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Volume 76, No. 3 October 2013

Colonias

How the Human-Made Space Affects Children's Active Living

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ABOUT THE COVER

Hidalgo County, Texas, is listed by the U.S. Census Bureau as the second poorest county in the U.S. In this month's cover feature, "Mexican-American Children's Perspectives: Neighborhood Characteristics and Physical Activity in Texas-Mexico Border *Colonias*," the authors investigated how children in Hidalgo County living in *colonias* (impoverished neighborhoods along the U.S.-Mexico border) felt about their opportunities (or lack thereof) to exercise and play. The authors conducted focus groups and collected data as part of a research project to produce environmental policy recommendations to promote physical activity among *colonia* children. They found that safety, cleanliness, parental involvement, and nearness of parks facilitated the children's physical activity.

See page 8.

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Official Publication

NATIONAL ENVIRONMENTAL HEALTH ASSOCIATION

Journal of Environmental Health
(ISSN 0022-0892)

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Published monthly (except bimonthly in January/February and July/August) by the National Environmental Health Association, 720 S. Colorado Blvd., Suite 1000-N, Denver, CO 80246-1926. Phone: (303) 756-9090; Fax: (303) 691-9490; Internet: www.neha.org. E-mail: kruby@neha.org. Volume 76, Number 3. Subscription rates in U.S.: $135 per year and $250 for two years. International subscription rates: $160 per year and $300 for two years (airmail postage included). Single copies: $12, if available. Reprint and advertising rates available at www.neha.org/JEH/. CPM Sales Agreement Number 40045946.

Full text of this journal is available through Bigchalk.com at www.bigchalk.com and from ProQuest Information and Learning, (800) 521-0600, ext. 3781; (734) 973-7007; or www.umi.com/proquest. The *Journal of Environmental Health* is indexed by Current Awareness in Biological Sciences, EBSCO, and Applied Science & Technology Index. It is abstracted by Wilson Applied Science & Technology Abstracts and EMBASE/Excerpta Medica.

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Periodicals postage paid at Denver, Colorado, and additional mailing offices. POSTMASTER: Send address changes to *Journal of Environmental Health*, 720 S. Colorado Blvd., Suite 1000-N, Denver, CO 80246-1926.

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PRESIDENT'S MESSAGE

Alicia Enriquez Collins, REHS

Moving Forward Through Collaboration, Coordination, and Communication

We are off to a running start following our 77th Annual Educational Conference (AEC) & Exhibition in Washington, DC, this year. It was a pleasure to meet many of you in person and hear the overwhelmingly positive response regarding the quality educational program presented. And it was an honor to witness our esteemed and deserving colleagues receive recognition for their accomplishments.

In this column, I will touch on a few activities and projects that will keep NEHA's board of directors busy in the coming months and also include a glance at the year ahead. These projects require a huge effort by the board, members, volunteers, and the NEHA staff. I hope you will notice throughout this column a common theme that incorporates some of my favorite words—*Collaboration, Coordination, and Communication*!

- *Building partnerships.* This is an area where the board of directors and NEHA staff truly excel! What a privilege to be part of this team. Along with board members Brian Collins, Keith Johnson, Roy Kroeger, and Adam London, I have participated in the Food and Drug Administration (FDA) Partnership for Food Protection and will continue to work with FDA leadership to represent NEHA members as the important work of implementing the requirements of the Food Safety Modernization Act continues. NEHA is represented on a number of national councils and is very involved in developing food safety and food defense courses for environmental health professionals. To assist with coordinating these efforts, I recently appointed a NEHA Food Protection Team. Many thanks to NEHA's Food Safety Technical Advisors, Scott Holmes and John Marcello, and the food safety experts who represent us on various committees and councils around the country. Due to our partnerships and collaborative efforts, we have seats at the table. Now, it is time to coordinate our efforts and communicate these critical activities to you as our members.

> *It is time to coordinate our efforts and communicate these critical activities to you as our members.*

- *Development of two new NEHA awards.* To better recognize our fellow practitioners for the phenomenal work that is done every day, NEHA debuted two new awards this year that were presented for the first time at the AEC. The awards, the Environmental Health Innovation Award and the Educational Contribution Award, were designed to recognize our peers who implement innovative practices and develop valuable educational tools for the environmental health profession. These new awards will serve to highlight individuals, jurisdictions, or organizations that have either developed an effective tool, overcome a challenge, or identified a need and addressed it. These new award opportunities will help us communicate new practices to our members and foster greater collaboration.

  Thanks to Nelson Fabian, David Ludwig, Terry Osner, Kristen Ruby, and the board of directors for making these awards possible this year.
- *Affiliate communication.* NEHA has 52 affiliate associations. It has been my goal for quite some time to improve communication with our affiliates. During the 2012 AEC in San Diego the affiliates requested a simple mechanism for information sharing, such as posting announcements or submitting a request for assistance from a subject-matter expert or a board member. After working with fellow board members and NEHA staff, I am pleased to report that we now have an electronic communication tool in place. It is an electronic form that, once completed by an affiliate president, will either prompt a blast e-mail to the other 51 affiliate presidents or it will be submitted to the appropriate board member, staff member, technical advisor, or other resource as needed.
- *Student mentorship program.* This program is a very important investment in the future of our profession. I must recognize Dr. Sheila Pressley of Eastern Kentucky University and the American Academy of Sanitarians (AAS) liaison for her leadership and facilitation of the mentorship

program; the mentors from AAS; the Past Presidents' Affiliate for donating their time and sharing their expertise; and NEHA staff member Terry Osner for coordinating the student mentoring sessions at the 2013 AEC. I have asked President-Elect Dr. Carolyn Harvey to lead the student mentorship and leadership program for the 2014 AEC. Kudos to the mentors for investing their valuable time in the future generations of environmental health professionals.

This year, 32 students participated in the program. Our goal is to increase that number next year. Through collaboration and coordination with our partners in academia for student recruitment, this can be accomplished. This past summer, two new Technical Advisor appointments were made specifically for the student mentorship program. With the input we received from conference participants this year, we are transforming the existing student-focused program into a leadership development program that will provide expanded benefit to students, individuals reentering the profession, and seasoned professionals looking to hone their leadership skills.

- *Key definitions for environmental health.* In April 2012, an ad hoc work group was convened by the board of directors to examine the definition of the term "environmental health." Region 7 Vice President John Steward was assigned to lead a team of peers from across the country to evaluate how the term was being used and to research the definitions used by other entities. After gathering input from members and the public, NEHA's definition of "environmental health" has been revised and the definition of "environmental health professional" has been developed. Each of these definitions was recently approved by the NEHA board. The new definitions and a full summary of the team's one-year journey are chronicled on page 72 of this issue. Congratulations to John and the entire team for tackling this important task that will impact our messages both within the profession and when communicating environmental health information to the public.
- *NEHA 2014 AEC & Exhibition.* The 2014 AEC will be held in Las Vegas, Nevada, where we will unite with our colleagues from the International Federation of Environmental Health (IFEH) for a joint conference. What an exciting opportunity! The last time the IFEH held a conference in the U.S. was in San Diego in 2002. We were pleased to have IFEH President Peter Davey as an honored guest at the 2013 AEC. Cohosting the 2014 IFEH conference will provide NEHA an opportunity to work together with Peter and others from IFEH to provide an enhanced online learning component at the conference. We are also thrilled to introduce a special feature within the 2014 conference—an international career fair. The career fair will be available to all in attendance, students and aspiring professionals as well as anyone seeking to make a career or life change. Once again, I must acknowledge Dr. Carolyn Harvey for her leadership role in building this exceptional opportunity for NEHA members.

New endeavors aside, the day-to-day business of the association keeps the NEHA staff, board of directors, technical advisors, the *Journal*'s technical editors and peer reviewers, and many members and other volunteers busy throughout the year. This team of extraordinary people makes me proud to be involved with NEHA—I find deep reward in having a connection with each of you who work to enhance our organization, our profession, and our shared mission. Having member input, support, and commitment to this organization makes leading the nation's premier organization for environmental health professionals extremely gratifying. I thank you all as we move forward!

enriqueza@comcast.net

Mexican-American Children's Perspectives: Neighborhood Characteristics and Physical Activity in Texas-Mexico Border *Colonias*

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Abstract **The qualitative study described in this article investigated perceptions about environmental factors influencing physical activity (PA) among children from underserved neighborhoods known as *colonias* in the U.S.-Mexico border. Ten focus groups were conducted with 67 Mexican-American *colonia* children ages 8 to 13 living in one of the poorest border counties in the U.S. Analyses indicated that PA among children was influenced by neighborhood characteristics, including litter, speeding cars, unleashed dogs, and dark streets. The children also underlined intrapersonal and social environmental factors. Findings may inform policy makers and public health professionals about ways to promote PA among underserved children through urban planning and programs focusing on PA-supportive infrastructure, neighborhood safety, and family- and home-based physical activities.**

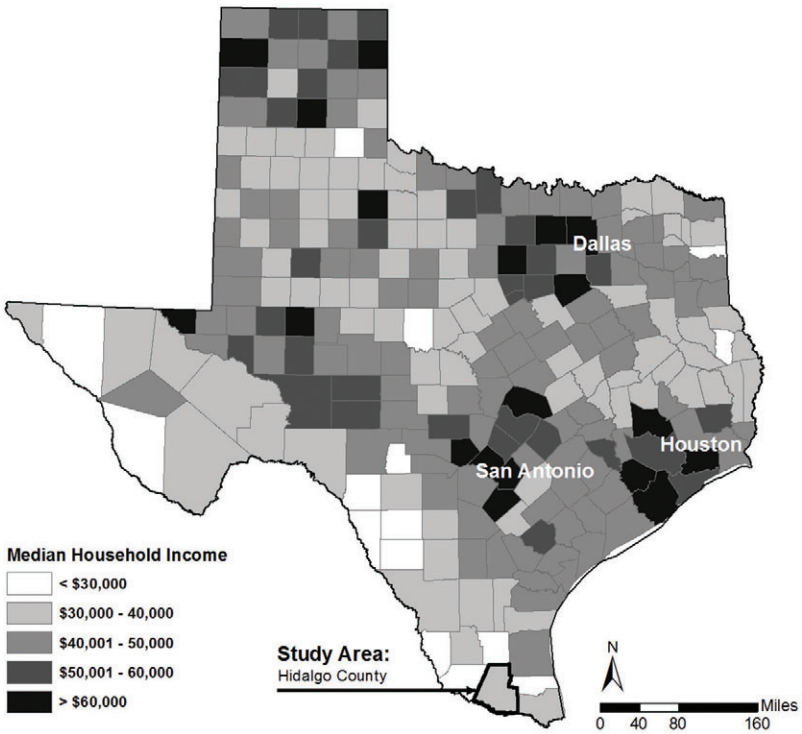
Introduction

Physical activity (PA) is associated with optimal metabolic function, improved motor skills, increased fitness levels, and beneficial changes in body composition in young children (Barbeau, 2007; Hills, King, & Armstrong, 2007; Matvienko & Ahrabi-Fard, 2010; Pate et al., 2006). Sedentary children are at risk of obesity and cardiovascular disease in adulthood (Butte, Christiansen, & Sørensen, 2007; Dietz, 1997; Gopinath, 2011; Janz et al., 2002; Juonala, 2010; Tanha, 2011; Trost, Sirard, Dowda, Pfeiffer, & Pate, 2003). Despite the well-known benefits of being physically active, PA prevalence rates among youth in the U.S. fall short from the Healthy People 2020 objective of having at least 20.2% of all U.S. youths meeting federal PA guidelines (Centers for Disease Control and Prevention [CDC], 2011a). Currently, only 15.3% of high school students meet PA recommendations with lower rates among Hispanic youth (11.8%) compared to their non-Hispanic white counterparts (16.9%) (CDC, 2011b). Research with Mexican-American children 6–11 years of age found this population to be significantly less active than other ethnic groups (U.S. Department of Health and Human Services, 2005; Whitt-Glover et al., 2009).

Although the physical environment is recognized as an important influence of physical activity (de Vet, de Ridder, & de Wit, 2011; Sallis & Glanz, 2006), most of the research in this field has been conducted with adult and nonminority children samples. Systematic literature reviews show that land use mix, street connectivity, population density, cycling routes, short trip distance, access to facilities, and aesthetic features are predictors of active living (Fraser & Lock, 2011; Humpel, Owen, & Leslie, 2002; McCormack & Shiell, 2011; Saelens, Sallis, & Frank, 2003). Studies in the U.S. found that envi-

FIGURE **1**

Map of Texas Highlighting Study Area



ronmental determinants of PA among adults include presence of a mall (Michael, Beard, Choi, Farquhar, & Carlson, 2006); low household crowding (Keegan et al., 2012); homeownership (Hannon, Sawyer, & Allman, 2012); and curb cuts, crosswalks, and density of retail (King, 2008). Research in Canada and Japan found that having access to a variety of destinations is a predictor of walking (Gauvin et al., 2008) and population density and parks are associated with sports activity among adults (Hanibuchi, Kawachi, Nakaya, Hirai, & Kondo, 2011).

Although the environmental literature on young children's PA behavior is scarce, research has focused on urban areas and found that correlates to PA include highly dense neighborhoods with sidewalks, parks, schools (Babey, Hastert, Yu, & Brown, 2008; Dalton et al., 2011; Rodríguez et al., 2012), and land use mix (Voorhees, Yan, Clifton, & Wang, 2011). Veitch and co-authors (2010) found that Australian children living in a cul-de-sac played more in their own street than those not residing in cul-de-sac streets.

Evidence exists that communities where low-income minority families live have limited access to public parks, playgrounds, and recreation facilities (Boone, 2011; Gordon-Larsen, Nelson, Page, & Popkin, 2006; Powell, Chaloupka, Slater, & Harper, 2006; Powell, Chaloupka, Slater, Johnston, & O'Malley, 2007; Powell, Slater, & Chaloupka, 2004; Voss, Hosking, Metcalf, Jeffery, & Wilkin, 2008). Yet these studies have focused on the association between the neighborhood's socioeconomic characteristics and PA, and little is known about the influence of the built environment among children living in impoverished neighborhoods. Our study was intended to address this literature gap by conducting focus groups to investigate perceptions about environmental factors influencing PA behaviors among Mexican-American children aged 8–13 years living in *colonias* in the Texas-Mexico border region. *Colonias* are impoverished neighborhoods along the U.S.-Mexico border and offer important settings to study environmental-physical activity relationships in underserved and economically disadvantaged communities with inadequate infrastructure. Border residents experience great social and health disparities. People residing at the borderland are disproportionately affected by a lack of urban infrastructure, high prevalence rates of obesity and other chronic diseases, poor access to health care, lack of insurance, and poverty rates (Mier, Flores, Robinson, & Millard, 2004; Mier et al., 2008; Ory et al., 2009; Shapleigh, 2008).

Methods

Our study was conducted in *colonias* in Hidalgo County, Texas, listed by the U.S. Census Bureau as the second poorest county in the U.S. (Bishaw & Semega, 2008). Although no census data exist for *colonias* collectively, it is estimated 2,294 *colonias* are in the Texas-Mexico border region (Texas Secretary of State, 2011a). Forty-two percent of these *colonias* are located in Hidalgo County (Texas Secretary of State, 2011b) where the study was conducted (Figure 1).

Families living in *colonias* are one of the most disadvantaged, hard-to-reach minority groups in the U.S. *Colonias* are settlements located along the U.S.-Mexico border characterized by impoverished conditions and in many cases a lack of basic services (e.g., paving and street lighting) (Ward, 1999). *Colonia* residents are very poor (the average household income is less than $834 a month), have limited education (70% have less than a high school education), and have little access to medical services (Federal Reserve Bank of Dallas, 1995). The average number of young children per family in the border *colonias* is three (McCallum, 2004).

Data presented in our study are from the focus groups carried out as part of a two-year research project seeking to produce environmental policy recommendations to promote PA among economically disadvantaged Mexican-American children and their families living in border *colonias*. Ten focus groups were conducted between February and May 2010 with 67 children aged 8–13 years. Our study meets the guidelines suggested by researchers to reach saturation, namely convening three to four focus groups with 6–10 participants (Safman & Sobal, 2004).

A convenience sampling technique was used to recruit participants. Certified community health workers identified and

recruited the participants. Eligibility criteria were living in a *colonia*, being a Mexican-American 8–13 years of age, being female or male, consenting to participate in the focus group, and having obtained parental consent.

Two moderators with experience working with Mexican-American youth facilitated the discussions. Focus groups were conducted in English or Spanish, depending on the language preference of participants. All children preferred English. Each focus group lasted approximately 45 minutes, after which participants received a stipend and were personally thanked for their attendance. At the end of the focus groups, children were asked to complete a questionnaire asking demographic information and questions related to PA behaviors. For focus group discussions, researchers used a theme guide that included topics related to environmental motivators and barriers to PA and elicited children's recommendations for a PA-supportive neighborhood. PA-related items in the questionnaire included questions from the physical activity questionnaire for older children (PAQ-C) and the middle school youth risk behavior survey (CDC, 2011a). The PAQ-C has been validated and tested for high reliability (Crocker, Bailey, Faulkner, Kowalski, & McGrath, 1997), including studies with Hispanic populations (Martinez-Gomez et al., 2009).

To obtain anthropometric measurements children were asked to remove their shoes. Body weight to the nearest 0.1 kg was measured with a digital balance. Body height was measured to the nearest 1 mm with a stadiometer. Body mass index (BMI) was calculated according to the CDC charts and percentile rankings (underweight: less than the 5th percentile; normal: 5th percentile to less than the 85th percentile; overweight: 85th to less than the 95th percentile; and obese: equal to or greater than the 95th percentile) (CDC, 2009). Our study was approved by the Texas A&M University institutional review board.

Focus group discussions were transcribed verbatim from audiotape. Researchers removed all subject identifiers to assure anonymity of participants. The research team reviewed and systematically coded the transcripts and identified key words and emerging themes. Researchers based the data analysis on the focus group analysis principles of Morgan and Krueger (Morgan, 1988, 1998; Morgan & Krueger, 1998). In cases of disagreement about themes during the coding process, the team discussed the issue until reaching a consensus. If no consensus emerged, the principal investigator's decision prevailed.

TABLE **1**

Personal Characteristics of Focus Group Participants (*N* = 67)

Characteristic	*n* (%)[a]
Gender	
Female	33 (49.3)
Male	34 (50.7)
Age (mean/*SD*)	10.15±1.89
School grade	
Elementary school (3rd–5th grade)	46 (68.7)
Middle school (6th–8th grade)	21 (31.3)
Country of birth	
United States	53 (79.1)
Mexico	14 (20.9)
BMI[b]	
Underweight (<5th percentile)	1 (1.5)
Normal (5th percentile to <85th percentile)	26 (38.8)
Overweight (85th percentile to <95th percentile)	13 (19.4)
Obese (≥95th percentile)	27 (40.3)
Met physical activity recommendations[c]	
Yes	10 (21.3)
No	37 (78.7)
Time spent watching television on school days[cd]	
0 hours	5 (10.6)
1–2 hours	31 (66.0)
3 hours or more	11 (23.4)
Time spent using a computer or video games[cde]	
0 hours	14 (29.8)
1–2 hours	28 (59.5)
3 hours or more	5 (10.7)

[a]Valid percentage based on the number of valid cases, *n*.
[b]BMI = body mass index.
[c]Children reporting being sick, or that something prevented them from their normal physical activities in the past week before the survey, were excluded when computing these variables. Therefore, 10 children were excluded in the computation of these variables.
[d]The number of hours per school day.
[e]Time spent using a computer for something not school related or playing video games.

Results

Table 1 shows demographic characteristics and physical activity levels of children. One-half of the sample was female. The mean age of participants was 10.15 years (*SD* = 1.89). A majority of the participants were elementary school students (68.7%) and were born in the U.S. (79.1%). Forty percent of the children were obese. The majority did not meet PA recommendations (78.7%). On an average school day, most respondents reported spending one to two hours watching television (66.0%) and using the computer for activities not related to school (59.5%).

Four themes emerged from focus groups discussions: preferred PA locations, environmental facilitators, environmental barriers, and children's recommendations. Although the discussions focused on the physical characteristics of their neighborhoods in relation to their PA behaviors, participants also talked about the influence of intrapersonal

TABLE **2**

Summary of Key Findings

Emerging Theme	Physical Environmental Factors	Intrapersonal and Social Factors
Preferred locations to be active	Home (backyard and garage) Park	Not applicable
PA[a] facilitators	Park in the vicinity with sport fields and equipment	Knowing the health benefits of PA Being accompanied by parents and friends
PA barriers	Litter Speeding cars Unleashed dogs Weather Dark streets	Crime in neighborhood Time spent on media Homework requirements Being grounded by parents
Children's recommendations to improve their PA behaviors	Build football/basketball fields in the neighborhood	Parental involvement Limit time on media Less homework School physical education classes with enjoyable activities and no bullying

[a]PA = physical activity.

and social environmental factors, including the health benefits of PA; neighborhood safety; parental involvement; time spent on TV, computers, and homework; school physical education (PE) classes; and the climate.

Preferred Locations to be Active

The majority of the children said their preferred locations to be physically active were their home (at the backyard and garage) and the park. A few participants had a preference for playing and exercising on the streets and at a community center or walking in the mall.

Physical Activity Facilitators

Participants were asked about their perceptions of the places where they exercised. Most children focused their initial comments on intrapersonal elements and the social environment highlighting that it was easy to be physically active due to the health benefits they felt. They also thought that being accompanied by family and friends made it easy to be physically active.

Participants said that PA was good because it helped them to wake up, grow, make them active, have energy, get in shape, forget about their problems, and lose weight. "What I like most, my favorite sport is softball because I get energy there and it feels something like I always want to play that for my whole life it feels…it is something special for me," one boy mentioned. A female participant stated, "I like. . .from outdoors…I like walking because I feel like…like my problems are out and everything." A few children said that when the activity was fun it made it easy to be active.

A majority of the children discussed that having a new park in the vicinity helped them to be more active. The consensus was that the park was nice and safe. Children liked that the park had football fields and basketball courts, a walking trail, areas covered with grass, monkey bars, slides, swings, and it was available for people of all ages. A few mentioned that having police patrolling the park and their neighborhoods facilitated their ability to exercise.

Physical Activity Barriers

When asked about what neighborhood characteristics kept children from being physically active, the majority of participants mentioned elements of both the social and physical environment, but highlighted that gangs and gunshots were the main obstacle. "Every night I hear gunshots," one girl said. A male participant added, "some people in the neighborhood have drugs and guns. That is why parents don't let their children go out and play."

Among the physical characteristics of the neighborhoods that affected the children's ability to be active, most participants mentioned that the trash on sidewalks, streets, and the park was a problem. Additional physical environmental barriers brought up in group discussions were speeding cars, bad weather, unleashed dogs, and no lights on the streets. One male participant complained, "I always have to clean the trash on the sidewalk." Children also said they were not active when it was too hot or cold or raining. "When it rains, it gets very muddy," one female child mentioned.

Participants also commented about additional social environmental barriers besides the presence of gangs and gunshots. The majority believed that children were not physically active because of spending time on television, computer, video games, or texting on their cell phones. One female child explained, "kids are too busy playing computers or video games or doing homework." Then a male participant added, "or texting in the phone," while another male stated, "maybe they are watching their favorite show and they can't go outside." Other participants considered that many children are not active because they are lazy, tired, or sleepy.

A majority of participants also said that homework requirements or being grounded by their parents kept them from being physically active. Also mentioned by a few participants was that some children preferred eating junk food instead of going outside to play or exercise. A few participants considered being obese to be a barrier to physical activity, but a few others said that kids who are skinny believed they don't need to exercise at all.

Children's Recommendations

Children voiced that they would be more active if football fields and basketball courts were built in the neighborhood, if parents got more involved in exercise activities with them, and if they spent less time with television, video games, and computers. "[Our parents] can help us by playing with us or just like if they see us running, run with us or walk," one female child commented. "We can invite them [our parents] and play and run with them so they get active like us," a male participant added.

Participants also recommended getting less homework and having PE classes that were more fun. Children explained that fun exercises in PE would include going outside to play and do activities they enjoyed such

as football, jumping on the trampoline, and playing hide-and-seek. Some children said they did not enjoy exercise at school because many times other kids made fun of them or bullied them during PE. A few participants said that PE activities were too hard to do, particularly when running and doing push-ups, stretches, and scissors.

Discussion

Our study investigated perceptions of Mexican-American children living in socially and economically disadvantaged neighborhoods in the Texas-Mexico border region, known as *colonias*, about their neighborhood's influence on their PA behaviors. Our findings show that participants enjoyed being active around their home and at the park. They identified PA motivators and barriers within and beyond the neighborhood infrastructure, highlighting intrapersonal and social environmental factors influencing their active living.

Study results indicate that the majority of the *colonia* children in our study were sedentary and overweight or obese. They believed physical characteristics of their neighborhood hindered their ability to be active, including the trash on sidewalks, speeding cars, unleashed dogs, weather, and dark streets. Internationally emerging research suggests that neighborhood characteristics (e.g., sidewalks, street connectivity, green areas, mixed-use land) influence physical activity behaviors, but most studies have been conducted with adult and nonminority children samples (Berke, Koepsell, Moudon, Hoskins, & Larson, 2007; Gauvin et al., 2008; Lee & Moudon, 2004; Li et al., 2008; Lopez & Hynes, 2006; McMillan, 2005; Michael et al., 2006; Owen, Humpel, Leslie, Bauman, & Sallis, 2004; Saelens & Handy, 2008; Sallis & Glanz, 2006; Wendel-Vos, Droomers, Kremers, Brug, & van Lenthe, 2007). Furthermore, studies with young populations show conflicting results on the association between some features of the physical environment (e.g., litter, abandoned cars, traffic) and exercise among children (Molnar, Gortmaker, Bull, & Buka, 2004). For instance, a few studies show that neighborhood litter and graffiti are positively associated with PA in children (Hume, Salmon, & Ball, 2007; Romero et al., 2001). Another study, however, found no significant relationship (Franzini et al., 2009). Further, mixed land uses with destinations (nonresidential uses) nearby are often promoted as key features of walkable and activity-friendly environments (Gauvin et al., 2008; Michael et al., 2006; Saelens et al., 2003), but nonresidential land uses were shown to be deterrents for children's walking to school behaviors (Saelens & Handy, 2008). Stronger evidence exists, however, that children who have access to parks and recreational facilities are more active than those without access (Babey et al., 2008; Cohen et al., 2006; Pate et al., 2008; Tucker et al., 2009).

Participants in our study voiced that having a park close to their home helped them be active and recommended building football fields and basketball courts in their neighborhoods. This finding suggests that instead of investing in large, expensive parks in border *colonias*, one alternative could be building smaller playgrounds and sports fields in the heart of these neighborhoods. Additional research especially longitudinal studies with pre-post assessments and in more diverse types of underserved communities is warranted to further investigate the impact of the physical environment on active living among underserved young groups.

Colonia children in our study underlined the influence of intrapersonal and social environmental factors on their PA levels. Intrapersonal factors included the perception that PA is beneficial to their health. Also, having parents and friends involved in the children's exercise activities made it easier for them to be active. Global literature reports that children from various U.S. and British settings are aware of the link between health and PA (Brockman, Fox, & Jago, 2011; Brockman, Jago, & Fox, 2011; Lee, Lai, Chou, Chang, & Chang, 2009; Pham, Harrison, & Kagawa-Singer, 2007). Additionally, studies using objective PA measures (e.g., accelerometers) show that involvement of parents and friends is significantly associated with PA behaviors among children (Jago, Davison et al., 2011; Jago, Macdonald-Wallis et al., 2011). Health promotion programs and strategies aiming to increase the PA levels of border *colonia* children should consider including family-based activities.

Besides the neighborhood characteristics, other social environmental factors were present that children in our study considered barriers to exercise, including neighborhood safety and time spent on television, computers, and video games. Our descriptive data showed that a majority of the participants reported spending one to two hours using media on school days. Evidence from previous studies shows a negative association between media-related sedentary behaviors and PA behaviors in children (Koezuka et al., 2006; McKenzie et al., 2008; Singh, Kogan, Siahpush, & Van Dyck, 2008; Spinks, Macpherson, Bain, & McClure, 2006). Studies on the association between perceived neighborhood safety or crime rates and children's PA levels present conflicting findings (Franzini et al., 2009; Hume et al., 2007; Liu, Colbert, Wilson, Yamada, & Hoch, 2007).

Children in our study offered insights on an additional social environmental element. To improve children's PA behaviors, study participants recommended PE classes that are fun and include outdoor activities. Our analyses indicate that "fun PE" meant having classes that offered activities that children enjoyed (e.g., trampoline jumping, playing hide-and-seek) and not too hard to perform (e.g., push-ups). Many study participants also said that bullying in PE should be eliminated. Previous research found that leisure-PA in school settings correlated positively with PA in children (McKenzie, Crespo, Baquero, & Elder, 2010). Additionally, previous studies indicate that bullying in PE classes is prevalent and negatively impacts children's participation (Parrish, Yeatman, Iverson, & Russell, 2011; Wang, Lannotti, & Luk, 2010).

Our study has some limitations. Due to the convenience sampling technique used to recruit the children and neighborhoods, study results cannot be generalized and are limited to the targeted population and its environment. Although the research team made their best effort to present rich descriptions of participants' perspectives about the environmental factors influencing their PA behaviors, it is worth noting that the children's comments were mostly descriptive, but not extensively elaborated. Participants' voices, however, may resonate with other researchers' or professionals' situations to a degree in which they could apply our findings (Locke, 1989).

Conclusion and Recommendations

To the best of our knowledge this is the first study that explores perceptions of

PA-related environmental factors among Mexican-American children living in one of the most social and economically disadvantaged areas of the U.S. The way in which low-income minority children experience their physical environment in relation to their PA behaviors is not well understood. Given limited existing studies about environmental-PA relationships focusing on minority children, our study provides valuable insights that can help guide interventions to account for the complex interacting environmental, social, and individual influences on PA among this unique population. Our study brings novel insights regarding young minority children's perceptions about PA as influenced not only by the neighborhood infrastructure but also by other intrapersonal and social environmental factors. These results suggest the importance of considering an ecological approach (Sallis et al., 2006) when planning interventions and policies seeking to improve PA behaviors among disadvantaged populations.

Hispanic children in the U.S. are disproportionately affected by the obesity epidemic compared to other ethnic groups (Ogden, Flegal, Carroll, & Johnson, 2002). Thus, qualitative research such as our exploratory study may inform childhood obesity prevention program development and urban planning. The real-life perceptions of the children in our study revealed aspects of their neighborhoods and social context that should be taken into account in promoting a healthier environment that is more PA-supportive, culturally relevant, and effective for them. Further research using GIS techniques and a quantitative approach is warranted to test research hypotheses examining the impact changes in the physical and social environment may have on lifestyle behaviors at the U.S. border and among minority children and their families.

Findings from our study can guide environmental health professionals and policy makers to lead a policy development process that improves the built environment in border *colonias* and makes it more supportive of children's active living. Although environmental experts traditionally work to improve environmental conditions related to pollution, hazards, and outbreaks (National Environmental Education Foundation, 2009), Ponder and Dannenberg (2008) underline the key role of these experts in improving the built environment through participating in interdisciplinary teams with urban planners and others and promoting healthy community design choices.

Environmental policy recommendations can potentially emerge from an interdisciplinary approach with strong support from and collaboration with environmental health practitioners. Needed policy recommendations aimed to promote PA among minority children in low-income communities should address issues including neighborhood safety; PA-supportive infrastructure; regulations restricting unleashed dogs; strict traffic regulations; and urban development considering green areas, street connectivity, zoning, and mixed-land use.

Acknowledgement: Our study was funded by the Robert Wood Johnson Foundation (RWJF) through its national program, Salud America! The RWJF Research Network to Prevent Obesity Among Latino Children (www.salud-america.org). Salud America!, led by the Institute for Health Promotion Research at The University of Texas Health Science Center at San Antonio, Texas, unites Latino researchers and advocates seeking environmental and policy solutions to the epidemic.

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continued on page 14

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continued on page 16

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Did You Know?

You can find useful information about the built environment and healthy community design on the Centers for Disease Control and Prevention's Environmental Health Services Branch Web site at www.cdc.gov/nceh/ehs/topics/BuiltEnvironment.htm.

Physical Conditions of a House and Their Effects on Measured Radon Levels: Data From Hillsborough Township, New Jersey, 2010–2011

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Abstract **Concentrations of radon in homes are thought to be dependent on several factors, including the presence of certain physical conditions of the house that act as entry points for this colorless, odorless gas. Drains and sump pits are currently sealed as part of radon mitigation, but doing so may cause drainage problems and mold. The authors attempted to determine if specific attributes and physical conditions of homes are associated with measured residential concentrations of radon. Radon tests were conducted in 96 participating homes in rural Hillsborough Township, New Jersey, November 2010–February 2011. Samplers were placed and a walk-through survey was conducted. Test devices were analyzed by a New Jersey certified radon testing laboratory and results compared to survey data. Overall, 50% of houses with a perimeter drain and 30% of houses with a sump pit exceeded the New Jersey and federal radon action level of 4.0 picocuries per liter, and 47% of homes with both a sump and a perimeter "French" drain exceeded this action level. The authors' results suggested certain physical conditions act as pathways allowing radon entry into homes. Results could be used by local and state agencies to start local initiatives, e.g., increased testing or to seal these components as partial mitigation.**

Introduction

The dangers of radon gas have been a concern since epidemiologic studies indicated an increased rate of lung cancer in high-exposure occupational settings (Al-Zoughool & Krewski, 2009). Studies have also shown an association between indoor residential radon exposure and risk of lung cancer (Krewski et al., 2006; Turner et al., 2011), even at the U.S. Environmental Protection Agency (U.S. EPA) action level of 4.0 picocuries per liter (pCi/L) (Alavanja, Lubin, Mahaffey, & Brownson, 1999).

Both U.S. EPA and the New Jersey Department of Environmental Protection (NJDEP) have set action levels for radon at 4.0 pCi/L, but have recommended taking action at levels as low as 2.0 pCi/L. The World Health Organization (WHO) has stated since DNA damage may occur at any level of exposure, no threshold value for radon exists (WHO, 2009), further suggesting indoor residential radon concentrations should be reduced to as low as possible (Turner et al., 2011).

Physical conditions in a house are believed to act as pathways for radon entry such as cracks in the foundation, plumbing penetrations, and sump pits, as well as components affecting ventilation, such as doors and windows (U.S. Environmental Protection Agency [U.S. EPA], 2010).

Previous U.S. studies on residential radon exposure have incorporated multistate (Cohen, 1999; Cohen & Gromicko, 1988; Ronca-Battista et al., 1988; White, Bergsten, Alexander, & Ronca-Battista, 1989) or nationwide data (Arvela, Holmgre, & Reisbaka, 2012). We excluded previous basic engineering and physical science studies/reports from national laboratories and universities, as well as school and commercial building and industry studies, given the focus of this article on homes in rural/suburban areas. We also excluded previous papers based in Europe, because our focus was in the U.S.

The goal of our field study was to try to determine if the physical conditions of a house were associated with cross-sectional measured indoor radon levels. If this association does exist, then 1) the current literature would be correct in stating physical conditions can act as pathways for radon entry, and 2) local environmental and public health agencies might consider using this as a tactic to further reduce indoor residential radon concentrations. In other words, they would use this information in a proactive manner by targeting high-risk areas, e.g., where sump pits or drains were common. Then they could suggest that altering the physical conditions of the house could be an alternative to installing an active radon mitigation system for homeowners (Rahman & Tracy, 2009) who are hesitant due to cost, time, etc. If no statistically significant association is found, then results may suggest that

sealing drains or sump pits may not be necessary to reduce elevated radon levels, especially in flood-prone areas where these home attributes are important.

Background on Study Area

Hillsborough Township is located in the Southern Piedmont, an area known to have an elevated radiometric signature and soil with medium to high radon transport potential due to underlying geology (Cattafe, Ranney, Miller, & Andolsek, 1988). Subsequently, Hillsborough Township has been designated a "Tier 1" area for radon by NJDEP. This area is relatively rural within New Jersey.

Methods

Our study was approved as an expedited full protocol by the institutional review board (IRB) of the University of Medicine and Dentistry of New Jersey (IRB approval #0220100130).

With funding provided by U.S. EPA, the NJDEP radon section sponsors a program called the "Radon Awareness Program" (RAP). This program provides funding for interested local governmental agencies to purchase and offer residents a radon test kit and the subsequent laboratory analysis and reported results summary.

Sampling was conducted in Hillsborough Township from November 2010 until the end of February 2011. The target number of participants for this field study was 70, which is approximately half of the total number of test kits (N = 152) available (including quality control/quality assurance samples).

Interested persons contacted the Hillsborough Health Department to schedule an appointment for a free radon test. At appointment time, we visited each residence and placed a test device in the lowest level of the house. The radon test was conducted for 48 to 96 hours.

If the homeowner signed a consent form, then we also conducted a walk-through inspection of the house and completed a survey regarding the physical conditions of the house (see Sidebar for list of survey topics). Participants were instructed to seal the test device and mail the kit for laboratory analysis using the provided self-addressed, stamped envelope.

Data Sources

Two types of data were used in this study: quantitative data on indoor air radon gas concentrations in the lowest level (including basements) of participant homes, and qualitative to semi-quantitative data from the technician walk-through survey on physical attributes of homes. Thus, radon test results received were compared with the walk-through survey questionnaire data from the corresponding house. We used a study identification number system—Hills001, Hills002, etc.—to match data sets and create a master, deidentified database in Microsoft Excel.

The walk-through survey questions used were previously validated, i.e., taken from the Centers for Disease Control and Prevention's Healthy Housing Manual (2010) and Relationships of Indoor, Outdoor, and Personal Air (RIOPA) study (Weisel et al., 2005). Questions focused on conditions of floors and walls of the foundation of the homes; the number and

Radon Walk-Through Survey

These questions are from the U.S. CDC *Healthy Housing Manual* (2009); page numbers noted. [If we added questions used in the Relationships of Indoor, Outdoor, and Personal Air (RIOPA) study (Weisel et al., 2005), they appear in brackets.]

[In what year was your home built? _____

In what year did you have a major renovation? _____
An addition? _____

NOTE: If neither, then please write "N/A" for not applicable in each of the spaces.]

Ceiling, Floors, and Walls
(From pages 38–39 [and as added in by RIOPA research team]):

Bulging, buckling, or alignment problem

No bulging, buckling, or alignment problem

Large holes ≥8.5 inches × 11 inches:
A hole is larger than 8.5 inches by 11 inches but it does not penetrate the area above or adjacent,
or – More than three tiles or panels are missing,
or – There is a crack more than 1/8 inch wide and 11 inches long,
or – A hole penetrates the area above or adjacent.

Medium-sized holes present: holes less than 8.5 inches × 11 inches in area,
or – No hole penetrates the area above or adjacent,
or – No more than three tiles or panels are missing.

Small holes present: holes smaller than 8.5 inches × 0.5 inch (do not count pinholes) in total hole area.

No holes observed

[Does your home have a sump pump in the basement? (Y/N) ____]

[Do you have a well for drinking water and/or water for other uses located next to the home? (Y/N) ___]

Doors
(From page 40 [and as added in by RIOPA research team]):

[Number of doors, by floor:

Basement, below ground level and to the outside: _____

1st floor at ground level to the outside: _____

2nd and higher floors (3rd, etc.) to a balcony or fire escape: _____]

Entry door seals deteriorated/missing: The seals are missing on one or more entry door(s), or they are so damaged that they do not function as they should.

No damage observed

Bathroom door missing

One or more missing (not bathroom or entry):

A door is missing, but it is not a bathroom door or entry door.

Entry door missing

None missing

continued on page 20

condition of doors and windows throughout the house; the type and condition of mechanical heating, ventilation, and air conditioning (HVAC) systems; and presence (or absence) of sump pits and drains along the perimeter of basements (sometimes called "French drains"). The year the house was built, the year(s) of any renovations/additions, and the source of potable water was also noted. Windows and doors were counted and inspected for drafts. The type of substructure of the house was also recorded as well as the observed condition of the foundation floor and wall surfaces. Finally, if a sump pit was present, we recorded if it was sealed at the time of the technician walk-through survey at the scheduled home visit. Each physical component marked "present" was visually inspected at each home.

Data Management and Analyses

We used Microsoft Excel for data entry, management, and review, including scatter plots and descriptive statistics, and then SAS version 9.2 to conduct analyses of variance to compare measured radon levels by home attributes.

Results

Radon

One hundred fifty-two test kits were available. One hundred twenty-nine homeowners were given radon test kits; 92 signed the consent form and agreed to participate in our study. Radata, Inc. did not receive test devices from four participants, making the final total participant number 88. In addition, 37 homeowners only wanted a radon test done and did not sign the consent form to participate in the full study; these test results were not included in the final database for our study's analyses.

Quality Assurance/Quality Control (QA/QC)

For QA/QC procedures, 10 duplicate samples and six field blank tests were conducted at participant's houses with signed consent forms. The results of the six field blank samples were reported as "0.2 pCi/L," which represents the minimum detection limit according to the protocols of Radata, Inc., the NJDEP approved contract laboratory. For the 10 duplicate samples taken, the standard deviation ranged from 0.07 to 0.49 pCi/L and the mean standard deviation was 0.18 for the 10 samples.

Residential Physical Components

Data gathered from technician walk-through surveys conducted were both summarized then compared to radon test results from the 88 houses included in the full study (Table 1).

Year of Construction

Please refer to Figure 1. The average year in which study homes were built was 1971. Seventeen of the houses were built in 1990, the year radon resistant new construction (RRNC) was implemented, or afterwards (mean radon concentration = 2.5 pCi/L). Four of these houses built in or after 1990 had radon concentrations ≥4.0 pCi/L. Seventy-one of the houses were built prior to 1990 (mean radon concentration = 3.7 pCi/L).

Radon Walk-Through Survey *continued from page 19*

Heating, Ventilation, and Air Conditioning (HVAC) System
(From pages 43–44):

Not working: HVAC system does not function; it does not provide the heating or cooling it should.

The system does not respond when the controls are engaged.

Working

Supply (return) air entirely from living area

No forced air system present

Supply (return) air includes fresh (outdoor) air

Need replacement

Clean

Not applicable

Reversed air flow in chimney observed:

Misaligned, damaged, blocked, rusted, corroded, or disconnected

Not misaligned, damaged, blocked, or disconnected

No exhaust ventilation required (e.g., electric or no HVAC systems in unit)

Windows
(From pages 50–51 [and as added in by RIOPA research team]):

One or more windows missing

One or more windows cracked or broken

One or more windows cannot be opened

All windows intact and can be opened

[Number of windows, by floor:

Basement, below ground level: _____

1st floor at ground level: _____

2nd and higher floors (3rd, etc): _____]

Missing or damaged:

A sill is missing or damaged, but the inside of surrounding wall is not exposed and is still weather tight.

Not weather tight:

A sill is missing or damaged, exposing inside of surrounding wall and compromising weather tightness.

Not missing or damaged

Missing/deteriorated (leaks present): There is missing or deteriorated caulk or seals and evidence of leaks or damage to the window or surrounding structure.

Missing/deteriorated (no leaks): There is missing or deteriorated caulk on widows, but there is no evidence of damage to the window or surrounding structure.

Not missing/deteriorated

Comments, Housing Unit Section (free response, administering technician, or participant)

TABLE **1**

Radon (Rn) Test Results Based on Physical Component or Condition

Component	*n*	# > 4 pCi/L	% > 4 pCi/L	Mean (*SD*)	Range
Houses studied	88	27	30.6	3.5 (2.9)	0.2–14.3
No sump pit[a]	27	7	25.9	3.0 (2.8)	0.4–12.1
Sump pit present	61	18	29.5	3.7 (3.0)	0.2–14.3
Uncovered[a]	49	14	28.5	3.9 (3.2)	0.2–14.3
Covered/sealed	12	4	33.3	3.0 (2.3)	0.5–5.7
Perimeter drain	20	10	50.0	5.5 (3.6)	1.1–12.1
No perimeter drain	68	12	17.6	2.9 (2.5)	0.2–14.3
Both a sump pit and a perimeter drain	17	8	47.0	5.2 (3.4)	1.1–10.6
Neither a sump pit nor a perimeter drain	26	5	19.3	2.5 (2.1)	0.4–7.4
Foundation type					
Basement[b]	73	25	34.2	3.9 (3.1)	0.2–4.7
Slab-on-grade	12	3	25.0	2.3 (1.8)	0.4–4.7
Split level	3	0	0	1.1 (0.3)	1.0–1.5
Cracks/holes[a]					
No	68	20	29.4	3.6 (3.0)	0.2–12.1
Yes	20	5	25.0	3.3 (2.9)	0.7–14.3
Small	13	4	30.7	3.0 (1.9)	0.8–4.6
Medium	5	0	0	2.2 (0.9)	0.7–3.0
Large	2	1	50.0	7.8 (9.1)	1.4–14.3
Heating, ventilation, and air conditioning (HVAC) return air					
From inside house	71	23	32.4	3.8 (3.1)	0.2–14.3
Includes "fresh air"	17	2	11.7	2.1 (1.7)	0.4–6.1
Year of construction[a,c]					
Prior to 1990	71	21	29.5	3.8 (3.1)	0.4–4.3
1990 to present	17	4	23.5	2.6 (2.0)	0.2–5.7
Active Rn system[d]	9	1[e]	11.1	1.8 (1.9)	0.2–4.3
Passive Rn system	15	3	20.0	2.8 (1.8)	0.7–6.1

[a]Noted differences, based on analysis of variance, were not statistically significant at $p < .05$ or $p < .10$.
[b]Difference in Rn measures based on analysis of variance was also statistically significant at $p < .05$.
[c]1990 was chosen as the cut point between "newer" and "older" construction.
[d]64 homes had neither an active nor a passive Rn control system.
[e]System was found to not be functioning at time of test.

Sump Pit and Perimeter Drain

Sixty-one houses sampled had a sump pit in the basement (mean radon concentration = 3.7 pCi/L), 18 of which had a radon concentration ≥4.0 pCi/L. Twenty-seven houses did not have a sump pit in the basement (mean radon concentration = 3.0 pCi/L), and seven of these houses had a radon concentration ≥4.0 pCi/L. Twelve homes with sump pits had covers sealed with caulk (mean radon concentration = 3.9 pCi/L), four of which had a radon concentration ≥4.0 pCi/L. Forty-nine houses with sump pits were therefore not covered and sealed (mean radon concentration = 3.9 pCi/L), and 14 of these houses had a radon concentration ≥4.0 pCi/L (Figure 2).

Twenty houses sampled had a perimeter floor drain around the floor of the basement foundation (mean radon concentration = 5.5 pCi/L), 10 of which had a radon concentration ≥4.0 pCi/L. Sixty-eight houses did not have a perimeter floor drain (mean radon concentration = 2.9 pCi/L), 12 of which had a radon concentration ≥4.0 pCi/L (Figure 2).

Seventeen houses in our study had both a perimeter drain and a sump pit (mean radon concentration = 5.2 pCi/L), eight of which had a radon concentration ≥4.0 pCi/L. In contrast, of the 26 houses without either a sump pit or a perimeter drain (mean radon concentration = 2.5 pCi/L), only five had radon concentrations ≥4.0 pCi/L (Figure 2).

HVAC

Seventy-one of the participating houses had an HVAC system that recirculated air taken from inside the house (mean radon concentration = 3.8 pCi/L); 23 of these had a radon concentration ≥4.0 pCi/L. Seventeen houses had an HVAC system drawing air from outside the house (mean radon concentration = 2.1 pCi/L); two of these exceeded 4.0 pCi/L (Figure 2).

Foundation

Seventy-three houses had a basement (mean radon concentration = 3.8 pCi/L), 25 of which had a radon concentration ≥4.0 pCi/L. Twelve houses were built slab-on-grade (mean radon concentration = 2.3 pCi/L), and three had a radon concentration ≥4.0 pCi/L. Three houses were split-level design (mean radon concentration = 1.1 pCi/L), and none exceeded 4.0 pCi/L (Figure 3).

Radon Mitigation

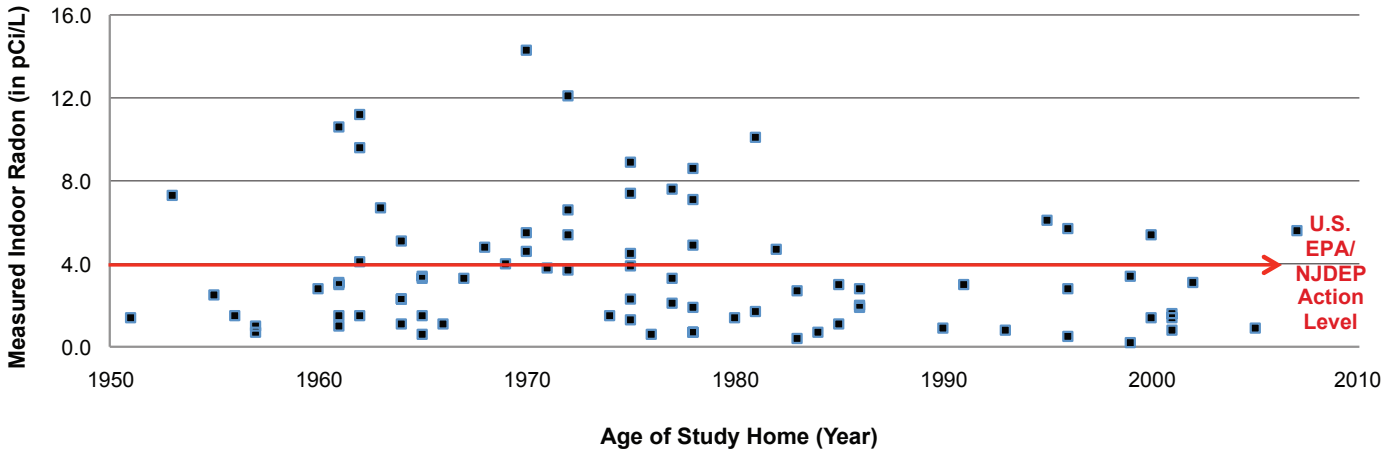
Nine houses in our study were found to have an active radon mitigation system installed, while 15 homes had RRNC (passive systems). Of the 15 houses with RRNC (mean radon concentration = 2.8 pCi/L), three were found to have a radon concentration ≥4.0 pCi/L (Figure 3).

Cracks in Foundation Floor/Walls

A visual inspection was conducted for cracks and holes in the foundation floor and walls. Sixty-eight houses had no observed cracks/holes in the foundation (mean radon concentration = 3.6 pCi/L). Twenty of these houses with no cracks/holes, however, still had radon concentrations ≥4.0 pCi/L. Thirteen houses were found to have small holes (mean radon concentration = 3.0 pCi/L); four of these had radon concentrations ≥4.0 pCi/L. Five houses were found with medium-sized holes (mean radon concentration = 2.2 pCi/L); none of these five were ≥4.0 pCi/L. Two houses were found with large holes (mean radon concentration = 7.8 pCi/L); one was ≥4.0 pCi/L (Figure 3).

FIGURE **1**

Indoor Radon Measurements (November 2010–February 2011) by Age of Home, Hillsborough Township, New Jersey



U.S. EPA = U.S. Environmental Protection Agency; NJDEP = New Jersey Department of Environmental Protection. For four of 88 study homes built prior to the year 1950, the measured indoor radon values (in pCi/L) were as follows: 1775 (1.4), 1830 (3.0), 1875 (2.1), 1918 (0.8).

Discussion

Radon

Overall, 27 of 88 radon tests conducted in our study exceeded the action level of 4.0 pCi/L. Since the average standard deviation was <10% of 2.0 pCi/L and <5% of 4.0 pCi/L, these are considered quality data.

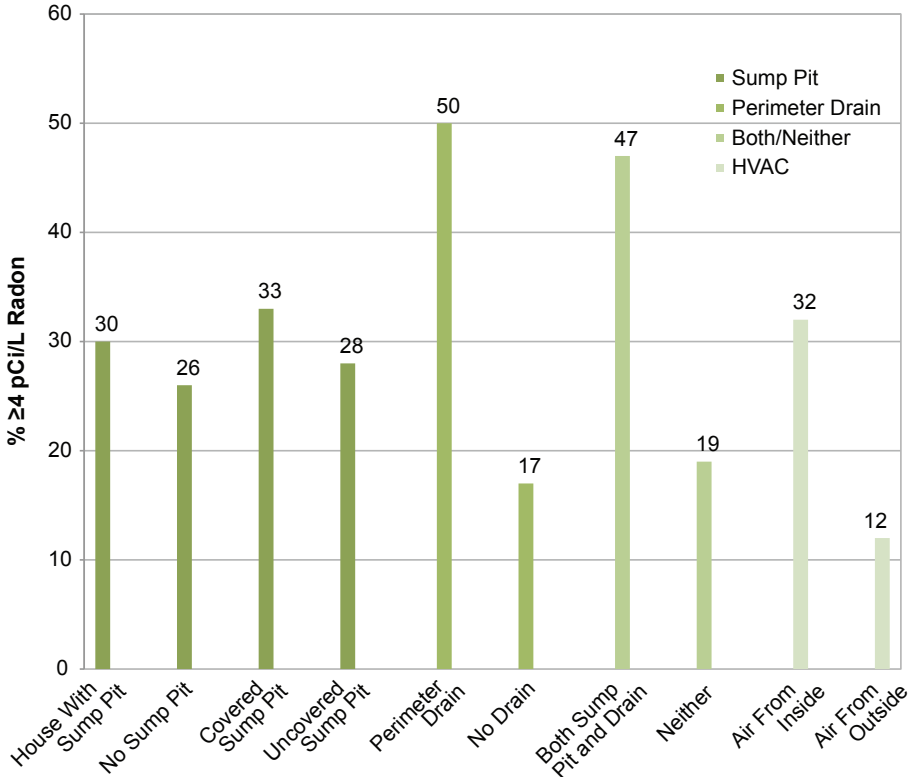
Residential Physical Components

Year of Construction

RRNC in New Jersey was codified by Subchapter 10 "Radon Hazard Subcode" of the New Jersey Uniform Construction Code in 1990, requiring builders of any new construction in Tier 1 areas of the state, such as Hillsborough Township, to install radon-resistant features like installing piping for a radon mitigation system, installing a plastic liner under the foundation to serve as a vapor barrier, and sealing openings with polyurethane caulk (NJDEP, 2010a, 2010b). More of the older houses (built prior to 1990) in our study exceeded the action level of 4.0 pCi/L than houses built after RRNC was required (Figure 3) and are consistent with recent studies (Arvela et al., 2012). In our study, however, the observed differences were not statistically significant, which may be in part due to sample size and the wide range in ages of homes in this rural community.

FIGURE **2**

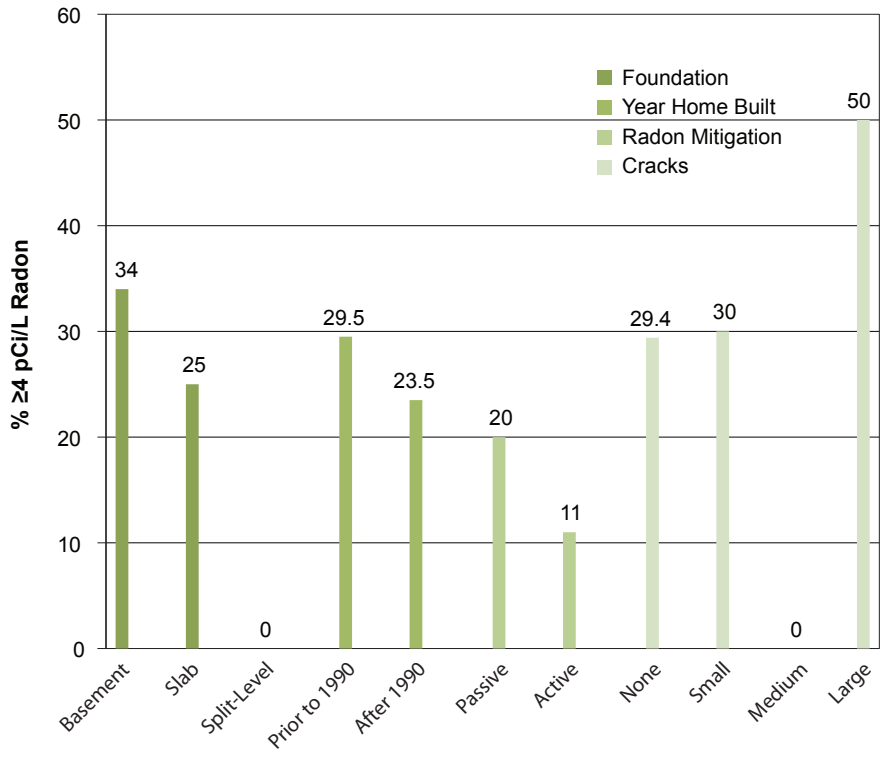
Percentage of Houses ≥4 pCi/L of Radon Based on Sump Pits, Perimeter Drains, and HVAC System



HVAC = heating, ventilation, and air conditioning.

FIGURE **3**

Percentage of Houses ≥4 pCi/L of Radon Based on Foundation, Year of Construction, Radon Mitigation, and Cracks in Foundation



Sump Pit and Perimeter Drain

In summary, average radon concentrations were not only higher in houses with a sump pit than those without it, but were also higher when the sump pit was not sealed compared to those in which sump pits were sealed (Table 1). This finding suggested not only an association between the presence of a sump pit and the measured indoor residential concentration of radon, but also that sump pits that are not sealed may allow more radon gas to enter into a house. In this study, however, the observed differences were not statistically significant, which may be in part due to sample size and the variation in values of age of home and of measured indoor radon.

The presence of a perimeter floor drain represented the largest likelihood that the indoor residential radon concentration in our study would be ≥4.0 pCi/L. Not only did houses with a perimeter floor drain have higher average radon concentrations than houses without a drain (Table 1), but nearly three times as many houses with these drains had radon concentrations ≥4.0 pCi/L (50%, versus 17.6% if they did not have perimeter floor drain). Furthermore, apparent associations appear stronger than those for sump pits.

These results suggested average indoor radon concentrations in study homes with both a sump pit and a perimeter drain present were about double the average indoor radon concentration for houses with neither physical condition (mean = 5.2 pCi/L and 2.5 pCi/L, respectively), and the percentage of houses tested *above the action level of* 4.0 pCi/L with both physical components present was nearly three times higher than the percentage of houses with neither present. As with results seen between both perimeter drains and sump pits independently, the combination of these two physical components suggested there are ways to intervene to reduce indoor residential radon concentrations—seal perimeter drains and cover sump pump pits.

HVAC

In summary, mechanical ventilation with fresh, filtered outdoor air resulted in diluted, i.e., lower, indoor residential radon concentrations. Still, average indoor residential radon concentrations were above the level at which action is recommended across both groups (houses with HVAC that recirculated interior air and those that incorporated fresh air).

Foundation

Our study's results regarding the influence of basements on indoor residential radon concentrations are consistent with other studies (Rugg, 1988), and were statistically significant.

Radon Mitigation

While the average radon concentration and percentage of homes with indoor residential radon concentrations ≥4.0 pCi/L were lower for houses built under RRNC, suggesting the effectiveness of these methods, 20% of houses in our study built with a passive system—in addition to other RRNC requirements—still had a radon concentration ≥4.0 pCi/L.

Cracks in Foundation Floor/Walls

Our results suggest that the presence of cracks or holes in the foundation floor or walls, contrary to some past research, did not act as a significant pathway or entry point for radon gas into homes in our study relative to sump pits and perimeter drains.

Potential benefits of our study include expanding our knowledge on how this dangerous gas enters a house through the foundation or basements of single-family homes in rural and suburban areas located relatively closer to agriculture than to cities as well as providing further evidence as to whether current tactics for preventing or mitigating it are sound. Furthermore, our study was timely, as multiple federal agencies recently announced a new collaboration and launched an initiative, i.e., the Federal Radon Action Plan, to reduce exposure to radon particularly in homes, including a recommendation to test homes at least every two years and a recommendation to provide incentives to increase testing and mitigation measures (American Society of Safety Engineers, 2011).

Strengths of our study included every test and technician walk-through survey being conducted by an investigator trained in environmental public health, and kits being offered on a first-come, first-served basis, which eliminated selection bias.

Limitations to our study included the influence of environmental or seasonal fluctuations of radon, the fact that house pressurization was not calculated, and that test kits had to be sealed and mailed by participants, which may have introduced some nondifferential error due to measurement bias. Nevertheless, the study's high community participation was noted by NJDEP.

Conclusion

The results of our study suggest certain physical components may act as pathways for radon into a house, particularly in rural areas with older homes with unfinished or partially finished basements. Sealing components may be a more feasible method of reducing radon exposure where a full mitigation system or improved mechanical ventilation system is cost prohibitive, or if radon concentrations do not exceed the 4.0 pCi/L action level but are ≥2.0 pCi/L.

Acknowledgements: We would like to thank the NJDEP Radon Section for their help and support of this study in terms of supplies (radon testing kits) and laboratory analyses via an approved contract laboratory, Radata, Inc. We also thank S.W. Kelly, J. Melendez, and A.E.M. Mapou for internal review of this manuscript.

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Residential Carbon Monoxide (CO) Poisoning Risks: Correlates of Observed CO Alarm Use in Urban Households

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Abstract **The authors conducted a household survey and observation to assess carbon monoxide (CO) knowledge and risks as well as prevalence of CO alarms in an urban community prior to the enactment of a mandatory ordinance requiring CO alarms in one U.S. city. From July to December 2009, household surveys and observations were completed in 603 residences. Participants were mostly African-American (61%), women (70%), 25–54 years in age (66%), and with a high school education or less (51%). Most homes visited contained CO-producing appliances, including gas stoves (86%), gas furnaces (82%), and gas water heaters (79%). Participants' overall mean percentage correct knowledge score was 57%. CO alarms were *reported* by 33% of participants and *observed* among 28% of households. Low rates of CO knowledge and CO alarm ownership, combined with high rates of CO-producing sources in homes, suggests the need for widespread campaigns to promote CO alarms. Recommendations are also made to integrate the lessons learned from the public health community's experience promoting smoke alarms.**

Introduction

Carbon monoxide (CO) poisoning is a significant yet preventable public health problem that is only recently gaining the necessary attention of public health and safety officials and policy makers. CO is a colorless, odorless gas that is produced through the incomplete combustion of hydrocarbons (Kao & Nanagas, 2005). CO sources are ubiquitous in homes, especially in heating equipment such as gas furnaces, gas and propane heaters, clothes dryers, stoves, woodstoves, and fireplaces. Other sources of CO include motor vehicle exhaust and tobacco smoke.

CO exposure is a leading cause of poisoning death in the U.S., killing approximately 450 people annually (Centers for Disease Control and Prevention [CDC], 2011). Technically, CO is identified as a toxicant, a poison that is made by humans or introduced into the environment as a function of human activity (Graber, Macdonald, Kass, Smith, & Anderson, 2007). The effects of CO exposure are often difficult to recognize because of their nonspecific nature. Early symptoms of CO exposure include headache, dizziness, weakness, nausea, confusion, and vision problems; disorientation, unconsciousness, and death may result at higher levels of CO exposure (Raub et al., 2000).

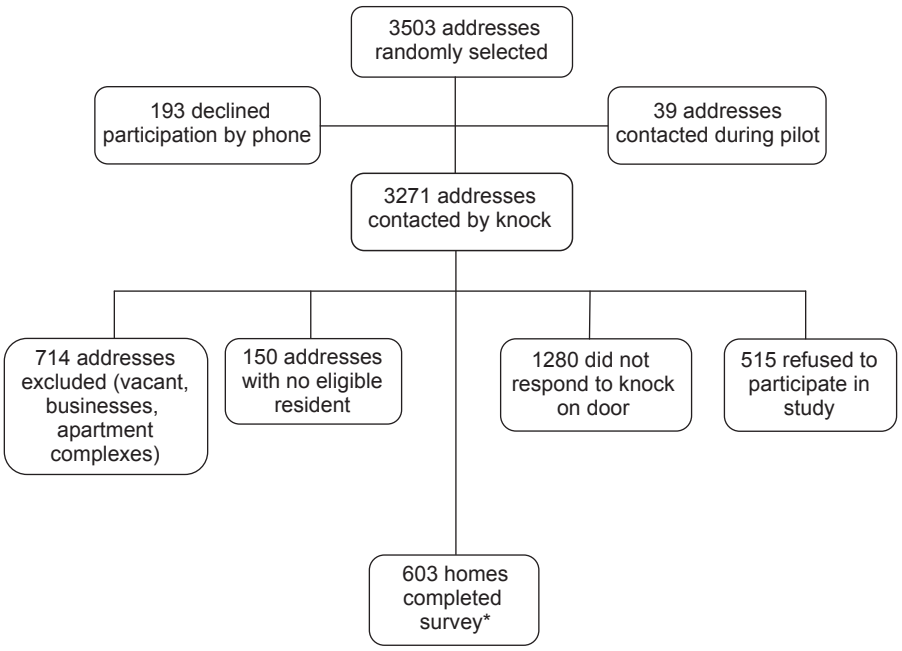
The Centers for Disease Control and Prevention (CDC) estimated that during the years 2004–2006, 20,636 nonfatal, unintentional, non-fire-related CO exposures were seen in emergency departments each year (CDC, 2008). Compared to older children, those four years of age and younger had the highest estimated rate of CO-related emergency departments visits (11.6/100,000). For adults, the rate of CO exposure was highest (10.4/100,000) among those aged 25–34 and lowest (3.6/100,000) among those 65 years and older (CDC, 2008). According to CDC, 73% of the estimated annual CO events seen in emergency departments occur in the home (CDC, 2008).

CO alarms are one of the most important protective devices for preventing CO exposure and poisoning in homes. Given the indiscernible nature of CO itself and the nonspecific nature of symptoms from exposure to it, CO alarms serve as a warning tool to prevent prolonged exposure to high levels of CO. These devices, which retail for $20 to $60, emit an audible alarm when CO is detected at either or both an amount present or a length of exposure that would produce morbidity or mortality. The Consumer Product Safety Commission and other groups have long recommended CO alarms as a defense against CO poisoning (Consumer Product Safety Commission, 2012). Yoon and co-authors (1998) estimated that CO alarms could prevent at least half of nonfire unintentional CO poisoning.

As of this writing, statutes from 27 states address issues of CO alarms in certain types of residential dwellings. Many of the statutes limit CO alarms by the type of residence (e.g., rental property), when it was built (e.g., new construction only) or

FIGURE **1**

Study Design



*Nine surveyed had incomplete data.

upon a change of ownership. Only Illinois and Massachusetts statutes mandate alarms in "every dwelling" (National Conference of State Legislatures, 2012). In Maryland, where our study was undertaken, a law was enacted in 2009 requiring CO alarms for *new* residential construction.

Estimates of CO alarm use in the literature are sparse and equivocal. Runyan and coauthors (2005) conducted a random-digit-dial survey among a nationally representative sample that revealed that 29% of homes *reported* a CO alarm. More recently, Hampson and Weaver (2011) completed a computer-based survey of two sets of medical center employees in Washington and Utah and found CO alarm use *reported* in 51% of homes. Unfortunately both studies rely on self-reported information, which is a documented limitation (Chen, Gielen, & McDonald, 2003).

The Johns Hopkins Home Safety Project sought to describe among an urban population the knowledge and behaviors relevant to preventing carbon monoxide poisoning as well as household risks. Specifically, our article aims to describe the prevalence of *observed* CO alarms prior to the enactment of a city ordinance requiring CO alarms in all city residences. We also aim to identify correlates of CO alarm use.

Methods

Study Design and Sampling

A baseline survey of East Baltimore households was conducted between July and December 2009 as part of a community intervention trial, assessing the impact of an enhanced Baltimore City Fire Department (BCFD) home visit program through which smoke alarms are installed.

Neighborhood Selection and Address Randomization

In preparation for a community intervention trial that would be evaluated using a two-group, quasi-experimental design, we created a sampling frame that would be comparable across important confounders of key outcomes, such as prevalence of smoke alarms and the prior success of BCFD personnel in gaining access to the premises through their program. Based on a desired final sample size of 350–400 completed baseline surveys in each community, we determined that we would need a total of 12 census tracts. We formed a sample of 10,000 paired combinations (which we called "blends") of six randomly chosen census tracts out of the 49 census tracts in East Baltimore. We then computed a summary statistic for each blend composed as the blend's unweighted average of 1) vacancy rate; 2) number of previous BCFD home visits attempted; 3) percentage of BCFD home visits that were successful (i.e., BCFD gained entry); 4) residential fire rate; 5) percentage of dwellings built after 1984; and 6) percentage of owner-occupied properties.

The quality of matching in each pair of blends was assessed as the difference between the two blends of the raw sum of the above six indicators. The 10,000 matched scores were sorted and the study team selected candidate matches out of the top one percentile of match scores for further consideration. Members of the team, which included community representatives, drove through several of the top candidate matches to observe the neighborhoods to ensure that they had residential properties as expected and would be suitable for the intervention trial (e.g., neighborhoods had been gentrified for a large development project or new industry had come in since the time of the census).

The final selection of 12 census tracks (six paired tracts in each community) included a total of 10,333 residences. Residences that were not eligible for the BCFD installation program (i.e., public housing and city managed apartment complexes, n = 375) were excluded. From the remaining 9,958 eligible addresses, three separate samples of 1,200 addresses were randomly selected. A new random selection was done when all previously selected addresses had been resolved (i.e., enrolled, refused, deemed ineligible, or did not respond after five attempts to contact).

Data Collection

All selected addresses received a project letter detailing the survey and contact information in case a resident wished to schedule an appointment or opt out of the survey. Data collectors, in teams of two, knocked on the doors of selected addresses, leaving a copy of the project letter at any door where there was no answer. Each house was visited on five nonconsecutive days or until an eligible

resident completed the survey, refused at the door or via telephone, or was deemed ineligible by the data collectors. If unsuccessful after five attempts, the address was coded as "no answer" and not visited again unless the resident called the project office to make an appointment to complete the survey.

Eligibility criteria included both housing structure and resident characteristics. Premises deemed unsafe, vacant, or nonexistent by data collectors were coded as ineligible residences. To be eligible, respondents had to be English speaking and at least 18 years old. After determining eligibility and obtaining written informed consent, data collectors, with permission, conducted the survey inside the participant's home. Surveys were conducted on small netbook computers and lasted about 30–45 minutes. Data collectors read questions aloud and recorded the respondent's answers.

TABLE **1**

Sample Sociodemographic Characteristics, Carbon Monoxide (CO)–Producing Appliances, and CO Alarm Ownership

Characteristics		Pearson χ^2 (*p*-Value)	Observed CO Alarm		Total Sample *N* = 603 (%)
			Yes *n* = 166 (28%)	No *n* = 437 (72%)	
Gender	Male	0.10 (.76)	48 (29)	132 (30)	180 (30)
	Female		118 (71)	305 (70)	423 (70)
Age	18 to 24	2.35 (.80)	26 (16)	63 (14)	89 (15)
	25 to 34		44 (27)	123 (28)	167 (28)
	35 to 44		32 (19)	86 (20)	118 (20)
	45 to 54		26 (16)	82 (19)	108 (18)
	55 to 64		25 (15)	49 (11)	74 (12)
	65 and above		13 (8)	34 (8)	47 (8)
Household role	Head of household	0.23 (.63)	132 (80)	355 (81)	487 (81)
	Other		34 (21)	82 (19)	116 (19)
Education	Less than high school diploma/GED	5.01 (.17)	21 (13)	58 (13)	79 (13)
	High school diploma/GED		57 (34)	173 (40)	230 (38)
	Some college		40 (24)	71 (16)	111 (19)
	Completed college		48 (29)	133 (31)	181 (30)
Per capita income	$5000 or less	4.40 (.22)	29 (21)	100 (29)	129 (27)
	$5001 to $10000		31 (22)	72 (21)	103 (21)
	$10001 to $25000		42 (30)	82 (24)	124 (26)
	$25000 or more		39 (28)	86 (25)	125 (26)
Race	Black or African-American	0.92 (.34)	96 (58)	263 (63)	359 (61)
	Other		69 (42)	158 (38)	227 (39)
Homeowner status	Rent	15.95 (.00)	59 (38)	238 (57)	297 (52)
	Own or pay mortgage		97 (62)	183 (44)	280 (49)
Children (<18) in home	Yes	0.04 (.84)	65 (39)	175 (40)	240 (40)
	No		101 (61)	262 (60)	363 (60)
CO sources in home	Gas furnace	0.73 (.39)	120 (85)	286 (81)	406 (82)
	No gas furnace		22 (16)	66 (19)	88 (18)
	Gas water heater	2.28 (.13)	118 (84)	281 (78)	399 (79)
	No gas water heater		23 (16)	81 (22)	104 (21)
	Gas stove	0.16 (.69)	144 (87)	375 (86)	519 (86)
	No gas stove		21 (13)	61 (14)	82 (14)
	Gas clothes dryer	0.26 (.61)	52 (33)	124 (30)	176 (31)
	No gas clothes dryer		108 (68)	285 (70)	393 (69)
Total number of CO sources in home	No CO equipment	2.27 (.69)	15 (9)	53 (12)	68 (11)
	1 CO equipment		19 (11)	60 (14)	79 (13)
	2 CO equipment		31 (19)	84 (19)	115 (19)
	3 CO equipment		67 (40)	159 (36)	226 (38)
	4 CO equipment		34 (21)	81 (19)	115 (19)

Measures

Sociodemographic Characteristics

Sociodemographic measures as part of the survey included self-reported race and ethnicity, education, household role, gender, age of respondent and all household members, and homeowner status. Household income was determined in two parts. First, the respondent viewed a card listing seven income ranges and selected the one that contained their household income. Per capita income was then calculated by dividing the midpoint of that income range by the total number of residents.

CO Knowledge

Eleven questions examined participant's knowledge about CO sources and poisoning risks, CO signs and symptoms, CO alarm functionality and recommendations, legal requirements for alarms, and proper evacuation steps in response to an activated CO alarm. All items were created for the purpose of our study and pretesting used cognitive interviewing to improve wording and comprehension. Percentage correct scores were calculated for knowledge items.

CO Sources in Home

Participants were asked whether they had common household gas appliances (e.g., furnace, water heater, stove, clothes dryer). The total number of CO-producing appliances found in the home was tallied for each household.

CO Alarm Status

After completing the survey, which included a self-report question on whether there was

TABLE **2**

Carbon Monoxide (CO) Knowledge and CO Alarm Ownership

Knowledge Items: True/False or Multiple Choice Options. Correct Answer Indicated in *Italics*.	Pearson χ^2 (*p*-Value)	Observed CO Alarm		Total Sample *N* = 603 # (%) Correct
		Yes *n* = 166 # (%) Correct	No *n* = 437 # (%) Correct	
CO is a gas *that cannot be seen.*	3.19 (.074)	146 (88)	358 (82)	504 (84)
You can smell CO, *false.*	14.77 (.00)	135 (81)	285 (65)	420 (70)
Electric heaters do not cause CO poisoning.	1.24 (.27)	74 (45)	173 (40)	247 (41)
Only children and teens are at risk for CO poisoning, *false.*	1.58 (.21)	157 (95)	400 (92)	557 (92)
Symptoms of CO poisoning are similar *to the flu.*	4.71 (.03)	37 (22)	65 (15)	102 (17)
Near all sleeping areas is the best place to install a CO alarm in the home.	1.40 (.24)	35 (21)	74 (17)	109 (18)
The first thing to do if your CO alarm goes off is to *get everyone out of the house and call 911.*	7.15 (.01)	143 (86)	333 (76)	476 (79)
How often should you change the battery in your CO alarm, *every six months.*	0.19 (.66)	78 (47)	214 (49)	292 (48)
Using a gas oven to heat your home could cause CO poisoning, *true.*	2.49 (.11)	134 (81)	326 (75)	460 (76)
Your smoke alarm will alert you when CO levels are too high, *false.*	2.46 (.12)	107 (65)	251 (57)	358 (59)
In Baltimore city, all homes are required by law to have a CO alarm, *false.*	5.34 (.02)	51 (31)	179 (41)	230 (38)
Overall mean percentage correct knowledge score	*t* = 3.16 (.002)	60%	55%	57%

a CO alarm in the home, data collectors asked all respondents to show them any CO alarms in their home. Data collectors confirmed its existence, tested whether it was working by pressing the "test" button, and recorded the result.

Data Analysis

In addition to providing frequency distributions for the variables under study, we used Chi-square tests to examine bivariate relationships between having a working CO alarm and sociodemographic factors and CO knowledge. Inverse probability weights were used to examine the potential biases due to the study area having a higher frequency of African-American and low-income respondents than all of Baltimore. Weights were calculated based on race and income distributions obtained from the 2000 census data. Weighted and unweighted multiple logistic regression models were then constructed to examine the relationships between the outcome, having a working CO alarm, and sociodemographic factors and CO knowledge and their results compared. Results of the unweighted versus weighted models varied by no more than 10%; therefore, results for the unweighted models are presented. The analysis was conducted using Intercooled STATA 9.2.

Results

Recruitment

From a total of 3,503 eligible addresses, we excluded 193 who refused via telephone in response to the project letter and another 39 who participated in a pilot test of the computer survey application. Data collectors attempted to visit the remaining 3,271 addresses in person and excluded another 2,659 addresses for various reasons (Figure 1). Household surveys were conducted with 612 participants, but nine had incomplete data and were removed, resulting in a final sample size of 603 completed surveys.

Demographic Characteristics

A majority of respondents were African-American (61%), female (70%), between the ages of 25 and 54 (66%), and had a high school education or less (51%). Most self-identified as the "head of the household" (81%) (Table 1). Almost three-quarters of the respondents (74%) reported a per capita income of $25,000 or less and a little more than half (52%) rented their home. Forty percent of respondents lived with children under the age of 18.

CO Sources in the Home

As shown in Table 1, most homes visited contained CO-producing appliances. In fact, 76% of the sample reported two or more items that produce CO (data not shown). The most commonly reported items were gas stoves (86%), gas furnaces (82%), and gas water heaters (79%). Less than 1% reported the use of a kerosene heater (data not shown).

CO Alarm Status

A majority of respondents (54%) reported not having a working CO alarm; another 13% were unsure. One-third (33%) of respondents reporting having a CO alarm (data not shown). We were able to confirm through observation that 166 (28%) participants had at least one working CO alarm. The only sociodemographic characteristic related to having a working CO alarm was homeowner status (Table 1). Compared to those who rented, those who owned their home or paid a mortgage were statistically significantly more likely to have a working CO alarm (62% vs. 44%, p = .00). We found no relationship between having a working CO alarm and either the presence or total number of CO-producing appliances in the home (Table 1).

CO Knowledge

As shown in Table 2, CO knowledge varied across different topics. Most respondents knew that children and teens are not the only ones at risk of CO poisoning (92%); and

that CO is a gas that cannot be seen (84%). Conversely, few respondents were able to correctly identify symptoms of CO poisoning (17%) and the proper location for a CO alarm (18%). More than one-third (38%) of city residents knew that (at the time of the survey) CO alarms were not required by law. The overall mean percentage correct knowledge score was 57%.

We found a significant relationship between having a CO alarm and overall mean percentage correct knowledge score (Table 2); respondents with higher mean percentage correct knowledge scores were more likely to have an observed CO alarm in their home compared to those with a lower knowledge score (60% vs. 55%, $t = 3.16$, $p = .002$). Individual knowledge items varied with CO alarm ownership. For instance, knowing that one cannot smell CO was significantly associated with having a CO alarm (81% vs. 65%, $\chi^2 = 14.8$, $p = .00$) as was knowledge of CO poisoning symptoms (22% vs. 15%, $\chi^2 = 4.71$, $p = .03$). CO alarm owners, however, were less likely than those without alarms to correctly answer the question about legal requirements for CO alarms in Baltimore city (31% vs. 41%, $\chi^2 = 5.34$, $p = .02$).

Predictors of CO Alarm Ownership

Results from the multiple logistic regression analysis, including odds ratio (*OR*s) and corresponding confidence intervals (*CI*s) are summarized in Table 3. The results indicate that having at least one working CO alarm is associated with owning a home or paying a mortgage (*OR* = 3.43; 95% *CI*: 1.69, 6.98; $p = .0007$). Two knowledge items were associated with observed CO alarms, knowing that CO cannot be smelled (*OR* = 2.90; 95% *CI*: 1.45, 5.98; $p = .039$) and knowing what to do when an alarm activates (*OR* = 2.20; 95% *CI*: 1.00, 4.82; $p = .0495$). Mistakenly thinking that CO alarms are legally required was associated with CO alarm ownership (*OR* = 0.25; 95% *CI*: 0.14, 0.45; $p = .0001$).

TABLE **3**

Logistic Regression Model of Sociodemographic Characteristics and Carbon Monoxide (CO) Knowledge Correlates of CO Alarm Ownership

Sociodemographic Characteristics		Adjusted *OR*[a]	95% *CI*[a]
Gender	Male	1	
	Female	1.41	0.71, 2.59
Age	18 to 24	1	
	25 to 34	0.34	0.11, 1.08
	35 to 44	0.25	0.08, 0.84
	45 to 54	0.22	0.07, 0.71
	55 and above	0.31	0.09, 1.05
Household role	Other	1	
	Head of household	1.41	0.60, 3.34
Education	High school/GED	1	
	<High school/GED	1.22	0.48, 3.09
	Some college	1.46	0.65, 3.27
	Completed college	0.91	0.40, 2.07
Per capita income	$5000 or less	1	
	$5001 to $10000	1.40	0.60, 3.24
	$10001 to $25000	1.24	0.47, 3.28
	$25000 or more	1.29	0.43, 3.89
Race/ethnicity	Other	1	
	Black or African-American	0.92	0.47, 1.77
Homeowner status	Rent	1	
	Own or pay mortgage	3.43	1.69, 6.98*
Children (<18) in home	No	1	
	Yes	1.01	0.53, 1.94
Homes with CO-producing equipment			
Gas furnace	No	1	
	Yes	1.22	0.53, 2.78
Gas water heater	No	1	
	Yes	1.42	0.63, 3.21
Gas stove	No	1	
	Yes	0.80	0.33, 1.94
Gas clothes dryer	No	1	
	Yes	0.71	0.41, 1.25

continued ▸

Discussion

Our results provide some of the first evidence on the extent to which residents in urban neighborhoods are aware of CO poisoning risk, are exposed to it, and are taking action to protect themselves. The findings suggest that considerable education is needed to better inform residents of the causes and symptoms of CO poisoning; the proper location, maintenance, and response to CO alarms; and the differences between smoke alarms and CO alarms. The overall mean percentage correct knowledge score was 57%, a failing grade by any test measure. The importance of these findings is underscored by the fact that almost 90% of homes had at least one source of CO and more than 50% had three or more sources. Thus, potential exposures to CO are a real threat in these urban neighborhoods and most residents are ill informed about CO.

We found shockingly low levels of *self-reported* CO alarm ownership, with just 33% self-reporting at least one working alarm in their home. This self-reported CO alarm possession prevalence is only slightly higher than that reported by Runyan and co-authors (2005). In their random-digit-dial telephone survey of 1,000 households designed to be

TABLE **3** *continued*

Logistic Regression Model of Sociodemographic Characteristics and Carbon Monoxide (CO) Knowledge Correlates of CO Alarm Ownership

Sociodemographic Characteristics		Adjusted *OR*[a]	95% *CI*[a]
Knowledge question			
CO is a *gas that cannot be seen*.	Incorrect	1	
	Correct	1.27	0.59, 2.70
You can smell CO, *false*.	Incorrect	1	
	Correct	2.90	1.41, 5.98**
Electric heaters do not cause CO poisoning.	Incorrect	1	
	Correct	0.73	0.40, 1.33
Only children and teens are at risk for CO poisoning, *false*.	Incorrect	1	
	Correct	1.17	0.29, 4.73
Symptoms of CO poisoning are similar to *the flu*.	Incorrect	1	
	Correct	1.75	0.88, 3.46
Near all sleeping areas is the best place to install a CO alarm in the home.	Incorrect	1	
	Correct	1.75	0.90, 3.40
The first thing to do if your CO alarm goes off is to *get everyone out of the house and call 911*.	Incorrect	1	
	Correct	2.20	1.00, 4.82***
How often should you change the battery in your CO alarm, *every six months*.	Incorrect	1	
	Correct	0.94	0.54, 1.62
Using a gas oven to heat your home could cause CO poisoning, *true*.	Incorrect	1	
	Correct	0.89	0.44, 1.80
Your smoke alarm will alert you when CO levels are too high, *false*.	Incorrect	1	
	Correct	1.30	0.70, 2.40
In Baltimore city, all homes are required by law to have a CO alarm, *false*.	Incorrect	1	
	Correct	0.25	0.14, 0.45****

[a]*OR* = odds ratio; *CI* = confidence interval.
**p* = .0007; ***p* = .0039; ****p* = .0495; *****p* < .0001.

representative of the entire U.S. population, 29% reported having a CO alarm. Our data differ significantly from Hampson and Weaver (2011); their computer-based survey of 1,351 individuals reported CO alarm use by 51% of their respondents.

An important strength of our study is the ability to confirm self-reported CO alarm ownership with observed data, a technique recognized to be the gold standard for reporting injury prevention behaviors. The observed prevalence of at least one working CO alarm in the home fell to 28% from 33% who self-reported alarm use. The differences between observed and reported rates in this case are not as high as those found for smoke alarm ownership by us (Chen, Gielen, & McDonald, 2003) and others (Douglas, Mallonee, & Istre, 1999). Nevertheless, the discrepancy between self-report and observed practices reminds us that we cannot rely on self-report alone to determine household safety behaviors.

The low rates of CO alarm ownership and knowledge, combined with the high rates of CO-producing sources in homes, also suggest the need for widespread campaigns to promote the use of CO alarms. Our data did not identify specific subgroups of the population least likely to have working CO alarms, which further supports the conclusion that campaigns should be targeted broadly, to homeowners, landlords, and tenants. Moreover, promotional campaigns should consider the needs of low-income communities to address the costs of and easy access to such safety devices.

Public health and safety officials should consider the lessons we have learned in our effort to promote and distribute smoke alarms and integrate these into CO alarm promotion and distribution programs. Criteria have been established to define gold standard smoke alarm campaigns including 1) working in local communities and recruiting community partners, 2) canvassing homes in high-risk areas, 3) using smoke alarms with special features (like long-lasting lithium batteries and a hush feature), and 4) conducting follow up activities to ensure alarm functionality (Ballesteros, Jackson, & Martin, 2005). CO promotion campaigns while in their nascent stages should be encouraged to incorporate these important lessons learned from the smoke alarm experience. Although not yet deemed a gold standard criterion, another potentially important finding from the smoke alarm experience is the concern about whether audible alarms awaken sleeping children and the call to consider voice-recording options (Smith, Splaingard, Hayes, & Xiang, 2006).

The results presented here should be interpreted in the context of several limitations. Our ability to generalize results is limited to other urban populations with similar demographic characteristics to the participants in this study. The majority of our sample was African-American adults living in a predominantly low-income, urban area, and we did not include Spanish-speaking residents. We were able to weight our sample to account for the higher frequencies of African-American and low-income residents in our study area compared to all of Baltimore and found only minor differences. Although our sampling methodology included random selection of households within census tracts specifically chosen to result in a representative sample of East Baltimore homes, our completed sample size was smaller than originally anticipated due to high rates of refusal and residents not being home. We do not have data to compare those who completed the survey to those who did not.

Conclusion

Our work recognizes and documents the need for enhanced education and promotion efforts targeted to CO poison prevention. As of March 2011 (after the completion of our data collection), all Baltimore city residences are required to have at least one working CO alarm. Legislation is a necessary but insufficient mechanism alone to

ensure that all residents are safe in their homes. Implementation of the law needs to be supported with public health campaigns that address the knowledge gaps that we identified and to enhance access to and affordability of CO alarms for low-income and other special need communities.

Acknowledgements: We are grateful to the residents of Baltimore who allowed us into their homes and who completed our survey and observation. We would also like to thank Dharssi Safiyya who assisted us with a review of the literature on carbon monoxide while she was pursuing a master of public health degree at the Johns Hopkins Bloomberg School of Public Health.

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INTERNATIONAL PERSPECTIVES

Multilevel Analysis of Childhood Nonviral Gastroenteritis Associated With Environmental Risk Factors in Quebec, 1999–2006

Although most of the information presented in the Journal *refers to situations within the United States, environmental health and protection know no boundaries. The* Journal *periodically runs International Perspectives to ensure that issues relevant to our international membership, representing over 30 countries worldwide, are addressed. Our goal is to raise diverse issues of interest to all our readers, irrespective of origin.*

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Abstract

Childhood nonviral gastroenteritis is a priority for various public health authorities. Given that waterborne transmission is sometimes incriminated during investigation of gastroenteritis outbreaks, the authors hypothesized that watershed characteristics may influence the occurrence of this disease and could contribute additional insights for better prevention and control. The study described here aimed to investigate watershed characteristics in relation to nonviral gastroenteritis and specifically three bacterial and parasitic forms of childhood gastroenteritis to assess their relative importance in the province of Quebec, Canada.

Information on children aged 0–4 years with bacterial or parasitic enteric infections reported through ongoing surveillance between 1999 and 2006 in the province of Quebec was collected. Factors measured at the municipal and watershed levels were analyzed using multilevel models with a Poisson distribution and log link function. Childhood nonviral gastroenteritis, giardiasis, and campylobacteriosis were positively associated with small ruminants and cattle density. Childhood salmonellosis was positively associated with cattle density. Also, childhood campylobacteriosis incidence was positively associated with larger watershed agricultural surface. In addition to local agroenvironmental factors, this analysis revealed an important watershed effect.

Introduction

Infectious gastroenteritis is a frequent cause of morbidity in young children. Studies from North America and elsewhere indicate that each year between 1.2 and 2.5 episodes occur of gastroenteritis per child under five years of age (Glass, Lew, Gangarosa, LeBaron, & Ho, 1991; Herikstad, 2002; Payment et al., 1997). In Quebec, nonviral gastroenteritis is mainly caused by *Salmonella* spp., *Campylobacter* spp., and *Giardia lamblia* (Kaboré et al., 2010). The original sources of these pathogens are likely wide ranging and dependent on location. Their persistence throughout watersheds, however, indicates a certain interconnectedness that could affect downstream water quality (Whitman, Nevers, & Byappanahalli, 2006). Their transport overland in surface runoff is responsible for event-related increases in the concentration of watershed in-stream waterborne pathogens (Ferguson, de Roda Husman, Altavilla, Deere, & Ashbolt, 2003). In addition, transport mechanisms appear to become more important at the in-stream level as *watershed size* increases (Rees, Long, Baker, Bordeau, & Pei, 2006). Moreover, pathogen control can be problematic at the watershed scale where they may remain viable and can potentially be amplified by agricultural practices (Hutchison, Walters, Moore, & Avery, 2005).

Thus, people involved in watershed planning should take into consideration the basic biological characteristics of pathogens in

TABLE **1**

Quartiles Distribution of Variables at Municipalities and Watersheds Levels

Variable	Quartile 1 (Very Low Risk)	Quartile 2 (Low Risk)	Quartile 3 (Moderate Risk)	Quartile 4 (High Risk)
Small ruminants density*	0–≤0.0001	0.0001–≤0.003	0.003–≤0.110	0.110–≤2475
Poultry density		0–≤0.001**	0.001–≤0.5	0.5–≤346450
Cattle density	0–≤0.001	0.001–≤0.503	0.503–≤0.826	0.826–22000
Swine density		0–≤0.001**	0.001–≤1.311	1.311–≤55641.5
Watershed surface***	0–≤3027.28	3027.28–≤6700.73	6700.73–≤10098.21	10098.21–≤162078.4
Watershed agricultural area surface***	0–≤672.47	672.47–≤1668.19	1668.19–≤2328.03	2328.03–≤3442.17

*Number of animals per agricultural area surface (heads/km^2).
**Quartiles 1 and 2 have been pooled.
***Km^2.

order to plan and implement remedial measures or to avoid practices that could inadvertently promote their viability (Rosen, 2000). Problems associated with these pathogens in watersheds usually involve multiple sources, which managers may find difficult to disentangle (U.S. Environmental Protection Agency [U.S. EPA], 2005). This limitation is highly important in watershed best management practice and the alternative way to overcome it is likely the use of an ecological approach with surveillance data to investigate infection association occurring in these watersheds. It can provide more insights about problems and contribute to highlight the contextual effects of watersheds (Agriculture & Agri-Food Canada, 2007).

To our knowledge, very few studies have investigated watershed contextual effects in the association of childhood nonviral gastroenteritis with environmental risk factors. Moreover, in the classic multilevel analytical approach, measures of association between contextual factors and outcomes have their standard errors corrected for the nonindependence of events occurring within areas (Snijders & Bosker, 1999). Multilevel models that provide measures of variation based on random effects could inform on the distribution of outcomes across areas (Merlo, Chaix, Yang, Lynch, & Råstam, 2005). Those aspects appear to be of high importance in social epidemiology because of the input they could bring in sustaining the effectiveness of focusing intervention on reducing health inequalities within certain geographical areas rather than specific people (Yang, Eldridge, & Merlo, 2009).

Therefore, we investigated Quebec's watershed effect on total nonviral gastroenteritis (including *Salmonella*, *Campylobacter, Giardia, E. coli, Yersinia,* and *Cryptosporidium)* and specifically giardiasis, campylobacteriosis, and salmonellosis, in order to assess their relative importance and their territorial distribution.

Materials and Methods

Study Design and Area

The hierarchical structure of the information allowed the use of a multilevel analysis. The framework consisted of a total of 1,265 municipalities nested within 43 watersheds called water-integrated management areas (WIMAs). The study area covered the province of Quebec excluding the northern regions (Northern Quebec, Nunavik, and James Bay Cree territories) to avoid rate overestimation.

Study Data and Case Definition

Four sources of data were used for this study: 1) a database from the Ministère de l'agriculture, des pêcheries et de l'alimentation du Québec (MAPAQ) used for the integrated management of farms, from which we extracted livestock densities and agricultural acreage of watersheds; 2) the drinking water database of the Ministère du développement durable, de l'environnement et des parcs (MDDEP) was used to generate indices of drinking water quality; 3) the census database from the Institut de la statistique du Québec (ISQ) was used to estimate child populations for the period of 1999 to 2006; and 4) data from the reportable diseases database of the Ministère de la santé et des services sociaux du Québec (MSSS) was used to extract cases of children with gastroenteritis.

Cases were defined as confirmed infected children aged 0–4 years with *Giardia* spp., *Salmonella* spp., *Campylobacter* spp., *Yersinia enterocolitica, Cryptosporidium parvum,* and enterohemorrhagic *E. coli* reported to the public health regional units (directions régionales de santé publique) of the Quebec ministry of health in the period of 1999 through 2006 (MSSS, 2008). Among these, *Giardia*, *Salmonella,* and *Campylobacter* were the most frequently reported pathogens in children diagnosed with nonviral gastroenteritis. With this consideration, the cumulative incidence of reported cases per municipality specific to *Giardia, Salmonella,* and *Campylobacter*, as well as a general cumulative incidence including all cases as defined above, were used as the four outcome variables for the analysis.

Municipality-Level Variables

Livestock Densities

Small ruminants, poultry, cattle, and swine densities were defined as the number of animals per cultivated agricultural area in square kilometers (animals/km^2) for each municipality. The area of cultivated land included cropland, summer fallow, and tame or seeded pasture and is estimated every five years from the *Census of Agriculture*. Estimates for noncensus years were obtained by assuming a simple linear trend in the variation of areas of cultivated land between census years (Hofmann, Filoso, & Schofield, 2005). These densities were then categorized in quartiles, based on their cumulative frequency (Table 1). Each quartile includes 25% of the cumulative frequency. The lowest quartile (Q1 = very low risk) is considered as the reference and compared to the others (Q2 = low risk, Q3 = moderate risk, and Q4 = high risk). The poultry and swine densities distribution, however, presented Q1 and Q2 values rather similar. Therefore the first two quartiles were combined.

Drinking Water Quality

An index combining information on the source of water and on the treatments applied to this water was created based on a previous study (Gagnon, Duchesne, Lévesque, Gingras, & Chartrand, 2006). Two sources of water were considered—surface water (SW) and ground water (GW), including private wells. Private wells were assigned to municipalities without community waterworks or where community waterworks supplied 40% or less of the population. The treatments were classified according to their effectiveness in neutralizing or removing all pathogens. Purification is usually a conventional treatment including coagulation, decantation, filtration, and disinfection with chlorine or ozone, or UV, or chlorine dioxide. In order to estimate the quality of distributed water, four categories of drinking water were created as follows: 1) very low-risk drinking water (purified or chlorinated + UV-treated GW); 2) low-risk drinking water (chlorinated GW or purified or UV-treated SW); 3) moderate-risk drinking water (GW, including well water without treatment or chlorinated + UV-treated SW); and 4) high-risk drinking water (chlorinated SW).

A cross validation of the drinking water database revealed two new municipalities (Saint-Malo and Bolton-Ouest) receiving municipal drinking water. They have been excluded from the analyses because they were not recorded during the study period.

Municipalities were then allocated to one of the 43 WIMAs. Of the 43 WIMAs considered, three were specifically created for this analysis to account for particular municipalities and achieve 100% coverage of the study area. The first virtual WIMA included the islands located in the St. Lawrence River, the second included those in the Gulf of St. Lawrence, and the third included those found around the Hudson Bay. The 1,265 municipalities have also been allocated into one of two groups according to their geographical positions within the watersheds. The first group included those located within 50 km of the St. Lawrence River (the main drainage output of the study region), considered to be "downstream located," and those further than 50 km of the St. Lawrence River, considered "upstream located." These allocations were based on studies by Lyautey and co-authors (2007) and Ruecker and co-authors (2007).

Watershed-Level Variables

Two contextual variables were constructed at the watershed level: 1) the coverage of the watershed agricultural area and 2) entire watershed area. They were both measured in km^2 and used as proxy information related to the presence in the natural water system of one of the pathogenic agents under study. These contextual variables were also categorized in quartiles, based on their cumulative frequency as described above and also in Table 1.

Statistical Analysis

Human cases of nonviral gastroenteritis, giardiasis, salmonellosis, and campylobacteriosis were considered as discrete counts of rare events, which is a characteristic of Poisson distributions (Ott & Longnecker, 2008). Specific outcome variables, namely those related to nonviral gastroenteritis, giardiasis, salmonellosis, and campylobacteriosis incidence were examined using a two-level model with a Poisson distribution for possible associations with the environmental variables under study. The generic multilevel models used were as follows:

Null Model

$\log(\pi_{ij}/E_{ij}) = \beta_{0ij} + U_{0j}$

$\log(\pi_{ij}/E_{ij})$ = *log of count per municipality/expected count (or population adjusted offset).*

When exponentiated becomes IR

β_{0ij} = *Population adjusted average count in a municipality*

U_{0j} = *Watershed specific differential in* $\log(\pi_{ij}/E_{ij})$

Model 1

$\log(\pi_{ij}/E_{ij}) = \beta_{0ij} + \beta_1$ *livestock densities*$_{ij} + \beta_5$ *water quality*$_{ij} + \beta_6$ *upstream*$_{ij} + U_{0j}$

Adding municipality-level variables; β_1 *to* β_4 *(the four kinds of livestock densities),* β_5 *quality of drinking water,* β_6 *watershed side (upstream or downstream).*

Model 2

$\log(\pi_{ij}/E_{ij}) = \beta_{0ij} + \beta_1$ *livestock densities*$_{ij} + \beta_5$ *water quality*$_{ij} + \beta_6$ *upstream*$_{ij} + \beta_7$ *watershed area*$_{0j} + \beta_8$ *agricultural area*$_{0j} + U_{0j}$

Adding β_7 *and* β_8*; watershed-level variables.*

The models were fitted using iterative generalized least square estimates and using first-order maximum quasi-likelihood estimates in (MlwiN release 2.10). The exponentiated regression coefficients derived from these models were used to estimate incidence ratios (IR) and their corresponding 95% confidence intervals. Each model was evaluated by estimating the effect of independent variables according to four steps. First, the null model presents the variance partition between the two levels under consideration (municipalities and watersheds) and allows for an initial appreciation of the variance distribution without any exploratory variables (Diez Roux, 2002; Subramanian, Kawachi, & Kennedy, 2001). The following steps progressively introduce first- and second-level variables in order to assess which part of the variance can be explained by these covariates. In the second step, variables at the municipality level (livestock densities, drinking water quality, and municipality location within watersheds) are introduced in the model. The third step involves the inclusion of variables at the watershed level (watersheds and agricultural areas) (full model). In the last step, variables not statistically significant in the full model are removed, leaving a model (final model) containing only statistically significant factors ($p \leq .05$). In a multilevel model, the between-watershed variance is a residual term measured on the log IR scale, which is not directly meaningful. We thus assessed the magnitude of between-watershed variations (Chaix, Rosvall, & Merlo, 2007; Larsen & Merlo, 2005; Merlo et al., 2005) by the median mean ratio (MMR). The MMR is the median increase of IR when moving to a watershed with a higher risk, when randomly picking out two municipalities in different watersheds (Hedin, Petersson, Cars, Beckman, & Håkansson, 2006; Larsen & Merlo, 2005; Merlo et al., 2006). Therefore, the MMR expresses the unexplained second-level variance into the IR scale, and it can be interpreted as such (Larsen & Merlo, 2005). Consequently, it can be directly compared to other covariates and indicates clearly their relative importance.

Finally, in order to deepen our understanding of the geography of childhood nonviral gastroenteritis in the province, we looked at the watershed-level residuals in order to identify which of the 43 watersheds differed significantly from the provincial average for each pathogen taken separately.

Results

Nonviral Gastroenteritis

Models evaluating the overall measure of reported cases of nonviral gastroenteritis in children are presented in Table 2; the null model shows a marginally statistical significant variance associated with the watershed level. The municipalities within these watersheds have a significant watershed-level variance of 0.09 (*SE* = 0.03), which gives an MMR of 1.33 expressing the median disease risk variation between watersheds. The control of these effects using municipality-level variables in Model 1 decreased the ratio to 1.30 (*SE* = 0.02), which can be interpreted as a diminution of 3% in the median watershed risk variation. Additional control with the watershed-level variables in Model 2 decreased the MMR to 1.25 (*SE* = 0.02). The final model containing only the statistically significant associated variables presents an MMR of 1.29 (*SE* = 0.02). The removal of positively associated watershed basin and watershed area variables as well as the watershed agricultural acreage variable could likely explain this increase. Thus, even after controlling for known associated factors, the final model presents a relatively large part of the unexplained variance at the watershed level. Moreover, the MMR indicates that the between-watershed variance is even more important than the small ruminants' factor and is as important as cattle density to explain the presence of the pathogen. This indicates that other factors might be implicated to explain the territorial distribution of the disease, since this unexplained variance is not distributed uniformly in the province. Indeed, the analyses of the watershed-level residuals of the final model, mapped in Figure 1a, highlight which watershed differed significantly from the average incidence of watersheds. Seven watersheds were found to have a significantly higher incidence of transmitting nonviral gastroenteritis after controlling for livestock densities and quality of drinking water.

Gastroenteritis Associated With Giardiasis, Salmonellosis, or Campylobacteriosis

Results in subsequent analyses showed similar patterns with giardiasis, salmonellosis, and campylobacteriosis. Still, some differences can be accounted for in each of these diseases. Giardiasis revealed a statistically significant and high watershed-level variance, with an MMR of 1.55 (*SE* = 0.07) indicating the variation of municipalities within these watersheds. This MMR decreases to 1.50 (*SE* = 0.06) in Model 1 when livestock densities, drinking water quality, and watershed basin information were included in the model, and to 1.47 (*SE* = 0.05) in Model 2 including municipality-level and watershed-level variables. Giardiasis was also positively and significantly associated to small ruminants and cattle densities. The final model revealed a very slight increase of the MMR to 1.49 (*SE* = 0.06), likely due to the withdrawal of positively associated drinking water quality, watershed basin, watershed, and agricultural areas (Table 3). The watershed-level residuals analyses found 12 watersheds with a higher incidence mapped in Figure 1b.

In the case of salmonellosis, no statistically significant contextual effects were observed in the models. Salmonellosis was still significantly associated, however, to the two last quartiles of cattle density. The municipality-level and watershed-level variables in Model 2 have controlled the complete variance of the disease expressed by a variance equal to zero (Table 4). Consequently, the second-level residuals analyses revealed only two watersheds with a higher incidence mapped in Figure 1c. These results showed the slight propensity of salmonellosis to be related to watershed environments.

Campylobacteriosis showed the most important and statistically significant contextual effects with an MMR of 1.61 (*SE* = 0.07) for municipalities within the watersheds (Table 5). The MMR was decreased to 1.50 (*SE* = 0.06) in Model 1. The disease in Model 2 was positively and significantly associated to small ruminants and cattle densities, with an important decrease of the MMR to 1.41 (*SE* = 0.04). The final model showed a more positive and a statistically significant association with watershed agricultural areas. The model still presented a statistically significant watershed-variance of 1.43 (*SE* = 0.46), however, revealing that cattle and small ruminant densities still explain a relatively important part of the second-level variance in campylobacteriosis incidence. Accordingly, watershed-level residuals analyzed and mapped in Figure 1d highlighted the 10 watersheds with a statistically significant higher incidence than expected in the province.

Discussion

In the province of Quebec, 5,068 cases of nonviral gastroenteritis were reported in children aged 0–4 years in the period of 1999 through 2006. Campylobacteriosis, salmonellosis, and giardiasis were found to be the most reported cases of the infections in children (Kaboré et al., 2010). In our best-fitting models with a multilevel analysis approach considering 1,265 municipalities embedded in 43 watersheds, nonviral gastroenteritis, giardiasis, salmonellosis, and campylobacteriosis incidence were found to be positively and significantly associated with at least one of the quartiles of small ruminants or cattle densities. A significant variance exists between watersheds in nonviral gastroenteritis, giardiasis, and campylobacteriosis, even after controlling for municipality and watershed-level variables. The MMR revealed that the watershed-level risk variance is highest for campylobacteriosis, followed by giardiasis and nonviral gastroenteritis.

These findings were consistent with several studies that investigated associations of nonviral gastroenteritis in people with animal densities (Haus-Chemol et al., 2006; Michel et al., 1999; Valcour, Michel, McEwen, & Wilson, 2002), as well as for children 0–4 years (Febriani, Levallois, Lebel, & Gingras, 2009). Moreover, they seemed plausible because of the potential role of domestic and wild animals in nonviral microorganism transmission, which is of increasing concern. Mature cattle can harbor and excrete in their feces pathogenic microorganisms that have a potential to infect humans (Pell, 1997). Cryptosporidial infections have been linked epidemiologically to runoff from nearby fields, pastures, and other areas of livestock or wildlife activity (Hansen & Ongerth, 1991). Also, surface water supplies where agricultural activities such as cattle ranching occurred have been found to contain higher levels of *Giardia* cysts and *Cryptosporidium* oocysts than protected or pristine water supplies (Ong, Moorehead, Ross, & Isaac-Renton, 1996).

Accounting for the multiple infection sources and watershed contamination mechanisms, the level of contamination of watersheds could be different. A downstream location could be

TABLE **2**

Multilevel Assessment of Nonviral Gastroenteritis Association With Environmental Risk Factors in Children 0–4 Years in Quebec, Canada, 1999–2006

Output: Gastroenteritis	Null Model		Model 1				Model 2				Final Model			
Livestock densities†			IR[a]	95% *CI*[a]		Sig.[a]	IR	95% *CI*		Sig.	IR	95% *CI*		Sig.
Small ruminants														
Very low risk			Ref				Ref				Ref			
Low risk			1.09	0.86	1.37		1.08	0.86	1.36		1.09	0.86	1.37	
Moderate risk			1.16	1.02	1.31	*	1.16	1.02	1.31	*	1.15	1.01	1.31	*
High risk			1.30	1.14	1.47	*	1.30	1.15	1.47	*	1.29	1.13	1.46	*
Poultry														
Very low risk□			Ref				Ref				Ref			
Moderate risk			0.83	0.73	0.94	*	0.83	0.74	0.94	*	0.83	0.73	0.94	*
High risk			0.89	0.79	0.99	*	0.89	0.80	1.00	*	0.89	0.80	1.00	*
Cattle														
Very low risk			Ref				Ref				Ref			
Low risk			1.25	1.09	1.43	*	1.25	1.09	1.43	*	1.26	1.09	1.44	*
Moderate risk			1.32	1.14	1.52	*	1.32	1.15	1.51	*	1.32	1.15	1.52	*
High risk			1.51	1.30	1.76	*	1.50	1.29	1.75	*	1.50	1.29	1.75	*
Swine														
Very low risk §			Ref				Ref				Ref			
Moderate risk			0.88	0.78	0.98	*	0.88	0.78	0.98	*	0.87	0.78	0.98	*
High risk			0.88	0.78	1.00	*	0.88	0.78	1.00	*	0.90	0.79	1.02	*
Quality of drinking water														
Very low risk			Ref				Ref				Ref			
Low risk			0.89	0.77	1.03		0.89	0.77	1.03		0.90	0.77	1.04	
Moderate risk			0.84	0.73	0.97	*	0.84	0.73	0.97	*	0.86	0.75	0.99	*
High risk			1.08	0.91	1.28		1.07	0.90	1.27		1.09	0.91	1.29	
Watershed side														
Upstream			Ref				Ref							
Downstream			1.08	0.95	1.23		1.06	0.93	1.21					
Watershed surface‡														
Very low risk							Ref							
Low risk							1.22	0.95	1.56					
Moderate risk							1.00	0.75	1.34					
High risk							0.99	0.77	1.29					
Watershed agricultural area surface‡‡														
Very low risk							Ref							
Low risk							0.91	0.70	1.19					
Moderate risk							1.26	0.97	1.65					
High risk							1.04	0.79	1.37					
Variance component	Coeff.	*SE*[a]	Coeff.	SE	Sig.		Coeff.	*SE*	Sig.		Coeff.	*SE*	Sig.	
Watershed variance	0.09	0.03	0.08	0.02	*		0.06	0.02	*		0.07	0.02	*	
Median mean ratio	1.33		1.30				1.25				1.29			

[a]IR = incidence ratio; *CI* = confidence interval; Sig. = marks a significant association; *SE* = standard error.
† Livestock densities expressed in number of animals/km^2.
§ Quartiles 1 and 2 have been pooled.
‡ Watershed superficies expressed in number of km^2.
‡‡ Watershed agricultural area superficies expressed in number of km^2.

TABLE **3**

Multilevel Assessment of Giardiasis Association With Environmental Risk Factors in Children 0–4 years in Quebec, Canada, 1999–2006

Output: Giardiasis	Null Model		Model 1				Model 2				Final Model			
Livestock densities†			IR[a]	95% *CI*[a]		Sig.[a]	IR	95% *CI*		Sig.	IR	95% *CI*		Sig.
Small ruminants														
Very low risk			Ref				Ref				Ref			
Low risk			1.48	0.98	2.25		1.48	0.98	2.23		1.49	0.99	2.24	
Moderate risk			1.34	1.05	1.70	*	1.33	1.04	1.69	*	1.30	1.04	1.63	*
High risk			1.50	1.17	1.92	*	1.49	1.17	1.90	*	1.45	1.15	1.84	*
Poultry														
Very low risk§			Ref				Ref				Ref			
Moderate risk			0.78	0.62	0.99	*	0.79	0.62	1.00	*	0.76	0.61	0.95	*
High risk			0.97	0.78	1.20		0.98	0.79	1.21		0.90	0.74	1.10	
Cattle														
Very low risk			Ref				Ref				Ref			
Low risk			1.12	0.85	1.46		1.11	0.85	1.45		1.10	0.84	1.43	
Moderate risk			1.11	0.85	1.46		1.10	0.84	1.45		1.04	0.80	1.34	
High risk			1.58	1.19	2.10	*	1.56	1.17	2.08	*	1.50	1.14	1.99	*
Swine														
Very low risk§			Ref				Ref							
Moderate risk			0.92	0.75	1.13		0.92	0.75	1.14					
High risk			0.82	0.65	1.03		0.82	0.65	1.03					
Quality of drinking water														
Very low risk			Ref				Ref							
Low risk			0.97	0.73	1.29		0.96	0.72	1.29					
Moderate risk			1.02	0.78	1.34		1.02	0.77	1.33					
High risk			1.22	0.88	1.70		1.22	0.87	1.70					
Watershed side														
Upstream			Ref				Ref							
Downstream			1.02	0.81	1.28		1.02	0.80	1.30					
Watershed surface‡														
Very low risk							Ref							
Low risk							1.34	0.87	2.06					
Moderate risk							1.04	0.62	1.73					
High risk							1.11	0.70	1.74					
Watershed agricultural area surface‡‡														
Very low risk							Ref							
Low risk							0.98	0.62	1.56					
Moderate risk							1.08	0.68	1.74					
High risk							0.92	0.57	1.49					
Variance component	Coeff.	*SE*[a]	Coeff.	*SE*	Sig.		Coeff.	*SE*	Sig.		Coeff.	*SE*	Sig.	
Watershed variance	0.22	0.07	0.18	0.06	*		0.17	0.05	*		0.18	0.06	*	
Median mean ratio	1.55		1.50				1.47				1.49			

[a]IR = incidence ratio; *CI* = confidence interval; Sig. = marks a significant association; *SE* = standard error.
†Livestock densities expressed in number of animals/km^2.
§Quartiles 1 and 2 have been pooled.
‡Watershed superficies expressed in number of km^2.
‡‡Watershed agricultural area superficies expressed in number of km^2.

TABLE **4**

Multilevel Assessment of Salmonellosis Association With Environmental Risk Factors in Children 0–4 Years in Quebec, Canada, 1999–2006

Output: Salmonellosis	Null Model		Model 1				Model 2				Final Model			
Livestock densities†			IR[a]	95% *CI*[a]		Sig.[a]	IR	95% *CI*		Sig.	IR	95% *CI*		Sig.
Small ruminants														
Very low risk			Ref				Ref							
Low risk			0.85	0.55	1.31		0.80	0.51	1.23					
Moderate risk			0.91	0.73	1.14		0.89	0.72	1.12					
High risk			1.10	0.88	1.37		1.08	0.87	1.35					
Poultry														
Very low risk§			Ref				Ref				Ref			
Moderate risk			0.81	0.65	1.01		0.78	0.63	0.98	*	0.72	0.59	1.34	
High risk			0.99	0.81	1.21		0.97	0.79	1.17		0.92	0.79	1.28	
Cattle														
Very low risk			Ref				Ref				Ref			
Low risk			1.27	1.00	1.61		1.25	0.99	1.59		1.14	0.93	1.40	
Moderate risk			1.28	1.01	1.63	*	1.36	1.07	1.74	*	1.35	1.07	1.71	*
High risk			1.31	1.01	1.70	*	1.35	1.04	1.75	*	1.29	1.03	1.62	*
Swine														
Very low risk§			Ref				Ref							
Moderate risk			0.79	0.64	0.97	*	0.87	0.72	1.06					
High risk			0.91	0.74	1.13		0.97	0.79	1.19					
Quality of drinking water														
Very low risk			Ref				Ref							
Low risk			0.95	0.74	1.22		0.99	0.78	1.27					
Moderate risk			0.87	0.69	1.10		0.91	0.73	1.14					
High risk			0.95	0.70	1.30		1.00	0.74	1.36					
Watershed side														
Upstream			Ref				Ref							
Downstream			1.09	0.92	1.29		1.06	0.89	1.27					
Watershed surface‡														
Very low risk							Ref							
Low risk							1.09	0.90	1.31					
Moderate risk							0.83	0.64	1.08					
High risk							0.94	0.75	1.19					
Watershed agricultural area surface‡‡														
Very low risk							Ref				Ref			
Low risk							0.71	0.57	0.88	*	0.77	0.66	0.91	*
Moderate risk							0.94	0.75	1.17		0.86	0.73	1.01	
High risk							0.68	0.56	0.83	*	0.74	0.64	0.85	*
Variance component	Coeff.	*SE*[a]	Coeff.	*SE*		Sig.	Coeff.	*SE*		Sig.	Coeff.	*SE*		Sig.
Watershed variance	0.03	0.02	0.03	0.01			<0.00	0.01			<0.00	0.01		
Median mean ratio	1.16		1.16				1.00				1.03			

[a]IR = incidence ratio; *CI* = confidence interval; Sig. = marks a significant association; *SE* = standard error.
†Livestock densities expressed in number of animals/km^2.
§Quartiles 1 and 2 have been pooled.
‡Watershed superficies expressed in number of km^2.
‡‡Watershed agricultural area superficies expressed in number of km^2.

TABLE **5**

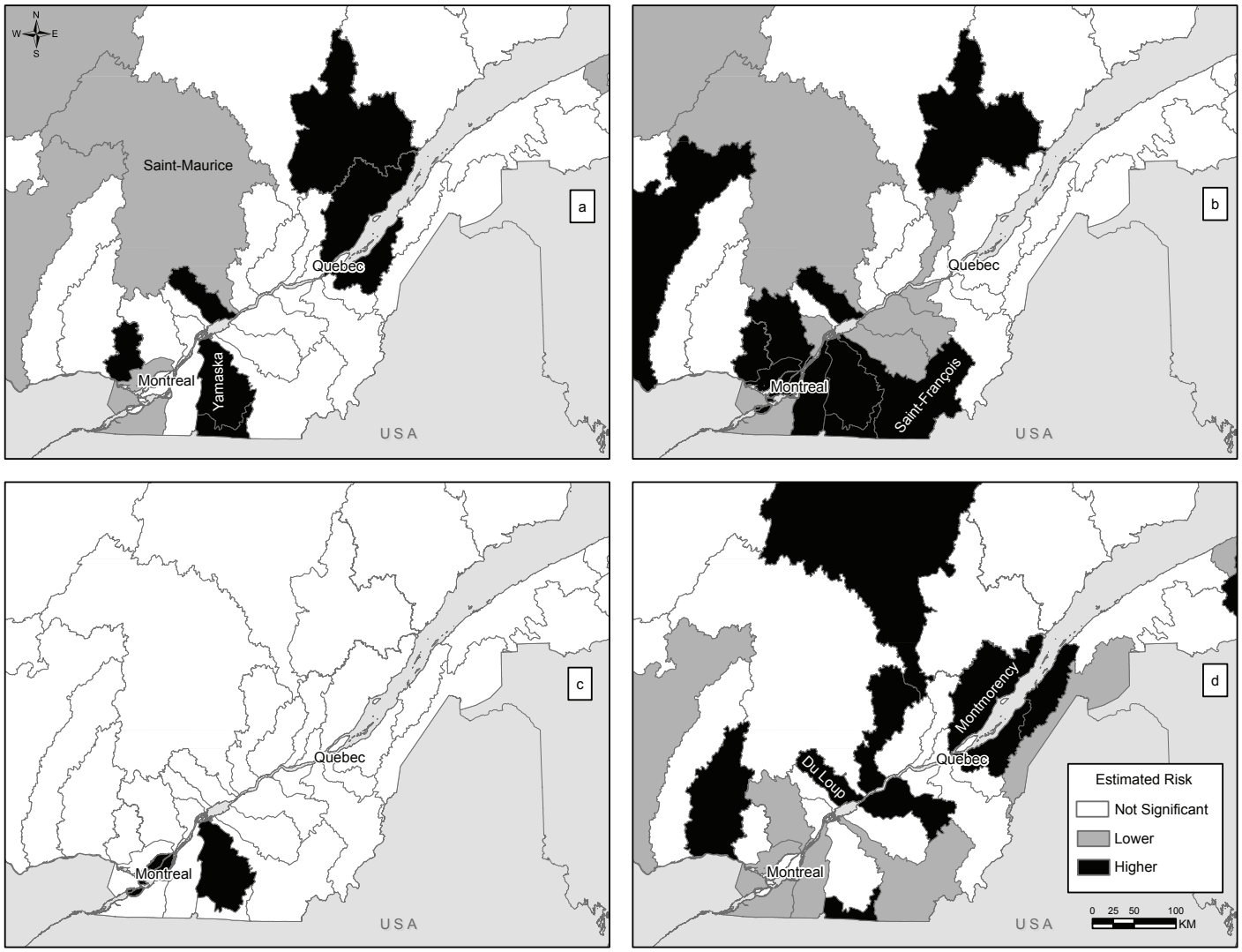
Multilevel Assessment of Campylobacteriosis Association With Environmental Risk Factors in Children 0–4 Years in Quebec, Canada, 1999–2006

Output: Campylobacteriosis	Null Model		Model 1				Model 2				Final Model			
Livestock densities†			IR[a]	95% *CI*[a]		Sig.[a]	IR	95% *CI*		Sig.	IR	95% *CI*		Sig.
Small ruminants														
Very low risk			Ref				Ref				Ref			
Low risk			1.03	0.69	1.54		1.01	0.69	1.48		1.02	0.70	1.49	
Moderate risk			1.27	1.03	1.56	*	1.28	1.05	1.57	*	1.27	1.04	1.54	*
High risk			1.30	1.05	1.61	*	1.33	1.08	1.63	*	1.32	1.08	1.61	*
Poultry														
Very low risk			Ref				Ref				Ref			
Moderate risk			0.91	0.74	1.11		0.92	0.76	1.11		0.90	0.75	1.08	
High risk			0.75	0.62	0.91	*	0.76	0.63	0.91	*	0.76	0.64	0.90	*
Cattle														
Very low risk			Ref				Ref				Ref			
Low risk			1.36	1.07	1.74	*	1.36	1.08	1.72	*	1.35	1.07	1.70	*
Moderate risk			1.64	1.29	2.09	*	1.62	1.29	2.05	*	1.62	1.28	2.04	*
High risk			1.64	1.26	2.13	*	1.60	1.23	2.08	*	1.63	1.26	2.11	*
Swine														
Very low risk			Ref				Ref							
Moderate risk			0.97	0.80	1.17		0.94	0.78	1.13					
High risk			1.09	0.88	1.35		1.05	0.86	1.29					
Quality of drinking water														
Very low risk			Ref				Ref				Ref			
Low risk			0.90	0.71	1.15		0.90	0.70	1.14		0.85	0.68	1.08	
Moderate risk			0.79	0.62	0.99	*	0.77	0.61	0.97	*	0.72	0.58	0.89	*
High risk			1.16	0.88	1.53		1.13	0.86	1.48		1.08	0.83	1.42	
Watershed side														
Upstream			Ref				Ref							
Downstream			0.98	0.79	1.21		0.93	0.76	1.15					
Watershed surface‡														
Very low risk							Ref							
Low risk							1.24	0.84	1.81					
Moderate risk							0.95	0.60	1.49					
High risk							0.84	0.56	1.27					
Watershed agricultural area surface‡‡														
Very low risk							Ref				Ref			
Low risk							1.04	0.68	1.60		1.15	0.76	1.73	
Moderate risk							1.76	1.15	2.69	*	1.87	1.22	2.86	*
High risk							1.46	0.94	2.26		1.69	1.14	2.50	*
Variance component	Coeff.	*SE*[a]	Coeff.	*SE*	Sig.		Coeff.	*SE*	Sig.		Coeff.	*SE*	Sig.	
Watershed variance	0.26	0.07	0.19	0.06	*		0.13	0.04	*		0.15	0.046	*	
Median mean ratio	1.61		1.50				1.41				1.43			

[a]IR = incidence ratio; *CI* = confidence interval; Sig. = marks a significant association; *SE* = standard error.
†Livestock densities expressed in number of animals/km^2.
§Quartiles 1 and 2 have been pooled.
‡Watershed superficies expressed in number of km^2.
‡‡Watershed agricultural area superficies expressed in number of km^2.

FIGURE **1**

Watershed-Level Risks of Enteric Infections in Children 0–4 Years in Quebec, Canada, 1999–2006



associated with an increased risk related to an upstream one, as demonstrated by American (Cooley et al., 2007) and Canadian studies (Lyautey et al., 2007; Ruecker et al., 2007). The results were that the downstream location had more risk than the upstream location in the watersheds (Kriersch, 2000). Even if these associations were not statistically significant in our study, positive associations were observed with nonviral gastroenteritis, giardiasis, and salmonellosis.

Similarly, small watershed size was positively associated with gastroenteritis, giardiasis, and campylobacteriosis without reaching statistical significance. A larger agricultural surface was a statistically significant risk factor, however, but only for campylobacteriosis. This could be explained by the larger sources of these pathogenic entities in watersheds entering the system through animal feces by direct deposition or as a result of overland runoff containing fecal material deposited in watersheds (Cox, Griffith, Angles, Deere, & Ferguson, 2005). Globally, the most important impact on the incidence of childhood nonviral gastroenteritis was the cattle density in watersheds. This was likely related to the concentration of the pathogenic microorganisms through the process of water migration following defecation and spreading, with an observable impact in small watersheds rather than bigger ones as found in our study. This was also demonstrated by Kiersch (2000), revealing the risk of small watersheds.

Beyond the fact of estimating more precise associations between diseases and environmental risk factors, using multilevel analysis demonstrated that watershed environment was important in childhood nonviral gastroenteritis incidence. This importance is different for each pathogen and it definitely provides an opportunity to identify watersheds with a higher inci-

dence, which is an asset in decision making oriented to disease control. Indeed, we observed a higher incidence of experiencing giardiasis or campylobacteriosis at the watershed level, with MMR at 1.61 (*SE* = 0.07) and 1.55 (*SE* = 0.07), respectively. As a result, our findings suggest that giardiasis and campylobacteriosis are significantly associated with watershed environments and highlight 12 and 10 watersheds, respectively, showing a higher incidence. Three of these watersheds (Yamaska, Baie Missisquoi, and Montmorency-Malbaie) mapped in Figure 1 should perhaps be highly concerned by their incidence for almost all the diseases.

Our exploratory study has some limits. Indeed, the reported cases could possibly have moved away from the location where they had been reported, bringing to light a possible ascertainment bias, which can have an impact on the ratio calculation (Lake et al., 2009). Multilevel studies must also assume stability of exposure and covariate distributions over time to ensure that distributions were representative of those that determined the observed ecological ratios. This assumption may not hold if they were individual behavioral trends or a significant degree of migration following the exposure period relevant to the observed ratios (Polissar, 1980; Stavraky, 1976). This assumption might also be violated by the fact that cases were not reported at the individual's address, but rather at the municipality level where the health care centers are located. Obviously, administrative boundaries of municipalities do not always follow the natural boundaries of watersheds and, consequently, our study depended on aggregated information at the municipality level, which can create a selection bias (Greenland, 2001). For ethical reasons, we were not given access to the necessary information at the individual level to assess this possible bias.

Conclusion

This article has presented a method demonstrating how nonviral enteric diseases surveillance data could be converted into area-based illness incidences linked to data sets of possible explanatory variables in a multilevel framework. It has also established that nonviral gastroenteritis, giardiasis, salmonellosis, and campylobacteriosis incidences are significantly associated with environmental risk factors. The unexplained watershed-level variances of these incidences may be attributed to unmeasured municipal and watershed characteristics that can be targeted in future studies. The key priority in these future studies should be to examine the pivotal factors driving transmission of pathogenic microorganisms and quantify their effects in watersheds. This study also has the merit of investigating and establishing at the same time a milestone for these future studies using nonviral enteric disease surveillance data, which could prove to be an important resource.

Acknowledgements: We would like to express our gratitude to the Fond Québécois de Recherche sur la Nature et les Technologies and to the Public Health Agency of Canada for their financial support of this study. We are indebted to the Regional Public Health Directors of the MSSS for providing us with the notifiable cases of the study; the MAPA for the animal data; the MDDEP for the drinking water quality data in the province of Quebec; and definitely the ISQ for the demographic data on children at the municipality level. We wish to thank Dr. Basile Chaix, INSERM Paris VI, Faculty of Medicine and Dr. Abdous Belkacem, Department of Social and Preventive Medicine, Faculty of Medicine, Laval University for their methodological advice. We also wish to thank Professor S.V. Subramanian of the Department of Society, Human Development, and Health at the Harvard School of Public Health for his valuable comments on this paper. The research work was done at the Institut national de santé publique du Québec.

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continued on page 44

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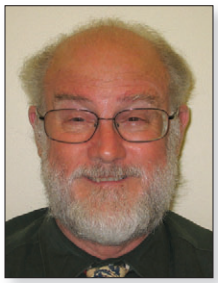
Did You Know?

October is the U.S. Environmental Protection Agency's (U.S. EPA's) Children's Health Month. You can find valuable information about protecting children's health on the U.S. EPA's Office of Children's Health Protection Web site at yosemite.epa.gov/ochp/ochpweb.nsf/content/homepage.htm.

DIRECT FROM ATSDR



James Holler, PhD

The Emergency Response Program at the Agency for Toxic Substances and Disease Registry

Editor's Note: **As part of our continuing effort to highlight innovative approaches to improving the health and environment of communities, the *Journal* is pleased to publish a bimonthly column from the U.S. Agency for Toxic Substances and Disease Registry (ATSDR). The ATSDR, based in Atlanta, Georgia, is a federal public health agency of the U.S. Department of Health and Human Services and shares a common office of the Director with the National Center for Environmental Health at the Centers for Disease Control and Prevention (CDC). ATSDR serves the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases related to toxic substances.**

The purpose of this column is to inform readers of ATSDR's activities and initiatives to better understand the relationship between exposure to hazardous substances in the environment and their impact on human health and how to protect public health. We believe that the column will provide a valuable resource to our readership by helping to make known the considerable resources and expertise that ATSDR has available to assist communities, states, and others to assure good environmental health practice for all is served.

The conclusions of this article are those of the author(s) and do not necessarily represent the views of ATSDR, CDC, or the U.S. Department of Health and Human Services.

James Holler is the emergency response program leader within the Division of Toxicology and Human Health Sciences.

Who We Are

The Emergency Response Program at the Agency for Toxic Substances and Disease Registry (ATSDR) is staffed by a group of trained emergency response coordinators (ERCs) with knowledge and experience to address acute release of hazardous materials. These ERCs, located within the Division of Toxicology and Human Health Sciences, often work with the Division of Community Health Investigation staff who are colocated at U.S. Environmental Protection Agency (U.S. EPA) regional offices. The Emergency Response Program provides support and collaboration with other federal agencies and state and local authorities to develop the appropriate public health response in the event of acute release of hazardous materials.

What We Do

The ATSDR Emergency Response Program has had significant participation in a number of high visibility national activities, including the 2001 anthrax response, the 2003 Columbia orbiter disaster, and the Graniteville train derailment and Hurricane Katrina, both occurring in 2005. Program members participated in the Deepwater Horizon oil spill response by developing an on-site program for state public health officials. Other actions included rapid data review and evaluation, formulation of sampling plans, and the development of numerous fact sheets for the general public, medical professionals, and state and local entities. Substances often addressed in previous consultations include mercury, pesticides, heavy metals, arsenic, various volatile organic compounds, and lead. More recently, the program provided data review and evaluation to the Arkansas Department of Health for air sampling associated with the Mayflower Pipeline oil spill in March 2013.

Many acute exposure situations develop as a result of train derailments, warehouse fires, and other unforeseen accidents. These exposure situations release hazardous materials into the air or water systems, endangering community members. Reference values outlined by the ATSDR minimal risk levels (www.atsdr.cdc.gov/mrls/mrllist.asp) or the U.S. EPA Integrated Risk Information System (www.epa.gov/IRIS/) program are used to assess these hazards. Other

guidance values can include U.S. EPA acute exposure guideline levels (www.epa.gov/oppt/aegl/), National Institute for Occupational Safety and Health–recommended exposure limits (www.cdc.gov/niosh/npg/), or American Conference of Governmental Industrial Hygienists' emergency response planning guides. These reference values provide guidance for managing potential environmental exposure and implementing actions such as evacuation or shelter in place. When such guidance values are not available, then reference values must be developed by ATSDR from published literature sources in a timely manner to be useful to the responders on the ground. The public health action plans and impacts to the community must be communicated to community members through meetings, fact sheets, and other media. The ATSDR Emergency Response Program can support local officials in communication activities through technical support, draft documents, and on-site support as needed.

The ATSDR Emergency Response Program assists in the development of site safety plans, the assessment of environmental monitoring data, the development of sampling plans, and the development of fact sheets and other communication tools for an incident. The program can provide recommendations on personal protective equipment, evacuation and reentry advice, and contingency planning. The program provides reach-back capabilities to draw on expertise within the agency, including physicians, toxicologists, chemists, environmental scientists, and other specialties. All emergency response coordinators are hazardous waste operations and emergency response (HAZWOPER) field qualified and can respond to a situation on site if requested. HAZWOPER training includes initial 40-hour training for cleanup activities and an annual eight-hour refresher training to retain certification.

ATSDR Resources

Safely and effectively managing hazardous material exposure incidents can be challenging, especially considering the rarity of such events for individual medical personnel. The Managing Hazardous Materials Incidents series was developed to provide emergency medical services personnel and hospital emergency departments with the necessary guidance to plan for, and improve their ability to respond to, incidents that involve human exposure to hazardous materials. The guidelines inform emergency personnel how to appropriately decontaminate, treat, and recommend follow-up care to exposed persons, as well as take measures to protect themselves. These guidelines can be found in three volumes at www.atsdr.cdc.gov/mhmi/index.asp. *Volume I—Emergency Medical Services: A Planning Guide for the Management of Contaminated Patients* and *Volume II—Hospital Emergency Departments: A Planning Guide for the Management of Contaminated Patients* are planning guides to assist first responders and hospital emergency department personnel in planning for incidents that involve hazardous materials. *Volume III—Medical Management Guidelines for Acute Chemical Exposures* is a guide for health care professionals who treat persons who have been exposed to hazardous materials.

Support From the Centers for Disease Control and Prevention (CDC)

After state and local resources are exhausted in a response situation, federal resources can be activated to provide the additional means necessary to protect lives and property. ATSDR and CDC support such federal actions in response through the National Response Framework (www.fema.gov/national-response-framework), which is organized by activity type into emergency support functions (ESFs).

The ATSDR Emergency Response Program has the unique role of supporting the Department of Health and Human Services for medical services (ESF #8) and supporting the U.S. EPA for hazardous materials (ESF #10). In addition to these two highly relevant ESFs, ATSDR ERCs have filled various roles within the National Incident Management System during declared federal disasters with the active participation of ATSDR/CDC.

The National Response Team (NRT) Activities

The NRT (www.nrt.org/) coordinates the federal response to oil and hazardous pollution incidents. This NRT is made up of 15 federal departments and agencies. The ATSDR Emergency Response Program assists in representing the Department of Health and Human Services on the NRT and the working committees of Preparedness, Response, and Science and Technology. The NRT supports the regional response teams and federal on-scene coordinators in addressing policy and programmatic issues for federal response situations. The participation of the ATSDR Emergency Response Program members ensures a strong viable public health component to environmental response planning. ATSDR routinely provides the on-scene coordinator, managing a response with assessment of environmental data and specific recommendations for community actions such as evacuation or shelter in place.

The ATSDR Emergency Response Program assists the CDC 24-hour Emergency Operations Center in responding to requests for rapidly needed information concerning chemical spill response. The ATSDR Emergency Response Program operates 24/7 with an emergency responder duty officer on a weekly shift. The ATSDR duty officer can be reached through the CDC Emergency Operations Center (770-488-7100).

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DIRECT FROM CDC ENVIRONMENTAL HEALTH SERVICES BRANCH


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Culture Shift: Strengthening the Role of Environmental Health in Public Health Performance Improvement Efforts

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.

Julianne R. Price is the statewide PACE coordinator for Florida, and C. Meade Grigg is the deputy secretary for Statewide Services for the state of Florida. Maggie K. Byrne is a public health advisor with EHSB.

Many environmental health (EH) programs already feel short on time, staff, and resources. Are performance improvement efforts worth the effort? Evidence from Florida suggests that they are. This column discusses two case studies in which EH improvement tools were effectively integrated with broader performance improvement initiatives, resulting in a clearer understanding of how EH issues intersect with larger public health (PH) concerns and the importance of EH involvement in addressing them.

A significant performance improvement opportunity is the Public Health Accreditation Board's (PHAB's) voluntary accreditation process. Health departments seeking accreditation must submit a recent community health assessment, community health improvement plan (CHIP), and agency strategic plan before applying (Public Health Accreditation Board [PHAB], 2011a, 2011b). As an integrated Florida Department of Health (FDOH), Florida county health departments are involved in these efforts through EH performance improvement tools:

- **The Environmental Public Health Performance Standards (EnvPHPS) Self-Assessment**
  These standards, developed by the Centers for Disease Control and Prevention (CDC), help organizations assess their capacity to fulfill the essential environmental public health services, mirror the National Public Health Performance Standards, and align with PHAB's domains (CDC, 2010).
- **The Protocol for Assessing Community Excellence in EH (PACE EH)**
  This 13-step methodology, developed by CDC and the National Association of County and City Health Officials (NACCHO), fosters community involvement in EH decision making and contributes to several PHAB standards (NACCHO & CDC, 2000).

Case Study 1: Walton County, Florida

In 2012, Walton County Health Department's Division of EH (WCHDEH) used the EnvPHPS self-assessment to determine the county's environmental capacity and needs. A stakeholder group, which became known as the EH Council, performed the assessment; members included representatives from police departments, schools, community organizations, and local government. The council found the lowest EnvPHPS scores in the two areas of monitoring and linking people to needed resources. In tandem, the WCHIP (Walton County Health Improvement Plan) used Mobilizing for Action through Planning and Partnerships for its process, while the council used PACE EH to continue assessments.

Garden in a bucket program created to promote vegetable intake in Walton County.

Early in the CHIP process, WCHDEH realized that EH should be actively involved in WCHDEH's community health improvement planning initiatives. Stakeholders working on the CHIP learned that many root causes for chronic diseases link directly to environmental factors; in response, they composed specific strategies to address both the community's EH concerns and the environmental causes of chronic disease. For example, to increase fruit and vegetable intake, a CHIP objective was formed to create a "garden in a bucket" initiative to encourage families to plant small container vegetable gardens and to prepare and enjoy nutritious meals together (see photo above). Now implemented in all county schools, this program was recently designated a NACCHO promising practice (National Association of County and City Health Officials [NACCHO], 2013).

Case Study 2: Indian River County, Florida

The Indian River County Health Department's Division of EH (IRCHDEH) staff members used PACE EH to review the EnvPHPS-identified service gaps and to develop and prioritize actions. Because IRCHDEH staff members began integrating the EnvPHPS self-assessment data into the CHIP *as the CHIP was being developed*, the CHIP advisory group realized that EH factors influence issues they were already working on such as obesity, limited access to care, and transportation. This synergistic timing resulted in the CHIP advisory group elevating built environment to the third most important issue in their CHIP.

IRCHDEH case results included an increase in health department staff input in the county's planning processes and a focus on nonmandatory EH functions: 1) performing built environment interventions in communities with high chronic disease rates, 2) reversing the decline of the Indian River Lagoon, and 3) reducing rates of hospitalization resulting from dog bites. IRCHDEH combined EH work with local stakeholders' work to create a strong role for EH in accomplishing CHIP priority actions, thus integrating EH into larger health planning and performance improvement activities.

Shifting the Culture

Utilizing PACE EH methodology to mobilize the community was key to integrating necessary processes, from defining issues to implementing action plans. The EnvPHPS self-assessment revealed service gaps, which the health department utilized to define deficiencies within a community and EH scope. Data and action plans from these processes were then incorporated into the larger CHIP. Because accreditation requires applicants to have a CHIP, the FDOH felt strongly that EnvPHPS and PACE EH particularly bolstered PHAB Domain 4 ("Engage with the community to identify and address health problems") and should be part of community health improvement planning. See Figure 1 for a more thorough crosswalk of how the EnvPHPS and PACE EH align with PHAB domains.

Florida's experience indicates that high-level leadership support for quality improvement can provide additional impetus for EH involvement. At FDOH, the deputy for Statewide Services emphasizes that "organi-

Quick Links on Environmental Health and Performance Improvement

- **Environmental Public Health Performance Standards (EnvPHPS)**—assessment tool, articles on environmental health performance improvement, and online toolkit on preparing for and conducting the assessment: www.cdc.gov/nceh/ehs/EnvPHPS.
- **National Public Health Performance Standards (NPHPS)**—tools and materials for local, state, and governing entity assessments: www.cdc.gov/nphpsp.
- **Protocol for Assessing Community Excellence in Environmental Health (PACE EH)**—online toolkit, PACE EH guidance document in English and Spanish, and other resources (you will be prompted to sign up for a free NACCHO login to download documents): www.naccho.org/topics/environmental/PACE-EH.
- **Public Health Accreditation Board (PHAB)**—review standards and measures and other resources supporting voluntary public health accreditation: www.phaboard.org.

FIGURE **1**

Aligning Public Health Accreditation Board Domains With EnvPHPS and PACE EH

Public Health Accreditation (PHAB) Board Domains	EnvPHPS	PACE EH
Domain 1: Conduct and disseminate assessments focused on population health status and public health issues facing the community.	Essential Service 1: Monitor environmental and health status to identify and solve community environmental public health problems.	PHAB cites PACE EH as an example tool for standard 1.1 (Participate in or conduct a collaborative process resulting in a comprehensive community health assessment). Florida has identified additional measures where a PACE EH process may contribute as follows: • 1.2.3 A (Collect additional primary and secondary data on population health status), • 1.3.1 A (Analyze and draw conclusions from public health data), • 1.3.2 L (Provide public health data to the community…), and • 1.4.1 A (Use data to recommend and inform public health policy, processes, programs, and/or interventions).
Domain 2: Investigate health problems and environmental public health hazards to protect the community.	Essential Service 2: Diagnose and investigate environmental public health problems and health hazards in the community.	None noted.
Domain 3: Inform and educate about public health issues and functions.	Essential Service 3: Inform, educate, and empower people about environmental public health.	No specific citation by PHAB; Florida has identified the following measures where a PACE EH process may contribute as follows: • 3.1.1 A (Provide information to public on protecting their health), and • 3.1.2 A (Implement health promotion strategies to protect the population from preventable health conditions).
Domain 4: Engage with the community to identify and address health problems.	Essential Service 4: Mobilize community partnerships and actions to identify and solve environmental public health problems.	No specific citation by PHAB; Florida considers the community-focused assessment component of PACE EH to be supportive of this domain.
Domain 5: Develop public health policies and plans.	Essential Service 5: Develop policies and plans that support individual and community environmental public health efforts.	PHAB cites PACE EH as an example tool for measure 5.2 (Conduct a comprehensive planning process resulting in a tribal/state/community health improvement plan). Florida has identified additional measures where a PACE EH process may contribute as follows: • 5.1.2 A (Engage in activities that contribute to the development and/or modification of public health policy), and • 5.2.3 A (Implement elements and strategies of the health improvement plan, in partnership with others).
Domain 6: Enforce public health laws.	Essential Service 6: Enforce laws and regulations that protect environmental public health and ensure safety.	No specific citation by PHAB, although PACE EH processes may contribute to standard 6.2 (Educate individuals and organizations on the meaning, purpose, and benefit of public health laws and how to comply) by helping raise awareness of environmental health issues and related laws.
Domain 7: Promote strategies to improve access to health care services.	Essential Service 7: Link people to needed environmental public health services and assure the provision of environmental public health services when otherwise unavailable.	No specific citation by PHAB; Florida has identified measures where a PACE EH process may contribute as follows: • 7.1.1 A (Convene and/or participate in a collaborative process to assess the availability of health care services), and • 7.1.2 A (Identify populations who experience barriers to health care services).
Domain 8: Maintain a competent public health workforce.	Essential Service 8: Assure a competent environmental public health workforce.	None noted.
Domain 9: Evaluate and continuously improve health department processes, programs, and interventions.	Essential Service 9: Evaluate effectiveness, accessibility, and quality of personal and population-based environmental public health services.	None noted.
Domain 10: Contribute to and apply the evidence base of public health.	Essential Service 10: Research for new insights and innovative solutions to environmental public health problems.	No specific citation by PHAB; Florida has identified measures where a PACE EH process may contribute as follows: • 10.1.1 A (Identify and use applicable evidence-based practices and/or promising practices with implementing new or revised processes, programs, and/or interventions).
Domain 11: Maintain administrative and management capacity.		None noted.
Domain 12: Maintain capacity to engage the public health governing entity.		None noted.

EnvPHPS = Environmental Public Health Performance Standards; PACE EH = Protocol for Assessing Community Excellence in Environmental Health.

FIGURE **2**

Strengthening Environmental Health (EH) Role in Health Through Performance Improvement

zational culture trumps strategy every time." EH issues are often the root of broader public health issues that the health department hopes to address. The evidence from Florida's experience supports the theory that EH involvement in larger public health quality and community health improvement efforts can help ensure these environmental causes are understood and addressed (Figure 2).

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DIRECT FROM NCSL

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2013 Environmental Health Legislation

Editor's Note: The NEHA Government Affairs program has a long and productive association with the National Conference of State Legislatures (NCSL). The organizations have worked together on any number of legislative and policy areas that directly impact the environmental health profession. One of the keys to the successes of the NEHA/NCSL collaboration has been the recognition of the fact that often some of the most significant legislation and policy initiatives related to environmental public health occur in state legislatures. The states have, in a very real sense, been the innovators in developing new programs and practices. In recognition of this fact, we have asked NCSL to provide occasional overviews of state environmental public health legislative activity, covering topics that are of the most pressing public concern.

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Overview

As states begin to recover from the Great Recession, state legislators are beginning to tackle problems held in abeyance since 2008, including environmental health. Concerns about environmental management, water and wastewater systems, toxics and chemicals, food safety, and indoor air all were addressed during the 2013 state legislative sessions. And unlike their federal counterpart, the state legislatures were able to enact several significant pieces of environmental health legislation, as well as adopt budgets for their states.

Every state legislature was in session in 2013. Most adjourned by late June, but the legislatures in eight states, the District of Columbia, and Puerto Rico will remain in session throughout the year. More states are under single party control (the most since the 1920s), with both chambers of the legislature and the governor being of the same party. Even with single party control, the overall bill passage rate remains around 10%. Certain states had a very high passage rate. Colorado had close to a 70% passage rate, with both houses and the governor's office being controlled by Democrats.

Bills on environmental health did particularly well, with close to 16% of the bills introduced ultimately being signed into law.

At the halfway point of the year in June 2013, the National Conference of State Legislatures (NCSL) had identified over 1,300 bills on environmental health being introduced in every state plus Puerto Rico and the District of Columbia. Of these, at least 181 laws have been enacted and 38 resolutions were adopted in 43 states. The NCSL environmental health legislative database lists bills into 16 categories: asbestos; asthma; biomonitoring, tracking, and surveillance; body modification; children's environmental health; drinking water, food safety; indoor air quality; lead; mercury; pesticides; swimming pools; toxics and chemicals; wastewater; environmental health management; and miscellaneous. The most activity was on food safety; however, toxics and chemicals saw the greatest number of laws enacted (32). Biomonitoring, tracking, and surveillance saw the fewest (1).

Asbestos

In 2013, eight bills were enacted and one resolution was adopted in seven states regarding asbestos. Most measures sought to limit exposure through increased abatement funding, warning labels, and more stringent requirements for asbestos removal and demolition of buildings.

Two bills (Tennessee HB 197 and Texas HB 1325) related to legal action. The former limits asbestos-related liability and the latter

encourages dismissal of long-pending actions arising out of asbestos exposure. Virginia HJR 120 served to establish Mesothelioma Awareness Day in Virginia, which will be recognized on September 26 every year.

Asthma

All of the 14 enacted laws on asthma authorized the administration of epinephrine[1] to someone in a public school who is suffering from asthma-related anaphylactic reaction. Arkansas HB 2011 permits such treatment only to students who have a prescription on file. Several of the bills explicitly authorize the storage of automatic epinephrine injectors on the school grounds. An Oklahoma bill (OK HB 2101) and bills in Virginia (VA SB 893 and HB 1468) expressly limit liability for those who administer the treatment.

Four resolutions were adopted related to asthma. Companion bills in Illinois (IL SR 237 and HR 263) proclaimed May 2013 as Asthma Awareness Month, and companion bills in Pennsylvania (PA SR 123 and HR 240) recognized May 7, 2013, as "World Asthma Day."

Biomonitoring, Tracking, and Surveillance

Biomonitoring detects and measures trace concentrations of chemicals that are present in human fluids and tissues due to exposure to chemicals in the air, water, soil, food, and consumer products. Three bills were introduced that concerned biomonitoring specifically, all of which are pending. Minnesota HB 961 would appropriate money for biomonitoring of children and disadvantaged communities. New York SB 243 would create an environmental health tracking system that would both link information to other biomonitoring databases and also conduct its own biomonitoring tests. New York AB 4182 would require every health care facility to report clinical laboratory test results that show abnormally elevated tissue levels of pesticides to the commissioner of environmental conservation within 24 hours.

Two bills were passed related to tracking and surveillance. New Mexico HM 42 requests the department of health to study the relationship between Parkinson's disease and pesticide exposure. Maryland enacted a law (SB 380) that requires a workgroup to study and report on cancer clusters[2] and potential environmental causes of cancer.

Body Modification

Body modification, which encompasses physical alterations of the body for nonmedical purposes, covers a wide range of practices. Tattoos and piercings are probably best known, but other procedures, including tongue splitting (where the tongue is cut one or two times to create multiple tips) and subdermal implants (a kind of body jewelry which is placed under the skin to create a raised design), are also considered in this topic area. While body modification procedures are an ancient practice, some body modification procedures have seen increased popularity, and states have responded in kind.

Thirty-seven bills were introduced in 18 states related to body modification. Of these, four were enacted. In Arkansas, licensure, training, and liability for performing body art on a minor were tightened for body artists (AR SB 388). Additionally, AR SB 387 prohibits subdermal implants from being performed in Arkansas. Minors who wish to receive a body piercing or tattoo in Utah must provide their parent or guardian's written and signed consent as well as their physical presence (UT HB 117). New Mexico's Body Art Safe Practices Act (NM HB 350) was bolstered by giving the board of barbers and cosmetologists cease and desist power. Two pending bills in Pennsylvania (PA HB 364; PA HB 1249) would only allow tongue splitting to be performed by a physician or a dentist.

Children's Environmental Health

Because children's environmental health covers a wide variety of topics, there is overlap with other areas in this summary. Of the 36 enacted bills, all 27 coincided with areas including swimming pools, asthma, indoor air quality, lead, and other toxic chemicals. In addition to the enacted laws, four resolutions were adopted. The two most significant trends in children's environmental health were related to schools and product safety.

Twelve newly enacted laws and two adopted resolutions related to schools. All but two of the laws were related to asthma. Nebraska L 210 changed certain enrollment practices, including provisions for students who are emotionally disturbed. Connecticut HB 5113 established a uniform policy regarding school pool safety. "Green schools," which emphasize superior indoor air quality and have been shown to lower asthma and allergy rates, were promoted through Kentucky HR 69. Pennsylvania's HR 203 recognized April 30, 2013, as "National Healthy Schools Day."

Protections related to children's products focused on toxic chemicals, including bisphenol-A,[3] formaldehyde, and Tris.[4] Bisphenol-A was prohibited in children's products through Minnesota HB 459 and Nevada AB 354. Maine HB 625 designated bisphenol-A as a priority chemical in children's products, which means it will be subjected to heightened regulation. Tris is prohibited in children's products in both Vermont (VT SB 81) and Maryland (MD HB 99), and Minnesota HB 458 bans sale of children's products that contain formaldehyde. Maine clarified its rule on reporting priority chemicals found in children's products by requiring that written notice must be submitted to the state's department of environmental protection within 30 days of the sale of the product (ME SB 153). New Jersey SJR 40 designates the month of November as "Children's Product Safety Awareness Month."

Many of the remaining children's environmental health bills addressed lead exposure, restrictions on smoking in a motor vehicle with a youth present, and protecting children from pesticides.

Drinking Water

Twenty-seven laws and three resolutions were passed in 21 states related to pollution, storage, conservation, treatment, testing, and administrative procedures related to drinking water.

Most of the enacted laws prevent the release of pollutants. Alaska HB 80 regulates the discharge of wastewater from cruise ships in state waters. Arkansas HB 2252 prohibits the grant of a discharge permit for concentrated animal feeding operations[5] unless the request has been publicized in a local newspaper. Also in Arkansas, anyone who transports and dumps liquids improperly will be subject to a penalty (AR SB 970). Arizona prohibits application of pesticides Rotenone or Antimycin A to any body of water until an impact analysis is conducted (AZ SB 1469).

Colorado SB 41 calls for protection of stored drinking water through additional rights to storage and construction permits for wells. Conservation was approached at two different angles: in Colorado, use of gray water[6] was authorized (CO HB 1044), and in Con-

necticut, the local water utility was directed to promote water conservation through changes to water rates (CT SB 807). Six laws addressed issues related to public information dissemination, reorganization of public utilities, and appropriations for improving drinking water quality. Three laws provided requirements for testing and water treatment. Maryland HB 641 requires the Washington Suburban Sanitary Commission to test for unregulated contaminants.[7] In New Mexico, HB 415 requires the department of environment to compile a list of contaminants that will be tested in public water supplies. North Carolina enacted the Private Well Water Education Act (NC HB 396), which requires local health departments to educate private well water users regarding testing of wells.

Technological advances in hydraulic fracturing and horizontal drilling have contributed to an unprecedented rise in hydraulic fracturing across the U.S. One growing concern is the contamination of public drinking water resulting from the hydraulic fracturing process. In 2013 Illinois enacted SB 1715, becoming the first state to require water testing before and after drilling operations. At least 22 bills have been introduced in 13 states in 2013 that address water quality protection through the disclosure of hydraulic fracturing fluid chemicals, groundwater testing, or by requiring emergency supplies of drinking water in the event of a spill or leak.

Oregon HJM 7 urges Congress to increase investment in clean drinking water, and Pennsylvania HR 8 designated January 2013 as "Safe Drinking Water Month."

Food Safety

In 2013, states introduced 174 bills and adopted 24 laws regarding food safety. As one might expect, many of the 24 enacted laws and two resolutions in 17 states were related to inspections and regulations. Another category of food safety that is gaining popularity, however, is cottage foods,[8] addressing the local and small production of food. Mississippi SB 2553 completely exempts cottage food production operations from regulation. In Montana, SB 94 exempts exchanges between home canners and gardeners from food safety regulations, and HB 247 allows for a permit to be obtained to salvage the meat from an animal that has been accidentally killed by a motor vehicle. Mississippi also passed HB 718 to facilitate the procurement and use of locally grown and locally raised agricultural products in school meals in order to improve the quality of food served in schools and support the state economy by generating new income for state farmers.

In the inspection and regulation category, laws were passed relating to changing requirements for dairy inspection, deregulation of commercially prepackaged food and drink, and exceptions to the definition of food service establishments for nonprofits. Washington SB 5139 requires sampling of milk products to ensure compliance with bacteriological and cooling temperature standards.

Connecticut's HB 6527 on GMO[9] labeling has an interesting effective clause. The bill was originally meant to require that baby food that contained GMOs was labeled, but was expanded to apply to all food. This law only goes into effect, however, once four states, one of which must border Connecticut, also enact mandatory GMO labeling laws and the aggregate population of those states is at least 20 million.

Three laws contained prohibitions. Delaware (HB 41) outlawed the sale of shark fins; Oklahoma (HB 1999) prohibits sale of horse meat for human consumption; and Minnesota (HB 459) restricts sale of children's food containers that contain bisphenol-A.[10] Two laws related to labeling: Washington HB 1200 creates a system for the unlawful misbranding of fish and seafood, and Mississippi SB 2687 reserves to the legislature any regulation of consumer incentive items and nutrition labeling for food.

Two resolutions were congratulatory in nature. Georgia SR 205 recognized February 19, 2013, as State Restaurant Day, and Hawaii SR 38 resolved to support the efforts of nongovernmental entities that help local agricultural producers meet federal food safety and food security requirements.

Indoor Air Quality

For purposes of this section, laws related to indoor air quality are categorized as relating to carbon monoxide, radon, mold, or smoking. Under these categories, a total of 18 laws and nine resolutions in 15 states were passed in 2013.

Carbon monoxide gas is dangerous not only because it is toxic at certain levels, but also because it is odorless and colorless and therefore difficult to detect. Many statutes already require carbon monoxide alarms to be installed in homes and rental units, and in 2013, seven more laws were enacted in this category. Most provide that either carbon monoxide detectors must be installed or that they must be properly maintained. Arkansas SB 840, however, repeals the requirement that low-voltage carbon monoxide detectors be installed in newly constructed homes. Indiana SB 305 restricts child care providers from receiving vouchers from the Child Care and Development Fund if the facility has been damaged from a carbon monoxide gas leak. Companion bills Maryland HB 1413 and Maryland SB 969 require disclosure of whether a carbon monoxide alarm has been installed for sale of real property.

While most of the focus has been on protecting dwellings, a trend has surfaced related to installation of carbon monoxide in public buildings—22 bills were introduced that would require carbon monoxide detectors in schools.[11] New Jersey AB 186 proposed requiring carbon monoxide detectors in ice rinks. A carryover bill pending in Oklahoma (OK HB 2059) would require that hotels and motels install detectors.

Two laws were enacted and two resolutions were adopted related to radon. Minnesota SB 887 established the Minnesota Radon Awareness Act, which requires disclosure of radon concentrations in real property transactions and requires property buyers to be warned about the dangers of radon and the importance of having a radon test performed. In Pennsylvania, HR 34 commemorates January 2013 as "Radon Awareness Month." Similarly, January 2014 was designated as Radon Action Month in the state of Utah via SCR 11, which urges the citizens of the state to take steps to protect themselves from the dangers of radon exposure.[12]

Every mold law that was passed and one resolution that was adopted arose out of Virginia, although 15 bills remain pending in New Jersey, New York, and Pennsylvania. Virginia HJR 49, SJR 66, HB 1291, and SB 678 are substantially similar and all provide for the deregulation of mold inspectors and mold remediators.[13] Virginia's HB 1110 lifts applicability of mold licensure requirements on an owner performing mold inspections or mold remediation on property that contains more than four residential dwelling units.

Pennsylvania HR 358 directs the department of health to consider regulations in support of nanotechnology and other nontoxic means that control bacteria, mold, mildew, fungi, algae, viruses, and volatile organic compounds causing noxious odors.

Smoking was addressed by eight laws and three resolutions. Oregon SB 444, Utah HB 13, and Illinois HR 46 relate to restrictions on smoking in a motor vehicle while a youth is present. North Dakota (ND HB 1253) will now reimburse for the costs incurred in securing signage related to complying with smoking restrictions. All of the other smoking bills and resolutions tightened restrictions on smoking, except that North Dakota HB 1292 no longer requires that nonsmoking public vehicles post signage and those vehicles may retain their ashtrays. Though no bills were enacted related to restricting smoking in outdoor areas, several were introduced. In Alabama, SB 195 failed, which would have prohibited smoking in outdoor arenas, amphitheaters, stadiums, and playgrounds.

Lead

Lead exposure continues to be a serious health concern, especially for children. In 2013, 13 laws and one resolution in eight states were enacted to reduce exposure, increase the flow of information, and more effectively identify lead poisoning.

Of the four laws related to reducing the possibility of exposure, three were designed to regulate lead-based paint. The fourth, Virginia SB 894, makes it a misdemeanor for any person to violate any provisions thereby posing a hazard to the health of pregnant women and children under the age of six years.

Maryland (MD HB 303) established the Task Force to Study Point-of-Care Testing for Lead Poisoning to study and make recommendations regarding point-of-care testing to screen and identify children with elevated blood lead levels. The health departments in New Jersey and Virginia were impacted by lead legislation. In New Jersey (NJ HB 3104), health benefit plans are now required to cover screening for blood lead levels. Virginia (VA HB 829) now permits linkages between the Virginia Immunization Information System and other health records, including blood lead level screening.

Missouri SCR 15 established the Lead Industry Employment, Economic Development, and Environmental Remediation Task Force, which will work to balance a booming lead industry with safe production and remediation measures. New York introduced at least six bills, all of which are pending, which would study potentially toxic substances, such as lead, in synthetic turf.[14]

Mercury

Exposure to mercury can have damaging effects on all people, but it is especially detrimental to fetuses, babies, and children because of its impact on neurological development.[15] Eight laws were enacted and one resolution was adopted related mostly to the prevention of environmental mercury contamination.

Illinois (IL SB 1715), Maine (ME HB 800), and New Mexico (NM SB 99) passed requirements to prevent water pollution through limits on hydraulic fracturing, restrictions on use of mercury in gold prospecting, and proper disposal of dental materials, respectively.

Texas (TX HB 2446) and Connecticut (CT SB 564) opted to offer tax breaks for facilities that meet certain mercury emissions goals. New Jersey AB 3104 served to improve education about mercury contamination by requiring information on the dangers of mercury poisoning through ingestion of certain fish to be posted in any health facilities that serve women who expect to become pregnant, women who are pregnant or breastfeeding their children, and young children.

Two somewhat unusual legislative acts were related to mercury in 2013. The first was a resolution (RI HR 6225) from Rhode Island that asks Congress to support a registry of veterans who were stationed in Fort McClellan in Alabama, owing to the extreme contamination of the military base. The second, Oregon HB 2448, removes the obligation of the governing board of the State Department of Geology and Mineral Industries to identify naturally occurring mercury that, if present in sufficient concentrations at a surface mining site, subjects the operator to increased bond or security requirements.

Pesticides

Of the 18 bills enacted and three resolutions adopted in 15 states regarding pesticides, 12 were related to regulations for pesticide applicators and direction to certain government agencies. In New Hampshire, HB 393 puts limits on the nitrogen and phosphorus content of fertilizers sold at retail and intended for use on turf. Oregon HB 3364 expands the list of state agencies and public universities required to adopt integrated pest management practices, as well as requiring notice regarding pesticide applications. Use of methyl bromide gas fumigation in the Department of Forestry's forest tree nurseries was continued through Virginia SB 126. Wyoming SB 160 enacted more stringent regulations on pesticide applicators.

Four laws addressed use of pesticides to control mosquitoes. In Maine, HB 201 requires the Department of Agriculture, Conservation, and Forestry to develop a plan for the protection of public health from mosquito-borne diseases while minimizing the risk of pesticide use to humans and the environment. Texas SB 186 addressed abatement of mosquitoes on uninhabited residential property that is reasonably assumed to be abandoned or uninhabited due to foreclosure.

Maryland SB 675 (with companion bill HB 775) and New Mexico HM 42[16] directed studies on the establishment of a pesticide use database and the connection between Parkinson's disease and pesticides, respectively. California ACR 21 declared the week of April 21, 2013, through April 27, 2013, as West Nile Virus and Mosquito and Vector Control Awareness Week.

Swimming Pools

While swimming pools contribute to a variety of health and safety challenges, the 10 laws enacted and two resolutions adopted in nine states were mostly related to sanitation and drowning safety and awareness.

Maryland HB 364 requires each county or municipality that owns or operates a swimming pool to develop and implement an onsite automated external defibrillator program. In Texas (TX HB 1932), abandoned swimming pools that are not covered and protected by a fence are now designated a public nuisance. In Connecticut, schools must follow a new, uniform policy regarding school pool safety so as to reduce loss of life and injury (CT HB 5113). Tennessee SB 172 adopted the Hotel and Public Swimming Pool Inspection Act, which will ensure that swimming pools are constructed and operated in a safe and sanitary manner.

Arizona SB 1290 reined in regulations for swimming pools in terms of licensure and registration requirements for antimicrobial treatments as well as time frames for grant or

denial of construction permits. Florida (FL HB 73) no longer requires swimming instructors to submit their certification for instructing people with developmental disabilities to the Department of Health.

Louisiana and South Carolina adopted statutes aimed at pool safety awareness. Louisiana HCR 17 recognized July 2013 as "Swimming Pool Safety Month" in honor of Aubrie and Angel Castine-Smith, who drowned in a swimming pool. South Carolina HB 4021 declared May 2013 as "Water Safety Awareness Month" to encourage public school districts to provide at least one hour of instruction on water safety during the month of May.

Toxics and Chemicals

The category of toxics and chemicals is very broad, the bulk of which has already been covered by other sections of this summary. Of the 32 enacted laws and six adopted resolutions in 19 states, 25 are related to one or more of the following areas: asbestos, pesticides, mercury, children's environmental health, mold, or lead.

Aside from these categories, laws and resolutions addressed training in the workplace, prevention of toxics and chemicals contamination, cleanup of contaminated sites and fees, modernization of the Federal Toxic Substances Control Act, and the study of atrazine.[17] Connecticut's HB 5725 established a statewide strategy to reduce phosphorus loading in inland nontidal waters. North Carolina clarified their laws to ensure that a maximum number of properties are able to participate in the brownfields program (NC HB 789). The exemption for incidental combustion of untreated wood from the ban on combusting construction and demolition debris was extended in New Hampshire (NH HB 517). Vermont's SB 81 strengthened its regulations on certain toxics, including flame retardants.

Wastewater

Wastewater bills ranged from the regulation of sewage, to dumping, to stormwater regulations. Twelve states responded to these needs with 16 newly enacted laws.

Five laws were related to administrative or broad regulatory changes. Arkansas' SB 670 exempts small water systems and small sewage systems from regulation by the Public Service Commission. North Carolina (NC HB 488) sought to promote regionalization of water and sewer systems by transferring ownership and operation of certain public water and sewer systems to a metropolitan water and sewerage district.

Three laws were passed to ensure proper disposal of materials into the water system. Three more in Iowa (IA HB 311), Indiana (IN HB 1497), and Montana (MT HB 293) serve to provide notice regarding stormwater discharges, connecting property to a sewer system, and the public service commissioner's jurisdiction, respectively.

Colorado HB 1191 provides grants for domestic wastewater treatment plants. New Mexico HB 415 proscribes a procedure for determining which water contaminants will be screened. Texans can now hook up rainwater harvesting systems of over 500 gallons, subject to certain requirements (TX HB 2781).

Environmental Health Management

Environmental health management refers to those policies that help manage environmental factors that may impact human health. Examples of these policies are seen throughout this summary. In 2013, 11 laws were enacted in 8 states that specifically relate to environmental health management. Subcategories include drinking and wastewater, food, property, and general promotion of environmental health.

Three laws are not easily classifiable in the other sections of this summary. First, Florida HB 73 provides for multiple regulations of residential property, including elevators, hurricane shelters, and repair or replacement of damaged property. Next, Oregon SB 476 requires the Department of Environmental Quality to provide notice regarding an agreement to perform removal or remedial action. Finally, Utah SB 57 created an environmental stewardship certification program where agricultural operations can apply for such certification upon compliance with best management practices, including sustainable agriculture, prevention of harm to the environment, and nutrient management plans.

Miscellaneous

In 2013, four environmental health laws and one resolution in five states stand out as outliers.

Maryland HB 613 authorized municipalities and certain counties to finance the cost of infrastructure improvements in a sustainable community in the same manner as a transit-oriented development and establishes a sustainable community tax credit program for commercial properties. New Hampshire HB 482 and Oregon HB 2131 both relate to bed bug infestations; the former assigns responsibility for bed bug infestations in rented properties, and the latter requires information pertaining to bed bug infestations to be held confidentially by public health authorities. A new Virginia law (VA HB 839) relates to ownership of property affected by defective drywall and costs for correction or elimination. Finally, Louisiana SR 128 urged the Louisiana State Board of Home Inspectors to determine whether amendments are necessary in order to expand the scope of practice of home inspectors to ensure that Louisiana home buyers are adequately protected and informed about the condition of residential resale buildings.

Note: The above summarizes state law or legislation and is the property of the National Conference of State Legislatures (NCSL) and is intended as a reference for state legislators and their staff. NCSL makes no warranty, expressed or implied, or assumes any legal liability or responsibility for third party use of this information, or represents that its use by such third party would not infringe on privately owned rights.

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[1] Epinephrine is a hormone used to treat a number of conditions, including anaphylaxis and cardiac arrest. It is typically administered through an injection, or what is commonly known as an EpiPen. Information available at http://en.wikipedia.org/wiki/Epinephrine.

[2] The occurrence of a larger-than-expected number of cases of cancer within a group of people in a geographic area over a period of time. Definition from the National Cancer Institute, available at http://www.cancer.gov/common/popUps/popDefinition.aspx?term=cancer+cluster.

[3] Bisphenol-A is an industrial chemical that has been present in many hard plastic bottles and metal-based food and beverage cans since the 1960s. Definition from the U.S. Food and Drug Administration, available at http://www.fda.gov/NewsEvents/PublicHealthFocus/ucm064437.htm.

[4] "Tris" is the common name given to types of phosphate ester flame retardants which can be found in household items and have been connected with cancer as well as liver and kidney damage. Information from the National Resources Defense Council, available at http://www.nrdc.org/living/chemicalindex/tris.asp.

[5] Animal feeding operations (AFOs) are agricultural operations where animals are kept and raised in confined situations. AFOs congregate animals, feed, manure, and urine, dead animals, and production operations on a small land area. Definition from the U.S. Environmental Protection Agency, available at http://www.epa.gov/Region7/water/cafo/index.htm.

[6] Gray water refers to the reuse of water drained from baths, showers, washing machines, and sinks (household wastewater excluding toilet wastes) for irrigation and other water conservation applications. Definition from Colorado State University, available at http://www.ext.colostate.edu/PUBS/natres/06702.html.

[7] Contaminants suspected to be present in drinking water, but that do not have health-based standards set under the Safe Drinking Water Act. Definition from the U.S. Environmental Protection Agency, available at http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/index.cfm.

[8] Cottage foods are non-potentially hazardous foods that do not require time and/or temperature control for safety and can be produced in a home kitchen for direct sale to customers at farmers markets, roadside stands, or other direct markets. Examples of cottage foods include breads, jams and jellies, dried pasta, coffee beans, and vinegar. Definition from the Michigan Department of Agriculture & Rural Development, available at http://www.michigan.gov/mdard/0,4610,7-125-50772_45851-240577--,00.html#ProductList.

[9] Genetically modified organisms.

[10] Supra note 7.

[11] In December 2012, 42 students and seven adults were seriously sickened by potentially lethal levels of carbon monoxide in an Atlanta elementary school that did not have detectors. "Georgia's Finch Elementary School Evacuated For Carbon Monoxide, 31 People Taken To Hospitals." Huffington Post. December 3, 2012. Available at http://www.huffingtonpost.com/2012/12/03/finch-elementary-school-e_n_2232191.html.

[12] Radon is the second-leading cause of lung cancer in the U.S. today. *A Citizen's Guide to Radon,* U.S. Environmental Protection Agency, available at http://www.epa.gov/radon/pubs/citguide.html.

[13] According to the Virginia Department of Professional and Occupational Regulation, Governor McDonnell's Commission on Government Reform and Restructuring recommended deregulation of the mold remediation and inspection profession because, unlike asbestos and lead abatement, the U.S. Environmental Protection Agency does not regulate mold remediation and inspection. In light of the absence of national oversight and standards, the General Assembly determined Virginia's regulatory program unnecessary and endorsed the commission's deregulation recommendation. Available at http://www.dpor.virginia.gov/Boards/ALHI/Mold_FAQ/.

[14] See NY S 853, NY A 5486, NY A 5813, NY S 4086, NY A 5980, and NY S 5726.

[15] Health Effects, U.S. Environmental Protection Agency, available at http://www.epa.gov/mercury/effects.htm.

[16] NM HM 42 is also covered in the *Biomonitoring, Tracking, and Surveillance* section of this summary.

[17] Atrazine is one of the most widely used agricultural pesticides in the U.S. Change in hormone levels is the most sensitive health effect observed in an extensive battery of atrazine toxicity tests. Atrazine Updates, U.S. Environmental Protection Agency, available at http://www.epa.gov/pesticides/reregistration/atrazine/atrazine_update.htm.

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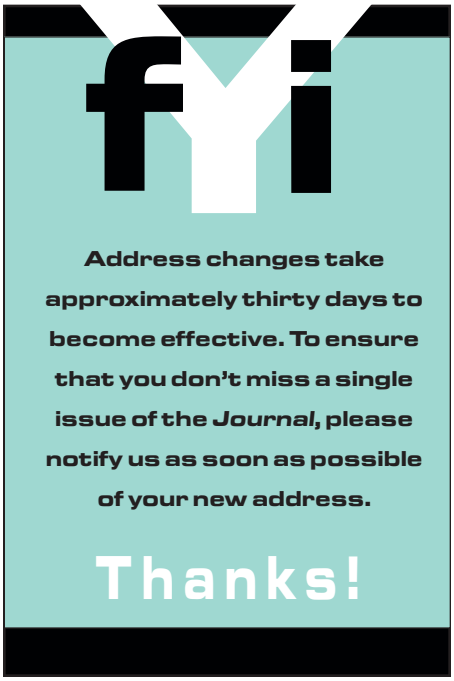

DEMYSTIFYING THE FUTURE

Thomas Frey

By 2030 Over 50% of Colleges Will Collapse: Part 1

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.

In 1791 when Mozart died, his 29-year-old wife, Constanze Weber, was forced to earn a living, so she began selling her late husband's manuscripts and turned the former messy paper scraps lying around the house into a tidy income stream.

Luckily for her, she lived after Gutenberg's printing revolution had begun in Europe, allowing her to leverage the power of rapid reproducibility.

Over time, the music industry has figured out many different formats for reproducing music, moving from sheet music, to Edison's cylinder phonograph, to vinyl records, to 8-track tapes, and eventually to downloadable digital recordings.

During those same 200+ years, colleges have done little to reproduce and distribute college courses, choosing instead to redo each college class, much like ancient monks reproducing the scrolls of history.

When demand for education increased, they simply built more colleges, thousands of them, in fact, all over the world. This is analogous to forcing people to go to concerts and other live venues to listen to music.

Over the coming decades, the amount of education we consume to stay competitive will increase exponentially.

The education we "buy," however, will increasingly be on "our terms," not on theirs. We will want education that is relative, timely, available on demand, and fits within a specific need. And it will need to be far more affordable.

For these reasons and more, which I'll explain below, we will begin to see the mass failure of traditional colleges. But out of this will come an entirely new education era unlike anything we have ever seen.

Embracing the Digital Era

Over the past decade, the number of people reading printed newspapers, visiting retail stores, and using direct mail has fallen sharply.

At the same time, the amount of news consumed on a daily basis has risen sharply, the overall level of retail sales has continued to increase, and person-to-person communications through e-mail, social media, texting, and other forms of digital communications have exploded around us.

Each industry has forged its own unique path into the digital age.

In the past few months the level of experimentation surrounding college education has shot up considerably, and many innovations are getting considerable traction. A high level of experimentation is always a leading indicator of change even if we don't have a clear view of what it will look like on the other side.

Key Metrics to Consider

Several driving forces are causing the world of higher ed to feel the ground shift beneath its feet. Consider the following metrics.

Rising Costs

- In the U.S., student loans exceeded $1 trillion for the first time in 2013 with the average student loan soaring to $23,300 (source: BBC, www.bbc.co.uk/news/business-23236019).
- In-state tuition and fees at California's largest colleges jumped 130% on average during the last decade, or roughly five times faster than inflation (source: *The Modesto Bee*, www.modbee.com/2013/07/08/2798083/data-center-tuition-trends-at.html).

Demand for Online Courses

- In less than six years, Apple's iTunesU reached the one billion course download threshold (source: Apple, www.apple.com/pr/library/2013/02/28iTunes-U-Content-Tops-One-Billion-Downloads.html).
- In less than one year from its founding, Coursera passed the 3.2 million registered student mark (source: Inside Higher Ed, www.insidehighered.com/news/2013/04/08/coursera-begins-make-money).
- Udemy now hosts over 8,000 courses for its base of 800,000+ students. Their top 10 instructors have earned combined course revenues of more than $5 million (source: The Next Web, thenextweb.com/insider/2013/06/18/udemys-online-learning-marketplace-has-8k-courses-800k-students-and-launches-new-summer-grant/).

The Seeds of Discontent

- Last year 284,000 college graduates, including 37,000 advance degree holders in the U.S., were working minimum wage jobs in 2012 (source: *Wall Street Journal*, blogs.wsj.com/economics/2013/03/30/number-of-the-week-college-grads-in-minimum-wage-jobs/).
- Out of 41.7 million working college graduates of 2010 in the U.S., 48% worked jobs that didn't require a bachelor's degree (source: Huffington Post, www.huffingtonpost.com/2013/01/29/underemployed-overeducated_n_2568203.html).
- In China, a recent study projected that more than half of the 94 million Chinese earning college degrees between 2010 and 2020 will be working blue-collar jobs because of an oversupply of talent (source: *International Business Times*, www.ibtimes.com/future-chinese-college-graduates-bleak-more-half-will-have-take-blue-collar-jobs-2020-1298875).
- According to the *Beijing Times*, China's college graduates on average make only 300 yuan, or roughly $44, more per month than the average Chinese migrant worker (source: *Wall Street Journal*, blogs.wsj.com/chinarealtime/2010/11/22/value-of-a-chinese-college-degree-44/).

Shifting Trends

- In their paper, "The Great Reversal in the Demand for Skill and Cognitive Tasks," researchers Paul Beaudry, David A. Green, and Benjamin M. Sand conclude that the year 2000 was a turning point where demand for cognitive tasks often associated with high educational skills began to decline (source: National Bureau of Economic Research, http://www.nber.org/papers/w18901).
- Forty-three percent of universities are planning to offer massive open online courses by 2016, a 30% jump from the number of institutions currently offering them (source: *USA Today*, www.usatoday.com/story/news/nation/2013/06/11/real-classrooms-better-than-virtual/2412401/).

According to Andrew Ng, founder of Coursera, "When one professor can teach 50,000 people, it alters the economics of education."

Student Loan Backlash

There's a big difference between affordability and financeability. Until now, colleges have had a relatively easy time selling a student on getting an education today in exchange for some unknown monthly payment to be determined later.

Hundreds if not thousands of studies have been commissioned over the years to support the value of higher education, and students on the fence are quickly overwhelmed with evidence that they're making the right decision.

In fact, the anti-education crowd is very small, and those questioning the cost of education have only become vocal during the past few years.

The "education industrial complex" is perhaps the most influential in the world, with everyone from presidents and world leaders, to Nobel Laureates, to CEOs and business executives all unwavering in their support of colleges and their accomplishments.

Yet for the lowly student sitting at home with $100,000 in debt and the only job available to them is one that doesn't require a college degree, the entire system begins to feel like a house of lies, with festering levels of anger working their way to the top.

Over the coming months this seething cauldron of discontent will begin to erupt in unusual ways.

Next month's column will explore the eight reasons why over 50% of colleges will fail by 2030, as well as provide some final thoughts on this subject.

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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Environmental Health Faculty Position

The Department of Health Sciences at Illinois State University in Normal, Illinois, invites applications for a full-time, tenure-track position as an Assistant/Associate Professor in Environmental Health beginning August 16, 2014. Candidates must have earned a doctorate in environmental health, occupational health, or related fields; or expect to complete a doctorate by August 30, 2014. The ideal candidate should have experience teaching courses in environmental or occupational health (e.g., industrial hygiene, occupational health, air quality, water quality, and professional practice) and/or professional experience in environmental health. Candidates will be expected to contribute to the design and implementation of the education curriculum, develop a focused area of research, including publication in refereed journals, and provide service to the campus and professional communities. A full job description is available at http://www.illinoisstate.edu/jobs, posting number 10147300. Initial review of applicants will begin on November 15, 2013, and continue until the position is filled. For more information, please visit http://www.healthsciences.ilstu.edu.

Illinois State University is an equal opportunity, affirmative action employer committed to encouraging diversity.

Did You Know?

You can become a registered adult volunteer trainer for the Boy and Girl Scouts of America (BSA and GSA) and share your expertise in STEM (science, technology, engineering, and mathematics) with the youth of America. BSA and GSA offer a variety of skill courses to adolescents ages 12–17 that provide a brief introduction to a spectrum of professional subjects, including STEM. STEM topics of interest such as public health, chemistry, environmental science, soil and water conservation, and sustainability are areas in which environmental health professionals have expertise. NEHA encourages its members to look into these volunteer training opportunities. Help foster the next generation of scientific professionals by sharing what you know! For more information, visit www.neha.org/pdf/STEM.pdf.

EH CALENDAR

UPCOMING NEHA CONFERENCES

July 7–10, 2014. The Cosmopolitan of Las Vegas, NV. For more information, visit www.neha2014aec.org.

NEHA AFFILIATE AND REGIONAL LISTINGS

Alaska
October 2–4, 2013: Annual Educational Conference, sponsored by the Alaska Environmental Health Association, BP Energy Center, Anchorage, AK. For more information, visit https://sites.google.com/site/aehatest/.

California
October 17–18, 2013: 2013 CEHA Update, hosted by the Citrus Chapter of the California Environmental Health Association, Sheraton Anaheim, Garden Grove, CA. For more information, visit www.ceha.org/events.

Illinois
October 17–18, 2013: IEHA Annual Educational Conference, sponsored by the Illinois Environmental Health Association, Parke Hotel, Bloomington, IL. For more information, visit www.iehaonline.org.

Kansas
October 1–3, 2013: KEHA Fall Conference 2013, sponsored by the Kansas Environmental Health Association, Ramada Inn, Topeka, KS. For more information, visit www.keha.us.

Missouri
October 2–4, 2013: Annual Education Conference, sponsored by the Missouri Environmental Health Association, The Resort at Port Arrowhead, Lake Ozark, MO. For more information, visit www.mmfeha.org.

Montana
October 7–9, 2013: 2013 Fall Educational Conference, "**Partnering for Healthy Change,**" sponsored by the Montana Environmental Health and Public Health Associations, Great Falls, MT. For more information, visit www.mehaweb.org.

Oklahoma
October 14–16, 2013: 2013 Conference, sponsored by the Oklahoma Society of Environmental Health Professionals, The Sheraton Midwest City Hotel, Midwest City, OK. For more information, visit www.osehp.org.

Texas
October 8–11, 2013: 58th Annual Education Conference, sponsored by the Texas Environmental Health Association, Double Tree Hotel, Austin, TX. For more information, visit www.myteha.org/Annual_Education_Conference.

Wyoming
October 8–10, 2013: 2013 Annual Education Conference, sponsored by the Wyoming Environmental Health Association and the Wyoming Food Safety Coalition, Hotel Terra, Teton Village, WY. For more information, visit www.wehaonline.net.

TOPICAL LISTINGS

Air Quality
October 14–16, 2013: 35th Annual Industrial Ventilation Training, co-sponsored by The Deep South Center for Occupational Health & Safety, The University of Alabama at Birmingham, and Auburn University, Birmingham, AL. For more information, visit www.rayhunterandassociates.com/bham-ivc.

Food Safety
November 18–21, 2013: InFORM 2013: PulseNet, OutbreakNet, and Environmental Health, San Antonio, TX. For more information visit http://www.aphl.org/conferences/InFORM-2013-PulseNet-OutbreakNet-and-Environmental-Health/Pages/default.aspx.

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- Rely on portable XRF to test toys, jewelry, electronics, and other consumer products.
- Depend on portable X-ray fluorescence analysis for regulated soil pollutant analysis projects like agricultural and environmental protection agencies do.

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!

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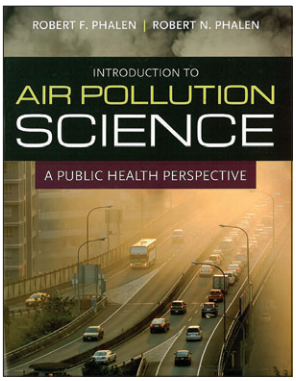
Introduction to Air Pollution Science: A Public Health Perspective

Robert F. Phalen and Robert N. Phalen (2012)

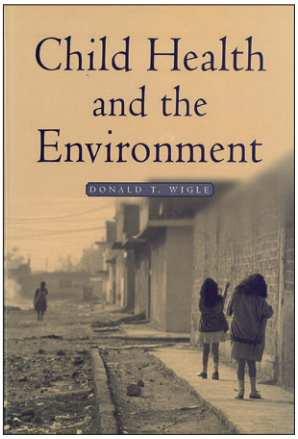


This book offers a broad foundation for understanding the environmental issues associated with air pollution and its impact on human health. Echoing the approach to air pollution currently used by the U.S. Environmental Protection Agency, this groundbreaking book gives readers a solid grasp of this evolving field. It contains in-depth coverage of diverse subjects including sampling and analysis; visibility, climate, and the ozone layer; human exposures to air pollutants; toxicology and epidemiology studies; as well as risk assessment and ethics. This timely resource also addresses more specific issues like acid deposition, ozone depletion, environmental justice, clean technologies, and global climate change, providing readers with the analytical skills they need to comprehend today's air pollution challenges.

331 pages / Paperback / Catalog #1123
Member: $79 / Nonmember: $85

Child Health and the Environment

Donald T. Wigle (2003)

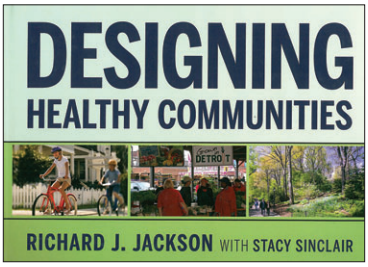


This is the first textbook to focus on environmental threats to child health. It will interest professionals and graduate students in public health, pediatrics, environmental health, epidemiology, and toxicology. It provides overviews of key children's environmental health issues, addresses the health 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

Designing Healthy Communities

Richard J. Jackson with Stacy Sinclair (2012)

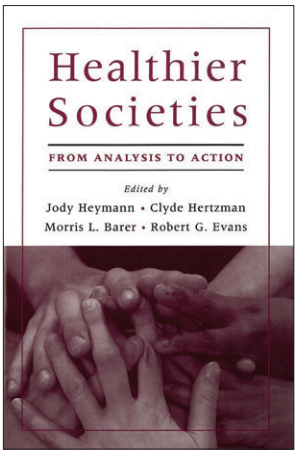


This book highlights how we design the built environment and its potential for addressing and preventing many of the nation's devastating childhood and adult health concerns. The author looks at the root causes of our malaise and highlights healthy community designs achieved by planners, designers, and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

Healthier Societies: From Analysis to Action

Edited by Jody Heymann, Clyde Hertzman, Morris L. Barer, and Robert G. Evans (2006)



This book addresses the fundamental questions that need to be answered before countries should invest seriously in improving social conditions, as a way of improving the health of the whole population. The book is divided into three parts that address the extent to which health is determined by biological factors or by social factors, examines four case studies that demonstrate the ways in which social change can dramatically affect adults' health, and outlines the challenge of translating the research into action and takes a serious look at what would be involved in meeting this challenge.

417 pages / Hardback / Catalog #758
Member: $59 / Nonmember: $64

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

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

Did You Know?

Beginning with the November issue of the *Journal of Environmental Health*, NEHA members will receive the *Journal* in an electronic format for free in addition to receiving the print *Journal*. Members will receive this one-year free benefit in order to get acquainted with the new E-*Journal* format.

JEH QUIZ

FEATURED ARTICLE QUIZ #2

Mexican-American Children's Perspectives: Neighborhood Characteristics and Physical Activity in Texas-Mexico Border *Colonias*

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.
3. a) Complete the online quiz at www.neha.org (click on "Continuing Education"),
   b) Fax the quiz to (303) 691-9490, or
   c) Mail the completed quiz to
   JEH Quiz, NEHA
   720 S. Colorado Blvd., Suite 1000-N
   Denver, CO 80246.
   Be sure to include your name and membership number!
4. One CE credit will be applied to your account with an effective date of October 1, 2013 (first day of issue).
5. Check your continuing education account online at www.neha.org.
6. You're on your way to earning CE hours!

Quiz Registration

Name

NEHA Member No.

Home phone

Work phone

E-mail

→ Quiz deadline: January 1, 2014

1. Physical activity (PA) is associated with __ in young children.
   a. increased fitness levels
   b. improved motor skills
   c. optimal metabolic function
   d. beneficial changes in body composition
   e. all of the above
2. The Healthy People 2020 objective for meeting PA federal guidelines in U.S. youth is
   a. ≥20.2%.
   b. <20.2%.
   c. ≥50%.
   d. <50%.
3. Currently, only __ of Hispanic high school students meet PA recommendations.
   a. 20%
   b. 16.9%
   c. 15.3%
   d. 11.8%
4. Of the following, __ is not a predictor of active living.
   a. land use mix
   b. street connectivity
   c. population density
   d. crime rate
5. __ percent of the children participating in the focus groups were obese.
   a. Sixty
   b. Fifty
   c. Forty
   d. Thirty
6. Hispanic children in the U.S. are disproportionately affected by the obesity epidemic compared to other ethnic groups.
   a. True.
   b. False.
7. The majority of the focus group children, __ , did not meet PA recommendations.
   a. 86.7%
   b. 78.7%
   c. 66.0%
   d. 59.5%
8. __ percent of the focus group children indicated that they watched television on school days three hours or more.
   a. Sixty-six
   b. Fifty
   c. Twenty-three
   d. Ten
9. The focus group children indicated the following physical environmental factors as barriers to PA with the exception of
   a. litter.
   b. speeding cars.
   c. weather.
   d. crime.
   e. dark streets.
10. Children participating in the focus groups said they would be more active if
    a. football fields and basketball courts were built in the neighborhood.
    b. they spent less time watching television and playing video games.
    c. parents got more involved in exercise activities with them.
    d. all of the above.
    e. b only.
11. The majority of children in the focus groups preferred to be physically active at their home or a park.
    a. True.
    b. False.
12. When asked about using a computer for something not related to school or playing video games, __ of the focus group children indicated that they did not spend any time on these activities on school days.
    a. 1%
    b. 5%
    c. 15%
    d. 30%

JEH Quiz #6 Answers
May 2013

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

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.

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

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

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

DELEGATE CLUB ($25–$99)

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

George F. Pinto
Elgin, IL

HONORARY MEMBERS CLUB ($100–$499)

Letter from the NEHA president, name in the Journal *for one year, and endowment pin.*

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Martinez, CA

H. Harold Lehman
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Bette J. Packer, REHS
Andover, MN

James M. Speckhart, MS
Norfolk, VA

21st CENTURY CLUB ($500–$999)

Name in AEC program book, name submitted in drawing for a free one-year NEHA membership, name in the Journal *for one year, and endowment pin.*

Scott M. Golden, RS, MSEH
Grove City, OH

Massachusetts Environmental Health Association in Memory of Joseph "Jay" Walsh, Jr.
Milton, MA

Peter M. Schmitt
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SUSTAINING MEMBER CLUB ($1,000–$2,499)

Name in AEC program book, name submitted in drawing for a free two-year NEHA membership, name in the Journal *for one year, and endowment pin.*

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AFFILIATES CLUB ($2,500–$4,999)

Name in AEC program book, name submitted in drawing for a free AEC registration, name in the Journal *for one year, and endowment pin.*

EXECUTIVE CLUB AND ABOVE ($5,000–$100,000)

Name in AEC program book, special invitation to the AEC President's Reception, name in the Journal *for one year, and endowment pin.*

NEHA ENDOWMENT FOUNDATION PLEDGE CARD

I pledge to be a NEHA Endowment Foundation Contributor in the following category:

❍ Delegate Club ($25)
❍ Honorary Members Club ($100)
❍ 21st Century Club ($500)
❍ Sustaining Members Club ($1,000)
❍ Affiliates Club ($2,500)
❍ Executive Club ($5,000)
❍ President's Club ($10,000)
❍ Endowment Trustee Society ($25,000)
❍ Visionary Society ($50,000)
❍ Futurists Society ($100,000)
❍ **You have my permission to disclose the fact and amount (by category) of my contribution and pledge.**

I plan to make annual contributions to attain the club level of _____ over the next _____ years.

Signature _____ Print Name _____

Organization _____ Phone _____

Street Address _____ City _____ State _____ Zip _____

❍ Enclosed is my check in the amount of $_____ payable to **NEHA Endowment Foundation**.

❍ Please bill my: MasterCard/Visa Card #_____ Exp. Date _____

Signature _____

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NCEH/ATSDR (National Center for Environmental Health/Agency for Toxic Substances and Disease Registry)
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New Perspectives on Environmental Health: The Approval of New Definitions

NEHA recently approved newly revised definitions of the terms "environmental health" and "environmental health professional" at the July 2013 board of directors meeting in Crystal City, Virginia. The approval was the culmination of a year-long process of reviewing previously published definitions, proposing revisions to the NEHA board of directors, publishing draft definitions for public comment, conducting an opinion survey, incorporating public comment, and final revision.

At the spring 2012 board of directors meeting, a work group was directed to review the definition of environmental health, which had been officially adopted by NEHA in 1996, as well as the definition of environmental health professional. The work group also was asked to consider how often these definitions should be revisited.

The work group met using conference calls and online tools for collaboration. They conducted searches for definitions used by textbook authors, government agencies, academic institutions, and individual practitioners. They employed group discussion and collaborative editing to draft the new definitions prior to reaching consensus among the work group members. The proposed definitions were submitted to the NEHA board of directors for approval, as well as to the *Journal of Environmental Health* (*JEH*) editorial staff for review.

In April 2013, NEHA President Brian Collins shared the draft definitions with the membership in his "President's Message" column (Collins, 2013). He invited members of both NEHA and the public to participate in a survey about the definitions. The survey provided an opportunity to submit open-ended comments as well as responses to specific questions. A total of 206 people responded to the survey, conducted online using SurveyMonkey and a questionnaire developed specifically for the survey. Over 90% of respondents indicated agreement that the definitions should be periodically revised. Fifty-three percent of respondents, however, felt that the existing definition remained appropriate. Thus, it was evenly divided as to whether a change in definition was needed. In considering the proposed new definition of "environmental health" (Sidebar top right), 82% agreed that the new definition allowed understanding of the nature and purpose of environmental health.

When asked about the definition of "environmental health professional," 81% believed that the new definition allows understanding of the nature and purpose of environmental health. A substantial number of respondents, however, indicated that the new definition of environmental health professional was overly complex, even though many more found it to be informative and inclusive. The work group carefully considered those comments and revised the definition substantially into the version presented here (Sidebar bottom right). Thus, the use of online surveys and public input were helpful in shaping the final definition as well as providing a "reality check."

Definition of Environmental Health

Environmental health is the science and practice of preventing human injury and illness and promoting well-being by

- identifying and evaluating environmental sources and hazardous agents and
- limiting exposures to hazardous physical, chemical, and biological agents in air, water, soil, food, and other environmental media or settings that may adversely affect human health.

Definition of an Environmental Health Professional or Specialist

An environmental health professional or specialist is a practitioner with appropriate academic education and training and registration or certification to

- investigate, sample, measure, and assess hazardous environmental agents in various environmental media and settings;
- recommend and apply protective interventions that control hazards to health;
- develop, promote, and enforce guidelines, policies, laws, and regulations;
- develop and provide health communications and educational materials;
- manage and lead environmental health units within organizations;
- perform systems analysis;
- engage community members to understand, address, and resolve problems;
- review construction and land use plans and make recommendations;
- interpret research utilizing science and evidence to understand the relationship between health and environment; and
- interpret data and prepare technical summaries and reports.

Environmental health evolves as a field, and this trend generally means greater complexity of the field (Harrison & Coussens, 2007). The proposed definitions reflect this reality. A definition has a distinct purpose depending on how the definition is intended to be used. The work group's intent was to provide an understanding of the concepts and allow accurate and inclusive communication,

based on contemporary practice and theory. The work group believes their efforts to be authoritative and complete definitions that may be used in official reports, textbooks, publications, and training materials. The revised definitions will provide for a better understanding of the conceptual basis of the terms as well as their scope and nature.

The work group acknowledges the great importance of clear and straightforward communications about environmental health and the profession. The definitions do more than just distill commonly used language about the concept and the profession. The newly adopted definitions will be useful when communicating with the public. One survey participant expressed that the definition should be "tweetable," or communicated in 140 characters or less. To that end, we offer a tweet, based on a simplification of the definition:

Environmental health evaluates hazards to health in the environment, protects all from harmful agents, and promotes health and well-being.

The work group recommended that NEHA's president appoint a work group every five years, or more often if necessary, to review the definitions and provide recommendations to the board of directors regarding appropriate changes and actions. NEHA's board adopted this recommendation, and the policies and procedures now reflect the regular consideration of revision of the definitions in the future.

The work group appreciates that some people will disagree with NEHA's newly adopted definitions; however, opportunity exists for additional definitions of the terms, based on philosophy, perspective, locale, and a host of other factors. NEHA recognizes that the definitions will change, and their internal process now recognizes that reality. NEHA hopes many will find the definitions useful to develop a better understanding of the field of environmental health.

What is your opinion of the new definitions? How will you use them? Will they be helpful to you when you communicate with the public? Please share your thoughts at http://form.jotformpro.com/form/32254562666963, or via NEHA's Facebook page (www.facebook.com/NEHA.org), or the LinkedIn forum entitled Environmental Health Professionals (www.linkedin.com/groups/Environmental-Health-Specialist-Professionals-3820502?_mSplash=1).

Acknowledgement: This piece was submitted by NEHA Region Seven Vice President and Work Group Chairperson John A. Steward, REHS, MPH, on behalf of work group members:

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- Sandra Long, REHS, NEHA Region Five Vice President;
- Adam London, RS, MPA, NEHA Region Six Vice President;
- Carolyn Hester Harvey, PhD, CIH, RS, DAAS, CHMM, NEHA President Elect; and
- Alicia Enriquez Collins, REHS, NEHA President.

References

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Harrison, M., & Coussens, C. (2007). *Global environmental health in the 21st century: From governmental regulation to corporate social responsibility*. Retrieved from http://www.nap.edu/openbook.php?record_id=11833&page=R1

Jill Cruickshank Promoted to Chief Operating Officer

Jill Cruickshank has been promoted to the position of NEHA's chief operating officer (COO). This is a new position that has been created due to NEHA's growth and success. Previously, Jill (aka "Jill C.," as two Jills work in the NEHA office) was the marketing and communications manager and held responsibilities such as promoting NEHA's products and services across various communication channels, building and managing the sales process, and administering the exhibit hall and Virtual AEC for NEHA's annual conference.

As COO, Jill C. will work closely with NEHA Executive Director and CEO Nelson Fabian to translate business vision and strategy into operational tactics. She will be responsible for daily operations of the organization, supervision of the managers of NEHA's programs, business development, and ensuring that NEHA's programs remain competitive, high quality, and meet customers' needs.

During her interview for the position of COO, Jill C. was asked why she wanted to make such a dramatic change from the world of marketing to operations. Her reply was that handling operations is in her blood, and even while in the marketing role, some of the tasks she liked best included figuring out how to take a vision and identify the resources, time, processes, and budget needed to make that vision a reality.

Jill C. feels the combination of her marketing experience, master's degree in business administration, and love for NEHA will be a few of the key qualities she brings the role of COO. She is ecstatic about her new position at NEHA and looks forward to the new ways she will be working with the NEHA staff, board of directors, members, and customers to continue to bring growth and success to NEHA and you, the environmental health professional!

NEHA Convenes in the Nation's Capital

What better place to focus on policy involvement than in our nation's capital of Washington, DC? Approximately 20% of the training and educational sessions at NEHA's 77th Annual Educational Conference (AEC) & Exhibition, July 9–11, 2013, discussed the impacts of policy making and how it may affect environmental health around the country and in your community.

The focused exploration into the facet of policy involvement at the NEHA 2013 AEC included training and educating conference attendees on

- the rationale behind public policy decisions that impact the field of environmental health;
- discovering fresh ways to build capacity, find authority, and leverage unconventional partnerships to advance environmental health and protect human health;
- learning how the Food Safety Modernization Act is being implemented on the ground floor and the implications it has for policy at the state and local level;
- honing skills in communication, conflict resolution, and collaboration;
- learning communication techniques to influence policy within agencies from the local to the national level;
- best practices and lessons learned from others to streamline and optimize the implementation of policy decisions within the workplace; and
- empowering creation of policy that leverages resources efficiently and embraces the "newer frontiers" of environmental health.

AEC attendees were also introduced to policy involvement at the highest level of government as keynote speaker Dr. Graham Allison presented his expertise in policy and decision making during the Cuban Missile Crisis. He shared insights from his experience and how they could be used in local government to make daily decisions regarding politics, policies, finances, and of course, environmental health!

Outside of the conference walls, attendees were able to see government in action as they took to the sites and visited historical monuments, Capitol Hill, history museums, and more!

Over the years, the AEC has evolved into a multifaceted event. It has become so much more than a conference and serves as the nexus for environmental health training, education, networking, and advancement. By producing a multifaceted event each year, NEHA looks to address the differences attendees can have in their learning experiences while at the same time offering an event that continues NEHA's mission to advance the environmental health and protection professional for the purpose of providing a healthful environment for all.

Some of the facets that make up an AEC include

- training,
- education,
- networking,
- advancement,
- motivation and inspiration,
- policy involvement, and
- enjoyment of the destination.

Greening of the AEC

Third Annual Community Volunteer Event

For a third year, NEHA organized a community volunteer event at the AEC to support NEHA's sustainable efforts and give back to the AEC host city community by helping to offset the energy expenditures and greenhouse gas emissions of holding a large conference. Eighteen participants helped clean up a nearby stretch of the Four Mile Run trail and tidal stream bank area, adopted by and in collaboration with the U.S. Environmental Protection Agency's Potomac Yards Green Team. This is an important intervention in protecting downstream areas—such as the Potomac River, Chesapeake Bay, and the Atlantic Ocean—from litter, debris, and pollution.

Volunteers got to enjoy the outdoors (the weather was unusually cool, but it also rained!), great camaraderie with their fellow colleagues, and giving back to the community. At least 20 bags each of trash and recyclables were collected. Some of the more unusual items were an old sneaker, two different flip flops, a fishing pole, a license plate, tire tread, and car bumper parts. Upholding the principles of sustainability, volunteers also walked to and from the event, which was only half a mile away. Thank you to all of the volunteers listed below for their dedication and perseverance!

Darryl Booth
Landon Brokaw
Sandra Cooke Hulbert
Carol Dellapenna
Karen Fischer
Karen Gregory
Margo Jones
Melody Liples
Jenny Murphy
Agustina Lopez Novillo
Stephanie Peugh
Michelle Rhone
Sharon Smith
Emily Sjostrom
Scott Starzynski
Genette Stump
Jacqueline Taylor
Dale Yamnik

Green Initiatives at the AEC

NEHA continues to make the AEC a more environmentally sustainable event with guidance from the APEX/ASTM Standards. These standards are a set of nine formal, voluntary standards developed by the meetings, conventions, exhibitions, and events industry to provide event planners and suppliers prescriptive, measurable specifications for producing events in a more sustainable manner (www.conventionindustry.org/standardspractices/apexastm.aspx). Below are several tangible ways NEHA and the host hotel achieved some of the requirements of the standards.

Destination Choice: Washington, DC, Area

- Central location with the hotel within 10 miles of an airport.
- Sustainable transportation was available and promoted to attendees.
- Held a community volunteer event.

Exhibits

- Advised exhibitors how to green the exhibition.

Transport/Shuttles

- Used shuttles and mass transit when possible.

Marketing

- Used online and electronic communications, registrations, and confirmations.
- Printed in ways that reduced use of paper.
- Reduced waste related to attendee badges.
- Employed reusable signage wherever possible.

On-site Offices

- Printed in double-sided mode as much as possible.
- Reused shipping materials.

Audio Visual

- Turned off equipment at the end of each day.
- Energy efficient equipment was used whenever possible.
- Audio visual supplier participates in an equipment recycling program.

Food and Beverage

- No bottled water was served.
- Used reusable glasses, mugs, utensils, napkins, etc.
- Recycled approximately 100 pounds of paper, cardboard, plastic, and aluminum from July 7–10.
- Served 63 vegetarian/vegan meals.
- Used 469 pounds of locally sourced meats for the AEC's three ticketed food events.
- Leftover food from large events was minimized through the use of accurate meal counts.
- Three thousand pounds of food waste was composted from the AEC.

Meeting Venue

The host hotel, the Hyatt Regency Crystal City, has specific green objectives to achieve by 2015. Items below are helping to meet those goals.

Waste Management

- Paperless check-in and check-out at the front desk.
- Comprehensive recycling program with bins throughout the facility.
- Biodegradable, eco-friendly shampoo and lotion bottles used in guest rooms.

Food and Beverage

- Employs the Hyatt Regency program, "Food. Thoughtfully Sourced, Carefully Served."
- Purchases organic, local, seasonal, or sustainable food and beverage.
- Purchases coffee that is certified organic, bird friendly, Rainforest Alliance, fair-trade certified, or other certified shade grown or bird friendly.
- Uses green certified cleaning products.
- Employs packaging reduction and post-consumer content in carryout containers and menu paper.

Energy

- Guests have easy access to public transportation or shuttle services.
- Energy efficient equipment, such as compact fluorescent lighting and programmable timers/sensors, are used.
- Linens and towels are changed every three days on longer stays unless otherwise directed by guests.
- Low flow faucets, shower heads, and toilets have been installed.

Procurement

- Uses water-based paints and office supplies containing post-consumer recycled fiber.

Community Volunteer Event photo provided by Vanessa DeArman.

TRAINING and EDUCATION

Training and education are the most important reasons why people choose to attend the AEC. This year's agenda included over 180 presentations and 275 presenters; preconference workshops on the Model Aquatic Health Code, conflict analysis and resolution, and the public participation process; lecture and mini-lecture sessions; Learning Labs for hands-on training in roundtables, talk show panels, facilitated discussions, and group exercises; and drop-in Learning Labs with self-directed hands-on exercises.

Since the AEC was in such close proximity to our nation's capital, and given the current economic climate, it was only appropriate that NEHA build a strong policy component in the 2013 AEC. Forty-five policy-oriented sessions within many topic areas were aimed at building capacity for environmental health work within agencies, finding novel funding streams, creating innovative partnerships, and sharing results from pilot programs and alternative business models.

The AEC offered two policy tracks—environmental health policy and policy for an integrated food safety system (IFSS). The policy for an IFSS track was kicked off by the Food and Drug Administration's Deputy Commissioner for Foods Michael Taylor, JD, and focused on active implementation progress of the Food Safety Modernization Act (FSMA) from the national level to the local level. The environmental health policy track included a session on how to effectively communicate environmental health messages on Capitol Hill. It was followed by a field trip to Capitol Hill with a staffer of New Mexico Senator Tom Udall's office. Other policy-related sessions were most prominent in the sustainability, leadership/management, healthy homes and communities, and wastewater tracks where there were several sessions that generated lively conversation around local, state, and federal policy-making activities.

NEHA intends for attendees to return to their workplaces after the AEC with the ability to more than pay for their trip by continuing to incorporate return on investment (ROI) principles into the education and training structure. The AEC planning committee set out to deliver sessions that were 1) relevant to attendee job duties; 2) offered new knowledge, skills, or strategies; and 3) gave attendees either an opportunity to practice or the means to apply and implement the new knowledge, skills, or strategies upon returning to their workplace. To that end, presenters were guided to create presentations around learning objectives as tangible outcomes for attendees. NEHA will measure the ROI of the AEC by distributing a series of electronic surveys to conference attendees over a span of approximately six months inquiring about what was gained, what was applied or implemented, and the quantifiable difference it made in performance, efficiency, or expense.

AEC attendees got some hands-on training through the drop-in Learning Labs. These sessions enabled attendees to interact closely with experts to gain the knowledge, skills, and resources needed to do their jobs.

Other organizations that worked synergistically with NEHA to produce stellar educational content for the conference include the Association of Environmental Health Academic Programs, the Association of Pool and Spa Professionals, the State Onsite Regulators Alliance and Captains of Industry, the Food and Drug Administration, the U.S. Environmental Protection Agency, the Centers for Disease Control and Prevention, the U.S. Department of Housing and Urban Development, the National Center for Healthy Housing, American Public University, and the Uniformed Services Environmental Health Association.

Environmental Health Topics Covered: You Spoke and We Listened!

Using attendee comments and suggestions provided in the 2012 AEC attendee survey, 2013 AEC market research survey, and on NEHA's abstracts blog, a heavy emphasis was placed on sustainability and FSMA. NEHA continues to look for ways to give attendees what they want and need. The AEC's educational program also covered the following topics.

- Air quality;
- children's environmental health/schools;
- disaster/emergency response;
- emerging environmental health issues;
- environmental health impact assessments;
- environmental health policy;
- environmental health tracking and informatics;
- environmental justice;
- food protection and defense;
- general environmental health;
- hazardous materials and toxic substances;
- healthy homes and healthy communities;
- injury prevention and occupational health;
- international environmental health;
- leadership/management;
- onsite wastewater;
- pathogens and outbreaks;
- policy for an integrated food safety system;
- recreational waters, including pools/spas;
- sustainability (climate change and land use planning and design);
- technology and environmental health;
- terrorism/all hazards preparedness;
- uniformed services;
- vector control and zoonotic diseases;
- wastewater; and
- water quality.

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- Food (including Safety and Defense)—John A. Marcello, REHS, CP-FS, and Scott Holmes, REHS/RS;
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- Hazardous Materials/Toxic Substances—Priscilla Oliver, PhD;
- Healthy Homes and Healthy Communities—Sandra Whitehead, MPA;

- Injury Prevention—CAPT Alan J. Dellapenna, Jr., RS, MPH, DAAS;
- Institutions/Schools—Angelo Bellomo, REHS;
- International Environmental Health—Sylvanus Thompson, PhD, CPHI (Canada);
- Land Use Planning/Design—Steve Konkel, PhD, and Felix I. Zemel, MCP, MPH, REHS/RS, DAAS;
- Legal—Bill Marler;
- Meteorology/Weather/Global Climate Change—LCDR James Speckhart, MS;
- Occupational Health/Safety—Donald Gary Brown, DrPH, CIH, RS;
- Pools/Spas—Colleen Maitoza, REHS;
- Radiation/Radon—R. William Field, MS, PhD;
- Recreational Water—Tracynda Davis, MPH;
- Risk Assessment—Sharron LaFollette, PhD;
- Sustainability—Tom R. Gonzales, MPH, REHS;
- Technology (including Computers, Software, GIS, and Management Applications)—Darryl Booth, MBA;
- Terrorism/All Hazards Preparedness—Martin Kalis;
- Vector Control—Zia Siddiqi, PhD;
- Wastewater—Craig Gilbertson, RS;
- Water Pollution Control/Water Quality—Sharon Smith, RS; and
- Workforce Development, Management Policy, and Leadership—Val Siebel, REHS, and Ron de Burger, CPH, CPHI (Canada).

VIRTUAL

Virtual AEC

NEHA was pleased to again offer the Virtual AEC to attendees and to those who were not able to make it to the AEC in Washington, DC. With current budget cuts and demanding workloads NEHA understands that it is difficult for some environmental health professionals to get the approval and support to attend events like the AEC. The Virtual AEC provided those individuals with the opportunity to share in the AEC experience right from their office or home desks.

Twenty-five educational sessions were recorded live during the AEC and virtual attendees were able to view the sessions as they happened and ask questions of the speakers almost as if they were sitting right there in the rooms. Additionally, virtual attendees were able to connect with AEC attendees, speakers, and exhibitors through networking tools available in the Virtual AEC. The Virtual AEC also provided attendees with access to speaker presentations, handouts, and other materials, along with the opportunity to earn continuing education credits.

The Virtual AEC was available to those who attended the conference in Washington, DC—free of charge—as a valuable part of their registration package. Before even getting to Washington, DC, attendees were able to build their own schedules of training, networking, and advancement opportunities to take advantage of while at the AEC. The Virtual AEC also offered attendees greater flexibility to attend more sessions (and learn more) by being able to access the recorded sessions after the conference at their own convenience. Plus, attendees can go back and continue to review recorded sessions as many times as they would like for a year!

Although the 2013 AEC has ended in Washington, DC, the Virtual AEC continues to provide access to valuable educational content and networking opportunities. If you did not attend this year's AEC, you too can have access to these items by registering for the Virtual AEC. Visit neha2013aec.org to **register today!**

Grants, Partners, and Sponsors

Grants

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» Food and Drug Administration
» National Center for Healthy Housing
» State Onsite Regulators Alliance and Captains of Industry
» The Association of Pool and Spa Professionals
» Uniformed Services Environmental Health Association
» U.S. Department of Housing and Urban Development
» U.S. Environmental Protection Agency

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Tier IV

» Food Marketing Institute
» Orkin

Tier V

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» Gass Weber Mullins, Inc.
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» Mycometer, Inc.
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» San Jamar
» Sweeps Software, Inc.
» YUM! Brands, Inc.

Honorable Mention

» American Academy of Sanitarians
» Center for Environmental Research & Technology, Inc.

POLICY INVOLVEMENT

As mentioned, a focused exploration into the facet of policy involvement took place at the 2013 AEC. Along with approximately 20% of the training and educational sessions covering the impacts of policy making and how it may affect environmental health around the country, the AEC's keynote presentation was dedicated to the exploration of policy involvement and decision making.

Keynote

Washington, DC—home of policy and decision making. Who better to be the keynote speaker than Graham Allison, director of the Belfer Center for Science and International Affairs and Douglas Dillon Professor of Government at Harvard's John F. Kennedy School of Government? Dr. Allison has served as special advisor to the secretary of defense under President Reagan and as assistant secretary of defense for policy and plans under President Clinton, where he coordinated Department of Defense (DOD) strategy and policy towards Russia, Ukraine, and the other states of the former Soviet Union. He has the sole distinction of having twice been awarded the DOD's highest civilian award, the Distinguished Public Service Medal.

Dr. Allison's keynote presentation asked the question, "What do the Cuban Missile Crisis and environmental health have in common?" As the audience was to find out, these two disparate events have much in common. Dr. Allison began his presentation by reviewing the circumstances surrounding the 1962 Cuban Missile Crisis. His captivating talk highlighted some of the issues faced by President Kennedy and his advisors, and the ultimate decisions they made. He provided insights into the meetings, strategy, and thinking of this group as they worked to resolve the crisis. Dr. Allison also highlighted the circumstances that led to finding Osama Bin Laden in 2012. He connected both events with the decision-making process used by each president and his advisors.

He explained that life is clouded by uncertainty, including the decisions that we make each day. He elucidated that environmental health professionals deal with uncertainty when encountering a foodborne illness outbreak, environmental standards, or the release of some pathogen. He credited former U.S. Secretary of Defense Donald Rumsfeld with his epistemological identification of three distinct categories of uncertainty: knowns, known unknowns, and unknown unknowns. He used specific examples from the two historical events to highlight each category.

Keynote speaker Dr. Graham Allison spoke to a packed room about decision making and how environmental health can strengthen its role in policy development.

The Town Hall Assembly enabled attendees to learn about the state of the association and afforded them the opportunity to address the entire NEHA board of directors.

Prior to making decisions, he explained the importance of building data-gathering capability in advance in order to minimize the zone of uncertainty. While an expected value calculation may provide a path for a particular decision, one needs to understand that a logical decision may not result in a positive outcome; any political aspect of the decision may include blame.

He enlightened the audience by summarizing three principles to extract from the notion of uncertainty.

1. Review the capabilities available, even if there are only partial similarities with the existing issue.
2. Look for creative and inventive alternatives rather than settling for simplistic or quick options.
3. If possible, look for resources that have unique insights into the issue.

Extracting ideas from his book, *Essence of Decision: Explaining the Cuban Missile Crisis,* Dr. Allison explored complex decision making that occurs when the decision maker is not an individual, but an organization or government. He reviewed three different ways (or "lenses") through which analysts can examine events—the "Rational Actor" model, the "Organizational Behavior" model, and the "Governmental Politics" model—and then gave examples from the two events and recent sequestration to illustrate his points. He summarized his points with three observations about organizational decisions.

1. Recognize that an organization is a metaphor; in reality, it is a complexity of competing individuals and ideas, with compromise as a basis of decision making;
2. understand the organizational capability and constraints; and
3. manage the political process and its demands. The failure to do so is costly and perhaps catastrophic.

Environmental health professionals often encounter situations that require discerning known facts from uncertainty and making appropriate decisions in a timely manner. Dr. Allison's message spoke to the importance of managing the decision-making process, which can provide a reasonable outcome of an issue. He encouraged environmental health organizations to build capabilities in advance to shrink uncertainties and to begin thinking about the decision-making process and how to manage any political ramifications of those decisions.

Board of Directors Meeting Highlights

NEHA's board of directors meets four times each year with one meeting always held at the AEC. Highlights from this year's board meeting include the following.

1. The resignation of David Ludwig as Region 2 vice president and the ascension of David Riggs to next year's second vice president

has created vice president vacancies for Region 1 and 2. Prior to the board meeting letters and e-mails were sent to voting members in each region seeking candidates to fill these vacancies. This process did not yield any candidates from Region 1 and only a single candidate from Region 2. The board decided to continue the search for candidates for both regions. (Note: In late July, the board appointed Marcy Barnett, REHS, as the vice president of Region 2.)

2. AEC guests: The AEC board meeting is the only meeting in which guests may address the board on various topics. This year the board welcomed guests from the Association of Environmental Health Academic Programs (AEHAP), National Center for Environmental Health (NCEH)/Agency for Toxic Substances and Disease Registry (ATSDR), State Onsite Regulators Alliance (SORA), and International Federation of Environmental Health (IFEH).
   - AEHAP/Environmental Health Science and Protection Accreditation Council Executive Director Yalonda Sinde shared with the board enrollment and graduation rates of environmental health students at AEHAP-accredited schools. She indicated that environmental health enrollment is going up and that 20 programs are pursuing accreditation. She also shared that since 2004, a 124% increase in minority enrollment has occurred in environmental health programs. Finally, she indicated that over 40% of recent environmental health graduates find jobs with local or federal government, nearly 30% are employed by a private company or corporation, and an equal percentage (13%) find work in either an educational institution or a consulting firm.
   - Dr. William Cibulas, senior advisor for public health, NCEH/ATSDR, Office of the Director, provided an overview of the restructuring of CDC and NCEH/ATSDR in light of the economic cutbacks and sequestration. He indicated that some of the current and emerging environmental health issues include hydraulic fracturing (fracking) and climate change and health issues. He outlined the Partnership Activities for the board, including an overview of the Frameworks Institute Project. One goal of this project is to develop communication strategies and tools to help build public awareness and support of environmental health.
   - SORA Executive Director Jerry Iwan explained that SORA began because of the Clean Water Act. He explained that their conference, held at the AEC for the last four years, is the only forum for state regulators in the U.S. He stated that SORA's current focuses are community issues, decentralized wastewater technology, and sterilization of fresh water packages. He said SORA is looking forward to working with NEHA as a partner for another year in a productive relationship.
   - Peter Davey, president of IFEH and professor at Griffith University in Australia, provided an overview of environmental health practice and projects in various countries. He explained that IFEH is doing work in the Pacific Region and Africa. He added that IFEH established a special student association and encouraged their participation during World Environmental Health Day. He stated that over 500 students participated. One issue IFEH faces is getting academic practitioners involved. He described specific environmental health issues in various countries including Malaysia, Korea, and Australia. He concluded his presentation by stating that he looks forward to building stronger relationships with NEHA in the future.
3. AEC & Exhibition Topics
   - Executive Director Nelson Fabian explained that the Washington, DC, AEC presented challenges for both attendees and presenters, since some individuals received clearance to attend only this week. He added that sequestration forced some potential attendees, who work and live in the Washington, DC, area, to cancel their registration because of federal travel restrictions.
   - Fabian said that he is optimistic about the 2014 AEC in Las Vegas, Nevada, because of the location and because NEHA will host the IFEH Congress simultaneously, drawing approximately 200 attendees from around the world.
4. International Matters
   - The board reviewed information on the Canadian Institute of Public Health Inspectors (CIPHI) Centennial Meeting held in Winnipeg, Canada, and attended by NEHA's representative, Past President Mel Knight. Given the presentations and discussions related to IFEH and CIPHI, the board noted that similar environmental health issues exist worldwide.
   - Second Vice President Bob Custard stated that the project of developing a sister program between NEHA affiliates and environmental health organizations in other countries is tied to NEHA's transition to its new association management software.
5. President Elect Alicia Enriquez Collins reported on the affiliate communication project. She explained that affiliates surveyed indicated an overwhelming preference to receive information via e-mail. She added that NEHA staff has developed an electronic form to allow affiliates to share information or to request assistance to an environmental health issue.
6. Definition of Environmental Health
   - Region 7 Vice President John Steward reported that NEHA received 306 responses to the corresponding survey. He noted that while there was high agreement that revising the definition was appropriate, there was a 50/50 split on whether the 1995 definition was suitable.
   - The board adopted the proposed definition with the stipulation that the board would review the definition every five years.

Town Hall Assembly

The Town Hall Assembly attendees were treated to breakfast, which was generously sponsored by the National Restaurant Association (NRA). NEHA President Brian Collins called the meeting to order and invited Vito Palazzolo from NRA to provide a welcome. President Collins then gave a report on the status of the association over the past year, which highlighted many of the activities NEHA has been engaged in, as well as future directions.

NEHA's election process and summary of the 2013 election were shared. The floor was then opened up to any nominations for NEHA's second vice president office. None were made and the four candidates who had submitted their paperwork to the NEHA office prior to the AEC were introduced and allowed to speak for five minutes. The candidates for second vice president are Stan Hazan, Adam London, Gary Noonan, and John Steward.

A special presentation from NEHA Managing Director Larry Marcum was given on the status of NEHA's grants, contracts, and government affairs program. The floor was then opened up to any member comments and President Collins closed the meeting by thanking all for attending.

NETWORKING

Exhibition

As the doors opened to the exhibition on night one of the AEC, attendee energy to learn of the new happenings within environmental health was high and electricity was in the air! The exhibition was the place to be and be seen with cameras flashing and microphones on—attendees had plenty of opportunities to shine.

During the exhibition, attendees also had the opportunity to network with old friends and build new alliances. It provided a forum for exhibitors to offer their products, services, and knowledge to help environmental health professionals and their organizations to continue to improve their programs and operations.

The Poster Session was also held in the exhibition. Attendees had access to over 30 poster presentations that covered a broad spectrum of environmental health topics.

AEC attendees were able to talk one-on-one with a wide variety of exhibitors, learning more about the products and services available that are extremely important to their jobs.

Thanks to our door prize sponsors, drawings for Best Buy, Visa, and Amazon gift cards were awarded to some lucky attendees during the exhibition. Scholarships were also presented by Decade Software Company, LLC, and NEHA to the deserving recipients, which contributed to the buoyant atmosphere in the exhibition. It seemed that no matter the purpose attendees had for visiting the exhibition, fun was had by all!

A list of all 2013 AEC Exhibitors can be found on page 87.

Silent Auction

This year's Silent Auction was another success! Forty-five items made their way to the tables from our very generous NEHA members, affiliates, exhibitors, and sponsors. The $4,041.68 that was raised from this event will go to NEHA's 2014 AEC speaker fund. A sampling of this year's items included the following.

- Monopoly game—premier edition
- Gift cards for Best Buy and Bass Pro, plus a Bass Pro t-shirt
- Gift baskets from Connecticut, Oklahoma, and Texas
- Wine/spirits baskets from North Carolina and Colorado
- Three "Minnesota Grown" cookbooks, dish towel, and playing cards
- Framed black and white photo of Nashville/Brown County in Indiana
- Scottsbluff National Monument print and Visa card
- Two London Olympic coins and book, *The Stuff of Life*
- Two New England Patriots t-shirts
- Red Sox hat and two Fenway Park signs
- Pendleton wool notepad
- Photo meter system

Perhaps the most interesting items were the two South African photo safari packages for two at Zulu Nyala Game Lodge, which ended up receiving the highest bids. NEHA and NEHA staff also donated Silent Auction items. NEHA donated NEHA shirts, two NEHA logo embossed portfolios, a NEHA 2014 AEC full-conference registration, and a four-night stay at the 2014 AEC hotel—The Cosmopolitan of Las Vegas. A NEHA staff person also contributed the premier edition Monopoly game. In addition, 13 pieces of fashion jewelry were donated by NEHA staff and its board of directors during a Silent Auction fundraiser held in the Denver office in April. NEHA received several free pieces when staff and board members purchased jewelry from a catalog. Thanks again to the staff and board! This is becoming a NEHA tradition. The total amount received from the Silent Auction for the jewelry was $386.

NEHA thanks the generous donors and attendees who helped to make this year's Silent Auction a success! And a big thanks to our Silent Auction volunteers Robert Uhrik and Ellen Schroth.

With the clock ticking down to get the highest bid in, attendees swarm the Silent Auction tables to ensure they win the item they've had their eyes on!

Silent Auction Donors

NEHA affiliates: Colorado, Connecticut, Indiana, Iowa, Minnesota, Missouri, Nebraska, Oklahoma, and Texas.

Carolyn Harvey

Industrial Test Systems

Mel Knight

Roy Kroeger

Pat Maloney

NEHA board of directors and staff

Oklahoma Society of Environmental Professionals

Terry Osner

Shat-R-Shield

James Speckhart

John Steward

Peter Wright

NETWORKING

During the President's Banquet, incoming NEHA President Alicia Enriquez Collins (left) presents Immediate Past President Brian Collins (right) with his past president pin, while he passes on to her the presidential gavel of the association.

The AEC was packed with many opportunities to network with fellow attendees—be it at the Ice Breaker, Networking Luncheon, Exhibition, the various meetings, or in the hotel hallways.

Annual UL Event

All aboard for a river adventure! The weather could not have been more perfect with a cool summer breeze as attendees sailed down the Potomac River on the Nina's Dandy. The setting was very relaxing and attendees were treated to a special night at the Annual UL Event. Attendees enjoyed an incredible meal while listening to jazz being played on the piano. Then they ventured to the upper deck of the ship to see sights like the Washington Monument lit up with beautiful lights! The great food, weather, and company combined to create a magical evening, and the Annual UL Event set the tone for a wonderful NEHA conference!

NEHA 2013 AEC photos by Joe Deats Photography.

MOTIVATION and INSPIRATION

Awards & Honors

Walter S. Mangold Award

NEHA's highest honor, the Walter S. Mangold Award—given for outstanding contributions to the advancement of the environmental health profession—was presented this year to CAPT Michael Herring. Please see the accompanying story on page 84, which details CAPT Herring's distinguished career and contributions to the profession.

Walter F. Snyder Award

NSF International and NEHA honored Vincent J. Radke with the 2013 Walter F. Snyder Award. This award is given in honor of NSF's cofounder and first executive director, and it recognizes outstanding contributions to public health and the environment. Please see the accompanying story on page 85, which details Radke's career and contributions to the profession.

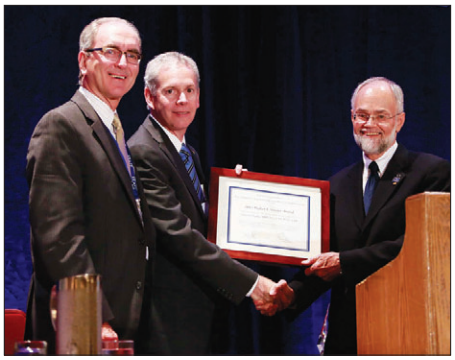
A. Harry Bliss Editor's Award

Dr. A. Harry Bliss was editor of the *Journal of Environmental Health* in 1969, the year this award was first presented. When he retired, the award was named after him to honor his 40 years of involvement in *Journal* production. NEHA often gives this annual award to outstanding writers and columnists, but the award may also go to individuals who, through other significant contributions made to the *Journal*, advance the cause and interests of both the association and the profession.

This year, NEHA is delighted to announce that the 2013 recipient of the A. Harry Bliss Award is Marler Clark, LLP, PS. Marler Clark is a Seattle-based law firm that is nationally known for its practice in the field of food safety. The lawyers of Marler Clark have been responsible for providing valuable legal information that is published in the *Journal* through the Legal Briefs column.

Educational Contribution Award

NEHA's board of directors established this new award to recognize NEHA members, teams, or organizations for an outstanding contribution within the field of environmental health. NEHA is providing this pathway for its members and their agencies to share creative educational methods and tools used across the country and around the world to educate one another and the public about environmental health.



NEHA Executive Director Nelson Fabian (left) and NSF President and CEO Kevan Lawlor (middle) present Vince Radke (right) with the 2013 Walter F. Snyder Award.

Nsedu Witherspoon (left) from the Eco-Health Child Care© program was named the first recipient of one of NEHA's newest awards, the Environmental Health Innovation Award, which was presented to her by NEHA President Brian Collins (right).

NEHA was pleased to name CAPT Mark Miller and Martin Kalis as the first recipients of this award. CAPT Miller and Kalis work within the Centers for Disease Control and Prevention/National Center of Environmental Health's (CDC/NCEH's) Environmental Health Services Branch and collaborated with federal, state, and local health and environmental health partners to develop the comprehensive Environmental Health Training in Emergency Response (EHTER) program. Thousands of environmental health professionals from all 50 states, two territories, and the District of Columbia have completed EHTER trainings.

Environmental Health Innovation Award

This newly created NEHA award is presented to a NEHA member or organization who has created a new idea, practice, or product that has had a positive impact on improving environmental health services or quality of life. This award also encourages other environmental health professionals to search for creative solutions to challenges.

NEHA was pleased to name Eco-Health Child Care® (EHCC) as the first recipient of this award. EHCC provides basic concepts and practical steps for healthier environments to child care providers. It has endorsed more than 2,000 child care facilities, protecting more than 70,000 children. These children benefit from environmental health best practices that support their health, development, and ability to learn. EHCC also informs parents about environmental health practices that can be adopted at home to protect children.

Excellence in Sustainability Award

NEHA's Excellence in Sustainability Award recognizes organizations, businesses, associations, and individuals who are solving environmental challenges by using innovative and environmentally sustainable practices. The award represents the importance of supporting meaningful sustainability efforts to ensure a safe and healthy environment for present and future generations. UL generously sponsors this award through a $1,000 honorarium and award memento.

The sustainability committee selected the Johnson County Wastewater Department (Kansas) as the winner of the 2013 Excellence in Sustainability Award for its Co-Generation Project 2013 implemented at a local wastewater treatment plant. Through the project, the treatment plant now processes 14.5 million gallons of wastewater per day. Other benefits of the project include local power generation, carbon footprint reduction, and reduced travel from waste and sludge hauling. The project will turn biosolids produced during wastewater treatment and from local restaurants (e.g., used cooking oil and grease) into enough electricity to power a wastewater treatment plant capable of treating waste streams from almost 150,000 people.

Staff from Hamilton County Public Health, winners of this year's Samuel J. Crumbine Consumer Protection Award, proudly display their award plaques after the AEC Awards Ceremony.

CAPT Mark Miller accepts NEHA's newly created Educational Contribution Award on behalf of his colleague Martin Kalis and himself.

UL and NEHA representatives pose with staff from Johnson County's Wastewater Department, the recipient of the 2013 Excellence in Sustainability Award.

Sabbatical Exchange Award

NEHA offers a wide-ranging opportunity for professional growth and the exchange of valuable information on the international level through its longtime Sabbatical Exchange Program. The recipient of this award may go either to England, in cooperation with the Chartered Institutes of Environmental Health, or to Canada, in cooperation with the Canadian Institute of Public Health Inspectors. Underwriters Laboratories, Inc. (UL) currently sponsors the sabbatical.

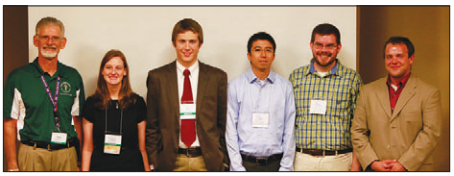
The award jury this year decided that the sabbatical award should be given to F. Charles Hart, who is an associate professor in environmental health at Kent State University. Dr. Hart will be conducting his sabbatical in Canada. He will study undergraduate environmental health science education and competency development at Canadian universities and their relevance for program development in the U.S.

NEHA/AAS Scholarship Awards

NEHA supports students in many ways. One way involves financial tuition support through a special scholarship program that is cosponsored by NEHA and the American Academy of Sanitarians (AAS). A special scholarship committee chaired by NEHA Past President Jim Balsamo manages the scholarship program. The following scholarships were presented on behalf of the committee:

- $2,500 graduate scholarship to Na'Taki Osborne-Jelks from Georgia State University Public Health
- $1,500 undergraduate scholarship to Raquel M. Sandoval from Boise State University
- $1,500 undergraduate scholarship to Amanda H. Mellen from Eastern Kentucky University
- $1,500 undergraduate scholarship to Rosalie M. Peterson from Dickinson State University

Student Research Presentations



Every year, the Association of Environmental Health Academic Programs (AEHAP) and CDC/NCEH sponsor and financially support undergraduate and graduate student research presentations. Thanks to a generous donation from NCEH, six students and their faculty mentors had the opportunity to present their research at the AEC. Presenting the student research awards was LT Jasen Kunz of the U.S. Public Health Service/CDC/NCEH and Dr. David Gilkey from Colorado State University. Each student participant listed below received a $500 award, a plaque, and a stipend of up to $1,000 to cover travel and research expenses.

Detection of Pharmaceuticals and Other Personal Care Products in Groundwater Beneath and Adjacent to Onsite Wastewater Treatment Systems
Katie Lynn Del Rosario, Graduate Student, East Carolina University, Greenville, NC
Faculty Mentor: Charles Humphrey, PhD

Tennessee Occupational Safety and Health Indicators
Claude Christopher Green, Graduate Student, East Tennessee State University, Johnson City, TN
Faculty Mentor: Ken Silver, DSc

Sub Threshold Doses of Cadmium and Arsenite Combine to Produce Neural Tube Defects in C57Bl/6J Mice: Impact of Splotch Allele
Frederick Huynh, Graduate Student, California State University, Northridge, CA
Faculty Mentor: Thomas Hatfield, DrPH, REHS

Comparative Probabilistic Hazard Assessment of *in vitro* Estrogen Agonist Activity
David A. Dreier, Undergraduate Student, Baylor University, Waco, TX
Faculty Mentor: Bryan Brooks, MS, PhD

Heavy Metal Concentrations in Hair as Predictors of Health Outcomes
Jared Ryan, Undergraduate Student, University of Wisconsin, Eau Claire, WI
Faculty Mentor: Crispin Pierce, PhD

NSF International Scholarship

AEHAP, in partnership with NSF International, offers a paid internship project to students from National Environmental Health Science and Protection Accreditation Council–accredited programs. The NSF International Scholarship program is a great opportunity for an undergraduate student to gain valuable experience in the environmental health field. The NSF Scholar was selected by AEHAP and spent 8–10 weeks in 2013 working on a research project identified by NSF International. The recipient also received a $3,500 stipend to support their research. This year's winner was Mykael Lindsay Nagy, an undergraduate student from Missouri Southern State University. Nagy's research was titled "Updated NSF Survey for Food Code Adoption" with mentoring from Michael Fletcher, MS.

Samuel J. Crumbine Consumer Protection Award

The Samuel J. Crumbine Award is a prestigious national award given annually to a local food protection agency that demonstrates excellence and continual improvement in a food protection program. The award is named in honor of Dr. Samuel J. Crumbine, a sanitarian, physician, and public health pioneer who was renowned for his innovative methods of improving public health protection.

continued on page 86

2013 Mangold Award Recipient

CAPT Michael E. Herring, MPH, REHS, United States Public Health Service

NEHA is proud to present the 2013 Walter S. Mangold Award, its highest honor, to Captain Michael E. Herring, MPH, REHS.

CAPT Herring has exhibited the highest levels of dedication, leadership, professionalism, and expertise that mark all aspects of his environmental health career spanning over three decades. He earned his BS degree in environmental health in 1980 from East Carolina University (ECU) under the mentoring guidance of Dr. Trenton G. Davis (1985 Mangold winner) and Dr. F. Oris Blackwell (1989 Mangold winner).

After graduating from ECU, CAPT Herring began his professional career in 1980 as a sanitarian with the Durham County Health Department in North Carolina. As a result of his hard work and leadership potential, CAPT Herring was promoted to environmental health supervisor in 1983. At the age of 24, he was the youngest environmental health supervisor in North Carolina and was running one of the most advanced environmental health programs in the state. In 1986, he was selected as Sanitarian of the Year for the North Central Environmental Health District of North Carolina. While at Durham County, he served in numerous leadership roles in district and state public health and environmental health associations and was regularly called upon to lead important environmental health initiatives impacting the health of North Carolina citizens.

In the fall of 1988, CAPT Herring accepted a commission as an environmental health officer with the U.S. Public Health Service (USPHS) and departed for his first assignment in Fairbanks, Alaska. He served as chief of the Office of Environmental Health for the Tanana Chief Conference, Inc., and district environmental health specialist for the Interior Alaska Service Unit and North Slope Service Unit, which provided health care and other services to 50 Alaska Native villages. At the end of his four-year tenure in Alaska, his program had nearly tripled in size and was providing higher quality and quantity of services than ever before. CAPT Herring was selected as the Environmental Health Specialist of the Year for the Alaska Area Native Health Service in 1989. He took on a leadership role in reestablishing the Alaska Environmental Health Association (AEHA) and was elected AEHA president in 1991.

CAPT Herring earned an MPH degree from the University of Texas Health Science Center at Houston (San Antonio campus) in 1993. After graduation, he was assigned to a dual position with the Environmental Management Branch of Indian Health Service (IHS) Headquarters West and the Albuquerque Area Office of IHS in Albuquerque, New Mexico. He led the efforts for a major revision of the IHS *Handbook of Environmental Health*, a detailed technical guide for IHS environmental health professionals that is used by other federal agencies and organizations. He served as coordinator of the Centers for Disease Control and Prevention (CDC)/IHS Longitudinal Study of Hantavirus in the Desert Southwest for the Albuquerque Area of IHS. CAPT Herring led a team that conducted monthly field studies of rodents in a tribal region of New Mexico that had been impacted by a deadly hantavirus outbreak. The study provided critical information that enhanced our current understanding of hantavirus and the role of rodents as vectors of hantavirus.

In 1995, CAPT Herring reported to the U.S. Coast Guard Support Center in Elizabeth City, North Carolina, to serve as chief of the Environmental Compliance Division. He was responsible for management of the largest environmental compliance program in the U.S. Coast Guard. His efforts elevated the status of the Support Center to one of the nation's pioneer sites for the development of new hazardous waste site remediation technologies. His program received numerous prestigious national and state environmental awards during his tenure including two White House Closing the Circle Awards, two North Carolina Governor's Awards for Excellence in Waste Reduction, four Coast Guard National Pollution Prevention Awards, and the Department of Transportation Environmental Excellence Award.

In December 2001, CAPT Herring accepted a position as a senior environmental health scientist at CDC's National Center for Environmental Health (NCEH) within the newly created Environmental Health Services Branch (EHSB). His work at CDC has resulted in numerous advancements and programs for the profession. He served as the EHSB lead for all workforce development activities. CAPT Herring worked closely with the Association of Environmental Health Academic Programs to increase enrollment, graduation rates, diversity, and the number of accredited environmental health academic programs throughout the U.S. He led the development of CDC's Summer Undergraduate Program in Environmental Health and formed the Uniformed Services Environmental Public Health Careers Work Group. While at CDC, he also served as chair of the USPHS Environmental Health Officer Professional Advisory Committee and was president of the Uniformed Services Environmental Health Association.

CAPT Herring currently serves as innovation team leader for EHSB and is the lead subject-matter expert on vector control and integrated pest management (IPM) at NCEH. He has done extraordinary work promoting the science and principles of IPM to health professionals throughout the U.S. and abroad. He led the development of the greatly successful course, "Biology and Control of Vectors and Public Health Pests: The Importance of Integrated Pest Management." He also played important roles in the development of CDC's Environmental Health Training in Emergency Response course, the Environmental Public Health Leadership Institute, and the Environmental Public Health Online Courses.

During the course of his career, CAPT Herring has received numerous awards from multiple federal agencies along with national and state associations and academia. He is one of the most highly decorated environmental health officers in USPHS. Although CAPT Herring's career achievements have left a legacy of which he can be proud, his greatest source of pride by far is in his family—his lovely wife Katie and his four children, Jaron, Callie, Trent, and Jeremy.

When asked about his career, CAPT Herring stated, "Surrounding yourself with good people is one of the keys to being successful in whatever you do. I've been very blessed to be in the right place at the right time working with many exceptional people." It is a certainty that many environmental health professionals who have had the privilege of working with CAPT Herring feel exactly the same.

RADM Webster Young, Jr., MPH, RS, DEAAS (Ret.), writes, "CAPT Herring maintains the highest ethical and professional standards in all of his activities such that he serves as a role model for all with whom he interacts."

CAPT Richard Gelting, PhD, PE (2013 Federal Engineer of the Year), writes, "CAPT Herring is the best environmental health professional that I have ever worked with or known. His span of expertise and knowledge across all environmental health issues is truly impressive."

Robert M. Corrigan, PhD, writes, "I consider Mike Herring one of my mentors in my own professional development. Each and every time I have the opportunity to work with him, I discover that I too am inspired to reach higher. I feel a new drive, a want, to do more for others."

Thus, it is a privilege and an honor for NEHA to present this award to CAPT Michael E. Herring, a professional who exemplifies the philosophy, ethics, and dedication expressed through the life of the late Walter S. Mangold.

2013 Walter F. Snyder Award Recipient

Vincent J. Radke, MPH, RS, CP-FS, DAAS, CPH

NSF International and NEHA presented the prestigious Walter F. Snyder Award to Vincent J. Radke, MPH, RS, CP-FS, DAAS, CPH, at the 2013 AEC in Washington, DC. The award, given in honor of NSF International's cofounder and first executive director Walter F. Snyder, is presented annually in recognition of outstanding contributions to the advancement of environmental health.

Radke is being honored for 43 years of distinguished environmental and public health service in enhancing the lives of people worldwide through leadership, dedication, service, and a commitment to fostering collaboration.

In the 1970s, Radke was instrumental in helping to eradicate smallpox. As a surveillance and assessment officer with the U.S. Peace Corps in 1970, he worked with the Ethiopian government; tribal chiefs; and school, health clinic, and church staff to combat smallpox and establish cholera and tuberculosis immunization programs. The World Health Organization (WHO) requested Radke to assist with the eradication of smallpox in Bangladesh in 1975 and to document that smallpox had been eradicated from Kenya in 1977. For his work, he was awarded the Order of the Bifurcated Needle by WHO's director general.

In the 1980s through early 1990s, Radke held several environmental health positions. As director of environmental health in Stamford, Connecticut, he ran programs in water, sewage disposal systems, food services, noise control, and air pollution. At the Virginia Department of Health, he provided sanitation and inspection services for water supplies, food service establishments, swimming pools, daycare centers, pet shops, and nursing homes. For his work responding to a cyclosporiasis outbreak related to pesto sauce, he and his colleagues at the Alexandria Health Department received the Washington, DC, Counsel of Government Award for Meritorious Service.

Radke was instrumental in establishing the Food and Drug Administration's model *Food Code* in northern Virginia in the mid-1990s, for which he received two annual Jerrold M. Michael awards from the National Capital Area Environmental Health Association. He also helped to set up the model *Food Code* for the state of Virginia.

In 2000 at the Institute for Environmental Assessment, Radke developed health, safety, and injury reduction programs for school districts in Minnesota. He established school safety committees and implemented environmental compliance training for school employees in food safety, bloodborne pathogens, chemical hygiene standards, and laboratory safety.

In 2001, the Environmental Health Services Branch (EHSB) of the Centers for Disease Control and Prevention (CDC) hired Radke as a lead sanitarian to enhance food safety and security domestically and globally. He organized and led collaborative food safety activities within the CDC and with the National Center for Environmental Health and the National Center for Infectious Diseases, across many public health disciplines (epidemiology, behavioral science, laboratory, and environmental health). He also led studies to identify environmental antecedents associated with foodborne illness, which required coordination between federal, state, and local agencies.

Radke helped develop the Environmental Health Specialist Network (EHS-Net), a collaborative forum of environmental health specialists to improve the practice of environmental health nationally. As coleader of the EHSB innovation team, he has ushered the development of numerous national public health programs to raise the awareness of public health professionals on emerging environmental health issues and to improve the practice of the environmental health sciences.

Radke served as a mentor in the Environmental Public Health Leadership Institute, working with environmental health leaders from federal, state, local, and tribal agencies across the U.S. His expertise was sought by the Office of U.S. Foreign Disaster Assistance to assess water and sanitation systems following natural disasters in the Pacific Islands and the Philippines, and he has been a first responder in many hurricanes in the U.S.

Radke has served as president of two NEHA affiliates—the National Capital Area Environmental Health Association and the Virginia Environmental Health Association. He is a NEHA technical advisor in disaster and emergency response and a board member of the American Academy of Sanitarians. He has served as a council member on the National Environmental Health Science and Professional Accreditation Council, reviewing and accrediting courses of study in environmental health at undergraduate and graduate levels.

"Vince Radke's career achievements reflect the principles expressed by Walter F. Snyder and the public health mission of NSF International," said Kevan P. Lawlor, NSF International president and CEO. "His service as a public health advocate, as well as a leader and a mentor, demonstrate his strong commitment to the promotion of public and environmental health. He inspires collaboration between agencies and people at all levels, and has helped establish many programs that have made a lasting global impact. These accomplishments make him an exceptionally worthy recipient of the Walter F. Snyder Award."

"Vince Radke is a respected leader in the environmental health field worldwide. He is highly regarded and respected due to his tireless service as well as his ability to encourage collaboration and drive change. Vince is an exceptional human health professional, as well as an inspiring human being. He deserves the Walter F. Snyder Award," said Nelson Fabian, executive director and CEO of NEHA.

continued from page 83

It is supported by the Conference for Food Protection in cooperation with the American Academy of Sanitarians; the American Public Health Association; the Association of Food & Drug Officials; the Foodservice Packaging Institute, Inc.; the International Association for Food Protection; the National Association of County and City Health Officials; the National Restaurant Association Solutions; NEHA; NSF; and UL.

Hamilton County Public Health (HCPH), Cincinnati, Ohio, was named as the 2013 Crumbine winner. HCPH's innovative consumer protection program that utilizes an electronic format for inspections and data report generation that are used as management tools. Additionally, the selection jury was impressed with HCPH's mantra of "education over enforcement" which drives performance and was consistent throughout their submittal documents. This is the second time HCPH has been honored with the award; their first award was given exactly 50 years ago. The award-winning application can be found online at www.crumbineaward.com.

Dr. Neil Lowry Memorial Award

The Dr. Neil Lowry Memorial Award honors and recognizes public health officials who have made outstanding contributions to advance the public's healthy and safe use of recreational water. The award is given by the Association of Pool & Spa Professionals (APSP) in memory of Dr. Lowry, a longtime member of APSP, who influenced the pool and spa industry for over 25 years as a consultant to government and private industry. This year's award was presented to Florida Department of Health's Brevard County Environmental Health Services Department.

Past Presidents Award

Each year, the Past Presidents group, comprised of former NEHA presidents, identifies a hero from the profession who accomplishes much on behalf of environmental health, but who does a lot of work behind the scenes. This year, the presidents identified two longtime NEHA members who have made enormous contributions to our field of practice. They were happy to publicly recognize Martin Kalis and Vincent Radke from CDC/NCEH's Environmental Health Services Branch.

Presidential Citations

A Presidential Citation is a special award given to individuals who have made exemplary contributions to NEHA during the president's term of office. President Brian Collins presented Presidential Citations to the following individuals.

Debbie Bankston
Debra Collins
Gabrielle Collins
Bob Custard
Scott Holmes
Mel Knight
John Marcello
Rebecca Morley
Yolanda Anita Sanchez
Tony Smithson
John Steward
Felix Zemel
The entire NEHA staff

Certificates of Merit

Certificates of Merit are awarded to affiliate members who make exemplary contributions to the environmental health profession. Each affiliate selects winners based upon its own criteria for recognition. For 2013, the following winners were announced.

- Colorado—James Dale
- Illinois—Wil Hayes
- Indiana—Mike Mettler
- Iowa—Tammy McKeever
- Jamaica—Leroy L. Walters
- Louisiana—Jefferson Purnell Jackson
- Massachusetts—Jennifer Tsoi
- Michigan—Dana DeBruyn
- Minnesota—Lynn Moore
- Missouri—Ainsley Lackey
- National Capitol Area—Marion Allen
- Nebraska—Doug Clark
- Oklahoma—Loree L. Boyanton
- Texas—Anthony E. Bennett
- Uniformed Services—CPT Sean Beeman
- Virginia—Agnes Fleming
- Wisconsin—Brian Hobbs
- Wyoming—Sara Geffre

Decade Scholarship Awards

Each year, Decade Software Company gives away 15 scholarships to environmental health professionals who might not otherwise be able to attend the AEC. A panel of Decade Software executives along with executives and elected officials of NEHA scored the short-essay responses of the applicants. The essay provided an opportunity for applicants to express their innovative ideas for the industry. Fifteen applicants received a $700 scholarship. This year's scholarship winners are listed below.

Patrice Barrett
Jerry Bingham
Lauren Brinker
Kimberly Burgess
Amanda Echler
Stephanie Gorman
Larry Johnson
Christy Kuriatnyk
Robert Mancini
Eric Myers
Agustina Lopez Novillo
Denisha Porter
Emily Sjostrom
Rachel Stradling
Robert Washam

NEHA AEC Scholarship Awards

NEHA provided a total of 24 AEC scholarships—19 full conference registration scholarships plus $400 travel stipends and five registration-only scholarships to those living/working in the Washington, DC, area. These scholarships were available to NEHA members working within the field of environmental health. Besides meeting basic qualifications, applicants were asked to explain why they were in need of these scholarships, as well as how they would benefit from attending the AEC. Congratulations to the scholarship recipients listed below.

Tiffany Breger
Veronica Bryant
Elizabeth Archer Campbell
Angela Dyjack
Frances Gelder
Karen Gregory
Bryan Hare
Sandy Heinen
Kyle Hobson
Michele Howard
Deborah Hoy
Sandra Cooke Hulbert
Ann Jackson
Temesgen Jemaneh
Chris Klawuhn
Yvonne Liang
Jennifer Light
Mellody Liples
Katherine Merten
Rosalia Petersen
Cyndi Tereszkiewicz
Susan Thweatt
Gratiela Vasilica
Maureen Wentzel

Student AEC Scholarship Awards

NEHA received donations through its Student AEC Scholarship Fund to provide two students with student registrations and $400 travel stipends to attend the AEC. About $1,200 was donated this year to the fund, and $1,000 has already been donated for the 2014 AEC—so the 2014 AEC is off to a great start for students! Congratulations to the recipients and thank you to all of the donors!

Scholarship Recipients

Meghan Card
Shika Southall

Scholarship Donors

American Academy of Sanitarians
Terry Osner
Welford Roberts
LCDR James M. Speckhart
John Steward

The recipients of the 2013 Decade Scholarship Awards.

Exhibitors

AbTech Industries, Inc.
www.abtechindustries.com

Advanced Drainage Systems, Inc.
www.ads-pipe.com

American Academy of Sanitarians (AAS)
www.sanitarians.org

American Chemistry Council
www.americanchemistry.com

American Public University
www.studyatapu.com

Anua
www.anua-us.com

Association of Environmental Health Academic Programs
www.aehap.org

Association of Food and Drug Officials
www.afdo.org

Association of Professional Piercers
www.safepiercing.org

Cambro
www.cambro.com

CDC, Environmental Public Health Tracking
www.cdc.gov/nceh/tracking

CDP, Inc.
www.cdpehs.com

Clarke
www.clarke.com

Decade Software Company, LLC
www.decadesoftware.com

Digital Health Department, Inc.
www.digitalhealthdepartment.com

Ecolab ActiveView HDI
laurie.savino@ecolab.com

Eljen Corporation
www.eljen.com

FDA/Center for Food Safety and Applied Nutrition
www.fda.hhs.gov

Global Food Protection Institute
www.gfpi.org

HealthSpace USA, Inc.
www.healthspace.com

Hoot Systems, LLC
www.hootsystems.com

HUD, Office of Healthy Homes
www.hud.gov/healthyhomes

Industrial Test Systems, Inc.
www.sensafe.com

Inspect2Go
www.inspect2go.com

InspekPro, LLC
www.inspekpro.com

International City/County Management Association
www.icma.org

International Federation of Environmental Health
www.ifeh.org

Intertek
www.intertek.com

ITW Professional Brands
tmillar@itwprobrands.com

Jet, Inc.
www.jetincorp.com

LaMotte Company
www.lamotte.com

Mitchell Humphrey
www.mitchellhumphrey.com

Mycometer
www.mycometer.com

National Center for Healthy Housing
www.nchh.org

National Environmental Health Association
www.neha.org

National Library of Medicine
www.nlm.nih.gov

National Restaurant Association
www.restaurant.org

National Swimming Pool Foundation
www.nspf.org

NEHA Food Safety Training
www.nehatraining.org

NSF International
www.nsf.org

Olympus NDT
www.olympus-ims.com

Ozark River Portable Sinks
www.ozarkriver.com

Paster Training, Inc.
www.pastertraining.com

Pennsylvania Environmental Public Health Tracking
www.epht.pa.gov

PerkinElmer, Inc.
www.perkinelmer.com

Presby Environmental, Inc.
www.presbyenvironmental.com

Project Energy Savers
www.projectenergysavers.com

Prometric
www.prometric.com

Qleeno
www.qleenousa.com

Restoro Polish Company
restoro@consolidated.net

RMSYS

Rural Community Assistance Partnership

Salcor
jscruver@aol.com

San Jamar
www.sanjamar.com

Shat-R-Shield, Inc.
www.shatrshield.com

Skillsoft
www.skillsoft.com

StateFoodSafety.com™
www.statefoodsafety.com

State Onsite Regulators Alliance and Captains of Industry© (SORA/COI)
www.nesc.wvu.edu/sora

Sweeps Software, Inc.
www.sweepssoftware.com

The University of Findlay
www.findlay.edu

ThermoWorks
www.thermoworks.com

TrackAssist-Online
www.yaharasoftware.com

UL
www.ul.com

University of Nebraska Medical Center, College of Public Health
www.unmc.edu/publichealth

U.S. EPA, Indoor Environments
www.epa.gov/iaq

U.S. EPA, Memorandum of Understanding Coalition

U.S. EPA, Office of Wastewater Management

U.S. Navy Recruiting Command
www.navy.com

Walden University
waldenu.edu

Zulu Nyala Group
www.zulunyala.com

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

SAVE THE DATES
JULY 7-10, 2014
LAS VEGAS, NEVADA

This unique event will highlight environmental health issues and solutions from around the world!

78th NEHA AEC

IN PARTNERSHIP WITH THE IFEH 13TH WORLD CONGRESS

NEHA 2014 AEC
CALL FOR ABSTRACTS

The National Environmental Health Association presents its 78th Annual Educational Conference & Exhibition in Las Vegas, NV, July 7-10, 2014.

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

AEC Format

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

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

to participate in the Call for Abstracts.

Ensuring Attendees a Return on Investment

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

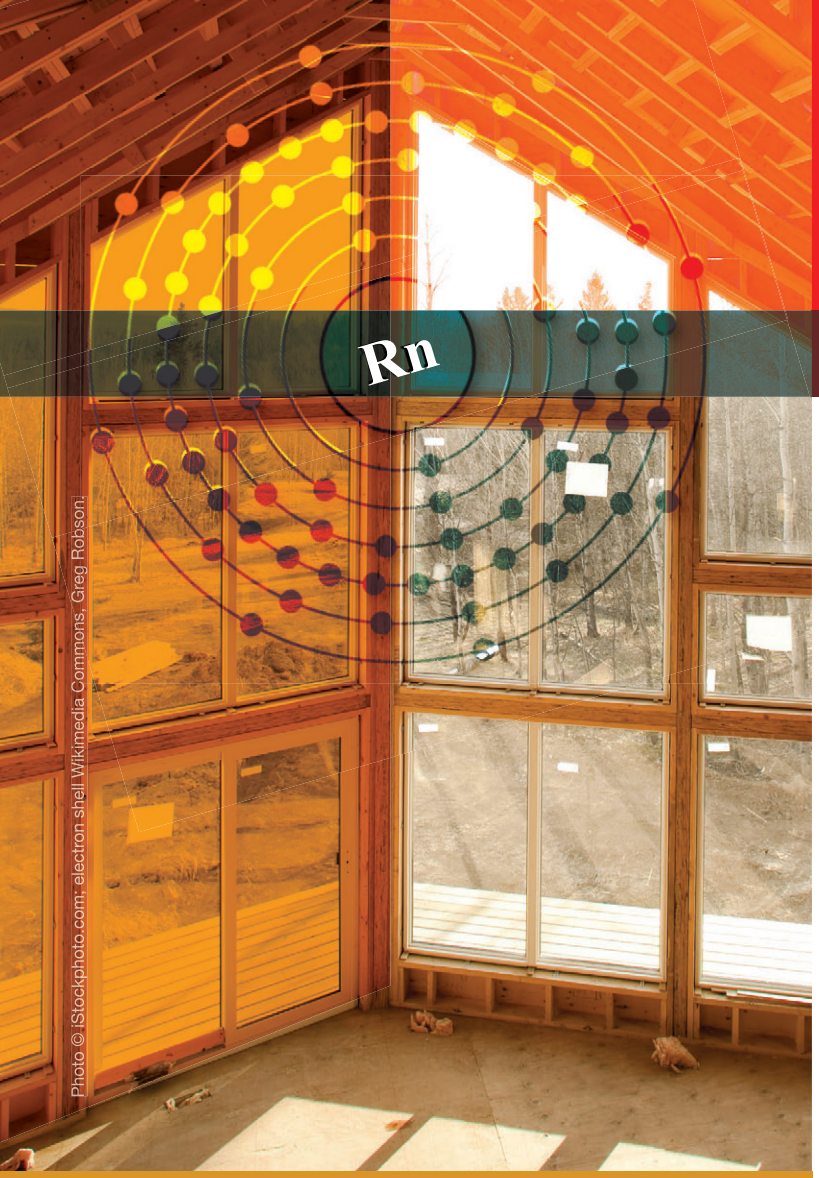
Virtual AEC

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

Submission Process

Individuals and groups involved in all aspects of environmental health and public health are strongly encouraged to participate in this Call for Abstracts. **Deadline to submit an abstract is October 11, 2013, 5:00 pm MST.**

Submit your abstract today at neha2014aec.org!



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NEHA Radon Resistant New Construction (RRNC) Training

November 19–21, 2013 ■ 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 October 18, 2013. Participants will be notified by October 25, 2013, if selected.

Applications must be on agency letterhead and include

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

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

NATIONAL ENVIRONMENTAL HEALTH ASSOCIATION

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

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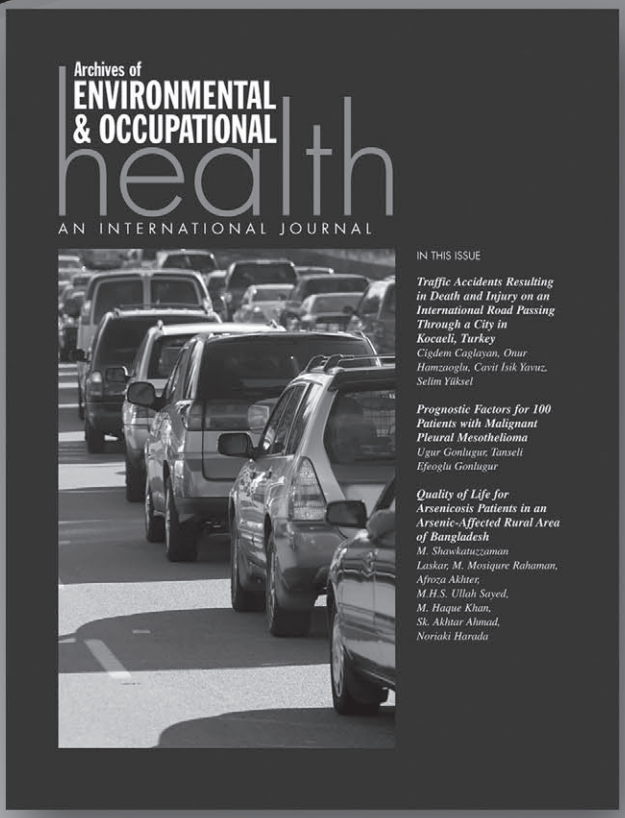

For more than 90 years, **Archives of Environmental & Occupational Health** has provided objective documentation of the effects of environmental agents on human, and in some cases, animal populations. This noted journal consolidates the latest research from such varying fields as epidemiology, toxicology, biostatistics, and biochemistry.

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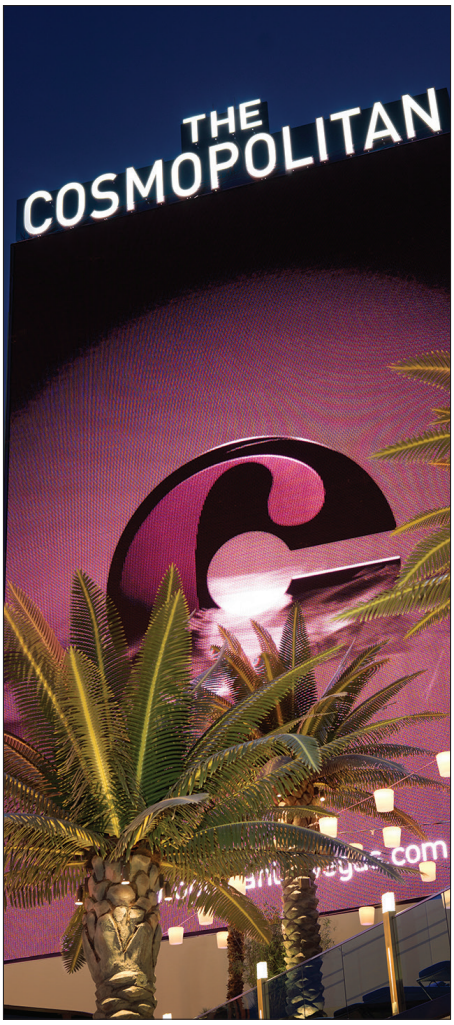
Managing Editor's Desk
continued from page 94



The Cosmopolitan of Las Vegas is the most original destination in the heart of The Las Vegas Strip. Stylish design and art engage cultural sensibilities while a vibrant nightlife scene captivates perceptions. World-class dining, hand-selected boutiques, an unrivaled Pool District, a 100,000 square-foot casino, the Sahra Spa & Hammam, and all the other unique features of The Cosmopolitan set the stage for the 2014 AEC to be an event not to miss!

Our AEC next year will also feature something we've never done before. We will be integrating into our conference the 2014 International Federation of Environmental Health's 2014 World Congress. What this means for you is that the 2014 AEC will be

- an extraordinary opportunity for you to meet colleagues from around the world, and
- the chance to learn about how environmental health issues are dealt with in other countries. (And this track will be in addition to our many tracks on the broad spectrum of environmental health issues and concerns that exist right here in the U.S.)

At our last AEC in Washington, DC, we not surprisingly stressed the issue of policy, as that's what Washington, DC, is all about. Las Vegas is about reinvention, excitement, and pushing the limits. Accordingly, our intent is to push innovation for next year's AEC.

If there is one lesson that the emerging literature on jobs has taught me as NEHA works to open up new job opportunities for EH professionals like you, it is that the future is all about innovation and "value added." We are taking that lesson to heart as we look to provide you with both a program and an experience next year that will showcase innovation in environmental health and how you can be a part of it.

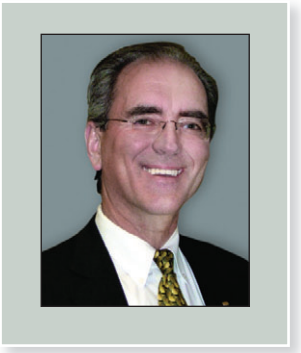
I could say much more but I'm at the limit of my attempt to talk about next year's conference within the bounds of less is more. I'll therefore end by simply observing that there is no city where the people watching, entertainment, and food combine to give you an experience like Las Vegas does. Throw in a very special and unique NEHA AEC and I hope you'll find the draw just too strong to pass up!

See you in Vegas next July!

nfabian@neha.org

Photos provided by The Cosmopolitan of Las Vegas.

MANAGING EDITOR'S DESK



Nelson Fabian, MS

An AEC Not to be Missed! (A Sneak Peek at the 2014 AEC)

What follows is one of my rare attempts to write a "Less is More" column! By saying little, I hope that the significance of what I am saying becomes larger!

Next year, NEHA will convene its 78th Annual Educational Conference (AEC) & Exhibition in the exciting and unique city of Las Vegas. There is simply no other city on the planet like this one.

In this era of tight budgets and multiple demands on our time, it isn't too early to start thinking about attending this special event. To help you begin your decision-making process, please note the following.

Every time NEHA takes its AEC to Las Vegas, our attendance goes up. This is a great benefit for the attendee inasmuch as a large attendance ensures an abundance of networking opportunities. To that point, our members consistently rank the opportunity to make new friendships as one of the greatest benefits they gain from attending a national conference of the type NEHA sponsors.

Because we expect a higher than normal attendance next year, we have to urge you to make your reservations early. To protect the association from attrition penalties, we are increasingly negotiating modest room blocks. This means that there is a conservative limit on the number of rooms we have booked for you at our host hotel, The Cosmopolitan of Las Vegas, which is truly one of the most spectacular properties to exist on the famous Las Vegas strip.

Speaking of which, we recently checked out room rates at The Cosmopolitan for a stay there this past August. Even on Priceline.com, we were finding that the lowest room rates were going for over $300 per night. For the NEHA AEC next year . . . our room rates are a ridiculous $139!

This is an incredible rate for an incredible room at an incredible hotel. Our block is going to sell out fast.

The Cosmopolitan of Las Vegas, a unique luxury resort and casino unlike anything else in Las Vegas, lights up the nighttime sky. This is the amazing location for NEHA's 2014 AEC next July!

Our intent is to push innovation for next year's AEC.

continued on page 92

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Last year Angie Clark did **700** routine inspections, **200** complaint inspections, **100** Court dates and logged **3,000** travel miles and quite possibly prevented dozens of illnesses.

She doesn't take chances. The communities she serves depend on her to do more inspections under an increasingly difficult work load and conditions. As a true professional, she demands the most from her tools and equipment.

That's why she is never without her tablet computer and HealthSpace EnviroIntel Manager.

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