Network, even simple questions about health and the environment could take months to answer. With the Tracking Network in place, public health officials can respond quickly, often within hours, to locate hazard sources or answer citizens' concerns. Before tracking was available, public health and environmental officials had to concentrate mainly on acute events such as hazardous chemical releases or point-source pollution such as air pollution from a specific source. Using the Tracking Network, officials can trace amounts of pollutants and their geographic spread over time. This capability allows officials to monitor long-term trends and place those acute events in context. More than 70 examples of how Tracking Network data have been used by state and local health departments to improve health in their communities are available at www.cdc.gov/ephtracking (Figure 2).

Data Available on the Tracking Network

The Tracking Network has data divided into three content sections. The Health Effects section includes data about asthma, birth defects, cancer, carbon monoxide poisoning, childhood lead poisoning, developmental disabilities, heart attacks, and reproductive and birth outcomes. The Environments section includes data about climate change, community water, housing, and outdoor air. The Population Health section includes data about biomonitoring, health behaviors (e.g., smoking), socioeconomic, and demographics. Geographic and temporal coverage of each data set varies, depending on the source.

In addition to their contributions to the national system, Tracking grantees have the flexibility to add data and content about locally relevant issues to their individual tracking networks. For example,

- Maine features data about Lyme disease;
- Massachusetts includes pediatric asthma data;
- Minnesota provides hospitalization data for chronic obstructive pulmonary disease;
- New York City includes data about pests and pest management practices;
- Oregon provides obesity data from driver's license records; and
- South Carolina provides extensive coastal data such as fishing, swimming, and water advisories.

FIGURE 2

Tracking Network Home Page



New to the Tracking Network

Enhanced Health Impact Assessment Tool

CDC recently expanded the tools on the Tracking Network by adding a new filter to the health impact assessment tool in the outdoor air quality section. This filter shows how lowering fine particulate matter (PM_{2.5}) by certain percentages can lead to fewer deaths from coronary artery disease (CAD), the most common type of heart disease in the U.S. (Figure 3). CAD is largely related to lifestyle habits such as poor diet, lack of physical activity, and smoking, but it is also the most common heart problem related to PM_{2.5} exposure over a long period. This health impact assessment tool can help identify areas where interventions to reduce air pollution could generate meaningful health improvements.

Expanded Climate Change Data

The expanded climate change data provide more than 30 years (1979–2011) of weather data about extreme heat days and events and temperature distribution. The extreme heat days and events data include temperature, heat index, and number of days to define extremely hot days and extreme heat events. The temperature distribution data allow access to daily temperature and heat index by county. These data can be used with historical hospitalization data to show how heat events may have affected health care use in a particular area, or indicate which areas might have the highest number of residents susceptible to a heat-related illness. This information can be used to design prevention messages and emergency planning.

New Data About Smoking-Related Cancers

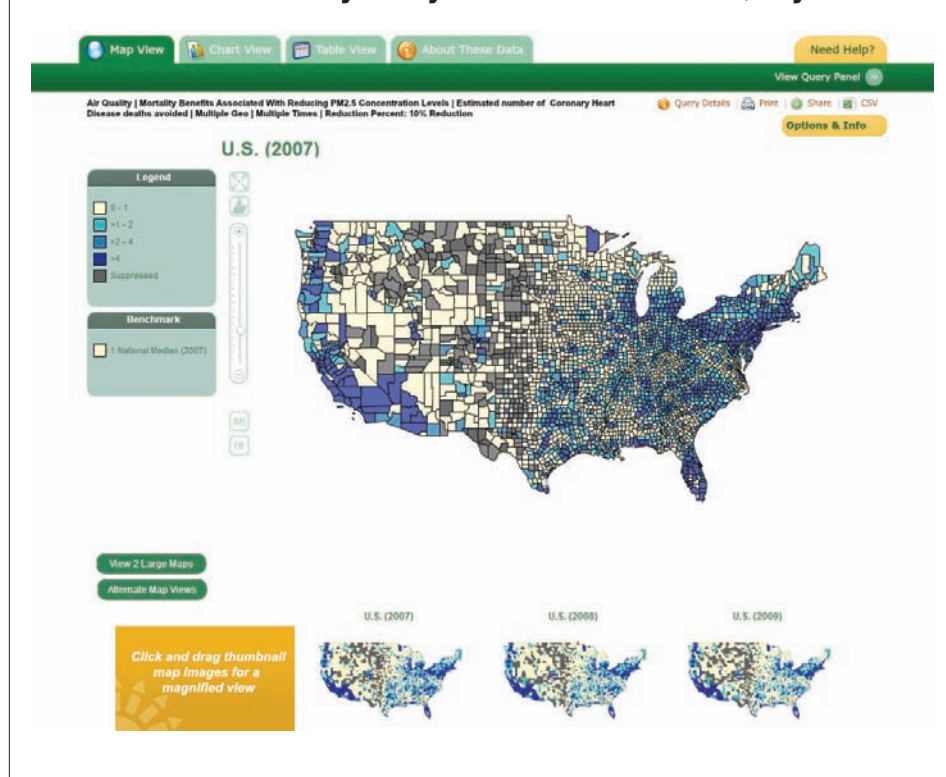
Data about cancers related to tobacco smoking are also now available on the Tracking Network. The newly added information includes data for esophageal, larynx, oral, and pancreatic cancers. These data can be studied in conjunction with the smoking prevalence data also available on the Tracking Network.

Coming Soon to the Tracking Network

In 2014, CDC expects to add data about pesticides from the American Association

FIGURE 3

Results From a Coronary Artery Disease/Air Pollution Query



of Poison Control Centers and a bibliography of literature featuring Tracking Network data. Data-display enhancements planned for 2014 include the ability to view multiple data sets together and a more intuitive and user-friendly “Info by Location” search option.

Resources for Environmental Health Professionals

In addition to the data and mapping features available on the Tracking Network, many other resources are available for environmental health practitioners. CDC has partnered for many years with NEHA to provide tracking-related training accessible through the Tracking Network Web site and NEHA’s online training Web site. CDC also has written a “how-to” guide for states or cities that are not funded by the national program but may be interested in starting environmental public health tracking activities. Many communication materials for raising awareness about environmental and health issues, including tool kits, fact sheets, videos, and

podcasts, are available on the Web site in the Communication Tools section.

The best way to stay connected with the Tracking Program is by joining our LIST-SERV. Send an e-mail to epht@cdc.gov and you will receive updates about new data, tools, and other resources.

The Tracking Network is the nation’s most comprehensive environmental public health surveillance system. If you have not had an opportunity to try it out, visit today at www.cdc.gov/ephttracking. I am very interested in hearing your feedback and suggestions on making this system useful for you. 🐼

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FINAL CALL FOR NOMINATIONS

2014 Walter S. Mangold Award

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

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▶ DEMYSTIFYING THE FUTURE



Thomas Frey

Thirty-Three Dramatic Predictions for 2030

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.

Humanity will change more in the next 20 years than in all of human history.

By 2030, the average person in the U.S. will have 4.5 packages a week delivered with flying drones. They will travel 40% of the time in a driverless car, use a 3D printer to print hyper-individualized meals, and will spend most of their leisure time on an activity that hasn't been invented yet.

The world will have seen over two billion jobs disappear, with most coming back in different forms in different industries, with more than 50% structured as freelance projects rather than full-time jobs.

More than 50% of today's Fortune 500 companies will have disappeared, more than 50% percent of traditional colleges will have collapsed, and India will have overtaken China as the most populous country in the world.

Most people will have stopped taking pills in favor of a new device that causes the body to manufacture its own cures.

Space colonies, personal privacy, and flying cars will all be hot topics of discussion.

Most of today's top causes, including climate change, gay rights, and abortion will all be relegated to little more than footnotes in Wikipedia, and Wikipedia itself will have lost the encyclopedia wars to an upstart company all because Jimmy Wales was taken hostage and beheaded by warring factions in the Middle East over a controversial entry belittling micro religions.

Our ability to predict the future is an inexact science. The most accurate predictions generally come from well-informed industry insiders about very near term events.

Much like predicting the weather, the farther we move into the future, the less accurate our predictions become.

So why do we make them?

In the segments below, I'll make a series of 33 provocative predictions about 2030, and how different life will be just 17 years in the future.

I will also explain why predictions are important, even when they are wrong.

Why Understanding the Future Is Important

Ignorance is a valuable part of the future. If we knew the future we would have little reason to vote in an election, host a surprise party, or start something new.

Once a future is known, we quickly lose interest in trying to influence it. For this reason, our greatest motivations in life come from NOT knowing the future.

So why, as a futurist, do I spend so much time thinking about the future?

Very simply, since no one has a totally clear vision of what lies ahead, we are all left with degrees of accuracy. Anyone with a higher degree of accuracy, even by only a few percentage points, can achieve a significant competitive advantage.

The Power of Prediction

If I make the prediction that “By 2030 more than 90% of all crimes will be solved through video and other forms of surveillance,” several things happen.

First, you have to decide if you agree that a certain percentage of crimes will be solved that way. If so, it forces you to think about how fast the surveillance industry is growing, how invasive this might be, and whether privacy concerns might start to shift current trends in the other direction.

More importantly, it forces you to consider the bigger picture, and whether this is a desirable future. If it reaches 90%, how many police, judges, and lawyers will be out of a job as a result of this? Will this create a fairer justice system, a safer society, or a far scarier place to live?

Please keep this in mind as we step through the following predictions.

Thirty-Three Dramatic Predictions

1. By 2030 over 80% of all doctor visits will have been replaced by automated exams. Details at www.impactlab.net/2012/09/11/technology-will-replace-80-of-doctors-vinod-khosla/.
2. By 2030 over 90% of all restaurants will use some form of a 3D food printer in their meal preparations. Details at www.futuristspeaker.com/2011/10/the-coming-food-printer-revolution/.
3. By 2030 over 10% of all global financial transactions will be conducted through Bitcoin or Bitcoin-like crypto currencies.
4. By 2030 we will see a growing number of highways designated as driverless-vehicle only. Details at www.futuristspeaker.com/2012/09/driverless-highways-creating-cars-that-talk-to-the-roads/.
5. By 2030 a Chinese company will become the first to enter the space tourism industry by establishing regular flights to their space hotel.
6. By 2030 the world's largest Internet company will be in the education business, and it will be a company we have not heard of yet.
7. By 2030 over 20% of all new construction will be “printed” buildings. Details at www.futuristspeaker.com/2012/04/printable-houses-and-the-massive-wave-of-opportunity-it-will-bring-to-our-future/.
8. By 2030 over two billion jobs will have disappeared, freeing up talent for many new fledgling industries. Details at www.futuristspeaker.com/2012/02/2-billion-jobs-to-disappear-by-2030/.
9. By 2030 a new protest group will have emerged that holds anticloning rallies, demonstrating against the creation of “soulless humans.”
10. By 2030 we will see the first city harvest 100% of its water supply from the atmosphere. Details at www.futuristspeaker.com/2013/09/tapping-into-the-waterways-in-the-sky/.
11. By 2030 world religions will make a resurgence, with communities of faith growing by nearly 50% over what they are today.
12. By 2030 over 50% of all traditional colleges will collapse, paving the way for an entirely new education industry to emerge. Details at www.futuristspeaker.com/2013/07/by-2030-over-50-of-colleges-will-collapse/.
13. By 2030 we will see a surge of micro colleges spring to life, each requiring less than six months of training and apprenticeship to switch professions. Details at www.futuristspeaker.com/2013/09/trimming-the-fat-introducing-the-lean-micro-college-model-for-education/.
14. By 2030 scientists will have perfected an active cross-species communication system, enabling some species to talk to each other as well as humans.
15. By 2030 we will see the first hurricane stopped by human intervention.
16. By 2030 we will see wireless power used to light up invisible light bulbs in the middle of a room.
17. By 2030 we will see the first demonstration of a technology to control gravity, reducing the pull of gravity on an object by as much as 50%.
18. By 2030 democracy will be viewed as an inferior form of government.
19. By 2030 traditional police forces will be largely automated out of existence with less than 50% of current staffing levels on active duty.
20. By 2030 over 90% of all libraries will offer premium services as part of their business model. Details at www.futuristspeaker.com/2013/10/libraries-that-create-their-own-economy-opening-the-door-to-premium-services/.
21. By 2030 forest fires will have been reduced to less than 5% of the number today with the use of infrared drone monitoring systems. Details at www.futuristspeaker.com/2013/06/proposal-to-eliminate-forest-fires-completely/.
22. By 2030 over 30% of all cities in the U.S. will operate their electric utilities as micro grids.
23. By 2030 we will have seen a number of global elections with the intent of creating a new global mandate, forcing world leaders to take notice. Details at www.futuristspeaker.com/2012/12/entering-the-era-of-global-mandates/.
24. By 2030 traditional pharmaceuticals will be replaced by hyper-individualized medicines that are manufactured at the time they are ordered. Details at www.futuristspeaker.com/2012/10/inventing-the-3d-pill-printer/.
25. By 2030 we will have seen the revival of the first mated pair of an extinct species. Details at www.futuristspeaker.com/2013/03/should-we-revive-extinct-species/.
26. By 2030 swarms of micro flying drones—swarmbots—will be demonstrated to assemble themselves as a type of personal clothing, serving as a reconfigurable fashion statement. Details at www.futuristspeaker.com/2013/10/the-future-favors-the-bold-8-backcasting-scenarios-for-understanding-the-future/.
27. By 2030 marijuana will be legalized in all 50 states in the U.S. and half of all foreign countries. Details at www.futuristspeaker.com/2012/11/entering-the-legal-marijuana-era-finding-the-pitfalls-and-profits-in-the-years-ahead/.
28. By 2030 cable television will no longer exist.
29. By 2030 a small number of companies will begin calculating their labor costs with something called “synaptical currency.” Details at www.futuristspeaker.com/.

com/2013/10/introducing-synaptical-currency-theory-assigning-value-to-brain-capital/.

- 30. By 2030 it will be common to use next-generation search engines to search the physical world. Details at www.futuristspeaker.com/2013/08/search-engines-for-the-physical-world-the-future-of-search-technology-in-an-increasingly-transparent-world/.
- 31. By 2030 basic computer programming will be considered a core skill required in over 20% of all jobs. Details at www.davincicoders.com/.
- 32. By 2030 we will have seen multiple attempts to send a probe to the center of the earth. Details at www.futuristspeaker.com/2010/09/prize-competition-1-the-race-to-the-core/.

- 33. By 2030 a form of tube transportation, inspired by Hyperloop and ET3, will be well on its way to becoming the world's largest infrastructure project. Details at www.futuristspeaker.com/2013/10/competing-for-the-world-largest-infrastructure-project-over-100-million-jobs-at-stake/.

Final Thoughts

Reading through the predictions above you will likely have experienced a number of thoughts ranging from agreement, to amusement, to confusion, to total disagreement.

As with most predictions, not all will be correct. But the true value in this list will come from giving serious consideration to each of them and deriving your own conclusions.

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

Corresponding Author: Thomas Frey, Senior Futurist and Executive Director, DaVinci Institute®, 511 East South Boulder Road, Louisville, CO 80027.
E-mail: dr2tom@davinciinstitute.com.

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DAVIS CALVIN WAGNER SANITARIAN AWARD

The American Academy of Sanitarians announces the annual Davis Calvin Wagner Award. The award will be presented by the academy during the Annual Educational Conference of the National Environmental Health Association.

The award consists of a plaque and a \$500 honorarium.

Nominations for this award are open to all diplomates of the academy who:

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

The nomination for the award may be made by a colleague or a supervisor and must include the following:

1. Name, title, grade, and current place of employment of the nominee.
2. A description of the nominee's educational background and professional experience.

3. A description of the nominee's employment history, including the scope of responsibilities.
4. A narrative statement of specific accomplishments and contributions on which the nomination is based, including professional association activities, publications, and community/civic activities.
5. Three endorsements (an immediate supervisor and two other members of the professional staff or other person as appropriate).

NOMINATIONS MUST BE RECEIVED BY APRIL 15, 2014. THREE COPIES OF THE NOMINATION DOCUMENT MUST BE SUBMITTED TO:

American Academy of Sanitarians
 c/o Thomas E. Crow
 25278 Kennebec Drive
 South Riding, VA 20152
tcrow23701@aol.com
www.sanitarians.org/aas-awards/

UPCOMING NEHA CONFERENCE

July 7–10, 2014: NEHA's 78th Annual Educational Conference & Exhibition in Partnership with the International Federation of Environmental Health, The Cosmopolitan of Las Vegas, NV. For more information, visit www.neha2014aec.org.

NEHA AFFILIATE AND REGIONAL LISTINGS

Alabama

April 9–11, 2014: 2014 Annual Education Conference, sponsored by the Alabama Environmental Health Association, The University of Alabama at Birmingham, AL. For more information, visit www.aeha-online.com.

Arizona

March 12–13, 2014: AZEHA Spring Conference, sponsored by the Arizona Environmental Health Association, Arizona State University, Tempe, AZ. For more information, visit www.azeha.org.

California

March 31–April 4, 2014: 63rd Annual Educational Symposium, "Harvest the Knowledge," hosted by the Redwood Chapter of the California Environmental Health Association, Napa Valley Marriott Hotel, Napa, CA. For more information, visit www.ceha.org/events.

Georgia

July 16–18, 2014: 68th Annual Interstate Environmental Health Seminar, hosted by the Georgia Environmental Health Association, Savannah, GA. For more information, visit www.geha-online.org.

Idaho

March 19–20, 2014: 2014 Annual Educational Conference, sponsored by the Idaho Environmental Health Association, Boise, ID. For more information, visit www.ieha.wildapricot.org.

Iowa

April 1–2, 2014: Iowa Governor's Conference on Public Health, partnered by the Iowa Environmental Health Association, Scheman Conference Center, Ames, IA. For more information, visit www.ieha.net.

Michigan

March 18–21, 2014: 2014 Annual Education Conference, sponsored by the Michigan Environmental Health Association, Big Rapids, MI. For more information, visit www.meha.net.

New Jersey

March 2–4, 2014: Annual Conference & Exhibition, sponsored by the New Jersey Environmental Health Association, Tropicana Resort and Casino, Atlantic City, NJ. For more information, visit www.njeha.org.

Ohio

April 15–16, 2014: 2014 Spring Annual Education Conference, sponsored by the Ohio Environmental Health Association, Worthington Double Tree Hotel, Columbus, OH. For more information, visit www.ohioeha.org/annual-education-conference.aspx.

Utah

April 2–4, 2014: Spring Conference, sponsored by the Utah Environmental Health Association, Moab, UT. For more information, visit www.ueha.org/events.html.

Virginia

April 10–11, 2014: 2014 Spring Educational Session, sponsored by the Virginia Environmental Health Association, Charlottesville, VA. For more information, visit www.virginiaeha.org/educational-sessions/.

Washington


May 12–13, 2014: 2014 Annual Educational Conference, "Environmental Public Health—Improving Quality of Life in Our Communities," sponsored by the Washington State Environmental Health Association, Great Wolf Lodge, Grand Mound, WA. For more information, visit www.wseha.org/2014-aec/.

Wisconsin

April 15–16, 2014: Spring Education Conference, sponsored by the Wisconsin Environmental Health Association, Kalahari Resort, Wisconsin Dells, WI. For more information, visit www.weha.net.

TOPICAL LISTINGS

Healthy Homes

May 28–30, 2014: National Healthy Homes Conference, sponsored by the Department of Housing and Urban Development, Rebuilding Together, HGTV, and DIY Network, Nashville, TN. For more information, visit www.healthyhomesconference.org. 

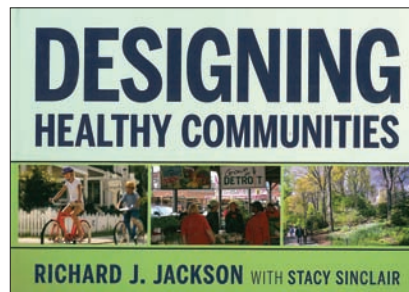
RESOURCE CORNER

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!



Designing Healthy Communities

Richard J. Jackson with Stacy Sinclair (2012)



This book highlights how we design the built environment and its potential for addressing and preventing many of the nation's devastating childhood and adult health concerns. The author looks at the root causes of our malaise

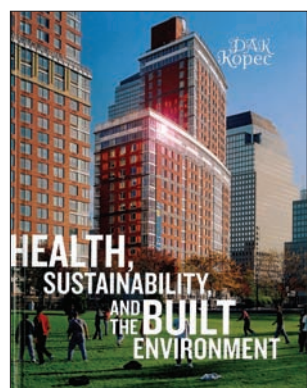
and highlights healthy community designs achieved by planners, designers, and community leaders working together. Ultimately, the author encourages all of us to make the kinds of positive changes highlighted in this book.

230 pages / Hardback / Catalog #1122

Member: \$48 / Nonmember: \$52

Health, Sustainability, and the Built Environment

DAK Kopec (2009)



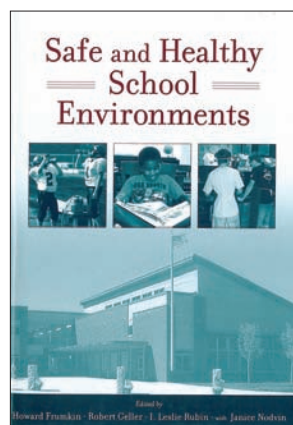
With the emergence of sick building syndrome in the 1970s and the emphasis on LEED standards today, many are becoming interested in the topics of health and sustainability. *Health, Sustainability, and the Built Environment* examines the concept of sustainability as it pertains to sustaining human health. By analyzing the many ways that humans interact with the built environment, the text teaches readers how to identify both the positive and negative effects designs can have on the health of occupants.

340 pages / Hardback / Catalog #1088

Member: \$99 / Nonmember: \$110

Safe and Healthy School Environments

Edited by Howard Frumkin, Robert J. Geller, I. Leslie Rubin, and Janice Nodvin (2006)



Millions of children and adults across the nation spend their days in school buildings, and they need safe, healthy environments to thrive, learn, and succeed. This book explores the school environment using the methods and perspectives of environmental health science. Though environmental health has long been understood to be an important factor in workplaces, homes, and communities, this is the first book to address the same basic concerns in schools.

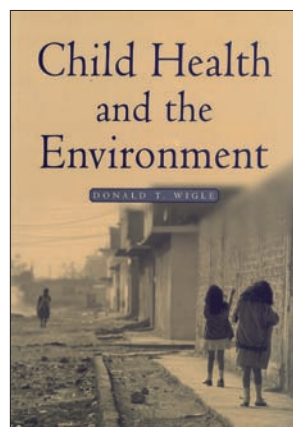
Each section of this book addresses a different environmental health concern facing schools today. The entire book is evidence-based, readable, generously illustrated, and practical—an indispensable resource for parents, school staff, administrators, government officials, and health professionals.

480 pages / Hardback / Catalog #631

Member: \$49 / Nonmember: \$54

Child Health and the Environment

Donald T. Wigle (2003)



This is the first textbook to focus on environmental threats to child health. It will interest professionals and graduate students in public health, pediatrics, environmental health, epidemiology, and toxicology. It provides overviews of key children's environmental health issues, addresses the health effects of different environmental contaminants, and summarizes associations between environmental exposures and child health outcomes and calls for an improved science base to

guide public health decisions and protect child health.

396 pages / Hardback / Catalog #759

Member: \$59 / Nonmember: \$64

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JEH QUIZ

FEATURED ARTICLE QUIZ #5

Health and Housing Outcomes From Green Renovation of Low-Income Housing in Washington, DC

Available to those holding an Individual NEHA membership only, the *JEH Quiz*, offered six times per calendar year through the *Journal of Environmental Health*, is a convenient tool for self-assessment and an easily accessible means to accumulate continuing-education (CE) credits toward maintaining your NEHA credentials.

1. Read the featured article carefully.
 2. Select the correct answer to each *JEH Quiz* question.
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JEH Quiz #3 Answers December 2013

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

→ Quiz deadline: June 1, 2014

1. In their study, the authors measured self-reported resident physical and mental health, allergens, and building conditions in a low-income housing development being renovated.
 - a. True.
 - b. False.
2. Of the 102 occupied housing units available in the study, ___ of the units enrolled at baseline.
 - a. 64%
 - b. 57%
 - c. 43%
 - d. 25%
3. The retention rate of study participants for the follow-up approximately one year after the rehabilitation was completed was _____.
 - a. 64%
 - b. 57%
 - c. 43%
 - d. 25%
4. Which of the following professionals were not included in the multidisciplinary renovation approach?
 - a. Public health.
 - b. Construction.
 - c. Engineering.
 - d. Elected officials.
5. Samples were collected from the floor of the following rooms:
 - a. the living room, main bathroom, and kitchen.
 - b. the living room, youngest child's bedroom, and kitchen.
 - c. the youngest child's bedroom, adult's bedroom, and living room.
 - d. the living room, adult's bedroom, and kitchen.
6. Compared to baseline, water and energy consumption was reduced by ___ and ___, respectively, one year after renovation.
 - a. 16%; 54%
 - b. 54%; 16%
 - c. 45%; 16%
 - d. 16%; 45%
7. One of the study's limitations is that it is difficult to discern whether health improvements are due to the nature of "green" renovation versus "normal" renovation.
 - a. True.
 - b. False.
8. The presence of pests (cockroaches, rodents, other insects/vermin) decreased by ___ from baseline to the one-year follow-up.
 - a. 22%
 - b. 14%
 - c. 9%
 - d. 7%
9. Professional pesticide use ___ one year after the baseline.
 - a. decreased
 - b. increased
 - c. stayed the same
10. Almost all participating occupants felt that their homes were ___ to clean after the renovations.
 - a. harder
 - b. easier
 - c. the same
11. Self-reported general health in adults ___ after renovations.
 - a. declined
 - b. did not change
 - c. improved
12. Injuries in children decreased from ___ to ___ one year after renovation.
 - a. 7%; 4%
 - b. 7%; 0%
 - c. 15%; 7%
 - d. 15%; 4%

2014 Walter F. Snyder Award

Call for Nominations

Nomination deadline is April 30, 2014.

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



Nominations for the 2014 *Walter F. Snyder Award* are being accepted for professionals achieving peer recognition for:

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



Past recipients of the *Walter F. Snyder Award* include:

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



The 2014 Walter F. Snyder Award will be presented during NEHA's 78th Annual Educational Conference (AEC) & Exhibition to be held in Las Vegas, Nevada, July 7 - 10, 2014.

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

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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Industrial Test Systems, Inc.
www.sensafe.com

Inspect2Go
www.inspect2go.com

Inspek Pro LLC
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www.inspekpro.com

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Maricopa County Environmental Services
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Mars Air Doors
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www.marsair.com

McDonough County Health Department
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Mesothelioma Lawyer Center
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Mitchell Humphrey
www.mitchellhumphrey.com

Mycometer
www.mycometer.com

National Environmental Health Science and Protection Accreditation Council
www.ehacoffice.org

National Registry of Food Safety Professionals
Lawrence Lynch
www.nrfsp.com

National Restaurant Association
www.restaurant.org

National Swimming Pool Foundation
Michelle Kavanaugh
www.nspf.org

New Jersey State Health Department, Consumer and Environmental Health Services
Joe Eldridge
www.njeha.org

New York City Department of Health & Mental Hygiene
www.nyc.gov/health

North Bay Parry Sound District Health Unit
www.healthunit.biz

Nova Scotia Department of Agriculture
www.gov.ns.ca

NSF International
Stan Hazan
www.nsf.org

Omaha Healthy Kids Alliance
www.omahahealthykids.org

Oneida Indian Tribe of Wisconsin
www.oneidanation.org

Orkin
Zia Siddiqi
www.orkincommercial.com

Ozark River Hygienic Hand-Wash Station
www.ozarkriver.com

PerkinElmer, Inc.
www.perkinelmer.com

Pinnacle Health Childhood Lead Poisoning Prevention Program
www.pinnaclehealth.org/Conditions---
Treatments/Services/Children-s-Health/
Services/Childhood-Lead-Poisoning-
Prevention-Program.aspx

Prometric
www.prometric.com

San Jamar
www.sanjamar.com

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SneezeGuard Solutions Inc.
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St. Johns Housing Partnership
www.sjhp.org

Stater Brothers Market
www.staterbros.com

Sweeps Software, Inc.
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www.sweepssoftware.com

Target Corporation
www.target.com

Texas Roadhouse
www.texasroadhouse.com

The Steritech Group, Inc.
www.steritech.com

Tri-County Health Department
www.tchd.org

Underwriters Laboratories, Inc.
Gus Schaeffer
www.ul.com

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West Virginia Office of Economic Opportunity
www.oeo.wv.gov

Winn-Dixie Stores, Inc.
www.winn-dixie.com

WVDHHR Office of Environmental Health Services
www.wvdhhr.org

YUM! Brands, Inc.
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NEHA SECOND VICE PRESIDENTIAL CANDIDATE PROFILES

NEHA elects its leaders through a ballot that goes to all active and life members prior to the annual conference. Among other things, the ballot features the election for the position of NEHA second vice president. The person elected to this position begins a five-year commitment to NEHA that involves advancing each year to a different national office, eventually to become NEHA's president.

Election policies specify that profiles for the second vice president be limited to 800 words in total length. If a candidate's profile exceeds that limit, the policy requires that the profile is terminated at the last sentence before the 800-word limit is exceeded. In addition, the submitted profiles have not been grammatically edited, but presented as submitted and within the 800-word limitation. This year, NEHA presents four candidates for the second vice president office. Candidates are listed in alphabetical order as they will appear on the ballot.



**Stan Hazan, BSc, MPH, MBA
Sr. Director of Science
& Regulatory Affairs,
NSF International**

**Dedicated to Environmental
Health**

During my 25 years at the National Sanitation Foundation (NSF International), I have had the honor of working with, and learning from,

four distinguished NEHA Presidents. They set a very high bar for this key leadership position because of their dedication to environmental health and the profession. The next few years will see important strategic, operational and leadership challenges at NEHA, and I believe that my 35 years of private sector environmental health business and management experience can help NEHA meet these challenges head on. I am delighted to have the support of my employer NSF, to serve NEHA in a Board capacity.

My Environmental Health Career

I graduated from the University of Toronto in 1977 with degrees in organic chemistry and biochemistry and started my environmental health career as an analytical chemist. Shifting my focus to the business aspects of environmental laboratories, I returned to the University of Michigan Business School in 1985 to earn an MBA, and soon thereafter, joined NSF. I worked with health departments on standards and certifications of commercial food equipment, municipal water supply products, wastewater systems, plumbing system components, pool and spa equipment, biohazard cabinets and more. My time at NSF helped me to more fully appreciate the breadth and critical role of the Environmental Health professional. It is this appreciation that led me to become more active within NEHA and to successfully pursue an MPH in Environmental Health from the University of Michigan – School of Public Health.

Professional Track Record

At NSF, I have convened diverse stakeholder groups to develop consensus national standards. I have worked with hundreds of manufacturers, government agencies at all levels and many diverse trade and professional associations to develop product certification programs. I have also interacted extensively with regulators and academia to develop, manage and deliver education and training programs, including national and international conferences and webinars. I have worked with regulators both here and abroad to ensure their voices

and issues are heard. I have succeeded professionally by listening and responding to the needs of stakeholders; the same qualities and skills I would bring to the 2nd VP position at NEHA.

Leadership

I represent NSF on a variety of technical, scientific and regulatory issues. I serve as Secretary of the NSF Council of Public Health Consultants that oversees all NSF standards. As coordinator for the NSF/WHO Collaborating Center I work to leverage NSF expertise to global health issues pertaining to food, water and indoor environments. As a board member of both the UM SPH Dean's Advisory Board, and the Partnership for Food Safety Education, I provide both business and management perspectives – in environmental health. It's this blend of experience with business and understanding of regulatory issues I can also bring to the NEHA Board.

My Platform

Our dedicated NEHA leaders, staff and volunteers have done an excellent job of establishing a vision, diversifying the organization and strengthening its financial position. However, in the spirit of continuous improvement, over the last year that I have actively campaigned for 2nd VP, I have spoken to NEHA members and leaders about what NEHA needs to become an even better association. The following ideas were brought to my attention, and the NEHA Board may want to consider.

1. Increased membership through improved value proposition,
2. Expanded career opportunities for the EH professional in public and private sectors,
3. Strengthened Regional Affiliates for greater local input and direction,
4. Improved operational efficiencies in the association, and
5. Greater organizational transparency and accountability to members.

I believe my combined strong environmental health and business backgrounds would help me provide leadership on these and other NEHA priorities, and position me to give back to NEHA through a Board role. Please know that I will always listen to you and will ask for your guidance on issues that impact our changing profession.

I hope you agree and I ask for your vote!

Contact me

I welcome the opportunity to speak with you and listen to your ideas, opportunities and solutions to the challenges facing our association, at hazan@nsf.org or 734-769-5105. Please link to me at www.linkedin.com.

Thanks!

NEHA SECOND VICE PRESIDENTIAL CANDIDATE PROFILES



Adam London, RS, MPA

Adam London is a registered sanitarian and the Health Officer of the Kent County Health Department in Grand Rapids, Michigan. He graduated with a BS in Environmental Health from Ferris State University followed by a master's degree in Public Administration from Grand Valley State University. Adam is currently working

on a PhD in Public Health/Epidemiology at Walden University. His pursuit of this degree is driven by the belief that the environmental health profession needs to do a better job measuring and communicating the consequences of environmental exposures and conditions. Adam has spent years as a sanitarian at the local level providing services directly to the community. He has been fortunate to work in a variety of programs ranging from food safety to mosquito surveillance, and from wastewater treatment to beach water quality. As a public health administrator, he has extensive experience managing finances, developing policy, and advocating for environmental health. He understands that our profession is noble and critically important to the lives of countless people. He also believes that NEHA has a unique ability to serve these professionals and to further our cause at the national, and even international, level.

Adam currently serves as the Regional Vice President for Region Six representing Indiana, Illinois, Kentucky, Michigan, and Ohio. If elected to be your next 2nd Vice President, Adam intends to work with membership to make NEHA more valuable and to make the association more attractive to non-members. He believes that NEHA's best days are ahead of us and that our profession is on the precipice of a new era of opportunity. To prepare for this future, Adam proposes a platform and a vision consisting of:

1. **Generational Unity and Transition.** The Baby-Boom generation has contributed more to environmental health than perhaps any other group in the history of public health, however, they are retiring at an alarming rate. It is imperative that Generations X and Y are prepared to gracefully take leadership and carry the EH legacy to new heights. The future of NEHA and of our profession will be determined by the success of this transition. As a "Gen Xer", Adam understands this challenge and will enlist members from all generations in order to ensure the success of our organization for years to come.
2. **Storytelling and Advocacy.** The environmental health profession is invisible largely because the public does not recognize the harm we prevent. Research has shown that people have deep respect for environmental health once they understand what it is. As a profession, we need to embrace and anticipate all the tools of social media and communication. NEHA must also maintain informed positions on the relevant issues of the day. These positions should be used to inform and influence policy decisions at all levels.

3. **Tools for Professional Development.** High quality professional credentials, trainings, resources, and education must remain a priority. NEHA is the premier source for environmental health credentials. The association must continue to expand and improve other educational services. Many leadership positions in public health are being vacated due to the retirements of the Baby-Boom generation; it is important for NEHA to offer the resources necessary to help members compete for those positions. The professional advancement of NEHA members benefits those members and our association.
4. **Increase Membership.** NEHA has less than 5,000 members. This is only about 20% of the environmental health workforce. To maximize our collective impact, it is imperative for NEHA to engage non-members and increase membership. NEHA membership should be attractive and affordable for every environmental health professional.
5. **Service.** Environmental health professionals are motivated by a desire to serve humanity and to be good stewards of the world we've been blessed with. Adam believes that NEHA can do a better job of organizing and/or linking members with opportunities to volunteer or support causes which are consistent with the NEHA mission.

At the 2013 NEHA AEC, Adam told the story about the little boys at the beach. Those little boys thought that sanitarians are, "super-heroes that protect us from germs." Adam is running for 2nd Vice President because he believes that NEHA's membership consists of genuine heroes protecting their communities from illness and injury; Adam wants to serve these heroes and empower them to do more. Adam is also running for his children. He and his wife, Anne, have been blessed with six children ranging between from 3 to 17 years old. Adam believes that the quality of their future is largely dependent on the work that we do now to protect our environmental health. The London family enjoys camping, fishing, hiking, and sports. They are also very active in their church and school community.

Please support Adam London for 2nd Vice President in the 2014 election. Visit his facebook page at www.facebook.com/AdamLondonRVP6



Gary P. Noonan, MPA, RS/REHS, DLAAS, CAPT USPHS (Ret.)

I have been a member of NEHA for almost four decades. My 39 years of service in local, state, national, and international public health programs to improve health in the United States and abroad make me an ideal candidate for second Vice-

President of NEHA's Board of Directors. I believe my experience, professional network, and passion for environmental public health will make me an asset to NEHA's governing board.

NEHA SECOND VICE PRESIDENTIAL CANDIDATE PROFILES

After serving four years in the United States Army, I began my public health career in 1972 as a sanitarian for the Jefferson County Health Department in Lakewood, Colorado. In 1978, I accepted a commission as a Public Health Service (PHS) Officer and became the District Sanitarian for the Indian Health Service in Minot, North Dakota. I joined the Centers for Disease Control and Prevention (CDC) as an Industrial Hygienist in the National Institute for Occupational Safety and Health (NIOSH) in Morgantown, West Virginia in 1982. I served NIOSH for 11 years in several roles focused on improving worker safety particularly around the use of respirators and personal protective equipment. My work was instrumental in the redesign of safer respirators for our nation's firefighters.

I transitioned to CDC's Lead Poisoning Prevention Branch in Atlanta, Georgia in 1993, where I served as a Senior Environmental Health Scientist and then Acting Branch Chief. While there I guided several international activities in Russia, Egypt, China, Chile, Mexico, Peru, Micronesia, and Indonesia and trained over 120 scientists in these countries to identify sources of lead contamination and to employ measures to control the contamination. These trainings resulted in new national policies, programs, and interventions to prevent childhood lead poisoning. For the last 10 years, I have been the Associate Director for Emergency Response for CDC's Division of Environmental Hazards and Health Effects, where I provide oversight and coordination for the Division's activities related to terrorism events and natural and man-made disasters. In addition, I served for 13 months as the Acting Chief of the Environmental Health Tracking Branch.

Over the course of my PHS career, I earned 24 Public Health Service (PHS) Awards and Unit Citations. I have also received several significant public health awards including the NEHA and NSF's Walter F. Snyder Award, a Health and Human Services Secretary's Award for Distinguished Service, the PHS John G. Todd Award, and the American Academy of Sanitarians Davis Calvin Wagner Award.

I have served on the boards of numerous professional organizations. I was on the Atlanta Chapter's Commissioned Officers Association (COA) Board of Directors for two years, Vice President and President of the West Virginia COA, Resolution and Constitution Committee of the National COA; Board of Directors for the International Society for Respiratory Protection for two years, and two years each on the North Dakota and Colorado Environmental Health Associations' Board of Directors. I have served as the Vice Chair and Chair and am currently the Executive Secretary-Treasurer of the American Academy of Sanitarians.

After 39 years of work in environmental public health, I know that the work we do saves lives and improves health in this country and around the world. However I continue to see our profession under fire from budget cuts and lack of understanding of what we do and its importance.

I believe we need to improve advocacy for our profession. I will advocate for NEHA placing a full-time person in Washington D.C., so that we will have a voice at every meeting where our interests

are discussed so that individual can join with others who advocate for public health such as APHA, NAACHO, CSTE, and NALBOH in speaking for our profession.

I will also promote for more transparency in the activities of the board of directors. There should be little business that needs to be conducted in "closed session" by the board on behalf of the membership.

I believe that we all recognize the future of our profession lies in the younger members who work as county and state environmental health practitioners on the front-lines of public health. NEHA does a commendable job by offering the virtual conference option for the AEC for those who cannot attend in person, but costs need to be held to a minimum for those who are at the beginning of their careers and not making large salaries. NEHA offers opportunities for continuing education in the journal; these opportunities need to be expanded. We also need to expand our outreach to students of environmental health.

I am committed to furthering the interests of environmental health professionals across federal, state, local, and tribal organizations as well as in private industry and will use my extensive experience and broad professional network to serve you on the issues I have addressed here and others, as your next Second Vice President.



**John Steward, REHS, MPH,
CAPT, USPHS (ret)**

I wish to introduce myself and tell you why I am a candidate for Second Vice President of NEHA. I have been an environmental health professional and a NEHA member for over 37 years. I believe that participation in NEHA has been essential to whatever success I have achieved during my career.

Background: I grew up in Terre Haute, Indiana. I enrolled at Indiana State University (ISU) as a pre-med major. When I began to question whether I was on the right path, I looked for other possible careers. I discovered ISU's accredited environmental health program, headed by Walter S. Mangold Award Winner Hank Koren. I fell in love with the field of environmental health and discovered that it was my true interest, even though I had not known its name! As a wonderful mentor, Dr. Koren imparted knowledge and introduced career opportunities. I completed great internships in local and state health departments, before embarking on a career in the U.S. Public Health Service (USPHS) Commissioned Corps following graduation.

Career: My first USPHS field assignment was in Chinle, Arizona, on the Navajo Indian Reservation. I served American Indians for 10 years in local, district, and state-wide sanitarian and program manager positions, while earning my Masters in Public Health degree with a concentration in environmental health at the

NEHA SECOND VICE PRESIDENTIAL CANDIDATE PROFILES

University of Michigan. I have served American Indians in Arizona, Utah, and California and helped to address their environmental health problems. I was involved in environmental health at all organizational levels; however, what I valued most was working with people in their communities.

I transferred to Atlanta and began a 20-year career at the Centers for Disease Control and Prevention (CDC/ATSDR). I served as an environmental health consultant, scientist and manager in areas as varied as injury control, chronic disease prevention, and investigating environmental health concerns at hazardous waste sites. I also supported environmental health disaster response efforts over several years.

After serving as a USPHS officer for 30 years, I retired as a Captain in 2006. I immediately began a second career as a faculty member in the School of Public Health of Georgia State University. I have the opportunity to share my experiences and knowledge with a new generation of health professionals. I teach and advise our graduate public health students while managing a university-wide effort to understand and improve urban environments and health inequities. I often work with community organizations in support of their goals.

NEHA Service: I have served NEHA in several capacities. I chaired the General Environmental Health, Injury Prevention, Hazardous Substances, and Air-Land-Water technical sections, from 1986 to 2004. In 2005, I was elected to the Board of Directors, beginning nine years as a Regional Vice President, for both regions 7 and 10. As a Board member, I serve on the finance, food protection, sustainability, and international fund committees. I have learned to understand the complexity of a non-profit business like NEHA. My eight years of working on the Board have given me the perspective, knowledge, and experience to lead NEHA.

Platform: NEHA's status is the best it has been over its 75 year history. We are fiscally sound, and we are viewed as a national leader in service, training, and innovation. But NEHA and the profession face

several issues, including leadership succession planning, changing government, shrinking budgets, and an aging environmental health workforce. While we have a stable number of members, we should have many more, considering the size of the workforce!

I believe that environmental health is the foundation of public health. For too long, environmental health has not been understood or appreciated by others in public health or the public. Environmental health professionals should be presenting the story of our vital roles and contributions. Environmental health also needs to be open to accepting new challenges and opportunities. For example, environmental health factors play an important role in diabetes, obesity, and heart disease, which are leading modern health challenges. Climate change is the quintessential environmental health problem. What role will environmental health professionals play in these efforts? Traditional areas like food safety, water, and waste disposal remain critical public health concerns. How will we continue our role in emergency response and other core areas? Our public health- now and in the future- depends on our collective responses!

I believe that NEHA's vital mission is to serve the environmental health profession and promote leadership of the field. It is critical to have officers who understand the organization, speak the truth, and take action when needed. My continued service as a national officer will allow me to address these challenges. I am ready to lead NEHA and continue the association on a path that is relevant and responsive to 21st century issues.

More information:

Web: <http://tinyurl.com/John4NEHA>

Facebook: <https://www.facebook.com/JohnStewardForSecondVicePresidentNEHA>

Blog: <http://tinyurl.com/jstewardEHblog>

Twitter: <https://twitter.com/jstewardatl>

Email: jsteward@gsu.edu 📧

NEHA CREDENTIALS

Benefits of your NEHA credential:

- Recognition for your skills, knowledge, and expertise
- Demonstrates that you are competent, properly trained, and equipped to carry out your responsibilities
- Distinction as a leader, mentor, and role model in environmental health and protection
- Potential for more career opportunities, professional advancement, and increased earnings

Visit neha.org/credential to learn more.



NEHA NEWS

**Staff Profile: Marissa Mills**

I was born in Southern California, but have called Denver home for over half of my life. While not a native myself, I am the daughter and granddaughter of Colorado natives! I earned my bachelor's degree in psychology and history from the University of Colorado, Boulder. While in school I had the opportunity to study abroad in southern England. After returning home, I worked in

administrative support in the property management industry and took classes in film and creative writing at the University of Colorado, Denver.

I joined NEHA in December 2012 as the project assistant for the Research and Development department. I provide administrative support to the department's project coordinators as well as coordinate the logistics of the biannual Radon Resistant New Construction training. I am excited to be a part of a growing and dynamic organization! The best part about my job is the exposure to emerging environmental health topics and the opportunities to express my natural curiosity.

In my free time I am an avid reader and occasional writer. I enjoy learning, friendly debates, and spending time with my boyfriend and three-legged dog. 🐾

Did You Know?

The *Journal* is always looking for your feedback! We want to know what you like (or don't like) about each issue, and letters to the editor are always welcomed. Submit any feedback to jeh@neha.org.

LETTERS TO THE EDITOR**Dear Editor:**

In the December 2013 issue of the *Journal of Environmental Health* (76[5]), the article entitled, "State Health Agency Workforce Shortages and Implications for Public Health: A Case Study of Restaurant Inspections in Louisiana," aimed to evaluate how workforce shortages within a state public health department affect the ability of environmental health regulatory staff to perform routine food safety inspections and ensure the safety of the food supply. A minor but critical error was in the Introduction where I write, "The Food and Drug Administration (FDA) recommends that to sustain an effective risk-based food safety program, state agencies should maintain well-resourced programs; i.e., at least one-full time staff member devoted to every 280–320 food establishments (FDA, 2009)."

I was contacted by a NEHA member about the accuracy of this statement and the sentence should have correctly read, "The Food and Drug Administration (FDA) recommends that to sustain an effective risk-based food safety program, state agencies should maintain well-resourced programs; i.e., at least one-full time staff member devoted to every 280–320 food safety inspections performed annually (FDA, 2009)."

The change in wording from the FDA recommendation does not detract, however, from the intention of the comparison made within the article. In fact, it reinforces and strengthens the findings. As stated in the article, in 2010, seven total environmental health

sanitarians in East Baton Rouge, Louisiana, were responsible for inspecting 2,775 food establishments annually; creating a ratio of 396 food establishments to be inspected per sanitarian. Assuming that a sanitarian inspected each food establishment at least once per year (even though higher-risk category establishments should be inspected more than once per year), they would far exceed the FDA recommendation of 280–320 food safety inspections performed annually. Realistically, however, the minimum required 396 annual food establishment inspections do not take into account reinspections, complaint-based inspections, outbreak investigations, and other inspection duties as required by environmental health regulations. Thus, the true number of inspections that East Baton Rouge sanitarians are expected to perform annually is probably closer to double the recommended amount.

Based on the findings from this article and in the opinion of the author, it is important that state and local health department budgets are protected and maintained at a level where routine food establishment inspections can be performed according to FDA recommendations to ensure the safety of our food and to protect the public's health.

Lindsey Realmuto, MPH
Huntington, New York 🐾

NEHA MEMBERSHIP

WHAT DOES MEMBERSHIP IN THE NATIONAL ENVIRONMENTAL HEALTH ASSOCIATION OFFER YOU?

As a member of the National Environmental Health Association (NEHA), you join over 4,500 environmental health and protection professionals from across the nation and around the world in the public and private sectors as well as academia and the uniformed services in the only association serving ALL of environmental health and protection and ONLY environmental health and protection!

Benefits of NEHA membership include:



A Free Subscription to the Esteemed Journal of Environmental Health

- Find out why subscribers from around the world go to the *Journal of Environmental Health (JEH)* to stay current on the latest technological, legal, and research-based advancements in environmental health and protection. The *JEH* is an esteemed, peer-reviewed journal published ten times a year to keep you informed!
- **NEW!** Get an electronic copy of the *JEH*. Beginning with the November 2013 issue, NEHA members will receive the *JEH* in an electronic format for free in addition to receiving it in print.



Continuing Education

- Maintain your NEHA credential(s) with access to free educational courses and continuing education credits through NEHA's e-Learning site.
- Study environmental health abroad through the NEHA/UL Sabbatical Exchange Program!
- Take advantage of unique training opportunities through NEHA workshops on topics such as indoor air quality, radon resistant new construction, and Epi-Ready at little or no cost!



Savings and Discounts

- Receive big discounts on attendance to the NEHA Annual Educational Conference & Exhibition where you can acquire practical and real-world information, expertise, and training on a variety of environmental health topics and network with other professionals and experts in the field.
- Get significant discounts on credentialing fees as you look to advance yourself professionally by earning a credential offered by NEHA.
- Receive discounts on more than 150 environmental health and protection publications available in NEHA's online Bookstore!



Join/Renew Today at neha.org/member

NEHA is also working hard to bring you a membership that fits your particular wants and needs. We are working to evolve the NEHA membership options available to you including a multiyear dues option and the opportunity to receive an electronic version of the Journal of Environmental Health. Updates and information are available at neha.org.

Managing Editor's Desk

continued from page 86

Bob O'Neill is the executive director of the International City/County Management Association. Speaking from the standpoint of the professionals who actually run local government, Bob has publicly proclaimed that the next 10 years will be memorialized as the decade of local government. He observes that as federal and state government continues to shrink, more responsibility is falling back to local government. Given the financial challenges facing local government, the only way open for local government to meet these expectations is through (are you ready?!) ... innovation!

On this hugely important conclusion, I agree completely with what Bob is saying.

As I noted in my opening paragraph, I can actually envision a healthy future for environmental health through the pursuit of two much higher probability strategies than the low-odds "dialing for dollars" strategy that is getting most of the ink today.

We have a need to push IT sophistication throughout our profession. This can increase our capacity and even evolve the nature of our work from inspecting to big data analysis, which is more cerebral, less labor intensive, and more high level. Since I have written extensively about this way forward for environmental health, I'll simply defer in this column to previous columns in which I've delved into this line of thinking more deeply.

For the remainder of this column, I'd like to share some thoughts about innovation, which as O'Neil notes, is what local government increasingly needs to excel in.

In addition to Tom Frey, one of my favorite futurists is Daniel Burrus. Burrus writes a lot about innovation, though much of his thinking aims at the private sector. I would argue that a lot of Burrus's ideas are just as applicable to professionals working in the public sector, which is where most NEHA members work.

A recent article by Burrus was entitled, "Stop Competing—Start Winning by Innovating." (For anyone who has read *Blue Ocean Strategy*, my favorite business book of all time, you'll quickly recognize that that book and this article preach the same theme. Competition is a zero-sum game that features a loser for every winner. Innovation, however, opens up new "spaces" where no competition exists. Innovation is also seen by many economists as the engine that drives

creative destruction and the advancement of an economy like ours.)

Given the significance of innovation to economic success, I've long been fascinated with how innovation is celebrated within the private sector but not so much in the public sector. And yet, when we think about Bob O'Neill's commentary, can we possibly think that innovation isn't critical to the public sector as well? The simple truth of the matter is that local government *must* find ways to innovate if it is to have any hope of responding to the financial challenges it faces and at the same time provide at least a level of baseline services for which our various publics depend on government.

Taking innovation then as a given, the question becomes how can we encourage more innovation among our public sector professions including, of course, those of us who practice in environmental health? Burrus's article gives us some important markers to consider that I am happy to share here.

To begin, Burrus characterizes competers in the following ways, which are markers of what we don't want to do. (I've added my own comments when I couldn't resist!)

Competers:

- Try to control and direct their people (NF: Don't we often see this in government?!).
- Copy what others are doing (NF: The bane of best practices).
- Get locked into set patterns (NF: Another counter to best practices).
- Believe in standardized operations that force people to act in predictable ways.
- Avoid anything that would cast them as being significantly different from their competitors.
- Believe that the future will take care of itself if they take care of the present.

Innovators:

- Cultivate a creative mindset and create new patterns.
- Focus on their future goals and build a path to get there.
- Focus on how to apply new technologies to open up new opportunities.
- Seek to remain adaptive and to use change to their advantage.
- Maximize their differential advantage.
- Empower their people for positive action.
- Realize that people are their most upgradable resource and look for ways

to help them be more productive and innovative.

- Go looking for problems that they can turn into opportunities.
- Look for better ways of thinking and acting.
- Look for ways to translate raw data into actionable knowledge and insights.

The full article can be found at bigthink.com/flash-foresight/stop-competing-nit-start-winning-by-innovating.

To summarize, I don't buy the belief that to reverse the trends that are currently causing a downsizing of our profession, our only option is to insist on greater government funding for our programs. I don't buy this because within the current set of circumstances that are dictating government finances, I see nothing that convinces me that government could provide such funding, even if it wanted to.

I do, however, believe that capacity can be built through both the power of IT and innovation.

To that end, NEHA has teamed up with Decade Software to provide the leadership and IT solutions that can enable environmental health to grow and evolve. In addition, NEHA now sponsors an innovation award that serves to encourage the emergence of new and inventive ways for our profession to achieve its important work. We've also planned our upcoming Annual Educational Conference & Exhibition around the theme of innovation and aim to showcase innovation in action in environmental health at our Las Vegas meeting.

Contrary to what some would have you believe, our future can be exciting and bright and even fun as we learn how to adapt to our circumstances and find new and even better ways to succeed. And the odds of success are actually quite good! 🐼

nfabian@neha.org





2014 Environmental Health Innovation Award

This award was established by NEHA's board of directors to recognize a NEHA member or organization for creating a new idea, practice, or product that has had a positive impact on environmental health and the quality of life. Innovative change that promotes or improves environmental health protection is the foundation of this award.

Environmental health professionals face the dilemma of finding and implementing new ways of doing business without sacrificing the quality of their environmental health programs. This annual award recognizes those who have made an innovative contribution to the field, as well as encourages others to search for creative solutions. Take this opportunity to submit a nomination to highlight the innovations being put into practice in the field of environmental health!

Nominations are due in the NEHA office by March 17, 2014.

For more information, please visit www.neha.org/about/awardinfo.html.
Nomination materials can be obtained by e-mailing Terry Osner at tosner@neha.org.



2014 Educational Contribution Award

This award was established by NEHA's board of directors to recognize NEHA members, teams, or organizations for an outstanding educational contribution within the field of environmental health. This award provides a pathway for NEHA members and environmental health agencies to share creative methods and tools to educate one another and the public about environmental health principles and practices. Don't miss this opportunity to submit a nomination to highlight the great works of your colleagues!

Nominations are due in the NEHA office by March 17, 2014.

For more information, please visit www.neha.org/about/awardinfo.html.
Nomination materials can be obtained by e-mailing Terry Osner at tosner@neha.org.



MY NEHA:

YOUR KEY TO EASY PROFILE MANAGEMENT AND SELF-SERVICE ONLINE

Because of our growth, the National Environmental Health Association (NEHA) is implementing a new and more powerful system to manage data and operate the association. You, the NEHA members and customers, will benefit greatly from this new system as it provides you with the ability to more easily manage your personal profile and transactions with NEHA.

With just one login and password you will create your My NEHA profile. Through this profile you can easily manage your profile and update your contact information, join NEHA as a member or renew a current membership, review your credentials and continuing education credit requirements, buy products, register for events, and review your purchase history!

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- Update your contact information
- Manage your e-mail preferences to receive e-mails only on the topics most important to you



My Membership and My Professional Development Manage Your Membership and Credentials

- View your member record to see when your membership expires and automatically renew online
- View your credential record to see your credential number, expiration date, and other pertinent information related to each credential you hold
- Review your continuing education credit submissions to see which were approved/rejected, how many credits were applied, and to which credential the credits were applied



Shop Online

- It's time to get registered for the NEHA 2014 AEC, so shop online and purchase your conference registration using My NEHA
- Purchase membership, books, and more
- Handle open orders, invoices, and other transactions
- Receive a receipt automatically via e-mail for your purchases



My Transactions Access Your Transaction History

- View all of your transaction history within your profile whether it is products you've purchased, events you've attended, and/or memberships and credentials you hold
- Review invoices and pay any outstanding balances through the online store
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ENHANCED FEATURE ACCESSIBLE THROUGH THE E-JOURNAL



78th National Environmental Health Association (NEHA)
Annual Educational Conference (AEC) & Exhibition in Partnership
with the International Federation of Environmental Health (IFEH)



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JULY 7-10, 2014
LAS VEGAS, NEVADA

Building a World of Innovative Ideas for Environmental Health



78th
NEHA
AEC

IN PARTNERSHIP WITH THE
IFEH 13TH WORLD CONGRESS

ENHANCED FEATURE ACCESSIBLE THROUGH THE E-JOURNAL



*Check out this video from the 2013 AEC to
see why you should attend the 2014 AEC!*

neha2014aec.org

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REASONS WHY

Attending the NEHA AEC Is a Wise Investment for You and Your Organization

Don't miss this unique opportunity: The NEHA 2014 AEC is being held in collaboration with the International Federation of Environmental Health! This is an unprecedented and exciting opportunity to explore innovative ideas, approaches, and methods with environmental health professionals from all over the world.

1. The NEHA AEC is a premiere training and educational event for you to gain the skills, knowledge, and expertise needed to build capacity for environmental health activities, help solve your environmental health organization's daily and strategic challenges, and make recommendations to help improve your bottom-line results.
2. The NEHA AEC has fantastic session speakers that are environmental health subject matter experts, industry leaders, peers that share common challenges, and this year—speakers will come from all over the world!
3. Your attendance at the NEHA AEC is a solid investment in your organization that will result in immediate and longer-term benefits.
4. You can earn continuing education (CE) credit to maintain your professional credential(s).
5. NEHA is committed to providing you with a training and educational experience that also provides a return on investment (ROI) made for you to attend the AEC.

Need additional reasons why you should attend?

Check out the videos on neha2014aec.org to hear what other environmental health professionals are saying about the NEHA AEC.

neha2014aec.org

Follow NEHA on:  Twitter  Facebook  LinkedIn

KEYNOTE SPEAKER

The National Environmental Health Association is pleased to announce that Mark Keim, MD, with the Centers for Disease Control and Prevention, will address attendees of the 78th Annual Educational Conference (AEC) & Exhibition as the keynote speaker.

With the expanded international audience at this year's AEC, you'll want to hear Dr. Keim's perspective on emerging and contemporary issues, including the far-reaching health effects of global climate change.

Register today for the 2014 AEC so you don't miss this opportunity!



The National Environmental Health Association is pleased to announce that Mark Keim, MD, Associate Director for Science in the Office for Environmental Health Emergencies, National Center for Environmental Health/Agency for Toxic Substances and Disease Registry at the Centers for Disease Control and Prevention (CDC), will be the keynote speaker for this combined IFEH and NEHA environmental health event.

Dr. Keim will be speaking on emerging and contemporary issues, including the far-reaching health effects of global climate change.

In addition to his current role, Dr. Keim has spent many years working for the CDC in many capacities including Acting Associate Director in the Office of Terrorism Preparedness and Emergency Response, Medical Officer and Team Leader at the International Emergency and Refugee Health Branch, and Acting Associate Director for Science in the Division of Emergency and Environmental Health Services. He is also an adjunct faculty member at the Rollins School of Public Health at Emory University.

Dr. Keim has provided consultation for the management of dozens of disasters involving the health of literally millions of people throughout the world. Dr. Keim is the author of several hundred scientific presentations, 40 journal publications, and 13 book chapters.

Dr. Keim received numerous awards for his work in CDC's emergency operations during the World Trade Center, anthrax letter, and Hurricane Katrina emergencies, as well as for leading the U.S. health sector response after the Indian Ocean tsunami.

He has been a member of the White House Subcommittee for Disaster Reduction since 2006. He served as a review editor for the United Nations Intergovernmental Panel on Climate Change from 2009 to 2011.

INNOVATION & INTERNATIONAL SESSIONS

Join your colleagues from around the globe and be ready to learn what the best minds in environmental health today have to offer!



This year's combined NEHA and IFEH event will offer sessions that help environmental health professionals adapt to and excel in the ever-changing economic, professional, and global landscape by learning the best tips, tricks, and tweaks needed to thrive in their positions.

Approximately 15% of sessions in each educational track will have an internationally focused topic or presenter. There will also be a block of sessions dedicated to IFEH presenters covering environmental health issues from an international perspective.

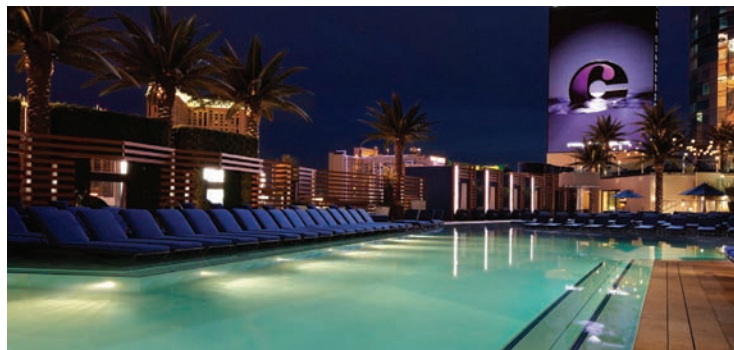
In addition, 20%–30% of sessions will highlight innovative approaches to barriers and day-to-day issues faced by environmental health professionals.

The 2014 AEC and World Congress sessions will empower you to:

- Develop your environmental health workforce and apply its proficiency to new areas
- Manage very real funding shortages and leverage resources in new ways
- Apply technology in new ways or use new technology
- Build novel partnerships and collaborative projects
- Find innovative solutions by exploring international approaches to shared concerns from the local to the global level

Specific session information will be available online at
neha2014aec.org/sessionsandevents

PRE-CONFERENCE WORKSHOPS



Industry-Foodborne Illness Investigation Training and Recall Response (I-FITT-RR) Workshop

Monday, July 7, 8:00am – 5:00pm

Do you and your staff know what to do if a foodborne illness or food recall occurs? If not, you need to attend this workshop to get the critical training needed to respond to these issues.

This NEHA-FDA supported workshop is designed to bridge the gap between the retail food industry and local and state regulatory officials in an effort to create stronger working relationships prior to a potential foodborne incident or recall occurring. It will help you:

- understand the steps for responding to a potential illness outbreak,
- know what to do when you get customer or product complaints,
- learn what's involved in food recalls and what you need to do, and
- be more familiar with the different agencies that work together to help you get through a food-related crisis.

Cost to attend is \$39 per person and space is limited to 30 people.

Springboard to Prevention: The Model Aquatic Health Code, 1st Edition

Monday, July 7, 1:00 – 5:00pm

Over the past six years a group of public health, academic, and industry experts have been working with CDC to develop the first comprehensive public health guidance for swimming pools and aquatic venues in the U.S. This workshop will present the first completed version of the Model Aquatic Health Code (MAHC). The MAHC will be a guidance document that can help local and state authorities update or implement swimming pool and spa codes or standards without having to “recreate the wheel.” The workshop will cover:

- Common health concerns at aquatic venues
- Key concepts influencing lifeguarding staffing plans
- Secondary disinfection
- A science-based operational and communication support toolkit for aquatic and pool programs

Cost is free with a full conference or one-day conference registration to the NEHA 2014 AEC.

CREDENTIAL COURSES AND EXAMS

Advance your expertise and career potential by obtaining a NEHA credential or certification at the AEC. You may choose to take just a credential/certification course, just an exam, or both a course and an exam while at the NEHA AEC. (Note: Only qualified applicants will be able to sit for an exam.)

Certified Professional of Food Safety (CP-FS)

Friday & Saturday, July 11 and 12, 8:00am – 5:00pm

This two-day refresher course is designed to enhance your preparation for the NEHA CP-FS credential exam. Participants are expected to have prior food safety knowledge and training equal to the eligibility requirements to sit for the CP-FS exam. The course will cover exam content areas as described in the job task analysis. The instructor will be available during and after the course for questions.

Cost: \$325 for members and \$425 for non-members, which includes the CP-FS Study Package (newly revised and updated CP-FS Preparation Guide, NEHA's Professional Food Manager book, and the 2009 and 2013 FDA Food Codes on CD), a \$145 value.

Exam: Sunday, July 13, 8:00 – 10:30am

Separate application and exam fee required. \$245 member/\$390 non-member. Deadline to apply to take the exam is May 30, 2014.

Certified in Comprehensive Food Safety (CCFS)

Friday & Saturday, July 11 and 12, 8:00am – 5:00pm

NEHA is pleased to offer the introductory course for the Certified in Comprehensive Food Safety (CCFS) credential at the 2014 AEC. The CCFS is a strong core credential for food safety professionals with a primary concern of overseeing the producing, processing, and manufacturing environments of the U.S. food supply. It has been designed to meet the increasing need for highly qualified food safety professionals from both industry and the regulatory community that provide oversight in preventing food safety breaches at U.S. production and manufacturing facilities and abroad. The credential course will cover exam content areas as described in the job task analysis. The course will utilize different learning modalities from critical thinking exercises to small group breakouts and videos.

Cost: \$325 for members and \$425 for non-members, which includes NEHA's brand new CCFS Preparation Guide.

Exam: Sunday, July 13, 8:00 – 10:30am

Separate application and exam fee required. \$245 member/\$390 non-member. Deadline to apply to take the exam is May 30, 2014.

Registered Environmental Health Specialist/ Registered Sanitarian (REHS/RS)

Friday & Saturday, July 11 and 12, 8:00am – 5:00pm

Sunday, July 13, 8:00am – 12:00pm

This two and a half day refresher course is designed to enhance your preparation for the **NEW 2014 NEHA REHS/RS credential exam**. Participants are expected to have a solid foundation of environmental health knowledge and training equal to the eligibility requirements to sit for the REHS/RS exam. This course alone is not enough to pass the REHS/RS credential examination. The class will cover exam content areas as described in the job task analysis. The instructor will be available during and after the course for questions.

Cost: \$499 for members and \$599 for non-members, which includes the newly revised and updated REHS/RS Study Guide, a \$179 value.

Exam: Sunday, July 13 1:00 – 6:00pm

Separate application and exam fee required. \$265 member/\$450 non-member. Deadline to apply to take the exam is May 30, 2014.

CONTINUING EDUCATION (CE) CREDITS

Earn up to 24 hours of CE contact hours (enough to meet your full two-year NEHA professional credential requirement) by attending and participating in the NEHA AEC. CEs can be fulfilled by attending:

- First Time Attendee Workshop
- Training and Educational Sessions
- The Keynote Session
- Pre-Conference Workshops
- Credential Review Courses
- Educational sessions via the Virtual AEC while they are being shown live during the AEC or as an archive after the AEC is over

NETWORKING

Strengthen your business and personal relationships and build a network of colleagues you can call on at anytime!

- Before You Arrive: Send meeting requests through the networking features of the **Virtual AEC–Your Meeting Companion**
- Monday: Mingle with peers and give back to the community hosting the AEC by signing up for the **Community Volunteer Event**. Reunite with friends at the always-exciting **UL Event** in the evening!
- Tuesday: Connect with exhibitors at the **Exhibition Grand Opening & Party**
- Wednesday: See exhibitors you missed the day before and chat with colleagues during the **Networking Luncheon**
- Thursday: Collaborate with other professionals at the **Town Hall Assembly**. Reconnect with everyone you have met during the AEC at the **President’s Banquet**
- After the AEC: Stay connected to your friends and contacts after leaving the conference through the **AEC and NEHA social media channels**

Annual UL Event



A trip to Las Vegas would not be complete without enjoying its world-class entertainment.

Monday, July 7, from 6:30–10:30pm

Join us for the Annual UL Event and get ready for an evening with one of the best entertainers in the industry today. As a successful headliner on the Las Vegas Strip, Terry Fator captures the hearts and funny bones of audiences from around the world with **Terry Fator: The VOICE of Entertainment**. Backed by a live band, Fator wows audiences nightly with singing, comedy, and unparalleled celebrity impressions. The “America’s Got Talent” winner brings to life a hilarious range of characters including Winston, the

impersonating turtle; Emma Taylor, the little girl with the big voice; and Monty Carlo, the lounge singer. Enjoy comedic banter and amazing vocal impressions of musical superstars such as Garth Brooks, Dean Martin, Aretha Franklin, Lady Gaga, and more. **Terry Fator: The VOICE of Entertainment** is a one-of-a-kind experience, only at The Mirage.

The UL Event is not included in the registration pricing for the AEC. There is a separate cost to attend this event and registration is required. To register for this event, visit neha2014aec.org/register.

4th Annual Community Volunteer Event



Clean the World™



For more details and to sign up as a volunteer, visit neha2014aec.org.

SORTING SOAPS TO CLEAN THE WORLD

Monday, July 7, from 1:00–3:00pm

The community volunteer event is designed to give back to the AEC host city community and enhance NEHA’s “green” efforts to reduce the footprint of the NEHA 2014 AEC and IFEH 13th World Congress.

This year’s community volunteer activity helps reclaim and repurpose waste from the hospitality industry and provides for people in need. Clean the World is a non-profit organization that collects and redistributes personal care items and gives them to domestic homeless shelters and impoverished countries suffering from high death rates due to hygiene-related illnesses. Since its inception in 2009, Clean the World

has put over nine million soap bars and two million pounds of bottled amenities back into human use, simultaneously diverting over 600 tons of waste from landfills.

Network with colleagues and contribute to a local and global cause while participating in volunteer activities which may include sorting amenities by content and package type, cleaning and boxing amenities, assembling hygiene kits, taking inventory, or writing educational and inspirational notes to recipients.

When you sign up, please be sure to read and be prepared with required attire and waiver. Join your fellow environmental health colleagues at Clean the World’s Las Vegas Recycling Operations Center and make a difference locally and internationally!

Enhance your learning experience whether you attend the AEC or participate online from your home or office via the Internet.



Three Ways to Use The Virtual AEC

1) Virtual AEC: Your Meeting Companion

Make the most of your time by planning your AEC schedule, events, meetings, and more! Great for both attendees and those participating remotely via the live broadcast.

2) Virtual AEC: Live Broadcast

For those who are *not* able to attend the AEC in person, view some of the sessions live as they occur! You, too, can schedule your sessions and chat with live and remote attendees, speakers, etc.

3) Virtual AEC: Continuing Education Resource

After the conference, view sessions for up to one year to earn continuing education credits.

How Can the Virtual AEC Help You?

- **Stay connected and informed:** View interactive maps, session descriptions, speakers, exhibitors, and attendee profiles. Get the latest NEHA 2014 AEC news and announcements via live social feeds sent directly to you.
- **Create your customized conference schedule:** Add sessions and events you want to attend to your schedule. Then export the schedule to your Outlook or other electronic calendar.
- **Network and converse:** “Meet” other attendees, speakers, and exhibitors via the chat forums. Request meeting connections, swap digital business cards, or connect digitally with others in your area of specialty or geographic region.
- **Learn:** Attend some of the educational sessions as they occur via live streaming broadcast. Use the chat feature to ask questions, post comments, and communicate with speakers and other attendees. Discover the latest innovative products and services shared by AEC exhibitors. After the conference, you can still access the educational sessions, view presentation slides, and obtain supplemental material through the continuing education resource.

CONFERENCE REGISTRATION

Registration information is available at neha2014aec.org. For personal assistance, contact Customer Service toll free at 866.956.2258 (303.756.9090 local), extension 0.

	Member	Non-Member*
Full Conference Registration	\$575	\$735
One Day Registration	\$310	\$365
Student/Retired Registration	\$155	\$230

***Special Savings!** Join NEHA for \$95 and get the AEC for \$575. Combined that is a **\$65 savings** over the non-member AEC registration rate. Plus, you get a whole year of NEHA member benefits!

LAS VEGAS, NEVADA

The Perfect Destination to Mix Business and Pleasure



When you come to Las Vegas, Nevada, you'll enjoy access to one of the most exciting and entertaining cities in the world, so it's no secret why the city welcomes millions of tourists each year. Whether you're looking for an exciting night life, live entertainment, or a place to find some peace and quiet, Las Vegas has everything you could ever want.

Take a walk down the Vegas Strip and try your luck at one of the many casinos that have made the city famous. And with hundreds of different restaurants, the city can cater to every taste and craving.

Las Vegas also plays host to almost any type of live entertainment you can imagine. You can see live comedy, stage shows, and concerts, or take in one of the many

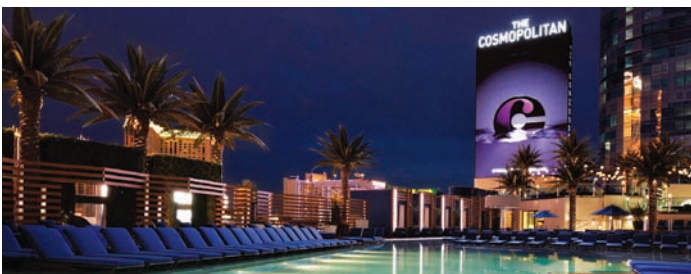
permanent fixtures of the Las Vegas entertainment industry like the Blue Man Group, Cirque du Soleil, or Penn and Teller.

For people looking to relax and unwind, Las Vegas has you covered. Treat yourself to a day at one of the city's many spas and resorts, or get out of the city and spend some time on the golf courses.

There's a reason they call Las Vegas the entertainment capital of the world. Whatever your idea of a good time is, you're almost sure to find it in Las Vegas.

neha2014aec.org

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NEHA AEC Venue & Hotel

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3708 Las Vegas Boulevard South, Las Vegas, NV 89109

Discounted room rates are now available—\$139 USD/night plus taxes and fees.

Visit neha2014aec.org/hotel

NEHA 2014 AEC PRELIMINARY SCHEDULE

Schedule is subject to change.

Saturday // July 5	Sunday // July 6	Monday // July 7	Tuesday // July 8	Wednesday // July 9
EHAC Meeting	EHAC Meeting	NEHA Board of Directors Meeting	Educational Sessions	Exhibition Open
IFEH Council Meeting	International Environmental Health Faculty Forum Business Meeting	Pre-Conference Workshops: • Industry-Foodborne Illness Investigation Training and Recall Response Workshop • Model Aquatic Health Code Workshop • NEHA/SORA Onsite Wastewater Field Trip	“Thank You Luncheon” for guests staying at the AEC designated hotel for two or more nights	Poster Sessions
	International Environmental Health Faculty Forum & EHAC Joint Meeting	IFEH Regional Meetings AEHAP Annual Meeting	Awards Ceremony & Keynote Address	Silent Auction
	IFEH AGM Meeting	Community Event	Exhibition Grand Opening & Party	Student Research Presentations
		First Time Attendee Workshop	Poster Sessions	Networking Luncheon
		Annual UL Event		Educational Sessions

Thursday // July 10	Friday // July 11	Saturday // July 12	Sunday // July 13
Town Hall Assembly	Credential Review & Certification Courses	Credential Review & Certification Courses	Credential Review & Exams
Educational Sessions			
President’s Banquet			



AEHAP = Association of Environmental Health Academic Programs
EHAC = National Environmental Health Science & Protection Accreditation Council
IFEH = International Federation of Environmental Health

neha2014aec.org

Follow NEHA on: Twitter Facebook LinkedIn

Stay at the designated AEC hotel—The Cosmopolitan of Las Vegas—for two or more nights and attend a free “Thank You Luncheon” on Tuesday, July 8.

Certain terms and conditions apply.

NEHA Radon Resistant New Construction (RRNC) Training

March 25–27, 2014 ■ 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 Marissa Mills at mmills@neha.org by **February 28, 2014**. Participants will be notified by March 5, 2014, 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.



For more information, please contact Marissa Mills, Project Assistant, at mmills@neha.org or 303.756.9090, ext. 304.

▶ MANAGING EDITOR'S DESK



Nelson Fabian, MS

The Keys to Building Environmental Health Capacity: Advancements in IT and Innovation

Though this column won't be published for a couple of months, I'm writing it as the new year begins. As I look ahead to this year and to the ones that will follow, I find myself returning to what has become a central theme in my thinking about the future of environmental health. If anything, my beliefs are even stronger today that with advances in IT sophistication and innovation, we can build capacity in environmental health even as general fund support for our work either holds steady or declines.

From the editorials I read and the thought leaders I listen to, this idea would seem to be at odds with the majority opinion that argues that additional funding is desperately needed if we are to have any hope of rebuilding capacity in both public and environmental health.

To be sure, if a funding surge for our profession were to take place, I would quickly join my colleagues in a joyous "high five" celebration. I have no plans, however, to buy any party hats. I see nothing within current public-sector funding trends that leads me to believe that a lobbying campaign for more money is anything but a low-probability strategy. And to my way of thinking, investing precious time and money in a low-probability strategy amounts to nothing more than supporting a dead-end endeavor.

A recent story of a failed ballot initiative in Colorado is instructive to understanding where local government and the electorate are with regard to increasing taxes to fund worthy causes.

Politically, Colorado is one of those "interesting" states. It features a strong political

With advances in IT sophistication and innovation, we can build capacity in environmental health even as general fund support for our work either holds steady or declines.

"middle" and neither political party can lay claim to owning the state. In short, if a state exists where perhaps common sense could actually prevail over political ideologies, this is probably such a state. On top of that, when political decisions arise that have to do with human capital and even social issues, voters here tend generally to be supportive.

Going into last fall's election, many polls, high-level politicians (like our popular governor and Mayor Bloomberg), and prominent people (like Bill and Melinda Gates) stood behind our education reform ballot issue that aimed to improve the quality, accountability,

and delivery of education in this state, particularly in poorer and rural school districts. Aside from the possibility that a small segment of the population might rebel against higher state taxes based solely on principle, it seemed to me that the voters would approve the measure. After all, the relationship between economic prosperity and an educated population is pretty well established. Moreover, Colorado features an above-average educated population. On top of everything else, the opposition spent very little money (\$40,000) to try to persuade voters to vote against this initiative. Supporters spent \$10 million! I for one thought that surely, this measure would pass easily.

To the surprise of many—myself included—the measure went down to defeat ... by almost a 2:1 margin!

Though this is a very specific story, it is indicative of countless similar such stories unfolding in local government throughout the country. And if this slide into tighter finances can happen here in Colorado where the economy is doing reasonably well and we have a well-educated populace who values human capital, it can happen anywhere ... and it is.

Like it or not, local government is fast becoming leaner and meaner from a fiscal standpoint. (Our recent Center for Priority Based Budgeting program also confirmed this development for us.) In my mind, I just can't reconcile this new fiscal reality with a strategy that hinges on gaining *increased* funding support from state and local general fund budgets.

But there is hope!

continued on page 72

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