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SNEAKERS AND SPOKES

THE BUILT ENVIRONMENT: CREATING CAMPUSES THAT ENCOURAGE PHYSICAL ACTIVITY AND WELL-BEING

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ABOUT THE COVER

The authors of this month's cover feature, "Sneakers and Spokes: An Assessment of the Walkability and Bikeability of U.S. Postsecondary Institutions," addressed the problem of obesity in the U.S. through the lens of the ease with which people on college campuses can walk and bike. They assessed walking and biking paths of 15 U.S. campuses and found that while 70% of audited path segments received an A or B grade, nearly half scored well below an acceptable level in many criteria. This study can help planners improve campus walk- and bikeability for the benefit of both human health and the environment. *See page 8.*

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PRESIDENT'S MESSAGE

Mel Knight, REHS

Technical Advisors Serving the Profession

The field of environmental health covers an extraordinary breadth of technical subject areas. Environmental health practitioners are expected to be proficient in everything from air quality to zoonotic disease. A generalist may routinely deal with food safety, wastewater, drinking water, solid waste, and more in a single day. Specialists may be responsible for highly specific programs such as emerging pathogens, radiation protection, or risk assessment associated with nanoparticles. This diversity is one of the many reasons that environmental health is challenging, rewarding, and ever changing.

NEHA's primary mission is advancing the environmental health professional and enhancing technical competency has always been a major focus. The NEHA Annual Educational Conference (AEC) & Exhibition, the *Journal of Environmental Health*, NEHA-sponsored training programs, and NEHA credentialing are all aimed at expanding and ensuring technical competence and proficiency. While much of this work is the product of talented NEHA staff, NEHA members perform a significant role in providing the required knowledge, skills, and abilities.

Opportunities to Serve

NEHA provides many opportunities for members like you and me to contribute to the profession. You might be interested in presenting or moderating at a conference. Authoring a paper or serving as a peer reviewer are also options. Representing NEHA as a subject-matter expert is another route of service that has recently grown in scale and scope.

NEHA's primary mission is advancing the environmental health professional and enhancing technical competency has always been a major focus.

My first significant involvement in NEHA began more than 20 years ago when I volunteered to serve as a subject-matter expert, specifically as the Section Chair for the Hazardous Materials Section. More recently I again served as a Section Chair, this time for the Leadership Development Section. During these times the primary responsibility for a Section Chair was to select and coordinate the speakers for the allotted program track at NEHA's AEC.

The Evolution of Section Chairs to Technical Advisors

The resources and needs of NEHA have evolved over time and NEHA now has a professional education coordinator with the responsibility for program speakers and logistics. Recognizing this change as now allowing Section Chairs to assume a broader role to more fully utilize their subject-matter expertise, the NEHA board of directors agreed this past year to expand the scope of subject matter areas and change the title from "Section Chair" to a more appropriate title of "NEHA Technical Advisor."

Areas of Subject-Matter Expertise

The NEHA board of directors adopted the following list of Technical Advisor Areas of Expertise: Ambient Air; Children's EH; Disaster/Emergency Response; Drinking Water; Emerging Pathogens; Environmental Justice; Food (including safety and defense); General; Hazardous Materials/Toxic Substances; Healthy Homes and Healthy Communities; Indoor Air; Injury Prevention; Institutions/Schools; International; Land Use Planning/Design; Legal; Management Policy (including leadership); Meteorology/Weather/Global Climate Change; Occupational Health/Safety; Pools/Spas; Radiation/Radon; Recreational EH; Risk Assessment; Sustainability; Technology (including computers, software, GIS, management applications); Terrorism/All Hazards Preparedness; Vector Control; Wastewater; Water Pollution Control/Water Quality; Workforce Development.

There was a clear awareness that this list is not static. There will be periodic additions, deletions, and consolidations to address the dynamics of our profession.

Responsibilities of NEHA Technical Advisors

NEHA Technical Advisors are now responsible for providing subject-matter expertise and counsel to the NEHA president, NEHA board, NEHA staff, NEHA affiliates, and the NEHA membership. In addition to providing assistance to the NEHA education coordinator, Technical Advisors have broadened roles and responsibilities. The NEHA board adopted a list of specific duties that included the following: staying abreast of the latest developments and educational needs of professionals within specific areas of expertise; identifying and sharing trends and needs of importance to NEHA's education coordinator; actively cooperating with and assisting NEHA's education coordinator in the development and implementation of NEHA AEC program tracks; assisting NEHA in responding to press inquiries, developing position papers, serving as an expert witness, and speaking on behalf of the association; and other activities as requested and agreed upon by the NEHA board of directors.

A Call to Serve

As was the case with Section Chairs, NEHA Technical Advisors are appointed by the NEHA president in consultation and with input from the NEHA board, NEHA staff, and NEHA membership. I was pleased to be able to appoint many former Section Chairs to newly created Technical Advisor assignments, and as a bonus the expanded categories and routine turnover ensure that there are numerous and continuing opportunities for those interested in serving the profession in this important capacity. I invite you to review the list of subject-matter areas and consider volunteering to become a NEHA Technical Advisor. As is the case with so many volunteer activities, the pay might be low, but the rewards can be great!

Mel Knight REHS
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Did You Know?

The deadlines to submit nominations for the Sabbatical Exchange Program, Mangold Award, and Samuel J. Crumbine Consumer Protection Award are coming up in March. To submit your nominations, visit www.neha.org/about/awardinfo.html. The award winners will be honored at the NEHA 2012 AEC.

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Call for Nominations

Nomination deadline is April 30, 2012.

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❖ ❖ ❖

Nominations for the 2012 *Walter F. Snyder Award* are being accepted for professionals achieving peer recognition for:

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

❖ ❖ ❖

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The 2012 Walter F. Snyder Award will be presented during NEHA's 76th Annual Educational Conference (AEC) & Exhibition to be held in San Diego, California, June 28-30, 2012.

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

Sneakers and Spokes: An Assessment of the Walkability and Bikeability of U.S. Postsecondary Institutions

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Abstract **The purpose of the study described in this article was to assess the walkability and bikeability of 15 U.S. postsecondary education campuses. The Centers for Disease Control and Prevention's evidence-based Healthier Worksite Initiative Walkability Audit was modified to rate campus walking and biking path segments for path safety, quality, and comfort. Universities (*n* = 13) assessed an average of 44 path segments, which earned a mean score of 72.71±10.77 *SD* (possible range 0 to 100). Postsecondary technical schools (*n* = 2) assessed 20 path segments, which received an average score of 76.56±13.15. About 70% of path segments received a grade A or B, but almost 1 in 10 received a failing or poor support score for walking and biking. Nearly half or more campus environments scored significantly below an acceptable score on many path safety and quality criteria. Postsecondary education campuses that are supportive of walking and biking offer numerous benefits to the environment and people. Findings from environmental assessments like the data reported here can provide valuable input to campus planners.**

Introduction

Obesity and its comorbidities are on the rise in all age groups, including young adults (Mei et al., 1998; Ogden et al., 2006). The transitional nature of young adulthood puts men and women aged 18 to 24 years at particularly high risk for unhealthy weight gain and obesity (Klem, Viteri, & Wing, 2000; Lewis et al., 2000; Wilkleby & Cubbin, 2004; Williamson et al., 1995). Transitions include moving from childhood homes, shifting from secondary to postsecondary education, transitioning from full-time education to full-time employment, developing intimate nonfamily live-in relationships, and becoming parents. In addition, young adults' personal health and lifestyle choices are increasingly made independently (Sparling, 2007).

Causal factors for obesity include both environmental and personal lifestyle and biological factors (French, Lin, & Guthrie, 2003; French, Story, & Jeffrey, 2001; Hill, 1998). The pace of population-wide genetic changes is too slow to account for the rapid escalation in recent obesity rates; clearly, environments favoring excess caloric intake and inadequate physical activity are at the root of this epidemic (Brinkley, Eales, & Jekanowski, 2000; Golan & Crow, 2004; Hill, Wyatt, Reed, & Peters, 2003).

Reciprocal determinism, a construct of Bandura's Social Cognitive Theory, posits that individuals' characteristics and behaviors and the environment within which the behaviors occur simultaneously and reciprocally affect each other (McAlister, Perry, & Parcel, 2008). If environments do not support weight-management behaviors, it is difficult for individuals to avoid unhealthy weight gain.

An environment common to more than 18 million young adults in the U.S. is that of postsecondary education campuses (Snyder, 2007). This environment provides a unique influence on emerging lifestyle patterns (Lowry et al., 2000). One lifestyle pattern of particular importance to maintaining a healthy weight is physical activity (Huang et al., 2003; Kimm et al., 2002). Currently, upwards of half of U.S. college students fail

to get sufficient exercise (Keating, Guan, Pinero, & Bridges, 2005). The limited research available indicates that individual-level interventions focused on increasing physical activity among college students have been largely ineffective (Keating et al., 2005). Thus, researchers have called for using a social-ecological approach that expands beyond the individual to include the environment (Cochrane & Davey, 2008; Keating et al., 2005), that is, creating environments that encourage physical activity by making activity the "default" or "easy" choice.

Although the built environment may not cause obesity (Kostova, 2011), walkability and bikeability of neighborhoods and communities are important environmental determinants of physical activity (Cochrane & Davey, 2008; Owen, Leslie, Salmon, & Fotheringham, 2000). Neighborhoods and communities characterized as walkable, either leisure oriented or destination driven, are associated with increased physical activity, lower body weights, more social capital, less depression, and less alcohol abuse (Renalds, Smith, & Hale, 2010). The high population density and short distances between destinations on university campuses make walking and biking feasible as modes of transportation that boost human energy expenditure (Balas, 2003; Toor, 2003).

Despite the potential health benefits, little is known about the extent to which postsecondary educational institutions support physical activity through their campus environments. Thus, the purpose of our study was to assess the walkability and bikeability of 15 U.S. postsecondary education campuses.

Methods

The university partners in the United States Department of Agriculture Multistate Research Project NC1028 "Promoting Healthful Eating to Prevent Excessive Weight Gain in Young Adults" assessed the bikeability and walkability of their campuses as well as two postsecondary technical schools. Assessments were conducted during a two-month window between October and November 2008 or May and June 2009.

Selection of Walking/Biking Paths for Assessment

Our study was guided by the principles of community-based participatory research (Green & Krueter, 2004). Thus, researchers at each university formed partnerships with key campus stakeholders (e.g., students, faculty, staff, administrators, and community members) who were invited to discuss their campus environments and identify the areas to assess for walkability and bikeability. Using campus maps that included at least a 1.5 mile buffer of areas off campus, stakeholders were asked to identify the most heavily trafficked areas and paths on and near campus that students used to travel by foot or bike between those areas. These included on- or near-campus homes (e.g., dorms, apartments) or parking lots (e.g., for commuters), academic buildings, and on- and off-campus activities, such as dining, recreation, and shopping locations. Maps were obtained from a variety of sources including official campus maps, campus cartographers, satellite images, 3-D, and Google Maps.

Researchers at each university marked campus maps with the most heavily trafficked pedestrian and biking routes between locations of interest. They then broke each route into segments based on changes in the character of the path. For example, to get from building A to a popular coffee shop pedestrians would 1) walk on path through grass, 2) walk on sidewalk next to road, then cross road, 3) walk on path through grass, then cross street, and 4) walk on sidewalk next to street and cross street to arrive at the shop. This route is broken into four segments because paths surrounded by grass have a different character and quality and thus would score differently than the segment that included a sidewalk alongside a road with intersections. Each campus research team assembled a network of path segments comprising common pedestrian routes. Data collectors were instructed to redefine path segments while in the field if the character of a segment changed to the extent that it caused conflicts in the consistency of scoring (see below).

Each university campus team was to audit a minimum of 20 segments, but campus size and the extent of walking/biking segments determined total segments audited. The technical schools evaluated fewer segments due to their smaller size. Twenty-five percent of the total segments were audited at night.

Instrument

A comprehensive review identified 31 walkability or bikeability assessment instruments (Moudin & Lee, 2003), none of which was designed to capture the unique features of university campuses. After careful review, the Centers for Disease Control and Prevention's (CDC's) Healthier Worksite Initiative Walkability Audit (Dannenberg, Cramer, & Gibson, 2005) was selected for our study because it is evidence based, captured a wide array of salient features, and required only simple modifications to make it suitable for use on university campuses. Specifically, the instrument was modified by adding criteria to capture terrain features and availability of nighttime safety equipment (e.g., lighting, emergency call boxes) and to increase clarity of each criterion. In addition, components from a neighborhood-based bikeability instrument (Pikora et al., 2002) were incorporated to assess the degree to which biking was promoted. The modified instrument was pilot tested on three campuses and refined to increase clarity and uniformity of coding.

The final instrument rated characteristics of walking and biking path segments on 12 criteria (Table 1). Four criteria focused on path safety: 1) pedestrian facilities (e.g., availability and quality of suitable walking surface such as sidewalk or path); 2) pedestrian/biker and motor vehicle conflicts (e.g., vehicle speed, traffic volume, pedestrian/biker visibility); 3) crosswalk quality (i.e., availability, traffic volume, traffic control); and 4) nighttime safety features (i.e., presence of adequate lighting and functioning emergency call boxes that are visible from all areas of path). Seven criteria assessed path quality: 1) path maintenance (presence of tripping/falling hazards such as cracked or buckled pavement, standing water); 2) path size (i.e., width sufficiency and presence of barriers to passage); 3) buffer zone (i.e., space between path and adjacent road); 4) accessible/passable for mobility impaired (i.e., ease of access, presence of ramps, curb cuts, handrails); 5) bikeability (presence and quality of designated bike lane); 6) terrain (i.e., extent of hilly vs. level topography); and 7) aesthetics (i.e., presence of uninviting to pleasant features [e.g., construction zones, noise, landscaping quality, benches, water fountains]). One criterion addressed path temperature comfort by assessing availability of shade.

TABLE **1**

Postsecondary Education Campus Walkability/Bikeability Semantic-Differential Assessment Instrument[a]

Criterion	Standards for Awarding Scores[d]					Score	Comments
	1	2	3	4	5		
Safety criteria							
Pedestrian facilities[a]	No permanent facilities		Sidewalk on one side of road		Continuous sidewalk on both sides of road or completely away from road		
Pedestrian/biker and motor vehicle conflicts[a]	High conflict potential: fast moving vehicles, high traffic volume, or poor visibility for foot or bike traffic				Low conflict potential: no vehicle traffic and good visibility for foot or bike traffic		
Crosswalk quality[a]	No crosswalk at major intersection	No crosswalk at low volume intersection	Crosswalk, no traffic control (i.e., stop signs or lights)	Crosswalk with traffic control or walk signal	No intersection or crosswalks are clearly marked and traffic controlled		
Nighttime safety features[b]	No lights or no visible emergency call box	Dim light or no visible emergency call box	Partial light or no visible emergency call box	Partial light and visible emergency call box	Well-lit and visible emergency call box		
Path quality criteria							
Path maintenance[a]	Major or frequent tripping/falling hazards such as cracked or buckled pavement, standing water				No tripping/falling hazards		
Path size[a]	No permanent facilities	<3 feet wide or significant barriers to passage			>5 feet wide, barrier free		
Buffer zone[a]	No buffer from roadway			>4 feet from roadway	Not adjacent to roadway		
Accessible/ passable for mobility impaired[a]	Completely impassible for wheelchairs (lacks ramps, curb cuts)	Difficult for wheel-chairs or other mobility impaired (lacks handrails on steps)		Inconvenient for wheelchairs or other mobility impaired (e.g., ramps require a detour to access)	Easy access for wheelchairs or other mobility impaired		
Bikeability[c]	No designated bike lane	Designated bike lane shared with parking area	Narrow (<3 feet) designated bike lane on road	Wide (>3 feet) designated bike lane on road or walking path	Wide designated bike lane separated from cars on road and walking path		
Terrain[b]	Very hilly or steps that require extra effort		Moderate hill that requires some effort		Flat or level, easy to walk or ride		
Aesthetic[a]	Uninviting (presence of construction zones, noise, poor landscaping, no benches or water fountains)				Pleasant (visually inviting, quiet, benches and water fountains available)		
Path temperature comfort criterion							
Shade[a]	No shade				Full shade		

[a]Minor adaptation from Centers for Disease Control and Prevention's Healthier Worksite Initiative Walkability Audit (Dannenberg et al., 2005).
[b]Created for this study.
[c]Minor adaptation from Systematic Pedestrian and Cycling Environmental Scan (SPACES) (Pikora et al., 2002).
[d]Scores for each criterion can range from 1 to 5; 1 = unacceptable/dangerous situation that provides poor support for walking and biking; 5 = meets the standard/pleasant situation that provides excellent support for walking and biking. Descriptions to anchor the low and high ends of the scale are provided for all criteria. Where feasible, descriptors for intermediate scores (i.e., 2 to 4) are provided. Inter-rater reliability for criteria ranged from 93% to 97%.

TABLE **2**

Campus Characteristics and Mean Walkability/Bikeability Scores

Campus	Campus Buildings*	Students Enrolled	Segments (*n*)	Score (Range: 0 to 100) Mean±*SD*	IRR#
Midwestern university 1	210	42,030	22	89.11±7.38[a]†	97
Midwestern university 2	579	46,045	78	83.86±9.10[a,b]	97
Midwestern university 3	230	28,000	26	76.64±3.84[b,c]	96
Midwestern university 4	195	23,520	79	75.18±10.02[c,d]	95
Midwestern university 5	158	11,706	34	73.57±5.79[c,d,e]	96
Midwest university totals				79.78±10.40[A]‡	–
Northeastern university 1	161	15,904	61	72.78±12.34[c,d,e]	94
Northeastern university 2	85	14,204	32	70.44±16.67[c,d,e]	96
Northeastern university 3	275	19,366	35	69.57±10.89[c,d,e]	95
Northeastern university 4	645	34,392	35	67.74±08.30[d,e]	93
Northeastern university 5	143	11,093	32	65.88±18.37[e,f]	97
Northeastern university totals				69.10±14.47[B]	–
Southern university 1	900	52,112	91	76.22±12.34[b,c]	94
Southern university 2	150	27,000	25	65.14±12.93[e,f]	97
Southern university 3	100	3,000	25	59.10±12.00[f]	93
Southern university totals				73.83±13.00[B]	–
Midwestern technical school	1	5,000	4	92.29±4.68	95
Northeastern technical school	6	293	16	60.82±21.61	92
Technical school totals			20	76.56±13.15	–

*Buildings and student enrollment (data from 2010) are an indication of campus size.

#IRR = Inter-rater reliability; value is percentage agreement.

†$F = 15.4$, $p < .0001$. Values bearing similar lowercase superscripts are not significantly different.

‡$F = 37.83$, $p < .0001$. Values bearing similar uppercase superscripts are not significantly different. Technical colleges and universities were not compared due to the large differences in campus characteristics.

Each criterion was scored using a five-point semantic-differential scale, where a score of "1" indicated the criterion was absent or dangerous and provided little or no support for walking or biking, and "5" indicated the criterion highly supported walking or biking (Table 1). As with the original CDC Healthier Worksite Initiative Walkability Audit (Dannenberg et al., 2005), our study's instrument weighted scores based on priority of importance. Scores for safety criteria (i.e., pedestrian facilities, conflict, crosswalks, and nighttime safety) were multiplied by a factor of 3 to reflect their critical nature. All other criteria except shade were deemed to be of medium importance and were multiplied by 2. Shade, deemed to be a less important criterion, was multiplied by 1. A score for each path segment was calculated using the equations below. Scores could range from 0 to 100.

Paths Assessed During Daylight

Daytime walkability/bikeability score = (((3 * [pedestrian facilities + conflict + crosswalks]) + (2 * [maintenance + path size + buffer + accessible/passable + bikeability + terrain + aesthetics]) + shade)/120) * 100.

Paths Assessed at Night

Nighttime walkability/bikeability = (((3 * [pedestrian facilities + conflict + crosswalks + nighttime safety]) + (2 * [maintenance + path size + buffer + accessible/passable + bikeability + terrain + aesthetics]))/130) * 100.

Data Collection

Data collection training was provided to all campus partners via webinar by the lead researcher. To gain proficiency in using the study instrument, data collectors assessed approximately six or seven path segments that were not part of their official campus audit. Training on each campus involved having all data collectors assess three or four path segments together and discussing and resolving differences in coding to enhance uniformity in coding. Subsequently, the data collectors independently assessed two or three additional segments to establish inter-rater reliabilities. A data collector was required to reach at least 80% proficiency before being permitted to collect data.

Data on each campus were collected by a team of at least two trained data collectors. Subsequently, data were entered into an Excel spreadsheet embedded with scoring calculations to permit each university team to review and monitor their results. Upon conclusion of data cleaning, spreadsheets were sent to the lead researcher for analysis using SPSS (version 17.0). Analysis of variance and Tukey follow-up procedures were conducted to determine differences among university campuses and geographic regions. Path scores for each campus were categorized by overall support for walking and biking. Grades were assigned as follows: grade A = score ≥85, indicating excellent support for walking and biking; grade B = score 70 to <85, indicating satisfactory support for walking and biking; grade C = score 55 to <70, indicating fair support for walking and biking; and grade F = score <55, indicating poor support for walking and biking. Chi-square was used to compare proportions of segments on each campus receiving each grade. To investigate whether the overall score for each walkability/bikeability criterion differed significantly from an "acceptable" score (i.e., a score of ≥4 on the five-point scales), *t*-tests were conducted for each criterion score on each campus.

Results

A total of 595 path segments were assessed on the 15 campuses. Campus characteristics and mean walkability/bikeability scores are reported in Table 2. Inter-rater reliability was high with agreement ranging from 93% to 97%. Universities assessed an average of 44 segments, which earned a mean score of 72.71±10.77 *SD*. Mean walkability/bikeability scores differed significantly by campus and region. Midwestern universities had significantly higher mean scores than both

TABLE **3**

Campus Walkability/Bikeability Score by Risk Category

Campus	Score and Rating of Path Segment Support for Walking and Biking				Total Segments Assessed
	Grade A: Score ≥85 (Excellent) *n* (%)	Grade B: Score = 70 to <85 (Satisfactory) *n* (%)	Grade C: Score = 55 to <70 (Fair) *n* (%)	Grade F: Score <55 (Poor) *n* (%)	
Midwestern university 1	14 (64)	8 (36)	0 (0)	0 (0)	22
Midwestern university 2	42 (54)	33 (42)	1 (1)	2 (3)	78
Midwestern university 3	0 (0)	25 (96)	1 (4)	0 (0)	26
Midwestern university 4	8 (10)	59 (75)	8 (10)	4 (5)	79
Midwestern university 5	1 (3)	22 (65)	11(32)	0 (0)	34
Northeastern university 1	11 (18)	30 (49)	13(21)	7 (12)	61
Northeastern university 2	7 (22)	11(34)	8 (25)	6 (19)	32
Northeastern university 3	2 (6)	19 (54)	11(31)	3 (9)	35
Northeastern university 4	1 (3)	15 (43)	18 (51)	1 (3)	35
Northeastern university 5	8 (25)	6 (19)	9 (28)	9 (28)	32
Southern university 1	27 (30)	38 (42)	21(23)	5 (6)	91
Southern university 2	1 (4)	9 (36)	11(44)	4 (16)	25
Southern university 3	0 (0)	7 (28)	8 (32)	10 (40)	25
University totals	121 (21)	282 (49)	120 (21)	51 (9)	575
Midwestern technical school	4 (100)	0 (0)	0 (0)	0 (0)	4
Northeastern technical school	3 (19)	3 (19)	4 (25)	6 (38)	16
Technical school totals	7 (35)	3 (15)	4 (20)	6 (30)	20

southern and northeastern universities. The technical schools assessed a total of 20 path segments, which received an average score of 76.56±13.15.

An examination of university path segments by grade revealed that about 70% received a grade of A or B, but nearly 1 in 10 received a failing or poor support score for walking and biking (Table 3). Three campuses (northeastern university 5, southeast university 3, and northeastern technical school) had significantly higher percentages of poor support segments, whereas three schools (Midwest university 1, Midwest university 2, and Midwest technical school) had significantly higher percentages of excellent support segments ($\chi^2 = 82.18$; $df = 13$; $p \leq .0001$).

Although the walkability/bikeability assessment is meant to be an overall indicator of the environment for walking and biking, an analysis of each criterion helps pinpoint issues relevant to specific campuses (Table 4). An examination of the safety criteria revealed that nearly half or more campus environments scored significantly below an acceptable score of ≥4 for pedestrian facilities, pedestrian/biker and motor vehicle conflict, crosswalk quality, and nighttime safety (Table 4). Path quality criteria significantly lower than the acceptable score for almost half or more campuses surveyed were bikeability, buffer zone, and terrain. Shade was absent along most path segments on the vast majority of campuses. Aesthetics and path maintenance were most likely to receive an acceptable score.

Discussion

The findings of our study indicate that overall, the surveyed U.S. postsecondary educational institution campuses could benefit from improvements to their support for walking and biking. Just one-fifth of the path segments evaluated were rated as providing excellent support for walking and biking and 10% provided poor support. The need for improved support for walking and biking was particularly pronounced at the surveyed northeastern and southern universities. Aesthetic-related path quality criteria (i.e., maintenance, size, accessibility, and aesthetics) tended to earn the highest scores. Criteria needing the most attention were bikeability, safety criteria (especially nighttime safety), buffer zones, and shade.

The high scores earned by aesthetic-related path quality criteria likely are the result of institutions wanting to create favorable impressions on future students who are considering enrolling. Nonetheless, this attention to aesthetics is a valuable support to walking in that pleasing walking paths are significant predictors of physical activity (Kaczynski, 2010).

No campus achieved an acceptable score for bikeability, which supports reports from the League of American Bicyclists (2010) that few schools and cities have developed bike-friendly environments. It is troubling that nearly half or more of campuses failed to achieve acceptable scores on all safety criteria. Because students are frequently on campus at night, the less than acceptable score for nighttime safety earned by a majority of campuses is especially surprising. Few emergency call boxes were found on or near campus; this

TABLE **4**

Scores by Criterion Falling Significantly Below Acceptable Walkability/Bikeability Score

Criterion	Segments *n*	Mean±*SD*	Campuses With Criterion Scores Significantly Below 4.0[1,2]	% of Campuses
Safety criteria				
Pedestrian facilities	595	4.07±1.24	Northeastern technical school, northeastern university 4, Midwest university 3[a], southern universities 2 and 3, northeastern universities 2 and 5[b]	47
Pedestrian/biker and motor vehicle conflict	595	3.95±1.27	Southern university 3, northeastern universities 3 and 5[a], southern university 2, northeastern technical school, northeastern universities 1 and 4[b]	47
Crosswalk quality	595	3.87±1.29	Southern universities 2 and 3; Midwest university 5[a]; northeastern universities 1, 2, 4, and 5[b]	47
Nighttime safety	176	3.35±1.15	Midwest universities 3, 4, and 5; northeastern universities 1, 2, and 5; southern universities 2 and 3; Midwest technical school[a]; northeastern universities 3 and 4; southern university 1[b]	80
Path quality criteria				
Path maintenance	594	4.23±0.93	Northeastern university 4, southern university 3[b]	13.3
Path size	595	4.03±1.19	Northeastern technical school, southern university 2[a], northeastern universities 4 and 5, southern universities 1 and 3[b]	40
Buffer zone	595	3.14±1.58	Northeastern technical school; all southern universities; Midwest universities 4 and 5; northeastern universities 1, 2, and 3[a]; northeastern university 4[b]	67
Accessible/passable for mobility impaired	595	4.14±1.23	Southern university 3; northeastern technical school; northeastern university 3[a]; northeastern universities 2, 4, and 5[b]	40
Bikeability	595	1.54±0.99	All universities[a]	100
Terrain	595	3.96±1.31	Midwest university 3, southern universities 2 and 3, northeastern university 3[a], northeastern technical school, northeastern universities 4 and 5[b]	47
Aesthetics	595	4.11±1.09	Northeastern technical school, northeastern university 5[a], northeastern university 2, southern university 1[b]	27
Path temperature comfort criterion				
Shade	439	2.60±1.17	Midwest universities 2 and 3, all northeastern universities, all southern universities, northeastern technical school[a], Midwest universities 1 and 4[b]	93

[1]Scores for each criterion can range from 1 to 5; 1 = unacceptable/dangerous situation that provides poor support for walking and biking; 5 = meeting the standard/pleasant situation that provides excellent support for walking and biking.

[2]Significantly different from acceptable score of 4.0; [a]$p < .001$; [b]$p < .01$.

might be because of the prevalence of cellular phones or desires to contain campus or town costs by not investing in emergency call box systems. Two-thirds of the campuses had less than adequate buffer zones between sidewalks and motor traffic. Campus researchers anecdotally reported that sidewalks were intentionally placed in close proximity to roadways to ease the burden of snow plowing.

A dearth of similar campus-based studies or widely differing methodology makes it difficult to compare the results of our study (Staten, Miller, Powers Noland, & Rayens, 2005; Wilkinson, Eddy, MacFadden, & Burgess, 2002). Our study's findings support previous research, however, reporting that communities like the campus communities studied here have multiple environmental barriers that deter walking and biking (Wilkinson et al., 2002). These include designs favoring motor rather than pedestrian traffic, limited bicycle access, safety concerns such as minimal crosswalks and traffic signals, and few benches or other amenities for pedestrians and bikers to refresh themselves (Wilkinson et al., 2002). Compared to workplace walkability, the study findings indicate that postsecondary education campuses are in better condition overall with more satisfactory and fewer poor quality segments. It is interesting to note that the top scoring campus environment in this study (Midwestern university 1) was also identified in a study of college campus transportation administrators regarding campus transportation sustainability (Balas, 2003).

Walking is one of the most accessible (e.g., cost-effective, easy-to-perform) forms of physical activity. Its benefits include "transportation" to a destination and improved mental and physical health. Prospective data from the Coronary Artery Risk Development in Young Adults (CARDIA) Study indicate that 30 minutes of walking daily can prevent significant weight gain (8 kg) over 15 years (Gordon-Larsen et al., 2009). Improving the walkability and bikeability of the postsecondary education campus environment has the potential to safeguard the health of millions of young adults (Grubbs & Carter, 2002). Improvements to campus environments should address the criteria

assessed in this study as well as others. For instance, adults who live in areas having greater access to goods and services within walking distance have higher activity levels (Ewing, Schmid, Killingsworth, Zlot, & Raudenbush, 2003; Kaczynski, 2010; Leslie et al., 2007; Owen et al., 2010).

A limitation of our study is that only 15 of the many postsecondary education campuses in the U.S. were assessed. Eight of the assessed universities, however, were the largest institutions in their states and two others were the second largest. Another limitation is that student perceptions of campus environmental support for walkability/bikeability were not assessed. Because perceptions of community walkability/bikeability are positively correlated with walking and bicycling activity (Duncan, Spence, & Mummery, 2005; Reed & Ainsworth, 2007), future studies should couple assessments of actual walkability/bikeability with perceived walkability/bikeability. Future research also should compare campus walkability/bikeability scores with actual student behaviors to establish how walkability/bikeability quality affects physical activity, body weight change during the years enrolled, and other quality-of-life factors such as stress, substance use, and depression (Renalds et al., 2010).

Conclusion

In conclusion, to our knowledge our study is the first to assess and compare the walkability/bikeability of postsecondary educational institution campuses. Our study also yielded an easy-to-use instrument, supported by its high inter-rater reliabilities, that others can use to benchmark their campuses. Engaging campus community stakeholders during the design phase of this study enabled us to identify the most heavily trafficked campus routes and, thus, conduct an assessment that would create an accurate, useful description of campus walkability/bikeability. Improved campus walkability/bikeability support could have far-reaching health and environmental benefits given the results of a survey of 23 large U.S. universities finding that 59% of students live within one mile of campus (Daggett & Gutkowski, 2003). Administrators at many higher education institutions have begun to create transportation demand management plans to address preservation of green space and improved support for campus walking and biking (Toor, 2003). Future studies that use our study's instrument to benchmark their campuses can maximize the usefulness of their data by using community-based participatory research principles and disseminating findings to decision makers (e.g., campus administrators, city planning boards) and decision advocators (e.g., stakeholders in the campus community).

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Lead in Drinking Water: Sampling in Primary Schools and Preschools in South Central Kansas

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Abstract **Studies in Philadelphia, New York City, Houston, Washington, DC, and Greenville, North Carolina, have revealed high lead levels in drinking water. Unlike urban areas, lead levels in drinking water in suburban and rural areas have not been adequately studied. In the study described in this article, drinking water in primary schools and preschools in five suburban and rural south central Kansas towns was sampled to determine if any exceeded the U.S. Environmental Protection Agency (U.S. EPA) guidance level for schools and child care facilities of 20 parts per billion (ppb). The results showed a total of 32.1% of the samples had detectable lead levels and 3.6% exceeded the U.S. EPA guidance level for schools and child care providers of 20 ppb. These results indicate that about one-third of the drinking water consumed by children age six and under in the five suburban and rural south central Kansas towns studied has some lead contamination, exposing these children to both short-term and long-term health risks. The authors suggest a need for increased surveillance of children's drinking water in these facilities.**

Introduction

The U.S. Environmental Protection Agency (U.S. EPA, 2011a), as directed by the Safe Drinking Water Act of 1974, has determined that no amount of lead in drinking water is safe. Water with lead contamination has been shown to increase the blood lead levels (BLLs) of children (Miranda, Galeano, Hull, Kim, & Paul, 2007b; Renner, 2007). In Washington, DC, elevated lead levels in drinking water were measured in 20,000 households sampled in 2004; in addition, 201 people had elevated BLLs and lived in homes where the lead content of the water exceeded 300 parts per billion (ppb) (Renner, 2007). One of the goals of the U.S. Department of Health and Human Services (2000) is the elimination of elevated BLLs in children.

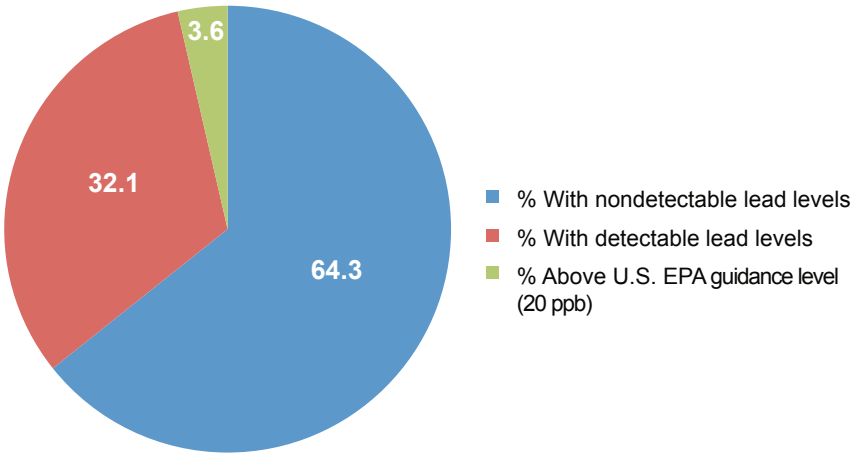
Recent studies have determined that early childhood BLLs as low as 2 µg/dL have detrimental effects on children's future intellectual abilities (Miranda et al., 2007a). Lanphear and co-authors (2005) found that for every 10 µg/dL increase in BLL, a decrease in intelligence quotient (IQ) points occurs ranging from 2.6 to 7.4 points. Studies by Needleman and co-authors (1990) and Miranda and co-authors (2007a) indicated that these declines are irreversible. Children with high BLLs also exhibit aggressive behavior, attention deficits, and slowed growth (Bogden, Oleske, & Louria, 1997; Needleman & Landrigan, 2004). Lead is stored in bone, and elevated levels can continue to cause problems throughout life (Bogden et al., 1997). Teenagers exposed to lead as children have more reading disabilities, lower class standings, decreased communication abilities, poor hand-eye coordination, slower reaction times, greater risk of not completing high school, and elevated levels of delinquent activity (Needleman, Schell, Bellinger, Leviton, & Allred, 1990). Lifelong health problems include hearing loss, tooth decay, spontaneous abortions, cardiovascular disease, anemia, hypertension, and kidney disease (Bogden et al., 1997; Lanphear et al., 2005).

Lead is removed from water by treatments at water utilities, but it leaches back into the water through the distribution system (Maas, Morgan, Pandolfo, & Patch, 2005). This is because the solder, fluxes, pipes, pipe fittings, fixtures, valves, and meters all can contain lead (Bryant, 2004; Maas et al., 2005). "Lead-free" fixtures and fittings can contain up to 8% lead (U.S. EPA, 1993). Drinking water fountains have been identified as particularly problematic because water often remains in their refrigerated systems for long periods (Jirles, Thigpen, & Forsythe, 1997).

Lead is colorless, tasteless, and odorless. The only way to measure lead in drinking water is to test it at the source (Maas et al., 2005). A study of drinking water sources in Philadelphia schools in 2000–2001 found that 57.4% had mean lead levels above 20 ppb; 28.7% of these had mean lead levels over 50 ppb (Bryant, 2004). A free tap water testing program in New York City in 2003 recorded about 15% of residences with lead levels exceeding 10 ppb (Maas et al., 2005). In the city of Greenville, North Carolina, 25% of the residential water sampled in 2004 had lead levels exceeding the U.S. EPA action level for lead of 15 ppb (Renner, 2005). In 2005, 12.5% of 40 workplace drinking water fountains tested in Houston also exceeded 15 ppb, with a maximum concentration of 210 ppb (Cech et al., 2006).

FIGURE **1**

Lead Levels in Drinking Water in Primary Schools and Preschools in South Central Kansas



ppb = parts per billion.

TABLE **1**

Contingency Table Examining Relationship Between Lead Levels and Age of Building

Age of Building (*n*)	<1 ppb[a] Lead	1 to <20 ppb Lead	≥20 ppb Lead
<5 Years (3)	3	0	0
5 to <25 Years (18)	15	3	0
25 to <45 Years (17)	11	6	0
≥45 Years (18)	9	7	2
Totals (56)	38	16	2

Note. df = 6, $p = .95$, χ^2e (Chi-square expected) = 12.6, χ^2o (Chi-square observed) = 42.0.
[a]ppb = parts per billion.

Information about lead contamination in suburban and rural areas is deficient since most studies have been done in urban areas (Bryant, 2004). In 1996, however, extreme levels were reported at a rural Utah school, including 670 ppb at a classroom tap and 840 ppb at a drinking fountain (Costa, Ash, Nuttall, Peterson, & Shaffer, 1997). According to the Kansas Department of Health and Environment (2006), the lead level in the drinking water of one residence in a rural south central Kansas town was 140 ppb. Our study examined the lead concentration of drinking water in primary schools and preschools in suburban and rural south central Kansas towns in 2008–2009 to determine if any exceeded U.S. EPA's guidance level for schools and child care facilities of 20 ppb (U.S. EPA, 2005c). Our study also examined the relationship between lead levels and building age, water temperature, and water corrosiveness.

Materials and Methods

The drinking water of primary schools and preschools of five towns in south central Kansas, two suburban and three rural, was sampled and analyzed for lead content. In communities that had more than one primary school, samples were collected at the oldest and newest facility, because buildings built before 1986 (U.S. EPA, 2011b) and those built in the last five years (U.S. EPA, 1993) are at the greatest risk for lead contamination in their drinking water. Drinking sources used by kindergarten and preschool children were targeted for our study, because children six years of age and younger have the greatest risk of brain damage from lead contamination (U.S. EPA, 2005a). Four samples were taken at each school, and one sample was taken from each type of water source at that location: bubbler, chilled bubbler, faucet, and cooler. If fewer than four types of sources were available, more than one sample was collected from the type of drinking source most commonly used. Two samples were collected from two preschools in each rural town and from four preschools in each suburban town. Twenty-eight samples were collected at primary schools and 28 samples were collected at preschools.

First-draw samples were taken in the morning before the faucets were used. Water was collected in a 1-L plastic container, stirred with a glass rod, then poured into a 30-mL acid-washed Nalgene collection bottle, according to protocol from the Clean Water Fund of North Carolina (CWFNC) (U.S. EPA, 2002). If any first-draw sample exceeded the U.S. EPA guidance level for schools and child care facilities of 20 ppb, purged line samples were collected. Purged line samples were drawn after a change occurred in water temperature, following the protocol from CWFNC (U.S. EPA, 2002). Samples were shipped to a certified lab at the Environmental Quality Institute of North Carolina for analysis. The method used could detect lead levels in excess of 1.0 ppb.

A Chi-square test was used with contingency tables to examine the relationships between lead levels and building age, water temperature, and water corrosiveness, with $\alpha \leq .05$. Water corrosiveness for each of the public water sources for these five communities was calculated using the aggressive index (AI) equation: AI = pH + log([total alkalinity] x [calcium hardness]).

Results

A total of 32.1% (n = 18) of the samples had detectable lead levels and 3.6% (n = 2) exceeded the U.S. EPA guidance level for schools and child care providers of 20 ppb (Figure 1). Of the two sources exceeding the U.S. EPA guidance

level, purged line collections yielded one result of 2.2 ppb and one result was not detectable. The maximum lead level detected was 27.2 ppb and the minimum was 1.0 ppb. The median detectable level was 3.35 ppb and the mean detectable level was 6.16 ppb.

The contingency table to examine the relationship between lead levels and age of building (Table 1) indicates that these factors are not independent since Chi-square observed (χ^2o) = 42.0 > 12.6 = Chi-square expected (χ^2e). These factors are directly related: as the age of the building increased, the lead levels steadily increased.

The AI of two of the communities was equal, resulting in only four water corrosiveness variables (Table 2) to compare with lead levels. The results indicate that these factors are not independent since χ^2o = 40.2 > 12.6 = χ^2e. As AI decreased, indicating an increase in water corrosiveness, lead content increased.

The table investigating lead levels and water temperature (Table 3) indicates that these factors are not independent since χ^2o = 32.1 > 15.5 = χ^2e. The highest levels of lead were found at temperatures 17°C–22°C. At temperatures <17°C, no samples had detectable levels of lead.

TABLE **2**

Contingency Table Examining Relationship Between Lead Levels and Water Corrosiveness as Calculated by Aggressive Index (AI) Equation

AI (*n*)	<1 ppb[a] Lead	1 to <20 ppb Lead	≥20 ppb Lead
10.18 (16)	9	5	2
10.73 (24)	17	7	0
10.91 (8)	7	1	0
11.59 (8)	5	3	0
Total (56)	38	16	2

Note. df = 6, *p* = .95, χ^2e (Chi-square expected) = 12.6, χ^2o (Chi-square observed) = 40.2.
[a]ppb = parts per billion.

TABLE **3**

Contingency Table Examining Relationship Between Lead Levels and Water Temperature

Water Temperature (*n*)	<1 ppb[a] Lead	1 to <20 ppb Lead	≥20 ppb Lead
4°C–10°C (3)	3	0	0
11°C–16°C (14)	14	0	0
17°C–22°C (27)	14	11	2
23°C–28°C (10)	6	4	0
>28°C (2)	1	1	0
Total (56)	38	16	2

Note. df = 8, *p* = .95, χ^2e (Chi-square expected) = 15.5, χ^2o (Chi-square observed) = 32.1.
[a]ppb = parts per billion.

Discussion

Results indicated that about one-third of the drinking water consumed by children age six and under in these five suburban and rural south central Kansas towns had some lead contamination, exposing these children to both short-term and long-term health risks. Exposure to lead can come from dust in the air as well as from food and nonfood items that enter through the mouth (American Academy of Pediatrics Committee on Environmental Health, 2005), but it has been documented that water contamination can be the sole source of lead poisoning (Cosgrove et al., 1989).

Schools that have their own water supply are regulated under the Safe Drinking Water Act (U.S. EPA, 2005b). They are subject to the Lead and Copper Rule (LCR) of 1991 that mandates water testing, public notification, corrosion control, and other corrective actions (Maas et al., 2005). Two samples exceeded the U.S. EPA guidance level for schools and child care providers of 20 ppb, but no corrective action, public notification, or further monitoring is mandated because they came from schools that utilize public water utilities. The *3T's for Reducing Lead in Drinking Water in Schools and Child Care Facilities: Training, Testing, Telling* (U.S. EPA, 2005c) is a program that makes recommendations to facilities utilizing public water utilities, but neither requirements nor penalties are imposed.

The lowered lead levels of the two purged line samples indicate that the lead is leaching from faucets, coolers, fixtures, soldering, pipe fittings, or other plumbing close to the outlet (Bryant, 2004). Murphy, in the *Effectiveness of Flushing on Reducing Lead and Copper Levels in School Drinking Water* (1993), reports that by midday, lead levels in purged lines, even in noncorrosive water, may not be significantly different from first-draw levels, so these results should not be interpreted to mean that those two water sources are not contributing to lead contamination.

Butala and co-authors (1991) found an inverse correlation (28% confidence level) between building age and lead concentration in water from nonrefrigerated fountains in buildings on the University of Nevada campus. The lead content in all of their samples, however, was <10 ppb due to the high alkalinity of their water supply, so these results may be atypical. Maas and co-authors (2005) report that drinking water contamination in the U.S. has decreased in the last century due to regulatory measures. The U.S. EPA (1993, 2011b, 2011c) reports that an increased risk of lead contamination exists in buildings built before the implementation of the Lead Contamination Control Act of 1988 because of the use of lead in fixtures and water cooler storage tanks and an even greater risk exists in buildings built before the Federal Lead Ban of 1986 because of the use of lead pipes, solder, and flux. In the early 1900s lead pipes were common in both exterior and interior plumbing (U.S. EPA, 1993). Therefore, the decrease

in lead concentration by age of building in our study is consistent with history.

Lead leaching into water supplies due to water corrosiveness is an element that led to the formation of the LCR (Maas et al., 2005). Murphy (1993) determined corrosivity was a factor in water with AI <10 but not in water with AI ≥10. Results of this sampling suggest that corrosivity could be a factor in water with AI ≥10.

A temperature increase intensifies corrosion of lead (Hermanson, 1991). Bryant (2004) found lead contamination in water drawn from hot water faucets in home economics classrooms in Philadelphia schools to be 32.1% higher than water drawn from cold water faucets in these classrooms, but specific temperatures were not reported. This sampling indicates that lead leaching into water supplies is minimal at temperatures <17°C.

Results of our study indicate a need for more sampling of water in buildings ≥45 years old, at temperatures ≥17°C, and in those served by water systems with an AI ≤10.18, especially in schools and child care facilities not subject to the LCR of 1991 (U.S. EPA, 2011c).

Conclusion

Lead poisoning is a preventable childhood illness. The U.S. EPA (1993) says 10%–20% of human exposure to lead is due to contaminated drinking water. Because children six years of age and younger have the greatest risk of brain damage from lead (U.S. EPA, 2005a), increased surveillance of the water supplies most frequently used by this age group is vital. Public water suppliers sampling in accordance with the LCR do not usually include schools because sampling of single-family dwellings is required (U.S. EPA, 2006). Results showing lead contamination in drinking water could result in the formation of regulations that would require closer monitoring and mandatory corrective actions in schools and child care facilities that utilize public water supplies, correcting this deficiency.

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INTERNATIONAL PERSPECTIVES

The Potential for Community Exposures to Pathogens From an Urban Dairy

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Abstract **The objectives of the study described in this article were to evaluate the variation and transport of fungal and bacterial concentrations in the air of a northern Mexico dairy cattle confined animal feeding operation (CAFO) and to determine the concentration and incidence of antibiotic-resistant *Staphylococcus aureus* isolates. Two-stage viable cascade impactors were used to measure the culturable airborne fungal organisms and bacteria. *S. aureus* resistant to penicillin, ampicillin, or cefaclor was identified.**

Samples were collected at three locations that were designated as on site, upwind of the cattle, and downwind of the cattle. The highest concentrations of culturable bacterial bioaerosols were consistently recovered from the on-site location. More than half of the organisms were antibiotic resistant at the on-site location. Elevated levels of culturable bacterial bioaerosols were recovered from the upwind site that may have been associated with the surrounding community. Bioaerosol concentrations were found in higher amounts than in a facility in the southwestern U.S. examined in the authors' previous study. The urban setting of the CAFO resulted in a higher potential for immediate community exposures.

Introduction

A number of excellent studies have examined the drift of bioaerosols from confined animal feeding operations (CAFOs) into the surrounding rural agricultural communities. Not all CAFO operations are located in rural environments, however. In many developing countries the line between agricultural and urban settings is blurring. As such, our study was conducted to examine a CAFO in an urban setting.

The animal husbandry industry has experienced significant production growth over the last few decades while at the same time the actual number of producers has decreased around the world (Speir et al., 2003). As countries become more affluent and human populations grow, the increased demand for livestock-derived food has led to increased industrialization of animal food production systems (Otte et al., 2007). Such industrialization has led to the increased utilization of CAFOs, where efficient animal husbandry has resulted in high animal population densities on small areas of land (Cole, Todd, & Wing, 2000).

The concentration of animals in relatively small areas creates conditions that are conducive to the transfer of pathogens within and between these populations, consequently increasing selection pressures and thus pathogen evolution (Otte et al., 2007). Emerging infectious disease events (EIDs) are dominated by zoonoses (60.3%) and 54% of EID events are caused by bacteria or rickettsia (Jones et al., 2008). The potential for organism transmission between food animals and human populations increases when they live in close proximity such as with the recent swine flu outbreaks.

CAFOs have been reported to release fungi, bacteria, antibiotic-resistant bacteria, and odor-emitting compounds into the surrounding air (Green, Gibbs, Tarwater, Mota, & Scarpino, 2006; Heederik et al., 2007; Mirabelli, Wing, Marshall, & Wilcosky, 2006; Radon et al., 2001). The negative health effects from airborne microorganisms released from CAFOs have been well documented. Among the most common negative effects are allergic and respiratory problems in both CAFO workers and people living in the surrounding areas (Donham et al., 2007; Green et al., 2006; Heederik et al., 2007; Liao & Luo, 2005; Mirabelli et al., 2006; Radon et al., 2001; Rule et al., 2005).

An additional public health concern is that the transference of antibiotic-resistant genes from the antibiotic-resistant microbial pool found in the CAFO environment may adversely affect the surrounding human population (Cole

et al., 2000; Gilchrist et al., 2007; Sapkota, Ojo, Roberts, & Schwab, 2006). The CAFO workers appear to be the most important bridge between antibiotic-resistant bacteria in the CAFO and the surrounding community (Heederik et al., 2007; Jo & Seo, 2005; Mirabelli et al., 2006; Von Essen & Auverman, 2005).

As the human population increases and the community demographic changes, the physical space that separates the general community and CAFOs continues to be reduced. This close proximity of dense animal and human populations appears to augment the risk and transmissibility of zoonoses (Gilchrist et al., 2007; Otte et al., 2007). To mitigate the risks posed by CAFOs onto the community, regulatory entities in the U.S. (i.e., the U.S. Environmental Protection Agency) have developed guidelines for CAFO siting (e.g., setback distances) and have further defined the constraints under which CAFOs are to operate. The active enforcement of these guidelines is likely to reduce the health risks of CAFOs to the human population.

Developing countries such as Mexico have an increasing number of CAFOs but have not developed the regulatory guidelines necessary to mitigate the associated health risks (Speir et al., 2003). Internal demand within developing countries initially drove the development of their own CAFO infrastructure. Economic globalization has increased the number of CAFOs in countries like Mexico, where less stringent environmental guidelines have made them less expensive to operate. The industrialization of livestock operations has reduced the physical gap between the human and feed animal populations; as human populations are displaced by socioeconomic forces they ultimately encroach upon the land that was previously designated for agricultural purposes.

Unchecked population growth in this region contributes to the close proximity of feed animals to the urban population center. Population growth in northern Mexico and the subsequent human population encroachment toward CAFOs, both as a result of natural population growth and migration waves within the country for socioeconomic purposes (i.e., employment opportunities), are potential public health concerns. As cities grow they may get closer to once far and rural CAFOs, virtually surrounding the CAFO, which then becomes part of the urban setting.

The opening of *maquiladoras* (manufacturing companies) in northern Mexico and the supply of jobs they created attracted many residents from south and central Mexico to the border with the U.S. (Peña, Fuentes, & Forster, 2005). Such exponential immigration growth has not been paralleled with organized urban planning. In the Paso del Norte Region, for example, the growth of the *maquiladora* industry has been exponential (half of all *maquiladoras* in Mexico are located along the U.S.-Mexico border) and has caused distorted population and urban growth as well as changed land use in the area (Peña et al., 2005).

The increasing number of CAFOs in close proximity to large human populations is likely to increase human risk. The actual impact of these facilities in terms of occupational, environmental, and community health, however, has yet to be fully elucidated. Previous literature concerning community health and CAFOs focused on CAFOs located in rural communities in the U.S., Canada, Europe, and Australia (Donhan et al., 2007). Our study was thus designed to evaluate the variation and transport of fungal and bacterial concentrations in the air of an urban northern Mexico dairy cattle CAFO and to determine the concentration and incidence of antibiotic-resistant *Staphylococcus aureus* isolates. A characteristic in our study is the relatively urban location of this northern Mexican CAFO with a surrounding community that was practically residing on the CAFO.

Methods

Samples were collected from a dairy cattle CAFO located in northern Mexico that housed approximately 5,000 cattle distributed across five feeding lots. This dairy farm was located within 10 miles of the U.S.-Mexico border on the outer edge of a major city in an unincorporated area of low-income housing called a *colonia*.

Sampling Sites

Three sampling sites were located within the dairy: on site, upwind, and downwind. The on-site sampling location was on an access road at the center of the dairy's cattle feeding areas, surrounded by cattle on each side. The upwind location was at the furthest upwind portion of the dairy's property line, over 100 m from the cattle. The downwind location was at the furthest downwind portion of the dairy's property line, 50 m from a small (20–30 head) calving area.

During the study period, the distance between the dairy and the nearest housing continued to decrease as additional housing was built within the *colonia*. At the start of our study, the distance between the dairy and the nearest housing was approximately 100 m. By the time of the second sampling, the distance between the dairy and the nearest housing was reduced to less than 50 m. At the time of the final sampling six months later, this distance was approximately 20 m from our upwind site. The distance between what we had originally defined as our downwind site and the surrounding housing was reduced to approximately 80 m for the final two samplings (August and November). It is important to note that we did consider sampling within the *colonia*. We did not have permission to sample from those in charge of the *colonia*, however, and therefore we were not able to sample there.

Sampling Methodology

Bioaerosol samples were collected in duplicate after a minimum of three days without rainfall during April, August, and November 2006. Duplicate bioaerosol samples were collected from 1 m above ground level between 9:00 a.m. and 10:00 a.m. Four two-stage viable cascade impactors were operated simultaneously, two loaded with malt extract agar (MEA) and two with tryptic soy agar (TSA). Samples were taken in duplicate at 30-, 60-, and 120-second durations at each sampling site with disinfection and changes in culture plates between each sample. The lower limits of detection for each sampling time were as follows: 71 CFU/m^3 for a 30-second sample, 35 CFU/m^3 for a 60-second sample, and 18 CFU/m^3 for a 120-second sample.

Collection of the bioaerosol samples was done using previously reported methods (Alvarado et al., 2009; Gibbs, Green, Tarwater, & Scarpino, 2004). A two-stage viable cascade impactor was connected to a pressure/vacuum pump calibrated to 28.3 L/min. with a TriCal Laboratory/Field Audit Calibrator for sample collection. This system separates bioaerosols into two size ranges: fine particles (1–8 µm) or "respirable" since they can reach human lungs, and coarse particles (>8 µm) or "nonrespirable" that are removed in human upper airways.

Each sampler system was loaded with sterile culture plates (100×15 mm plastic Petri dishes) for fungi and bacteria collection with MEA and TSA, respectively. Negative controls of both agars accompanied each sampling trip and were processed along with the other samples. Positive controls for TSA and MEA were *S. aureus* (American Type Culture Collection [ATCC] 25923) and *Candida albicans* (ATCC 10231), respectively. Both positive and negative controls were analyzed alongside the field samples.

Temperature and relative humidity were collected using a portable weather station and confirmed at the Texas Commission on Environmental Quality Web site, which maintains a weather station in the area (accessed May 2009).

Sample Analysis

Fungal samples were incubated at 25°C with colony counts conducted at 24 hours, 48 hours, 5 days, and 10 days in order for slow-growing fungi to develop. The day 10 colony count was used to calculate the CFU/m^3. Bacterial samples were incubated at 37°C and counted after 24 and 48 hours with the count at 48 hours used to calculate CFU/m^3. The genus of each fungal colony was identified via microscopy and morphology (Malloch, 1981). Mathematical adjustment (positive-hole correction) was applied to account for the sample systems under estimation of higher concentration of organisms (Macher, 1999). The CFU/m^3 of the all sampling time periods that were within the countable range (0–400 CFU/plate) for the two-stage viable cascade impactor were used to calculate the microbial concentrations. CFU/m^3 was calculated using the following formula: CFU recovered/(28.3 L/min. × time sampled) × 1000 L/m^3. The geometric metric mean and standard deviation were then calculated.

The fine bacterial samples particles (1–8 µm) were evaluated for the presence of *S. aureus* using Chapman Stone Media (CSM) and the replica plate method. Colonies grown on CSM presenting with typical *S. aureus* morphology were identified by gram staining with bacto coagulase plasma as a confirmation (Gibbs et al., 2004). *S. aureus* colonies were evaluated for antibiotic resistance via the Kirby-Bauer disk diffusion method with colonies plated onto duplicate Mueller-Hinton agar (MHA) and three antibiotic disks were placed on each plate (Bauer, Kirby, Sherris, & Turck, 1966; Gibbs et al. 2004). These antibiotics (10 µg ampicillin, 10 µg penicillin, and 30 µg cefaclor) were selected because they were from two classes of antibiotics (ampicillin and penicillin are both penicillins, and cefaclor is a second-generation cephalosporin) and because of their widespread use in human medicine. Unfortunately, we did not test the isolates for methicillin or cefoxitin resistance. *S. aureus* (ATCC 25923) was applied to the CSM and used in the Kirby-Bauer as a positive control.

TABLE **1**

Weather Conditions the Day of Each Sampling Visit

Date	Air Temperature (°C)	Relative Humidity (%)	Wind Speed (kph)
4/29/06	21.28	24.70	12.23
8/12/06	33.39	30.70	8.53
11/4/06	24.33	31.70	4.51

Note. Weather data from http://www.tceq.state.tx.us/cgi-bin/compliance/monops/daily_summary.pl

TABLE **2**

Geometric Mean and Standard Deviation of Culturable Fungal Organisms Recovered From the Site (CFU/m^3)

Particle Size and Date of Collection	Upwind		On Site		Downwind	
	Geometric Mean	Geometric *SD*	Geometric Mean	Geometric *SD*	Geometric Mean	Geometric *SD*
Fine						
4/29/06	97	4.58	139	4.93	102	4.62
8/12/06	139	4.93	312	5.74	267	5.59
11/4/06	147	4.99	203	5.31	263	5.57
Coarse						
4/29/06	18	2.87	18	2.87	134	4.90
8/12/06	22	3.10	28	3.33	64	4.16
11/04/06	45	3.80	58	4.07	53	3.97

Results

Weather Conditions

The weather conditions measured (temperature, relative humidity, and wind speed) varied on each day for sampling; however, this was to be expected as the sampling days were taken in different seasons, which inherently have different weather ranges (Table 1).

Fungal Organisms

The numbers of fungal organisms recovered from the fine particle range of bioaerosols were consistently higher than the number of coarse particles throughout the three sites and the three different sampling periods (Table 2). The concentrations of recovered culturable fungal organisms were least at the upwind site and greatest at the on-site sampling location. The most recovered concentration of total (fine and coarse) culturable fungal organisms was found at the on-site location in August 2006, which had a combined total of 340 CFU/m^3. The fewest recovered concentration of total (fine and coarse) culturable fungal organisms was found at the upwind location in April 2006, which had a combined total of 115 CFU/m^3. The types of fungal organisms

TABLE **3**

Geometric Mean and Standard Deviation of Culturable Bacterial Organisms Recovered From the Site (CFU/m³)

Particle Size and Date of Collection	Upwind		On Site		Downwind	
	Geometric Mean	Geometric *SD*	Geometric Mean	Geometric *SD*	Geometric Mean	Geometric *SD*
Fine						
4/29/06	3,760	8.23	23,400	10.1	6,160	8.73
8/12/06	288	5.66	32,200	10.4	1,490	7.31
11/4/06	25,900	10.1	24,700	10.1	1,160	7.05
Coarse						
4/29/06	601	6.40	19,200	9.86	2,170	7.68
8/12/06	269	5.59	17,000	9.74	783	6.66
11/04/06	40,700	10.6	20,500	9.93	884	6.78

TABLE **4**

Geometric Mean and Standard Deviation of *Staphylococcus aureus* Recovered From the Fine Portion of the Culturable Bacterial Organisms Recovered From the Site (CFU/m³)

Date of Collection	Upwind		On Site		Downwind	
	Geometric Mean	Geometric *SD*	Geometric Mean	Geometric *SD*	Geometric Mean	Geometric *SD*
4/29/06	41	3.70	57	4.05	71	4.26
8/12/06	42	3.75	817	6.71	141	4.95
11/04/06	435	6.08	700	6.55	128	4.85

identified were common environmental fungal organisms, such as *Alternaria*, *Aspergillus* spp., *Bipolaris*, *Cladosporium*, and *Rhizopous*; however, nonspecific genera were identified routinely in either elevated numbers.

Bacterial Organisms

The highest concentrations of culturable bacterial bioaerosols were consistently recovered from the on-site location with the exception of the November sampling period (Table 3). The total (fine and coarse) culturable bacterial organisms exceeded 40,000 CFU/m³ for all of the on-site samples. A marked increase occurred in the number of CFUs recovered in the fall at upwind and on-site locations that may be the result of microbial interaction between the *colonia* and the CAFO, a result that we expand upon in the discussion.

S. aureus was routinely recovered at each sampling location during each sampling visit (Table 4). As a proportion of the fine bacterial organism recovery, however, *S. aureus* varied widely at each location. *S. aureus* was 1.1% (March), 14.7% (August), and 1.7% (November) of the culturable fine bioaerosol at the upwind site. It was 0.2% (March), 2.5% (August), and 2.8% (November) of the culturable fine bioaerosol at the on-site location, and 1.2% (March), 9.5% (August), and 11.0% (November) of the culturable fine bioaerosol at the downwind location. So *S. aureus* was not found to maintain a consistent percentage of the fine culturable bioaerosol at any of the three locations.

In total, 86 isolates of *S. aureus* were evaluated for antibiotic resistance (Table 5). It is important to note that Table 4 represents calculated CFU/m³ (CFU/m³ calculated as CFU recovered/[28.3 L/min × time sampled] × 1000 L/m³), so the isolates available for antibiotic testing are much lower than the calculated concentrations of *S. aureus* in the air. The resistance to penicillin and ampicillin was highest on site, where at least two-thirds of the organisms were found to be resistant during each sampling visit. *S. aureus* isolates resistant to the two classes of antibiotics evaluated were found to be more prevalent on site as well. The recovery of *S. aureus* and its resistance to ceflacor were very low at the upwind sampling location prior to the November sampling period when the homes from the *colonia* had been constructed in close proximity to the sampling site.

Discussion

The distance between *colonias* and CAFOs is becoming virtually nil, facilitating the ease with which organisms and resistance may be shared, originating from either the *colonia* or CAFO and distributed between them. In dairy farms antibiotic use is more restricted, but on other types of CAFOs antibiotics have a number of uses, including but not limited to prophylaxis, growth promotion, treatment, and milk replacement for calves (Brown, Kulis, Thomson, Chapman, & Mawhinney, 2006; Ghosh & Lapara, 2007). The rate of occurrence of multidrug-resistant pathogens such as tuberculosis (which was not evaluated in our study but can be an issue within both cattle herds and *colonias*) and methicillin-resistant *S. aureus* (MRSA) continues at a rapid rate (Klevens et al., 2007; Moran et al., 2006). The prevalence and incidence of infectious diseases such as tuberculosis render them endemic in the border area where the population is medically underserved, resulting in a general lack of health care access. Since emerging infectious disease events are dominated by zoonoses, the interaction between communities and CAFOs in the developing regions should receive greater attention. Furthermore, mitigation processes from state and municipal health departments should be evaluated.

We found high concentrations of bacterial and fungal bioaerosols in the urban northern Mexican CAFO facility we studied. The concentration of heterotrophic microbes found in the northern Mexican CAFO was higher than that found in a southwestern U.S. CAFO

reported in our previous study, even though the cattle population was only half as large at the Mexican CAFO (Alvarado et al., 2009). The total bacterial bioaerosols recovered were equal in April, and 14 and 37 times higher in Mexico than in the U.S. in November and August, respectively.

On average 60% of culturable bacteria and 80% of fungal organisms were recovered in the fine particle range at all sites and during all sampling periods (Tables 2 and 3). This result was similar to our previous study in a southwestern U.S. dairy CAFO where >50% of bacteria and >85% of fungal organisms were recovered in the fine particle range (1–8 µm) (Alvarado et al., 2009). This result is believed to be related to the fact that fine particles remain suspended in the air longer, since coarse particles weigh more and thus settle at a faster rate (Menetrez, Foarde, & Ensor, 2001). Fine particles are likely to be a greater human health hazard than coarse particles, since fine particles are not filtered out in the upper airways.

We also found that a high concentration of antibiotic-resistant *S. aureus* was in the bioaerosols from the Mexican CAFO (Table 5). At least 65% of the organisms evaluated were resistant to ampicillin and 33% were resistant to the two classes of antibiotics evaluated. This percentage of antibiotic-resistant *S. aureus* was comparable to the rate we found in our previous study of a CAFO in the southwest U.S. (Alvarado et al., 2009). The percentage of antibiotic-resistant *S. aureus* was actually lower than we had previously found inside swine CAFOs in the American Midwest (Gibbs et al., 2004; Gibbs et al., 2006). The housing conditions for the swine were much different, however, with a higher density of animals and the employment of subtherapeutic doses of antibiotics in swine confinement. Additionally, the climatic conditions between the two regions were very different (Gibbs et al., 2004; Gibbs et al., 2006).

It is not clear why substantially higher organism concentrations were found in the bioaerosols of a northern Mexico CAFO compared to our previous study of a southwest U.S. CAFO, since the samples were collected using identical techniques by the same researchers during the same time period in similar climatic regions. We hypothesize that the differences may relate to the management of the facility, particularly as it is influenced by less stringent governmental regulations. In Mexico, federal regulations regulating CAFOs are minimal, with most regulations focusing on the control of discharges from the CAFOs into waterways, but not addressing other environmental concerns (Whitehouse, 2003). Currently, no standard definition exists for a CAFO in Mexico and no nutrient management plans are required. The only set geophysical requirements stipulate that CAFOs should not be built where there is water scarcity or where flood plains exist. No requirements exist for separation of CAFOs from housing developments. Construction and operating permits vary by state and by municipality, and no public notices are required (Whitehouse, 2003). Any number of these aspects could contribute to the higher bioaerosol levels.

The population growth has been accompanied by the uncontrolled growth of *colonias*, which are poor, overpopulated, unincorporated neighborhoods or communities that generally lack basic services such as water and wastewater treatment, electricity, and solid waste disposal (Ramos, May, & Ramos, 2001). The *colonia* in our study, like most *colonias*, was composed of makeshift housing that was constructed out of materials of convenience, such as tin and cinderblocks patched with cardboard structures. We hypothesize that the close proximity of the surrounding *colonia* and urban encroachment to the CAFO could be another reason for the high bacterial concentrations recovered in our study, particularly in the upwind and downwind locations. Since we did not have permission to sample from within the *colonia*, however, we can only speculate that it was a probable source of the bacterial organisms that we recovered. As explained above, as time passed from April to November, the *colonias* near the CAFO grew and came as close as 20 m from the offsite sampling locations. This close interaction between the bioaerosols from the CAFO and the community may have resulted in some of the elevated levels of bioaerosols (Tables 2 and 3) that we recovered from the offsite sampling locations, particularly as the normal wind flow through the CAFO was disrupted by the newly constructed buildings of the *colonia*.

Additionally, it is possible that bioaerosols we recovered were from a newly created solid

TABLE **5**

Number and Percentage of Antibiotic-Resistant *Staphylococcus aureus* Isolates

Location and Date of Collection	Number of Evaluated Organisms	Number of Resistant Organisms (% Resistant)			
		Ampicillin	Penicillin	Ceflacor	*Two Classes of Antibiotics
Upwind					
4/29/06	1	0 (0)	1 (100)	0 (0)	0 (0)
8/12/06	3	1 (33)	1 (33)	0 (0)	0 (0)
11/4/06	16	12 (75)	12 (75)	7 (44)	7 (44)
Total	20	13 (65)	14 (70)	7 (35)	7 (35)
On Site					
4/29/06	6	4 (67)	4 (67)	4 (67)	4 (67)
8/12/06	17	13 (76)	13 (76)	2 (12)	2 (12)
11/4/06	20	15 (75)	15 (75)	11 (55)	11 (55)
Total	43	32 (74)	32 (74)	17 (44)	17 (44)
Downwind					
4/29/06	2	0 (0)	1 (50)	0 (0)	0 (0)
8/12/06	14	8 (57)	9 (64)	2 (14)	2 (14)
11/4/06	7	3 (43	3 (43)	3 (43)	3 (43)
Total	23	11 (48)	13 (57)	5 (22)	5 (22)
All Sites	86	56 (65)	59 (65)	29 (34)	29 (34)

*Resistant to either Ampicillin or Penicillin and Ceflacor.

waste disposal pit for the *colonia* near the upwind location or generated from community wastewater flowing onto the ground in the area. So the potential exists for community-derived bioaerosols to interact with those from the CAFO, which could result in a multiple disease transmissions from the community to the animals as well as from the animals to the community. Thus the issue in this situation is not necessarily the siting of the CAFO away from the community but it is keeping the community from growing into the CAFO. In other areas with lax restrictions this scenario is likely to reoccur.

Our study had a number of weaknesses. It employed only culturally based collection methods, which neglects the viable but unculturable portion of the bioaerosols. Additionally, the limited sample times (30, 60, 120 seconds) do not give a complete picture of the bioaerosols exposures. In the future a longer sampling time with a different type of sampler that is not limited by overloading could provide more information. Different collection methods, such as use of impingers, may have resulted in better collection of bacterial organisms. Molecular methods could have been employed with impingers that would have given more information regarding the nonculturable portion of the bioaerosols. Ideally, personal sampling equipment could be conducted in both the *colonia* and CAFO; however, this may be difficult. Additional organisms beyond *S. aureus* could have been speciated and evaluated for antibiotic resistance.

Our lack of bioaerosol samples from within this *colonia* inhibits our ability to draw conclusions regarding the true interactions between the *colonia* and the CAFO. Had we been successful at gaining permission to sample within the *colonia* this would have been a significant step toward determining potential interactions. Correction of these weaknesses would also serve as an excellent basis for additional future studies. Future studies should evaluate the increasing interactions of bioaerosols generated in both CAFOs and *colonias* to determine the potential impacts.

Conclusion

Concentrations of bioaerosols were found in higher amounts in the Mexican facility examined in our current study than in a facility in the southwestern U.S. examined in our previous study. The urban setting of the CAFO in Mexico resulted in a higher potential for immediate community exposures. Future studies should evaluate the increasing interactions of bioaerosols generated in both CAFOs and *colonias* to determine the potential impacts.

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DIRECT FROM ATSDR

Christopher J. Portier, PhD

ATSDR in the 21st Century

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 bring back the 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.

Christopher J. Portier is the director of the National Center for Environmental Health and Agency for Toxic Substances and Disease Registry. Dr. Portier is an internationally recognized expert in the design, analysis, and interpretation of environmental health data. His research efforts and interests include such diverse topics as cancer biology, risk assessment, climate change, bioinformatics, immunology, neurodevelopment, genetically modified foods, and genomics.

In the last half of the 20th century, advances in industrial science and technology led to the development and production of tens of thousands of chemicals that are now ubiquitous in our air, water, food, and homes. In 1980, Congress responded to a number of unprecedented chemical disasters by passing the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as the Superfund act, and in so doing, created the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR was charged with a primary focus of assessing and preventing exposures and resulting illnesses in communities near Superfund sites. The agency was also charged with expanding the knowledge base about health effects from exposure to hazardous substances.

Since then, ATSDR has helped more than 900 communities across the country with products ranging from health assessments to toxicological profiles. Yet expectations from communities, Congress, and our partners have increased, while ATSDR's resources have not kept pace. In order to better implement ATSDR's mission to serve the public through responsive public health actions that promote safe, sustainable, and healthy environments, prevent harmful exposures, save lives, and reduce health care costs, we are reorganizing ATSDR. This reorganization is structured geographically and should help us improve our engagement with communities. In addition, we will be utilizing an evidence-based approach toward strengthening our scientific activities, especially as they pertain to toxicological profiles and multiple exposures in communities.

The communities we work with depend on us to provide accurate information about the health impacts of environmental exposures and to take responsive public health actions. Improving our risk communications, strengthening community participation in environmental health decision making, addressing social determinants of health, and providing additional resources to make progress on community health issues will advance ATSDR's CERCLA mandate. To meet these goals, the restructuring of ATSDR will include the creation of three geographical branches. Our enhanced geographic focus will allow ATSDR to be more sensitive to the needs of communities, including underserved populations, and the distinct issues they face.

We are also exploring additional opportunities to provide technical assistance and capacity building resources to communities so they are better able to understand the risks posed by nearby sites and participate in local decision making. The planned restructuring will provide opportunities for closer working relationships with our federal, state, and local partners, including our ATSDR state cooperative agreement holders, academic centers, and Pediatric Environmental Health Specialty Units. This reorganization addresses key issues raised in the National Conversation on Public Health and Chemical Exposures. The action agenda from the national conversation is the result of the work of thousands of people from across the U.S. and has recommendations to help government agencies and other organizations strengthen their efforts to protect the public from harmful chemical exposures.

At the same time, we are fostering opportunities for innovation and taking steps to ensure that ATSDR's work continues to meet the highest quality standards. In April, ATSDR will hold a science symposium with invited national experts and our own staff to evaluate ATSDR's scientific approach to assessing health risks at sites and generate action-oriented ideas for improving site-specific methods. The focus of the symposium will be to improve the methods ATSDR uses to develop and apply health risk estimates, streamline our chemical hazard reviews and better coordinate that effort with other government agencies, identify opportunities to better engage communities in our site-specific scientific work, and improve ATSDR's science through innovative toxicological and environmental health research.

Key to our success in improving ATSDR's science will be to break the historical bounds that have existed between epidemiology, toxicology, and medicine and encourage greater interaction between these disciplines. In the process of reorganization, ATSDR's divisions that have traditionally contained these disciplines will be merged into one division to reduce overlap, improve coordination, and support better interaction. Under the proposed design, epidemiologists will work with toxicologists to better understand emerging and priority exposures of concern and translate their findings for the clinical setting. In turn, physicians can use this new information as they train other health practitioners on assessing individuals and managing exposures.

After evaluating ATSDR's current organizational structure, a clear need has emerged to make changes to the way ATSDR is organized in order to fulfill expectations from communities, Congress, and our partners. In this new structure, ATSDR will be better equipped to plan and manage regional operations with a renewed commitment to affected communities. The proposed reorganization will also allow ATSDR to strengthen our science while improving efficiency, promoting better linkages, increasing accountability, and clearly defining responsibility. ATSDR is dedicated to doing whatever it takes to strengthen our commitment to communities, provide resources for professionals to make the best decisions, and constantly improve our science. I look forward to using this column to better inform you, the environmental health practitioner, of our continued commitment to serve the public through responsive public health actions to promote healthy and safe environments and prevent harmful exposures.

DIRECT FROM CDC ENVIRONMENTAL HEALTH SERVICES BRANCH

Kristin Delea, MPH, REHS

Evaluating Local and State Food and Water Safety Programs

Editor's Note: NEHA strives to provide up-to-date and relevant information on environmental health and to build partnerships in the profession. In pursuit of these goals, we feature a column from the Environmental Health Services Branch (EHSB) of the Centers for Disease Control and Prevention (CDC) in every issue of the *Journal*.

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

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

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Local and state food and water safety programs are on the frontline of food and waterborne illness prevention. Yet in the current economic climate, some of these public health programs are being reduced or eliminated. Data that show the impact of these programs on public health are crucial to policy makers faced with difficult choices that may affect the health of the communities they serve.

The Environmental Health Specialists Network (EHS-Net) at the Centers for Disease Control and Prevention's (CDC's) National Center for Environmental Health is planning to conduct an evaluation of local and state food and water safety programs that will provide these needed data. EHS-Net consists of environmental health professionals, epidemiologists, and laboratorians who work to understand environmental causes of food and waterborne diseases and to improve environmental public health practice. Food and/or water safety programs from California, Iowa, Minnesota, New York (including New York City), Rhode Island, and Tennessee participate in EHS-Net.

The purpose of this evaluation is to

- describe local and state food and water safety programs and their components,
- describe how these programs are influenced by both internal and external factors (e.g., staffing, economics, politics, etc.), and
- assess these programs' impact on public health, to the extent possible.

Some of the anticipated results of this evaluation include identification of services provided by food and water safety programs, a description of infrastructure and how it changes over time, identification of program strengths and gaps, assessment of future program challenges, and measurement of the impact of public health interventions. Current local and state EHS-Net programs will be participating in the evaluation. Non-EHS-Net programs will also be asked to participate to provide a comparison group that does not have the benefit of CDC funding for their food and/or water programs. The evaluation is expected to include a retrospective, current, and prospective view of programs. CDC will publish findings over the course of the evaluation process.

A review of environmental health evaluation and program assessment tools revealed no existing tool fully met this project's needs. Thus, CDC EHS-Net staff, with assistance from EHS-Net local and state program staff, developed a framework to guide the development of evaluation tools. This framework

FIGURE **1**

Environmental Health Specialists Network Evaluation Framework

incorporated theories from recognized public health instruments and profiles, such as the National Public Health Performance Standards (www.cdc/gov/NPHPSP/PDF/UserGuide.pdf).

Figure 1 depicts the EHS-Net evaluation framework, which is organized into four levels:

1. **Outcomes and Impacts**
   In general, food and water safety programs are expected to reduce the risk of food and waterborne illness, and thereby reduce the burden of these illnesses in the community served.
2. **Standards**
   The standards, regulations, and operating procedures that programs utilize need to be considered to fully understand program impact. Standards could include locally developed policies and regulations, model policies and regulations (e.g., FDA Model Food Code), or accreditation and standardization (e.g., FDA Retail Program Standards).
3. **Programs and Services**
   The services provided by food and water safety programs need to be fully described and understood. Programs and services are delivered using the standards defined in the Standards level.
4. **Basic Infrastructure**
   The programs' structure and capacity to implement services need to be assessed. Workforce capacity and competency, information systems, organizational structure, physical capacity, and financial resources are included. Basic infrastructure is essential to effectively provide the services represented in Programs and Services.

Many external factors may positively or negatively influence programs. These factors surround the triangle in Figure 1 and include social or political pressures (Social Environment), physical attributes of a program's jurisdiction such as the number of restaurants (Physical Environment), and community attributes such as population density (Community). These factors can influence how and what services the program delivers, and ultimately, the public health impact of the program.

The evaluation framework described here will be used to guide the development of data collection instruments to meet the goals of the evaluation. The EHS-Net food and water programs will begin data collection in 2012. If your food or water safety program is interested in participating in this evaluation process, or if you have comments or suggestions, please contact NVEAIS@cdc.gov.

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DEMYSTIFYING THE FUTURE

Thomas Frey

12 Laws of the Future

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 will be the keynote speaker at the NEHA 2012 AEC. He has also authored the book *Communicating with the Future*. Frey is a powerful visionary who is revolutionizing our thinking about the future.

We live in a very backward-looking society. We are backward looking because we have all personally experienced the past. When we look around us, we see evidence of the past everywhere we look. The past is very knowable.

And yet we will be spending the rest of our lives in the future.

It's almost as if we are walking backwards into the future.

My job as a futurist is to help turn people around and give them some understanding of the driving forces that are forging the world of tomorrow.

As a way of making the future understandable, I have assembled a series of "12 Laws" to both expand our thinking and put it into a usable framework for others to work with.

1.) **The future is one of nature's greatest forces.** It is a force so massive that the entire universe is being pulled forward in time simultaneously. We have no choice in this matter. The future will happen whether or not we agree to participate. There is no known way for us to either speed it up, slow it down, or even try to stop it. The pace with which the future is unfolding is constant, and at the same time, relentless.

2.) **The present is separated from the future by an invisible "field of knowability."** Everything in the present is knowable, but in the future, nothing is completely knowable. We can personally witness, experience, and make sense of the present, but on the other side of this interface lies a veil of understanding that we don't yet have.

3.) **Each of us experiences the unfolding of the future differently.** Every person is on their own personal journey. We each have our own ringside seat as we personally watch the field of knowability reveal itself to us in a unique and different manner. We are the star of our own hyper-individualized storyline.

4.) **The future is nonexistent until it exists, but we create our own approach vectors.** The energy that exists in the present creates an inertia that flows into the future. The inertia that is in place as we leave the present is still in place as we enter the future. If we witness the act of someone throwing a baseball, using a superfast strobe light, each billionth of a second motion is tied directly to the next billionth of a second motion. Our inertias give motion to the present and direction to our future.

5.) **The future is being formed amidst a backdrop of existing inertias.** On a personal level we are each dealing with the inertia of our body and the inertia of our mind. Both are constantly in motion. At the same time, our personal inertias are taking place inside the context of every other person's inertia, as well as the inertia of every other thing around us. Nature has its own sets of inertia, with the forces of nature providing the inertia for every living and every nonliving molecule in the entire universe.

6.) **The "unknowability" of the future is what gives us our drive and motivation.** The fact that the future is unknowable is a good thing. Our involvement in the game of life is based on our notion that we as individuals can make a difference. If we somehow remove the mystery of what results our actions will have, we also dismantle our individual drives and motivations for moving forward.

7.) **Predictions are based on probabilities, and most of our future is being formed upon a foundation of stable slow-changing elements that can be predicted with a high degree of probability.** As humans, we tend to focus on the volatile and ignore that which is stable. Buildings, trees, and mountains change very little from one day to the next. Only rarely do they undergo a radical transformation quickly. The earth's orbit around the sun, the speed of light, the changing of the seasons, the schedule of tides, the frequency of quartz crystals, and the laws of gravity are all predictable with a high degree of probability.

8.) **The future is not a human-centric force.** Without human influence, the future tends to be very cold and unforgiving. The future doesn't care whether you're happy or sad, employed or unemployed, married or single, personally content or emotionally adrift. The future is like a machine, impervious to our wishes, ambivalent to our goals. Only humans care about these things. At the same time, without humans, the future doesn't matter because there will be no one to care.

9.) **Amidst a backdrop of existing inertias, the future is ours to create.** We do not have direct control over the future, but new inertias can be created and existing ones can be influenced. The future is constantly being formed in the minds of people around us. Each person's understanding of what the future holds will influence the decisions they make today. As we alter someone's vision of the future, we also alter the way they make decisions in the present.

10.) **Thinking about the future will cause it to change.** The very act of thinking about the future creates a new inertia, and this inertia changes our energy flows into the future. The "future part of the brain" is like a muscle that rarely gets exercised. But the more we use it the better we get at leveraging the powers and energies of the future.

11.) **The future is filled with power and energy.** The inertia of all matter in the universe is like a massive river of power and energy flowing from the present into the future. As humans, we only have the ability to affect a tiny microcosm of change. But our seemingly insignificant existence can have massive implications.

12.) **Every avalanche begins with the movement of a single snowflake.** Our ability to tap into and leverage the power of the future is directly tied to the number of times we think about it. The more we think about the future, the more we expand our understanding of it. And the more we understand the future, the easier it becomes for us to interact with it.

My goal in creating these "laws of the future" is to prompt a conversation that will help further refine our thinking. I'm looking for feedback about what you agree with, disagree with, and what needs more explanation. So please, let me know your thoughts.

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.

CAREER **OPPORTUNITIES**

Food Safety Inspector

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

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Past or current food safety inspecting is required.
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DAVIS CALVIN WAGNER SANITARIAN AWARD

The American Academy of Sanitarians announces the annual Davis Calvin Wagner Award. The award will be presented by the academy during the Annual Educational Conference of the National Environmental Health Association. The award consists of a plaque and a $500 honorarium.

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

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

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

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

NOMINATIONS MUST BE RECEIVED BY APRIL 13, 2012. THREE COPIES OF THE NOMINATION DOCUMENT MUST BE SUBMITTED TO:

American Academy of Sanitarians
c/o Thomas E. Crow
25278 Kennebec Drive
South Riding, Virginia 20152
tcrow23701@aol.com
www.sanitarians.org/davis_calvin_wagner_award_process.pdf

neha.org

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

- Biology and Control of Vectors and Public Health Pests Program
- Environmental Public Health Tracking Program
- Epi-Ready Team Training Program
- Food Safe Schools Program
- Land Use Planning and Design Program
- Onsite Wastewater System Program
- Radon/Indoor Air Quality Training Program
- Workforce Development Program

EH CALENDAR

UPCOMING NEHA CONFERENCES

June 28–30, 2012: San Diego Marriott Marquis & Marina, San Diego, California. For more information, visit www.neha2012aec.org.

NEHA AFFILIATE AND REGIONAL LISTINGS

Alabama
June 6, 2012: 2012 Annual Education Conference, sponsored by the Alabama Environmental Health Association, Alabama 4H Youth Development Center, Columbiana, AL. For more information, visit www.aeha-online.com/5522.html.

California
April 2–5, 2012: 2012 Annual Educational Symposium, sponsored by the California Environmental Health Association, Sacramento, CA. For more information, contact Rashmi Nair, e-mail: NairR@SacCounty.net, or Judinae Ablang, e-mail: AblangJ@SacCounty.net.

Idaho
March 14–16, 2012: Annual Education Conference, sponsored by the Idaho Environmental Health Association, Boise State University, Boise, ID. For more information, please contact Jami Delmore, e-mail: jami.delmore@phd3.idaho.gov.

Michigan
March 28–30, 2012: 2012 Annual Educational Conference, sponsored by the Michigan Environmental Health Association, Kalamazoo, MI. Letter of request for abstracts posted at www.meha.net/banner.htm.

New Jersey
March 4–6, 2012: 2012 NJEHA Educational Conference & Exhibition, sponsored by the New Jersey Environmental Health Association, Tropicana Resort and Casino, Atlantic City, NJ. For more information, visit www.njeha.org/conference.html.

North Carolina
July 18–20, 2012: 66th Annual Interstate Environmental Health Seminar, hosted by the North Carolina Environmental Health Association, Fontana Village Resort, NC. For more information, visit www.wvdhhr.org/wvas/IEHS/index.asp.

Ohio
April 16–18, 2012: Spring AEC, sponsored by the Ohio Environmental Health Association, Doubletree Hotel, Worthington/Columbus, OH. For more information, visit www.ohioeha.org/AnnualEducationalConference.aspx.

TOPICAL LISTINGS

Children's Environmental Health
May 30–June 1, 2012: 2012 Research Conference—The Contribution of Epigenetics in Pediatric Environmental Health, sponsored by the Children's Environmental Health Network, San Francisco, CA. For more information, visit www.regonline.com/cehn.

Workforce Development
March 26–28, 2012: Management and Leadership Skills for Environmental Health and Safety Professionals, sponsored by the Harvard School of Public Health Center for Continuing Professional Education, Boston, MA. For more information, visit https://ccpe.sph.harvard.edu/EHS-Leadership.

INTERNATIONAL LISTINGS

May 21–27, 2012: 12th IFEH World Congress on Environmental Health, sponsored by the International Federation of Environmental Health and the Lithuanian Union of Hygienists and Epidemiologists, Vilnius, Lithuania. For more information, visit www.ifeh2012.org/welcome.

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

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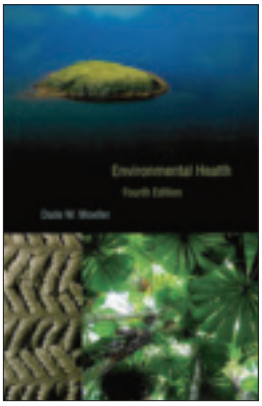
Resource Corner highlights different resources that NEHA has available to meet your education and training needs. These timely resources provide you with information and knowledge to advance your professional development. Visit NEHA's online Bookstore for additional information about these, and many other, pertinent resources!

NEHA BOOKSTORE
www.neha.org/store

Environmental Health (Fourth Edition)

Dade W. Moeller (2011)



New Edition Now Available! Dramatic changes in the field of environmental health since the last edition was published in 2004 demanded a new, radically updated version of this essential textbook. It offers readers a complete but manageable introduction to the complex nature of the environment, how humans interact with it, and the mutual impact between people and the environments where they work or live. This new edition emphasizes the challenges professionals will face in the field—the local and global implications of environmental health initiatives, their short- and long-term effects, their importance to both developing and developed nations, and the roles individuals can play in helping to resolve these problems. This book is indispensable reading for practitioners, students, and anyone considering a career in public health.

518 pages / Hardback / Catalog #410
Member: $77 / Nonmember: $80

Health, Sustainability, and the Built Environment

DAK Kopec (2009)

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

340 pages / Hardback / Catalog #1088
Member: $99 / Nonmember: $110

Pool & Spa Operator™ Handbook (2009 Edition)

National Swimming Pool Foundation (2009)

This reference is a must for professionals who help protect those who use aquatic venues. It is the most current and comprehensive in the field. The *Handbook* features valuable information to help understand and prevent drowning, recreational water illness, suction entrapment, evisceration, diving accidents, electrocutions, chemical hazards, and slips and falls. Fresh information on regulatory guidelines and vital operation topics are covered, including disinfection, water balance, water problems, troubleshooting, chemical testing, record keeping, chemical feed, and control technology. Nearly every chapter of the new edition has been updated and contains new content. The *Handbook* serves as a textbook for the Certified Pool-Spa Operator® certification and is a study reference for NEHA's REHS/RS exam.

280 pages / Spiral-bound paperback / Catalog #1014
Member: $55 / Nonmember: $59

Certified Pool/Spa Inspector™ Online Training Program

National Swimming Pool Foundation® (2011)

Online Course Now Available! Jointly launched by NSPF and NEHA, this online course expands upon and replaces the popular CPI™ training CD introduced by both organizations in 2005. The program is designed to help environmental health specialists conduct effective pool and spa inspections and to minimize exposure to public health hazards. The interactive, self-paced course features narration, images, video, and exercises and can be completed in about two hours. In addition, online course registrants receive the accompanying handbook.

Online Course and Handbook (68 Pages / Paperback) / Catalog #1067
Member: $50 / Nonmember: $55

ACCEPTING NOMINATIONS NOW

2012 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 public health.

Nominations are due in the NEHA office by Thursday, March 15, 2012.

For information, please visit www.neha.org/about/awardinfo.html. Members can obtain nomination forms by calling 303.756.9090, ext. 302, or by sending an e-mail to tosner@neha.org.

Association of Environmental Health Academic Programs *Announces*

The 2012 AEHAP/NCEH Student Research Competition

for undergraduate and graduate students enrolled in an EHAC-accredited program or an environmental health program that is an institutional member of AEHAP

Win **A $500 AWARD**

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Students will be selected to present a 20-minute platform presentation at the National Environmental Health Association's Annual Educational Conference & Exhibition in San Diego, California, June 28–30, 2012.

Entries must be submitted by April 9, 2012, to
Dr. David Gilkey
Colorado State University
146 EH Building
Fort Collins, CO 80523-1681
E-mail: dgilkey@colostate.edu

For additional information and research submission guidelines, please visit www.aehap.org.

AEHAP gratefully acknowledges the support of the National Center for Environmental Health, U.S. Centers for Disease Control and Prevention, for this competition.

JEH QUIZ

FEATURED ARTICLE QUIZ #5

Sneakers and Spokes: An Assessment of the Walkability and Bikeability of U.S. Postsecondary Institutions

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 March 1, 2012 (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: June 1, 2012

1. The Centers for Disease Control and Prevention's Healthier Worksite Initiative Walkability Audit was used in this study because it
   a. was designed to capture the unique features of university campuses.
   b. is evidence based.
   c. captures a wide array of salient features.
   d. all of the above.
   e. b and c.
2. The final instrument used in this study rated characteristics of walking and biking path segments on 12 criteria with a focus on path safety, path quality, and path temperature comfort.
   a. True.
   b. False.
3. The study instrument scores for safety criteria were multiplied by a factor of __ to reflect their critical nature.
   a. 2
   b. 3
   c. 5
   d. 10
4. The four criteria focusing on path safety include
   a. path maintenance, pedestrian/biker and motor vehicle conflicts, crosswalk quality, and nighttime safety features.
   b. buffer zones, pedestrian/biker and motor vehicle conflicts, path maintenance, and nighttime safety features.
   c. pedestrian facilities, pedestrian/biker and motor vehicle conflicts, crosswalk quality, and nighttime safety features.
   d. pedestrian facilities, pedestrian/biker and motor vehicle conflicts, crosswalk quality, and path size.
5. Currently, more than half of U.S. college students get sufficient exercise.
   a. True.
   b. False.
6. Causal factors for obesity include both environmental and personal __ and __ factors.
   a. genetics, lifestyle
   b. lifestyle, hereditary
   c. chemical, biological
   d. lifestyle, biological
7. Reciprocal determinism posits that individuals' characteristics and behaviors and the environment within which the behaviors occur subsequently and reciprocally affect each other.
   a. True.
   b. False.
8. An examination of university path segments by grade revealed that about __ received a grade of A or B.
   a. 93%
   b. 85%
   c. 70%
   d. 64%
9. Just __ of the path segments evaluated were rated as providing excellent support for walking and biking.
   a. one-eighth
   b. one-fifth
   c. one quarter
   c. one-third
10. The criterion needing the most attention was
    a. nighttime safety.
    b. bikeability.
    c. buffer zones.
    d shade.
    e. a, b, and c.
    f. all the above.
11. One limitation of the study was that __ perceptions of campus environmental support for walkability and bikeability were not assessed.
    a. student
    b. faculty
    c. zoning and planning professional
    d. campus security
12. Two-thirds of campuses had __ buffer zones between sidewalks and motor traffic.
    a. more than adequate
    b. adequate
    c. less than adequate
    d. no

JEH Quiz #3 Answers

December 2011

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

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.*

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NEHA ENDOWMENT FOUNDATION PLEDGE CARD

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

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- ❍ **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.

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Organization _____ Phone _____

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

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GLO GERM/Food Safety First
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National Restaurant Association
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PRESIDENT'S LETTER TO THE MEMBERSHIP ON REGION CHANGES

Dear NEHA Member,

NEHA is governed by a board of directors that consists of 5 national officers and 9 regional vice presidents (RVPs). The RVPs represent the NEHA members in a geographical area. They also maintain a close relationship with the NEHA affiliates in their geographical area, serve as a liaison between the affiliates in their geographical area and NEHA, and, when possible, attend affiliate functions in order to promote NEHA and maintain contact with NEHA members within the affiliates.

NEHA RVPs do not represent affiliates, but rather the NEHA members within their geographical areas. In an effort to better serve the members within a given region our board of directors recently reviewed the unequal distribution of NEHA membership within the existing RVP regions. Some geographical regions had 16%–18% of the NEHA membership, while others had less than 5% of the membership. The board of directors recognized this inequity and during its December board meeting made minor regional realignments with respect to a few RVPs and their geographical area of representation.

These changes can be summarized as follows.

- Beginning immediately:
  - » All NEHA members residing outside of the 50 U.S. states and the District of Columbia (except members of the armed forces of the U.S.) are now represented by the Region 3 RVP.
  - » Members of the armed forces of the U.S. residing outside of the 50 U.S. states, along with members within the District of Columbia, are represented by Region 8 RVP.
  - » The NEHA immediate past president is appointed as the liaison to the Past Presidents' Affiliate.
  - » The Region 8 VP is appointed as the liaison to the Uniformed Services Affiliate.
  - » Region 10 is abolished.
- Beginning with the next NEHA election for Region 8 (2012), NEHA members who reside in New York and New Jersey will be represented by the Region 9 RVP.

The board of directors believes that these changes will strengthen the representation of its members by the regional vice presidents.

Sincerely,

Mel Knight
NEHA President

NEHA SECOND VICE PRESIDENTIAL CANDIDATE PROFILE

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

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

Bob Custard, REHS, CP-FS

Bob Custard is this year's candidate for NEHA Second Vice-President. He has worked as an environmental health professional in Virginia for 25 years. He holds the NEHA REHS and CP-FS credentials. For the last ten years he has served as the Environmental Health Manager for the Alexandria (Virginia) Health Department. Previously he served as director of environmental health training for the Commonwealth of Virginia.

Bob has served as Region 8 Vice-President on the NEHA Board of Directors since 2003. He represents NEHA on the International Food Protection Training Institute's Advisory Council and co-chairs FDA's Training and Certification Work Group. He has championed expansion of NEHA's international involvement.

Bob is passionate about:

- Mentoring and training young environmental health professionals. Bob is a frequent speaker at NEHA and affiliate conferences. He has a strong commitment to equipping the next generation of environmental health leaders.
- Certification of environmental health professionals. Bob has worked tirelessly to promote credentialing of environmental health professionals. He believes that credentialing of environmental health professionals should be one of the criteria for accreditation of local health departments.
- Working with environmental health professionals in the Developing World. Bob has made six trips to Africa as a volunteer to share his environmental health skills.

Bob believes the five key issues facing NEHA are:

- Engaging key decision makers in government and helping them understand that environmental health is a public safety program that produces an extraordinary return on investment. By doing so, NEHA can actively assist affiliates whose members are facing environmental health program cuts in states and localities struggling with budget issues.
- Continuing to quickly expand NEHA's use of the internet to provide distance learning, link environmental health professionals via social media, host virtual conferences, fully develop NEHA's e-business platform, and distribute publications and information.
- Keeping NEHA in a strong financial position during these challenging economic times by creating diverse income streams and managing the association's finances conservatively. Bob believes that NEHA should be cautious about relying too heavily on federal contracts and grants.
- Continuing to expand NEHA's influence in Washington, D.C., as an advocate for environmental health and the environmental health profession.
- Preparing NEHA for its first leadership transition in decades. Specifically, the retirement of our executive director in a few years will create a high-risk period for the association.

Bob's core values are: Integrity, Professionalism, Service and Teamwork.

Did You Know?

Decade Software and NEHA provide a limited number of scholarships to NEHA 2012 AEC & Exhibition attendees. Decade Software offers 15 scholarships of $700 that include the conference registration fee. NEHA provides a limited number of travel scholarships to students. Visit neha2012aec.org for more information on these opportunities.

NEHA **NEWS**

NEHA Staff Member Tom Dickey Retires

After working at NEHA for over 12 years, Research and Development (R&D) Assistant Manager Tom Dickey has retired. Tom started working for NEHA in January 2001 as a project coordinator for the R&D program. In 2005 he was promoted to assistant manager, taking on further responsibilities and a greater role within the association. It is with a sad heart that NEHA says goodbye to Tom, someone who has made a definite impact on the profession and association. Tom's journey in environmental health did not start with NEHA, however, and what's more, his journey with NEHA did not start when he joined the staff.

Tom worked in the environmental health field for over 33 years before making the transition to NEHA. His career started at the City of Davenport (Iowa) Health Department as an intern. He then worked at the Scott County Health Department as a registered sanitarian and communicable disease control officer. He finally ended his "in the field" career as a registered environmental health specialist with the City of East Moline Health Department.

During his time working for health departments, Tom joined NEHA (and has been a member for over 40 years by maintaining an active membership during the time he worked at NEHA) and earned his Registered Environmental Health Specialist/Registered Sanitarian credential (which he also maintained during the time he worked at NEHA).

Tom was an attendee of NEHA's very first Radon Resistant New Construction (RRNC) training workshop. Little did he know that this attendance would be the start of his volunteer work, and ultimately his final career, with NEHA. As Tom states, he was a "huge fan of NEHA and felt privileged to be asked to contribute as a volunteer in any way that he could."

At the end of 2000, Tom decided to retire from the City of East Moline Health Department. This "retirement" and his departure from environmental health were, however, short lived.

Tom started working for NEHA in 2001. While not working from the NEHA Denver office, Tom's home office became a hub of high energy, activity, and accomplishment. During his time with NEHA, Tom worked on numerous R&D grant programs, such as

- the Centers for Disease Control and Prevention (CDC), Division of Adolescent and School Health's Food-Safe Schools Program;
- NEHA's Food Safety Resources Review Program in partnership with the National Agricultural Library;
- the National Coalition for Food-Safe Schools;
- NEHA's Radon-Indoor Air Quality Program in partnership with the U.S. Environmental Protection Agency;
- NEHA's Epi-Ready Outbreak Investigation Team Training program in partnership with CDC;
- the Biology and Control of Vectors and Public Health Pests: The Importance of Integrated Pest Management workshops in partnership with CDC; and
- the large umbrella contract that NEHA has with CDC.

Tom was instrumental in working with CDC to make possible to the membership several online training opportunities. Tom also traveled extensively on behalf of NEHA attending numerous NEHA Annual Educational Conferences, facilitating workshops, and meeting with NEHA's federal partners. Tom mentioned that he really enjoyed working "shoulder-to-shoulder with Larry with our governmental partners." In addition to his programmatic work, Tom stayed in tune and in touch with the other R&D staff in the Denver office and maintained working relationships with many environmental health professionals across the nation. For Tom, one of his notable accomplishments during his time with NEHA was "creating new relationships and strengthening existing relationships with NEHA's membership and federal partners."

R&D Manager Larry Marcum had this to say about Tom: "Tom brought so much to NEHA—but the single most impressive thing was the perspective he brought to us by virtue of having been a practicing environmental health professional over a long period of time. We all work hard to understand the real day-to-day work environment of our members. Tom was always able to give us a unique view on that based on real-world experience. His perspective made the programs and services we provide to our members and the profession in general more relevant, more useful, and therefore better."

Tom is highly regarded by professionals throughout environmental health. Below are just a few comments made by those he worked with over the years.

> "The Food Safety Office has worked closely with Tom since 2002 on developing, then implementing, the Epi-Ready Team training course that has been conducted over 50 times to over 2,500 participants from all 50 states. Tom has been tremendously supportive of the Epi-Ready project, CDC, and public health in general. We will greatly miss his sincerity, warmth, sense of humor, and years of environmental health experience. Tom is a true friend. We wish him well in retirement!"
>
> CAPT Donald Sharp, MD, DTM&H, Deputy Director, Food Safety Office, CDC

> "Upon our very first meeting, and in all the years since, Tom never stopped introducing me to projects, leaders, staff, and members engaged in the wide spectrum of environmental health. Tom truly believes environmental health is the greatest of professions, and his kind and insightful manner impressed many practitioners to become more engaged in meaningful local and national environmental health projects."
>
> Michéle Samarya-Timm, MA, HO, MCHES, REHS, Health Educator/Registered Environmental Health Specialist, Somerset County Department of Health, NJ

> "I've known Tom for decades. He is first and foremost the consummate gentleman. You will not meet a better person. The

Excellence: Tom accepts the 2008 NSF Food Safety Leadership Award on behalf of NEHA's Epi-Ready program.

Dedication: Hard at work taping an Epi-Ready workshop with CDC's Don Sharp and CERTI's Doug Kladder (left to right).

Camaraderie: Tom enjoys a relaxing moment at the NEHA 2010 AEC with CDC's Vince Radke and Mike Herring (left to right).

environmental health profession is losing one of its best soldiers. Tom would occasionally say, 'Here's another dumb Tom story,' but to me those stories were never dumb; they were funny and I always learned a lesson. To paraphrase the singer Tina Turner, 'Tom, you're simply the best environmental health professional, better than all the rest.'"

Vince Radke, MPH, RS, CP-FS, DAAS, CPH, Sanitarian, National Center for Environmental Health, CDC

"Tom Dickey exemplifies all of the outstanding human qualities for which professionals in our field of practice are known: friendliness, tact, diplomacy, a great sense of humor, and a deep passion for environmental health. Anytime you are working with Tom, you just can't help but feel good about what you are doing. It has been my privilege and honor to have worked closely with Tom for the past several years on various projects to promote the health and well-being of the American public. It has been an even greater honor to call Tom my friend. I wish him all the best for a long and happy retirement."

CAPT Michael E. Herring, REHS, MPH, Senior Environmental Health Scientist/Innovation Team Leader, National Center for Environmental Health, CDC

Tom made a positive difference and had a memorable impact on the profession. NEHA's Executive Director Nelson Fabian reinforces this by saying, "It has been a joy to work with Tom and to watch him in action. His spirit, positive attitude and energy, and passion for both NEHA and environmental health showed through his every interaction with others—whether in person, on the phone, or via the written word. Little wonder that NEHA is in a better place today than it was when Tom began his second environmental health career with us. Thanks, Tom, for a job well done! Not only did you accomplish a lot, you touched many people along the way." Fabian goes on to say, "One of my favorite quotes is that 'people will quickly forget what you said and even what you did—but they'll never forget how you made them feel.' I don't think anyone will ever forget Tom! He has a way of making everyone happy that they've had a moment with him."

Marcum also commented that "it was a joy to work with Tom—his constant good cheer, optimism, and creativity made us better. As I reflect on Tom's years with us, I don't think inspiring is too strong a word to describe someone who literally gave his entire adult life in service to environmental health. We are sad to be losing Tom as a colleague but we wish him only the best as he begins to enjoy this next chapter in his life."

Speaking of the next chapter, retirement for Tom does not mean that he will be disappearing from the world of environmental health. "I am leaving NEHA as an employee but not as a member." He has plans to enjoy the two-acre wooded lot that he lives on; spend time with his wife Sally, his family, and his new mini golden doodle puppy named Ruby; embark on a hunt for the Jeep pick-up his father owned; and to just enjoy a life where he's "on his schedule and not on anyone else's."

Tom mentioned that he wanted to leave NEHA on a high note and we can all agree that he has accomplished that. In reflecting on his retirement, Tom stated, "My years with NEHA have provided me the opportunity to meet and work with some very remarkable people and experiences, which I will always remember fondly. Certainly, a thank-you is in order to Nelson and Larry for 'taking a chance' on a home-office employee, but most importantly, a huge thank-you to my wife, Sally, who told me many years ago to 'go for it!' Her support, advice, and encouragement through my NEHA years will always be appreciated and for that...I love you, Sally!"

From all of us at NEHA, we thank Tom for positively impacting our lives, the profession, and the association. We congratulate you for all your accomplishments. You will be greatly missed and we wish you the best of luck on this next chapter of your life!

LETTERS TO THE EDITOR

The Story of CanSAR

Dear Editor:
While attending the National Healthy Homes Conference in Denver, Rick Miklick, NEHA's credentialing coordinator, came to the Cancer Survivors Against Radon (CanSAR) booth, saw the pictures of the members of CanSAR on the display board—many of whom have died and are now with us in spirit only—and heard the story of CanSAR. He asked if I would share it with the *Journal of Environmental Health*.

Among the instrumental creators of CanSAR were American Association of Radon Scientists and Technologists (AARST) members Dallas Jones, Peter Hendrick, Tom Heine, and John Mallon, who created a vehicle for individuals who had developed lung cancer after radon gas exposure to impart their stories. CanSAR began in 2004 with Liz Hoffmann, president, Wisconsin; and a few other members including Sue Michaels, Pennsylvania; Dennie Edwards, Ohio; Julia Harris, Georgia; and Ann Cosper, Alabama, who shared their stories through the news media and the CanSAR Web site. When the public heard Liz's story, thousands of people sought radon test kits to test their homes in Minnesota and Wisconsin.

In December 2005, my husband Joe was diagnosed with lung cancer that had traveled to his liver and bones. The oncologist told us that radon gas was a known cause of lung cancer; Joe died without knowing that our home tested over four times the U.S. Environmental Protection Agency action level. After a mitigation system was installed in my home, my Illinois licensed mitigator introduced me to Angel Price, NEHA's National Radon Proficiency program administrator, who shared my determination for radon legislation with Peter Hendrick. I met with my state representative, Dan Reitz, armed with a notebook filled with research on radon gas and the video "Radon is Real" produced by AARST. Educating the Illinois legislators about the danger of radon gas through e-mails, phone calls, letters, and visits consumed me and became my passion. Effective language, thanks to Dallas Jones, was developed and resulted in "The Radon Awareness Act" which passed unanimously through the House and Senate with much appreciation going to Cal Murphy and the Midwest AARST chapter for encouragement and support. Lives are being saved in Illinois because of this law; the number of homebuyers testing for radon before taking occupancy has grown from 8% previous to the enactment of the law to up to 40%; and mitigation is happening when the radon levels are elevated.

As individuals with lung cancer logged into the CanSAR Web site and requested a free radon test kit, I made contact, and if their radon levels were elevated, their personal stories were submitted and posted on the CanSAR Web site. Names for potential CanSAR members have come from newspaper articles, TV segments, and radon professionals. Our group has grown from the original five or six members to 25 individuals who have shared their stories so others may not have the same experiences.

On January 26, 2010, the newly formed nonprofit (501c3) Cancer Survivors Against Radon was incorporated. Our members are active with presentations to community organizations, church groups, college classes, and health fairs; other endeavors include runs/walks, TV and radio interviews, public service announcements, and American Lung Association activities. Testimony given by our members at hearings on radon bills has influenced radon laws in Illinois, Kentucky, Oregon, and Kansas.

"Capital Steps to Radon Action" is an annual event on the fourth Wednesday of January (National Radon Action Month) enabling supporters (wearing Reduce Radon t-shirts) to assemble on the capitol steps in their state to educate others on the danger of living and working with high levels of radon gas. To become involved in your state and initiate a group in your state, contact Gloria@cansar.org.

We never stop spreading the message that radon gas is the leading environmental cause of cancer mortality; radon gas accounts for up to 14% of lung cancer deaths in the U.S. according to the World Health Organization. Very few people are aware that over 21,000 individuals die annually from radon-induced lung cancer. If you go to www.cansar.org/about/our-stories/ you will see the many stories of our members who were not aware that radon was present in their homes until lung cancer invaded their bodies.

November was National Lung Cancer Awareness Month—a little-known fact. Most people diagnosed with lung cancer are diagnosed in late stage, and the five-year survival rate of late-stage lung cancer diagnosis is only 2%–3% according to the American Lung Association. We need your help and support in educating the public about the very real danger of radon gas. You can become a supporter at various levels on our Web site at www.cansar.org. Remember to test your home, and please become a friend of our Facebook page (www.facebook.com/radontee). It is up to us to make the difference and save lives through education and awareness of radon gas.

Gloria Linnertz
Waterloo, IL

Did You Know?

APHA's Environment Section recently developed a short film about the field of environmental health—*Environment Health You*. The film presents an overview of environmental health over the past century. View the video at vimeo.com/32226544.

Managing Editor's Desk
continued from page 62

us and start thinking more about our future possibilities than our past accomplishments.

Our profession has an expertise, community knowledge, and training background that enable us to fulfill many of the goals that are being envisioned for these new programs. We do have the potential to make an impact and to help our communities become more sustainable, healthier, and more prepared for environmental threats to health that loom in our future. However, for us to realize our potential, a major shift in our group thought must occur. We need to get excited about the future and the potential we have instead of mourning the loss of our past.

I would contend that we waste far too much time looking backwards and wishing it was 1982 (or whatever golden year you prefer!) all over again. (You may recall that I made a similar statement in another editorial I recently wrote about how IT can transform our profession. Repeating this point is a measure of how strongly I feel about how we've become captivated more by the laurels of our past than by the promise of our future.) Instead of falling into this trance that has us hypnotized that things used to be just fine, we need to get excited about how environmental health can evolve and how we can help that evolution along.

Let me illustrate this with an observation. There are two ways to look at the world. On the one hand, we could say (as we do today) that we once had the funding and the personnel to do a, b, c, and d. This kind of backwards thinking anchors our discussions to a reference point (some time in the past) that somehow gets established in our minds as the gold standard for how things should be today. (No—it's not a gold standard! Rather, it's simply how things used to be!)

On the other hand, we could look forward and observe that indeed, society is changing as are its priorities. Moreover, new areas of work for which environmental health has some relevance, are emerging. Rather than burning up precious resources to save programs that civic leaders are moving away from, we could instead be trying to wedge our way into these new programs where environmental health has the potential to make huge impacts. To put this in terms our little baseball player could understand, perhaps we should start thinking about becoming a pitcher, instead of a hitter—given how the balls are falling in today's world of cut programs and new programs. (Our modern physicist friends might suggest that we should be shaping our future to allow our potential to be realized.)

That's the difference between looking forward (and tapping into our potential) and looking backward (where potential becomes a meaningless and even more maddening, useless concept).

In short, we need to make the future more center stage in our thinking … and the past less. We also need to recognize and reaffirm that we have potential and that we can tap into it for the benefit of the future of our profession, its cause and its practitioners.

So … the larger question then becomes, what can NEHA do to help the environmental health profession realize its potential? In short, the answer is that NEHA can get people to talk and think about the future more often. If we can all spend a little more time thinking about the promise of the future and a little less time reminiscing about the tales of the past, we become much more open to ideas that offer hope and excitement about what our profession might look like in the years ahead.

That is the mission that NEHA is on. Our direction is to turn the conversation outward and forward. We indeed have a wide open future ahead of us. In line with our little baseball player and some modern physicists, an unshaped world lies out there for us to invent. And it's time we do a little inventing!

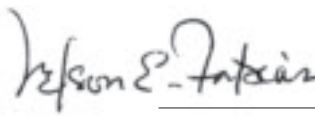
To help us to start thinking more deeply about the future and the place that environmental health could occupy within it, allow me to introduce you to our newest *Journal* columnist, Mr. Thomas Frey. Tom is a futurist! He is also Google's number-one-rated futurist speaker. Tom is also the executive director of the DaVinci Institute, which is an organization dedicated to understanding the future. Tom will also be NEHA's keynote speaker at our San Diego AEC in June.

Unlike our other columnists, the purpose of Tom's column is not to speak directly to environmental health issues. Rather, Tom will talk about the future. The idea behind his column is that as we get our profession to think more about the future, our minds will become more stimulated into thinking about future possibilities for environmental health. Informed with such futuristic insights, it should then become much easier for us to rethink how we can use our potential to evolve environmental health into a more popular, relevant, and contemporary field of practice.

I have followed Tom for years and have every confidence that you will enjoy listening to him like I have. I remember once listening to Tom being interviewed. He talked about living in the future and then reporting back on what he was seeing. While metaphorical, his point was well taken. He spends most of his life imaginatively living in the future. It quickly becomes exciting to hear back from him on what he is seeing.

His writings are astute and provocative. Take a look at the column in this *Journal* (page 34) as an example. If you find yourself scratching your head or shaking it in disbelief, then his column has been successful. It is meant to push you to think more openly about just where the future might lead. It is not our job to just inherit and perpetuate the past. It is our responsibility to imagine the future (and with NEHA's help) shape it in ways that enable us to maximize our impact … and potential—which trust me, is still there!

Here's to the pitcher in all of us!



nfabian@neha.org

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

NEHA AEC 76th

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Annual Educational Conference (AEC) & Exhibition

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	Member	Non-Member
Full Conference Registration	**$565**	**$725**
One Day Registration	$305	$355
Student/Retired Registration	$155	$225

Registration pricing will increase after May 24, 2012.

Registration pricing for Pre-Conference Workshops, Credential Courses and Exams, special events, and the Virtual AEC are available at neha2012aec.org/register.html.

Save $50

Stay at the designated AEC hotel–*the San Diego Marriott Marquis & Marina*– and receive a $50 food voucher to use toward your meal purchases.

Certain terms and conditions apply.

See AEC website for details.

Save on AEC Registration – Join NEHA as a Member Today!

Become a NEHA member and take advantage of the member registration rate of $565 for the full conference. An annual membership is just $95 and includes a free subscription to the *Journal of Environmental Health*; free Continuing Education credits for e-Learning courses; access to a members-only website, which includes a member directory; affinity programs with discounts for NEHA members on various goods and services; and more!

Customize Your Learning Experience

The NEHA AEC offers so many different facets for you to choose from to customize your own learning experience. From the multitude of environmental health topics discussed to the different learning environments of the Lecture and Learning Lab to the option to attend in-person or virtually, the NEHA AEC offers a fresh, progressive, and modern approach to training and education.

TRAINING

Productivity. Efficiency. Effectiveness.

Training

LEARNING LAB SESSIONS

Engage in interactive, dynamic, and self-driven sessions, which will provide you with hands-on training and real-world experience to help you cultivate new skills and bolster your proficiency to increase your productivity as an environmental health professional.

EH Health Impact Assessments (HIA)

- Designing an HIA: You Take the Lead
- Tox in a Box: A Concise Training on the Health Assessment of Environmental Hazards

Food Protection and Defense

- My Restaurant Did What?!
- ROP HACCP: Hazards, Preventive Measures, and Educational Opportunities

General EH

- The Devices, the Dissident, the Reactors, and the Radiological Tales: Lessons Learned for the EH Professional

Informatics/Leadership/Management

- Making the Message Stick
- Wake Up to the Social Media Planning Challenge
- Woodstock to WWF: How to Benefit from Generational Differences in the Workplace

Onsite Wastewater

- (Field Trip) Tour of an Ecological Wastewater Treatment and Reuse Decentralized Model

Technology and EH

- Mobile Phone Usage: More, More, More or Less, Less, Less?
- There's an App for That
- (Field Trip) University of California, San Diego: California Institute for Telecommunications and Information Technology—Cal-(IT)2 Tour

Terrorism/All-Hazards Preparedness

- Using Community-Based Participatory Research to Build Capacity for Environmental Emergency Preparedness and Disaster Resilience

The sessions below are a special group of Learning Labs that are scheduled for several hours each day during the AEC. At any one time, there will be eight of these sessions taking place, and you can drop into them at your leisure. Like other Learning Labs, these sessions will have a presenter and will be highly interactive. However, you are in charge of when you want to attend and the pace at which you wish to learn about a particular topic.

Children's EH

- Sanitation in Classroom and Food Preparation Areas in Child Care Facilities from North and South Carolina

Food Protection and Defense

- Food Establishment Resource Library (FERL) on the Southern Nevada Health District Website
- What's Cooking? Ethnic Foods 101

Healthy Homes and Communities

- The Effects of Indoor Air Pollutants on the Lung Health of Asthmatic Patients

EDUCATION

Knowledge. Understanding. Expertise.

Education

LECTURE SESSIONS

Acquire comprehensive information from environmental health subject matter experts and industry leaders, and learn from your peers as you share stories and best practices to address common challenges.

Children's EH

- Effectiveness of Local Lead Poisoning Prevention Laws
- Food Safety Risk, Response, and Resources: A School Food Service Action Guide
- Lead Guidelines for Children's Play Areas: The Need for Clean Soil Policies to Protect Children
- Methamphetamine Contamination Closes West Virginia School
- Pediatrician's Perceptions on Child Lead Poisoning
- Protecting Children: Tools to Improve Environmental Health in Child Care Settings
- What Got Into the Kids?

EH Health Impact Assessments (HIA)

- Community Engagement and Health Impact Assessments
- Environmental Impact Assessment: An Unrealized Opportunity for Environmental Health
- Using Health Impact Assessments for Comprehensive Plan Updates

Emerging EH Issues

- Medical Marijuana in California: Legal Standing and Dealing with Edible Products
- The Role of Public Health in Promoting a Food System that Is Safe, Secure, and Sustainable: S3
- What Is the Matter with Raw Milk?

Food Protection and Defense

- Addressing Illegal Food Vending and Food Defense with Education and Innovation
- Are You on the Cutting Edge?

- Impact of Internet Posting of Restaurant Inspection Scores on Critical Violations
- New Deli Slicer Standards in Food Safety
- Pets in Retail Food Outlets: A Literature Review
- Scores and More: Can You be Sued for Giving a Restaurant a Good Grade?
- The Fight Against Food Allergens: What Regulators and Industry Need to Know
- The Role of Rapid Cycle Improvement in Addressing Recurrent Critical Violations in Restaurants
- What's Hiding in Your Sandwich?

General EH

- Effective Strategies to Reduce Motor Vehicle Injuries in Native American Communities
- How an Agricultural Field Toilet Inspection Program Reduced Food Contamination Risk and Improved Farm Worker Health
- Human Mercury and Antibiotic Resistant Bacterial Sampling Along the Indian River Lagoon, FL: Dolphin and Human Health
- Nanomaterials for Environmental Remediation: Nanoinformatics for State Agencies' Safety and Health Regulatory and Oversight
- Outdoor Air Quality Impacts at Hydraulic Fracturing ("Fracking") Sites in Fort Worth
- Rat Hoarder Case

Hazardous Materials and Toxic Substances

- California's Unified Approach to Hazardous Material Programs
- Interagency Cooperation Helps Solve Mercury Mystery Threatening Children in Twin Falls, Idaho
- Methamphetamine Lab Contamination: A Different Look at the Impact of the Meth Epidemic
- Responding to Mercury Incidents
- San Bruno—Restoring a Community
- What Do You Do When You Have a Bomb Factory in Your Neighborhood?
- What Goes Up Must Come Down: Lessons Learned from Emergency Air Monitoring During the Escondido Bomb House Burn

Healthy Homes and Communities

- Home Is Where the Hazards Are
- Indoor Air Quality in Rural Alaskan Homes
- Preserving Our Past to Protect Our Future
- The Fungus Among Us: Blasto Isolated in the Home Environment
- The Inspector's Guide to Indoor Pool Air Quality
- "Why Don't People Walk?!" A Case Study of Active Travel at a Sustainable University

Informatics/Leadership/Management

- Cross Community Collaborations for Environmental Health
- EPH & Priority Based Budgeting—This Happened to Me!
- Look Inside a Statewide Environmental Reporting System Project
- State Environmental Health Policy
- Sustainable Policy in Environmental Public Health
- Using Dashboards to Make More Sense of Your Data
- Using Environmental Public Health Tracking Data to Assess State Public Health Laws

International EH

- Contents of Heavy Metals in Arable Soils and Birth Defect Risks in Shanxi, China: A Small-Area Level Geographical Study
- Implication of E-Waste Trafficking on Human Health
- Rapid Evaluation and Improvement of Drinking Water Supplies in Africa
- Understanding Team Organizational and Incident Command Challenges: Practice and Application During Two Different International Outbreak Responses

Onsite Wastewater

- Ecological Wastewater Treatment and Reuse: The Decentralized Model
- Recycled Coconuts as an Onsite Wastewater Technology?

The following sessions are being presented by the California Onsite Wastewater Association (COWA):

- Contracts: Managing Expectations
- OWTS Inspections
- Principles of Plan Checking
- Conducting a Small Community Assessment for Wastewater Infrastructure Improvements
- Source of Pollution or Groundwater Solution
- Take Care of What You Have
- Technology Approval
- Writing a Successful Grant

Pathogens and Outbreaks

- Collaboration Between FDA and Local Agencies to Assess the 2011 Multistate Cantaloupe *Listeria monocytogenes* Outbreak
- Legionnaires' Disease Outbreak at a Long-Term Care Facility: Environmental Health Considerations
- Passing Parasites: A Rare Foodborne Giardiasis Outbreak at a Restaurant
- Rapid Response Teams and the FDA CORE Network: Improving Foodborne Outbreak Responses
- Severe Brain Infections and the Environment: The Changing Epidemiology of *Naegleria fowleri* Infections
- Water and Foodborne Enteric Protozoa: Current Considerations for Environmental Health
- Zygomycosis Issue Following the Joplin Tornado

Recreational Waters

- A Potpourri of New Standards You Need to Know About for Pool and Spa Inspections
- Biofilms in Recreational Water: What Makes Them So Hard to Treat?
- Building an Aquatic Health Program of Excellence
- National Swimming Pool Codes—Junction of Health and Building Officials
- Pool Safety: From Construction to Technology
- Ultraviolet for Aquatics & Spray Parks: Air Quality and *Cryptosporidium*

Sustainability/Climate Change

- Climate Change Impacts on the Built Environment and Public Health
- Confronting Climate Change Health Risks in the Pacific Northwest
- Environmental Health, Sustainability, and Land Use Planning—A Perfect Trifecta
- Innovative Solid Waste Permitting, Organics Diversion, and Sustainability in the Napa Valley
- Wildfire Particulate Emissions and Respiratory Health Under Climate Change Scenarios: Project Overview and Results

Terrorism/All-Hazards Preparedness

- A Day of Disaster: The Environmental Health Impact of the April 2011 Tornadoes in Alabama
- Functional Assessment Service Teams (FAST): Emergency Sheltering for People with Access and Functional Needs
- National Preparedness Measures and Their Implications for Environmental Health
- Response to Hurricane Irene
- Riverwatch 2011: An Environmental Public Health Response to a Major Flood Event
- Riverwatch 2011: How a Local Environmental Public Health Agency Implemented Health Codes to Condemn Private Residences
- Understanding Water Issues During Selected Natural Disasters

Vector Control and Zoonotic Diseases

- Bed Bugs: A Re-Emerging Public Health Challenge
- Environmental Risk Factors for Re-Emerging Epidemic Typhus
- What Is the Buzz about PCRs?
- Where Have All the Vector Programs Gone?

Water Quality

- Minnesota's Assessment Source Water Monitoring Study
- Toolbox Approach of Source Tracking Human Sewage in Storm Drains

Sessions and schedule are subject to change.

COMPLETE AND UP-TO-DATE INFORMATION CAN BE FOUND ONLINE AT NEHA2012AEC.ORG.

Special Events at NEHA AEC

The Annual UL Event will be held Wednesday, June 27, 2012, from 6:30 to 10:00 pm.

ANNUAL UL EVENT
Aboard the USS Midway

Come aboard the USS Midway Museum and prepare yourself for a lifetime memory! At the Annual UL Event, you'll explore a floating city at sea and relive nearly 50 years of world history aboard the longest-serving Navy aircraft carrier of the 20th century. During the Annual UL Event you'll enjoy a tour of the historic aircraft carrier, a delicious catered dinner on the hangar deck, and other entertaining features such as private access to the flight deck to tour at your leisure. Don't miss the opportunity to see this fascinating piece of history!

COMMUNITY VOLUNTEER EVENT
Balboa Park

NEHA will be holding a Community Volunteer Event as part of the 2012 AEC. This is the second year that NEHA has organized a Community Volunteer Event as part of our efforts to "green" the AEC, and to give back to the host city in which the AEC is held.

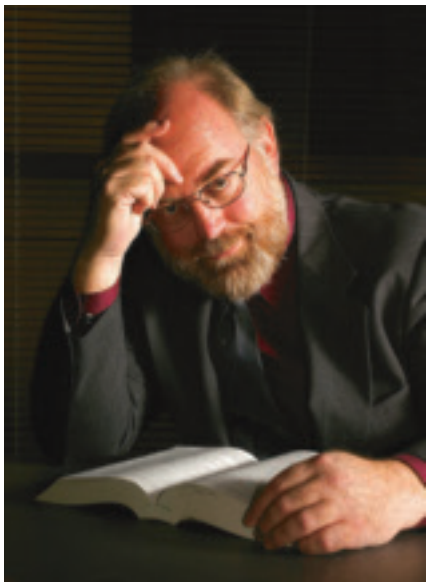
The Community Volunteer Event will be held from 1:00 to 4:30 pm on Wednesday, June 27, 2012.

The event will be held at San Diego's Balboa Park. Balboa Park is the nation's largest urban cultural park. It is home to 15 major museums, renowned performing arts venues, beautiful gardens, and the San Diego Zoo. In addition, the Park has an ever-changing calendar of museum exhibitions, plays, musicals, concerts, and classes—all in the beautiful and timeless setting of this must-see San Diego attraction.

Volunteers will be working with Park Ranger Carole to help maintain and improve the park for future visitors. Projects will include planting, trail restoration, painting, and other physical activities.

Space is limited so make sure to sign up today! For more details and to sign up as a volunteer, visit neha2012aec.org.

The keynote speaker is sponsored by NSF International.



The Awards Ceremony & Keynote Address will be held Thursday, June 28, 2012, from 1:00 to 2:50 pm.

"The future is truly a magical place. I have been there and would love to have you join me on my next journey."
– Thomas Frey

KEYNOTE SPEAKER

Be Motivated and Inspired by Senior Futurist, Thomas Frey

Thomas Frey is author of "Communicating with the Future: How Re-engineering Intentions Will Alter the Master Code of Our Future" and Executive Director and Senior Futurist at the DaVinci Institute. His keynote talks on futurist topics have captivated people ranging from high-level government officials to executives in Fortune 500 companies including NASA, IBM, AT&T, GE, Hewlett-Packard, Visa, Ford Motor Company, Lucent Technologies, Boeing, Capital One, Bell Canada, Times of India, Leaders in Dubai, and many more.

As things continue to change across our communities, there are "new normals" emerging. So what will the future world of work—and a profession like environmental health—look like? Attend the Keynote Address at the NEHA 2012 AEC for answers as Frey's presentation continues the discussion of "new normals" that began at the 2011 AEC, and explores where things are likely to go in the future.

Frey's presentation will motivate and inspire you with provocative knowledge, humor, and tantalizing information bits that you can immediately put to use to help environmental health be effective in our communities in the future.

Preliminary Schedule

Tuesday // June 26	Wednesday // June 27	Thursday // June 28	Friday // June 29	Saturday // June 30
Pre-Conference Workshops	Pre-Conference Workshops	1st Time Attendee Workshop	Town Hall Assembly	Educational Sessions
Credential Review Courses	Credential Review Courses	Educational Sessions	Exhibition Open	Networking Luncheon
	Credential Exams	Awards Ceremony & Keynote Address	Poster Session	President's Banquet
	Golf Tournament	Exhibition Grand Opening & Party	Silent Auction	
	Community Volunteer Event		Educational Sessions	
	Annual UL Event			

neha2012aec.org

Reasons Why

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

Difficult times make it more important than ever that you NOT miss the skills, knowledge, and expertise that can be derived from the NEHA AEC, which can help you and your organization build for a better tomorrow.

1. The NEHA AEC is a unique opportunity for you to gain the skills, knowledge, and expertise needed to help solve your environmental health organization's daily and strategic challenges, and to make recommendations to help improve your bottom-line results.
2. NEHA's AEC is the most comprehensive training and education investment your organization can make all year.
3. Your attendance at the NEHA AEC is a solid investment in your organization that will result in immediate and longer-term benefits.
4. You can earn Continuing Education (CE) credit to maintain your professional credential(s).
5. NEHA provides a return on the investment made for you to attend the AEC.

Need additional reasons why you should attend?

Check out the videos on neha2012aec.org to hear what other environmental health professionals are saying about the NEHA 2012 AEC.

Enjoyment of the Destination

San Diego is a destination you don't want to miss! It is California's second largest city, where blue skies keep watch over 70 miles of pristine beaches and a gentle Mediterranean climate means paradise every day.

San Diego County's 4,200 square miles offer immense options for business and pleasure. San Diego is renowned for a dazzling array of world-class family attractions including the world-famous San Diego Zoo and San Diego Zoo Safari Park, Sea World San Diego, and LEGOLAND California. The city offers an expansive variety of things to see and do, appealing to guests of all ages from around the world!

Stay at the NEHA AEC designated hotel (the San Diego Marriott Marquis & Marina) and enjoy access to all there is to see and do in San Diego. The enchanting waterfront location of the hotel makes it easy to walk to areas like the Gaslamp Quarter—a 16-block historic district filled with restaurants, specialty shops, and more!

Visit neha2012aec.org and click on "About San Diego" to plan how you're going to enjoy the NEHA 2012 AEC destination!

Marriott MARQUIS SAN DIEGO MARINA

AEC Designated Hotel

San Diego Marriott Marquis & Marina

333 West Harbor Drive, San Diego, CA 92101

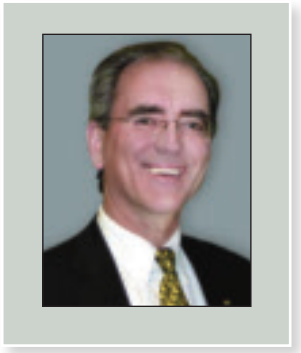
To make your hotel reservations, visit neha2012aec.org/hotel.html.

The San Diego Marriott Marquis & Marina is southern California's premier San Diego hotel, and is the designated venue and hotel for the NEHA 2012 AEC. Book your hotel room today to secure your stay at the beautiful San Diego Marriott Marquis & Marina at a wonderfully discounted rate of $149/night*!

See website for room availability within the NEHA block.

*Taxes and fees also apply. To receive the discounted rate of $149/night, you must book your hotel room within the NEHA block. Discounted rooms are available on a first-come, first-serve basis. Rooms with a bay view are also available at $169/night plus taxes and fees.

MANAGING EDITOR'S DESK



Nelson Fabian, MS

Think Future—Introducing Thomas Frey

Years ago I heard the following story: A young boy dreamed of being baseball's greatest hitter. To reach his potential, he practiced hard. By himself, he would toss a baseball into the air and swing his bat, hoping to hit the ball each time. However, each and every time, he missed the ball.

Finally, after missing the ball for the umpteenth time, he slowly gazed into the air, then down to the ground where the baseball lay and then with all the amazement only a child could muster, he exclaimed, "Wow, what a pitcher!"

I love this little story and have carried it with me over the years for a reason. It serves to continually remind me that we all have within ourselves, great potential. We just have to see it to then be able to use it.

This same lesson also comes to us from modern science. As science continues to tiptoe into the world of consciousness, we are hearing from some physicists that the mind actually creates matter, not vice versa. In other words, within us lies the power to both make and shape the world. We just have to realize that in order to make it happen.

I take from this telling insight an almost reverential belief in 1) the potential that everyone has and 2) in our ability to make the possible happen.

Potential. What a powerful word and concept! Tell someone they have potential and it is astounding what that person can do, once they too realize they have it.

And yet … as I travel the country and talk to people who practice our profession, I am finding it harder and harder to find any belief in potential. Instead I hear comments like, "Because we no longer have the resources, the funding and/or the personnel, ***we can't*** do very much anymore." "We're just hanging on." "The name of the game is to protect what we have."

> ***We need to get excited about the future and the potential we have instead of mourning the loss of our past.***

As I hear comments like these and then make the effort to understand what they say about us, I am more and more believing that the real consequence to these difficult economic times is less the loss of jobs that we so often hear about and much more the emergence of a group think that essentially maintains that we're successful if we simply maintain the present perimeters of our practice. Anything more is out of the question and in fact, even beyond our imagination. In short, with the profession in a state of retreat, I worry that environmental health is fast losing sight of the remarkable potential that it still has. Given the psychic and economic environments within which many environmental health people work, perhaps this should not be so surprising. Nonetheless, if we allow this kind of group think to prevail, I fear that we invite upon ourselves a tragedy that far transcends the loss of some jobs or even the loss of our influence in the communities we serve.

NEHA is here to argue that we haven't lost our potential. It is still there (and always has been) despite the cutbacks that we are experiencing. I would further argue that while some branches of our profession's evolutionary tree are indeed being pruned, new branches are sprouting and are there for the taking! Moreover, our profession possesses the training, community knowledge, and fundamental expertise to burrow into these new branches to establish an environmental health presence in—if not a mastery over—them. We just need to open our eyes (or maybe I should say our minds) and realize that we have the potential to take environmental health in some of these new directions.

To be more specific, through the window that our new Center for Priority Based Budgeting has opened up for us, we are able to now watch the decision making and budgetary processes that are taking place in communities all across the U.S. We are following (and even leading) the very processes that civic leaders are conducting as they set priorities and make budgetary decisions about what gets funded, what gets cut, what gets created, and what gets eliminated. Among other things, we have learned that even in these tough times, communities are finding new dollars to build brand new programs in topics like sustainability, healthy communities, built environments, health effects of global climate change, and even public safety (broadly defined to include environmental health considerations). However, what we also find is that all too often, local governments are filling positions in these new programs with music, political science, or even history majors! Are you kidding me?

We need to be telling our policy makers that we are the ones who can make these programs work. However, that will only happen if we rediscover the potential that exists within

continued on page 53

What's your story?

"NEHA couldn't be more pleased with this partnership as our respect over the years for Decade and it's commitment to environmental health, has been unwaveringly high and rock solid..."

Nelson Fabian, Executive Director and CEO, National Environmental Health Association

"The scenarios and applications seem endless to me...What an amazing life line to have when I'm in the field!"

Tami K. Hastings, Environmental Health Specialist II, Albuquerque Environmental Health Department

"All of our staff uses Envision/EnvisionConnect in some way beyond entering our daily time and activities. It is the primary tool for managing environmental health programs in our jurisdiction..."

Lorraine Lew-White, REHS Health Services Manager, San Mateo County Environmental Health

"Our department is now part of a statewide team of agencies that share information, forms, and innovation through a common information management platform..."

Brad Banner, Director, Butte County Environmental Health Department

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