Strengthening Epidemiologic Competencies Among Local Health Professionals in New York: Teaching Evidence-Based Public Health

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SYNOPSIS

Starting in 2004, the New York State Department of Health and the University at Albany Prevention Research Center collaboratively developed a course entitled Evidence-Based Public Health for Local Health Practice to strengthen epidemiologic and other competencies of public health professionals in local health departments. This article describes the development of the course and its adaptation to the needs of local public health staff.

The course utilizes didactic sessions, computer labs, and scenario-based exercises to demonstrate the use of data and evidence in the decision-making process. Follow-up surveys found that information and skills that emphasized epidemiologic competencies were likely to be used regularly or occasionally by the majority of participants. Half of the participants said that their agency's use of evidence-based public health practices had increased. Few respondents were trained as epidemiologists, yet most reported they used those skills in the workplace, suggesting a need to strengthen these competencies among non-epidemiologists.

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In New York State and many other areas, local health departments are seen as the primary organizing and mobilizing force for public health practice in most communities.[1] The capacity of governmental agencies, especially local health departments, to deliver essential public health services and solve community health problems requires health professionals who are competent in a range of subject areas.[2] Ensuring that this workforce is prepared with the skills and knowledge to face both identified and emerging public health challenges is a daunting task.[3] Often, local health professionals have not received training and education to learn the skills necessary to address current health issues, or may lack a basic understanding of how to identify problems in the first place.

In 2001, the Council on Linkages Between Academia and Public Health Practice (COL)[4] identified Core Competencies for Public Health Professionals, which specified the skills, knowledge, and attitudes necessary for the broad practice of public health. The competencies deemed necessary to provide these essential services to local communities were then cross-walked with the essential services.[5] The list resulted from a lengthy review process that involved more than 1,000 public health professionals.

COL's list of public health core competencies represents a set of skills, knowledge, and attitudes necessary for the broad practice of public health rather than describing what is needed in specific disciplines. The competencies apply to frontline staff, senior-level staff, and those in a supervisory or management role. For many of these domains, basic epidemiologic skills are necessary. COL acknowledged that discipline-specific competencies are needed for specialized roles within public health, but did not address them.

In January 2004, the Council of State and Territorial Epidemiologists (CSTE) hosted a summit to address workforce issues affecting public health epidemiologists and improve the practice of epidemiology within the public health system. The Centers for Disease Control and Prevention and CSTE subsequently defined Competencies for Applied Epidemiologists in Governmental Public Health Agencies (AECs) for four tiers of practicing epidemiologists that are organized under eight skill domains, yet acknowledged that different public health programs that use applied epidemiology may emphasize different competency areas.[6] For example, one of these tiers pertains to administrators and managers in supervisory positions who may require epidemiologic skills for decision-making rather than for data collection and analysis. Yet, an understanding of competencies needed by epidemiologists in other tiers may be critical in implementing effective public health programs.

In their 2005 report about public health infrastructure, Baker et al.[7] highlighted deficits in the workforce, information systems, and organizational capacity of local public health. They drew on two 2003 Institute of Medicine reports[8,9] and described major initiatives to systematically assess, invest in, rebuild, and evaluate workforce competency, information systems, and organizational capacity.

There is a large audience for workforce training in the state of New York with an apparent shortage of people trained in epidemiology. In 2002, the New York State Public Health Council estimated that 12,700 full-time equivalent workers were employed by governmental public health units,[10] and 57% of them worked in the local health departments, including the New York City Department of Health and Mental Hygiene. Despite these seemingly large numbers, a national enumeration study of the public health workforce conducted in 2000 by the Health Resources and Services Administration found New York's number of public health workers per capita to be in the lower third nationwide, with 73 workers per 100,000 population compared with 158 workers per 100,000 nationally.[11] To delineate the size and composition of New York's local governmental workforce, a survey of all 58 local health departments was conducted as part of the Public Health Leadership Institute project. This 2002 survey found that epidemiologists and communicable disease staff and/or disease-control investigators represented only 5% of the local health department workforce.[12]

A shortage of local health professionals formally trained in public health and an apparent underrepresentation of epidemiologists among them engenders concern about the epidemiologic capacity of local health departments to address public health issues. Not surprisingly, the 2002 survey identified education and training as a key priority, with an objective to increase access to competency-based training as described by COL.[12] One strategy to accomplish this goal is to develop partnerships between public agencies and schools of public health.

The movement toward evidence-based public health (EBPH) programs and policy, which has been gaining momentum over the past decade,[13–17] provides a context for enhancing core public health competencies, especially those based on epidemiology. A pioneering effort to train public health professionals in EBPH was launched in 1992 by the St. Louis University School of Public Health[18,19] for state, national, and international audiences. The purpose of the course is to train

public health practitioners to utilize a comprehensive approach for program development and evaluation from a scientific perspective, including principles of scientific reasoning and systematic uses of data and information systems.

In 2004, the New York State Department of Health (NYS DOH) undertook a multiyear training initiative with the Prevention Research Center (PRC) at the University at Albany School of Public Health to strengthen EBPH competencies of public health professionals working in local health departments. The New York course is called Evidence-Based Public Health for Local Health Practice.[20] This article describes the development of the course and how it was tailored to the needs of local health professionals. The course targeted key decision-makers and staff on whom they rely for data and information about the community. An important emphasis of this course is strengthening skills in finding and then using data and evidence from the scientific literature to inform programmatic and policy decisions. We summarize available information on how the course affected participants and the use of EBPH in local health practice.

METHODS

Two NYS DOH staff members and one school of public health faculty member who had attended the national training collaboratively developed a course for public health leaders in local health departments. The curriculum was modeled on the St. Louis curriculum and tailored to the needs of local health professionals.

Course adaptation

An initial course outline was developed by first identifying the epidemiologic competencies necessary to enhance evidence-based decision-making (Figure)[13] and then recommending subject areas and approaches that targeted these competencies. The proposed content was adapted for the local context based on the authors' experience working in local health departments (Bohn, Waltz), and ongoing interactions (by all) with staff from local departments across the state. The draft curriculum was then reviewed by an ad hoc advisory group representing 10 local health departments and modified based on their feedback. The final set of adaptations included the following:

Reorientation for local practitioners. In its module on research methods, for example, the St. Louis course presents an excellent introduction on research design and data-collection methods. Because few local health departments are in a position to develop their own studies, this material was significantly scaled back for the course. It is essential, however, that local health department staff be able to read research literature and assess strengths and weaknesses of studies. Therefore, a more consumer-oriented approach was emphasized so that staff would be more informed when they review the literature.

Small area data analysis. Any county interested in data analysis at a subcounty geographic level is likely to encounter problems in analyzing and interpreting rates based on small numbers of events (cases). With county populations in NYS as low as 5,300 residents, smaller counties have this problem even with county-level data. The course added discussion to explain why small numbers are an intrinsic problem and to suggest strategies to cope with this issue, as well as methods for creating synthetic estimates when local data are unavailable.

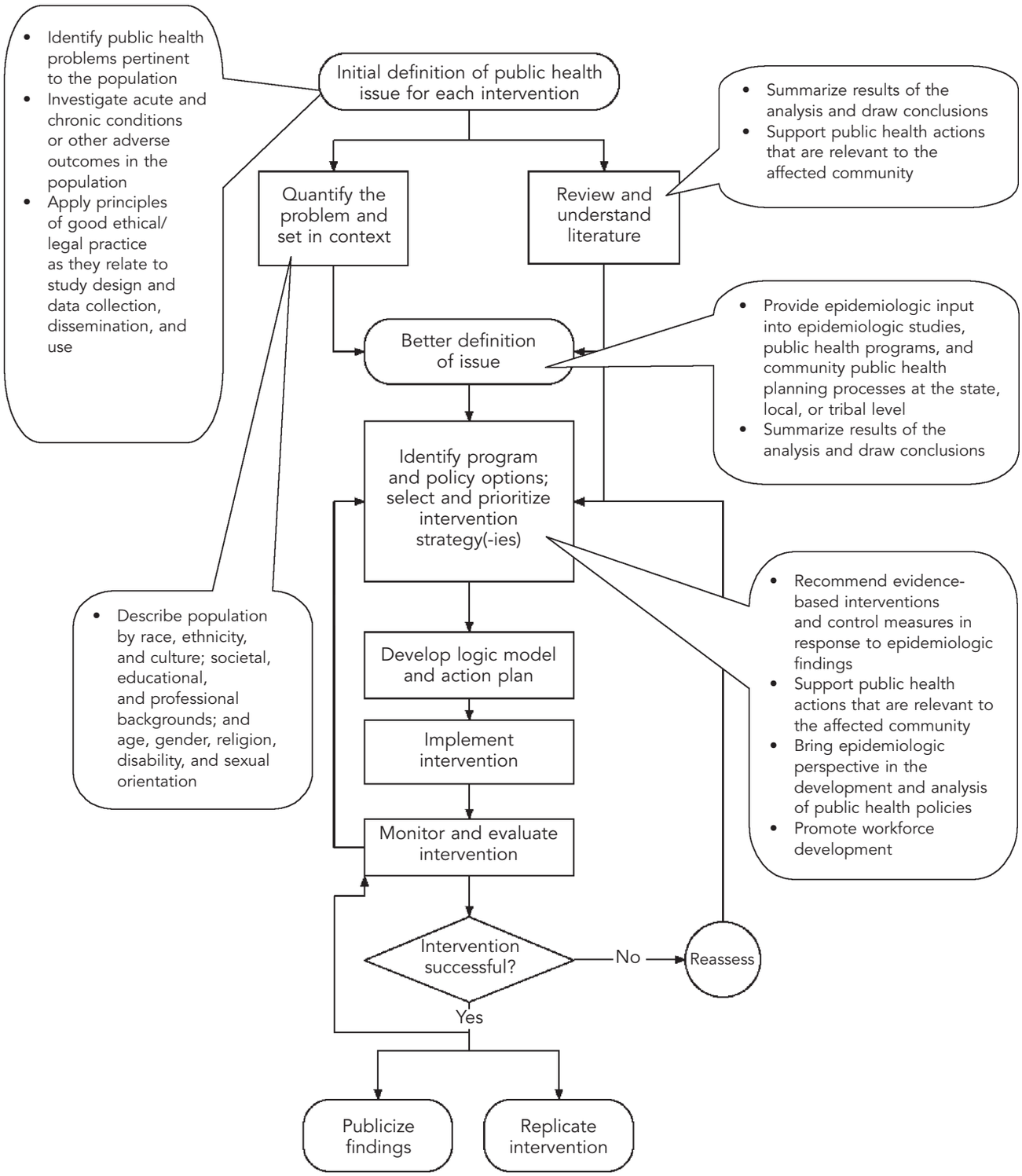
Focus on program development. Because local health department staff are more likely to be engaged in developing programs than formulating policies, the course focused on the steps necessary to plan and evaluate program interventions, especially how data are used to establish health priorities. The emphasis by CDC on the use of logic models for planning and evaluation is cascading down to the county level; therefore, it was identified as a high priority by the advisory group. A half-day of the training was devoted to the development of logic models and using them as the foundation for an evaluation plan.

Shorter duration. The St. Louis training is delivered in three to four days. Given the limited staffing in local health departments, the advisory group expressed concern that most of the target audience could not afford to be away from their offices for more than two consecutive days.

Provision of travel scholarships. Many counties have policies that limit out-of-county travel at local expense, so subsidizing travel costs was identified as a strategy to overcome this barrier. Unfortunately, resources were not available to support travel costs for all sessions.

Implementation. The course was offered to local health department staff and their community partners eight times during the period of May 2005 to October 2006. Invitations were targeted to the public health director and other staff in decision-making positions; each department was encouraged to send a team of two to four members. The class size was limited to 24 participants, primarily to allow sufficient interaction during computer-based lab exercises. The course curriculum,

Figure. Evidence-based public health framework with selected epidemiologic competencies



which can be viewed at the University at Albany PRC website,[20] included didactic sessions, computer labs, and scenario-based exercises that involved working in small groups.

While the content covered a broad range of health topics relevant to local communities, a strong focus was placed on chronic disease issues. Class exercises and case studies highlighted the issue of obesity and actions to reduce this pervasive problem. The overall approach and course content were consistent for all the trainings, with minor modifications over time based primarily on participant feedback. We incorporated the suggestion to offer the training to teams of health professionals, including other department colleagues and community partners.

Evaluation and follow-up survey. A 10-item pretest questionnaire was administered just before the training began. The same questions, in a different sequence, were asked again at the conclusion of the second day to assess participant knowledge about key EBPH concepts and whether that knowledge improved during the training. Each participant also was asked to complete a course evaluation at the conclusion of the training, which assessed the usefulness of the various modules, use of evidence-based decision-making in their workplace, and perceived instructors' abilities.

A follow-up survey was distributed to all participants in the first six sessions (i.e., to allow for a minimum of six months since training) to determine the impact of the course on their use of skills and knowledge in their job, whether information was shared as a result of the training, and whether they believed that participation as a team made any difference. Each participant was asked about his/her agency's use of EBPH and barriers to its broader adoption. All participants were invited via e-mail to complete the follow-up survey using the informz survey system. Three follow-up e-mail communications to nonresponders urged them to complete the survey. A total of 166 people were eligible to complete the survey; delivery of the e-mail could be confirmed for only 132 (80%); and 63 surveys were completed (48% of known recipients; 38% of the entire sample). The response rate for local health department staff was 35% (45 of 129 addresses); however, we could not estimate how many of the nonresponders were known recipients.

Data for the in-class assessment were collected on scannable forms at each training session and read using Remark software. Data from the follow-up survey were collected online in informz and downloaded as a Microsoft® Excel® spreadsheet. All results were analyzed using Excel and SAS.[21] For the purposes of this presentation, results are restricted to responses from staff in local health departments.

RESULTS

Training sessions and participants

Eight training sessions were delivered to 171 local health department staff, representing 46 local departments ranging in size from 24 to >5,200 employees. All but two participating departments sent teams of two or more. To date, 11 departments have sent a second team to a subsequent session, based on their positive experiences the first time.

As shown in Table 1, nearly two-thirds (63%) of participants have worked in public health for more than five years, including 45% who had worked in public health for more than 10 years. One-fifth (20%) of respondents had worked in public health for two years or less. Half of the participants had earned only a bachelor's degree. Only 8% had a Master of Public Health (MPH) or Master of Science in Public Health (MSPH) degree; and 5% had a doctoral degree.

Almost one-quarter (23%) of the respondents said their primary occupation was health administrator, and a similar number (22%) classified themselves as a nurse. Other professions self-identified were health educator or trainer (18%), biostatistician (8%), and epidemiologist (2%).

Short-term changes in knowledge about EBPH

After the first year's experience, we recognized that several questions in the test were problematic, due to ambiguous wording or poorly delineated choices of

Table 1. Public health qualifications of course participants

Educational attainment	N *(percent)*
Doctoral level	7 (5)
MPH (including MSPH)	12 (8)
Other master's degree	47 (32)
Bachelor's degree	73 (50)
Associate or other two-year degree	9 (6)
Years of public health experience	
<1	13 (9)
1–2	16 (11)
2–4	16 (11)
4–5	10 (7)
5–10	27 (18)
>10	67 (45)

MPH = Master of Public Health

MSPH = Master of Science in Public Health

responses. These items were corrected or replaced in subsequent versions, so it is not possible to aggregate all questions over all sessions. Using responses only from the 10 questions currently in use, the mean percentage of correct responses prior to the course was 67% and increased to 78% after completing the course. Knowledge scores increased on five items, one question had no change, and scores on four questions declined.

Assessment and actual utilization of specific topic areas

In its current form, the course is organized into eight modules, not counting a general introduction to EBPH principles and practices (Table 2). Because the course reaches a broad audience, we were interested in how relevant each module was for participants. We approached this issue in two ways. In the in-class assessment, participants were presented with a list of all modules and asked how useful they thought each was to their work assignment (on a five-point Likert scale, ranging from "not at all useful" to "very useful"). Then, during the follow-up survey, the same modules were listed and participants were asked how much they had actually used knowledge or skills gained from each module in the workplace (Table 2).

With a single exception, all (99%) of the participants rated the skills and knowledge gained from the Quantitative and Qualitative Tools for Descriptive Epidemiology module dealing with epidemiologic competencies as being useful ("somewhat useful" = 36%, "very useful" = 63%) in the in-class assessment. In the follow-up survey, nine out of 10 participants (91%; n=39) reported that they used these (descriptive epidemiology) skills regularly (33%) or occasionally (58%). In both datasets, epidemiology was the highest rated of the eight topics, tied only with the Program Planning and Logic Model module (99%) in the course evaluations.

Other modules most closely related to data and research were the computer laboratory session on Finding Data on the Internet (judged 89% useful; 81% actual use) and Research Methods (i.e., analytic epidemiology), which was judged to be useful by nearly all respondents (98%) and actually put to use by about three out of five (62%) since the training. All other respondents in the follow-up (39%) answered, "I will use, but have had no opportunity yet," reflecting the fact that these skills—unlike descriptive epidemiology—are put to use only occasionally in these local health departments.

With one exception, the remaining modules were assessed as being useful by at least 94% of participants. The second computer lab, Searching the Literature for Evidence, was judged to be useful by only 41% of participants. Somewhat paradoxically, 82% of participants reported they had applied the skills learned in the module. There is considerable variation across training sessions in the assessed utility of this lab. During two sessions, we encountered significant computer problems that severely limited what could be accomplished in the lab exercise. The reported actual use of competencies addressed in the remaining five modules ranged from 63% for the Program Planning and the Logic Model module to 82% for the Searching the Literature for Evidence module. It seems likely that the low actual use of logic model development reflects the sporadic need to perform this task.

Application of EBPH practices in decision-making by the agency

The in-class assessment suggested that the course would positively impact the use of EBPH in the short term. Few participants reported that their agency used evidence-based program planning—only 18% indicated that all or most of the programming decisions were based on best-available evidence. However, the proportion rose to 46% when participants were asked about the projected future use. It is not clear to what extent this increase reflects enhanced commitment to EBPH practices among the audience after the training vs. a perception of increasing external pressure to adopt these practices.

In the follow-up survey, when asked if their agency's use of EBPH practices had increased since the training, nearly half (49%) of the participants indicated that it did, and most of the other participants (44%) said they were not sure. Of the 25 respondents who had an opinion, 22 (88%) answered "yes" and half (n=11, 50%) of these people believed that the training had a substantial influence on that change, another one-third (n=8, 36%) thought the training had a small influence, and only 2 (9%) believed it had no influence.

Participants were then asked about barriers existing in their agency to broader implementation of evidence-based program planning and development, and they could select multiple response options. While two participants (4%) reported there were no barriers, the remaining respondents offered numerous reasons why (Table 3). The main barrier identified was the lack of time to plan new or reassess existing programs, reported by 71% of respondents, followed by lack of knowledge of EBPH principles among other staff (58%), a general resistance to changing old practices (51%), and lack of knowledge of EBPH principles among senior staff (47%). It is noteworthy that most staff did not sense significant, overt resistance

Table 2. Initial assessment and long-term use of EBPH modules by course participants[a]

EBPH course module	*Initial assessment*		*Follow-up assessment*										
	Somewhat or very useful		*Used regularly/ occasionally*		*Used regularly*		*Used occasionally*		*I will use, but have had no opportunity yet*		*Not used even though I had the opportunity*		
	N	*Percent*	N	*Percent*	N	*Percent*	N	*Percent*	N	*Percent*	N	*Percent*	*Total* N
Epidemiology/reviewing data	134	99	39	91	14	33	25	58	4	9	0	0	43
Finding data on the Internet (lab)	120	89	35	81	15	35	20	47	8	19	0	0	43
Research methods	132	98	25	61	9	22	16	39	16	39	0	0	41
Searching the literature for evidence (lab)	55	41	36	82	14	32	22	50	8	18	0	0	44
Cost-related issues	127	94	25	61	9	22	16	39	12	29	4	10	41
Identifying and selecting interventions	130	96	30	73	10	24	20	49	10	24	1	2	41
Program planning and the logic model	126	99	26	63	8	20	18	44	13	32	2	5	41
Monitoring and evaluation	117	98	28	68	15	37	13	32	9	22	4	10	41

[a]Maximum number of responses = 135; actual responses per question = 119 to 135

EBPH = evidence-based public health

to adopting EBPH (only one response), nor did large numbers perceive that funding agency mandates limit their ability to adopt these practices (20%).

DISCUSSION

New York's Evidence-Based Public Health for Local Health Practice course generated substantial interest and participation by local health professionals, produced short- and long-term changes in knowledge about EBPH and the epidemiologic competencies that support decision-making in local health departments, and increased EBPH practice in about half of them. These changes are especially important as the majority of participants indicated that they did not have primary responsibility for epidemiology, biostatistics, or planning. Instead, most were in administrative, management, clinical services, or health education.

One very interesting finding pertains to the fact that only 10% of the participants identified their primary job responsibility as epidemiology, biostatistics, or planning, yet more than 90% reported using epidemiology skills in the workplace. Many local health departments do not have an epidemiologist on staff, and so it is clear that this function rests with staff whose primary expertise lies elsewhere. The fact that the epidemiology module was cited by participants as the most used since the training argues for the importance of strengthening epidemiologic competencies among non-epidemiologists.

An assessment of skills and knowledge needed to lead and manage chronic disease programs that improve the health of the public was recently completed by the National Association of Chronic Disease Directors (NACDD).[22] Rather than specifying the skills and knowledge every chronic disease practitioner must have, the list suggests the optimal set of competencies to achieve excellence in chronic disease prevention and control. Many of the epidemiologic competencies emphasized in New York's course are embedded in the NACDD assessment. Competencies have also been established for other programmatic areas, such as environmental health,[23] maternal and child health,[24] genomics,[25] and public health informatics.[26] On each of these lists, epidemiologic competencies have a prominent role, as does a good understanding of evidence-based practice.

Table 3. Barriers to EBPH implementation

Perceived barriers to EBPH implementation	N *(percent)*
Lack of time to plan new or reassess existing programs	32 (71)
Lack of knowledge of EBPH principles among other staff	26 (58)
General resistance to changing old practices	23 (51)
Lack of knowledge of EBPH principles among senior staff	21 (47)
Funding agency directives make it difficult to use evidence-based planning	9 (20)
There are no barriers	2 (4)
Key staff reject principles behind EBPH	1 (2)
Lack of evidence-based strategies for addressing obesity	1 (2)

EBPH = evidence-based public health

Limitations

An important limitation of this analysis is the low (38%) response rate in the follow-up survey. Significant loss occurred in that 34 (21%) of the 166 course participants apparently never received the initial mailing. This was attributable to some individuals who were no longer at the agency and anecdotal comments from local agencies suggesting that a sizeable number of their systems block mail. To overcome this issue, the final reminder was sent from the University at Albany mail system even though it lacks the ability to track actual recipients of the invitation. In future evaluations, we will reconsider e-mail strategies in subsequent sample waves, with the aim of improving the response rate.

Given the low response rate, it is important to consider whether the responding group was a representative sample of people completing the course. Two characteristics were common to the instruments used for the in-class assessment and the follow-up survey. The proportion of follow-up survey responders with a doctoral or MPH/MSPH degree was higher (19% vs. 11%). People returning a follow-up survey reported an average of 9.4 years of public health experience, compared with 6.2 years among the in-class respondents. These differences suggest that the sample returning a follow-up survey had more public health training and experience than nonresponders. If we assume that local health professionals with more academic preparation and work experience are more likely to be in positions with decision-making authority, then any sample bias is in the direction of overrepresenting staff who can influence change within their organizations.

CONCLUSIONS

Our experience in New York State in leveraging a partnership between the state health department and a university-based PRC to adapt an existing EBPH

curriculum suggests that epidemiologic competencies among local health professionals can be enhanced. This training initiative harnessed the academic talent and commitment available in PRCs to produce a better trained workforce,[27] as well as the expertise of the state health department staff in epidemiology and public health programs. This course afforded a positive learning opportunity that elicited good participation across the state, especially by senior staff in decision-making roles. Anecdotal information on the perceived value of the training has come in the form of a number of unsolicited, positive messages on the experience after participants were back at work; and several local health departments have requested that we deliver this course to their entire staff. These outcomes are consistent with the recognized need to prepare the 21st century public health workforce, within the context of an evidence-based culture.

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