Workforce development: an assessment of public health epidemiologists in Tennessee, 2005

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I. ABSTRACT

The purpose of this project is to enhance the process of public health epidemiology workforce development in Tennessee. Drawing upon published literature, experts in the field of workforce development and an advisory panel of public health professionals, surveys were developed and fielded to assess the epidemiologist workforce within the Tennessee Department of Health (TDOH) and metropolitan regions. With a response rate of ninety-seven percent (97%), this tool gathered composition, utilization and job satisfaction information from epidemiologists in Tennessee.

A final report will be provided to the TDOH on workforce development recommendations for epidemiologists in Tennessee. It is our hope that these recommendations will serve as the starting point for future conversations about epidemiologist workforce development and competencies in our state.

The successful completion of this project required both SEPHLI co-leaders to create and share a unified vision for workforce development issues within Tennessee's epidemiology community.

II. INTRODUCTION / BACKGROUND

National health organizations continue to call for the need to assess and train the public health workforce. A 2003 report from the Institute of Medicine (IOM), *Who Will Keep the Public Healthy? Educating Public Health Professionals in the 21st Century*, reinforced the need to assess the public health workforce, emphasizing the education, training, and competency of public health workers as crucial components of the public heath infrastructure. In 2004, the Council of State and Territorial Epidemiologists (CSTE) affirmed this stance by urging health departments to periodically assess their epidemiology capacity. Workforce development is a key element to maintaining and improving the nation's public health capacity, especially considering the substantial changes to the role of public health after September 11, 2001.

From 2002-2004, the TDOH significantly expanded its epidemiology workforce in response to increased federal funding for bioterrorism preparedness. There are now more than 70 individuals functioning as public health epidemiologists in Tennessee. Previously, most formally trained epidemiologists were hired by the central office in Nashville -- providing epidemiological support to the regions on an "as-needed" basis. Resources from the CDC bioterrorism grant allowed for the placement of additional MPH level (and higher) epidemiologists into metropolitan and rural regional health departments across Tennessee. This shift has greatly

increased the ability of local and regional health departments to collect and analyze data, evaluate programs, and implement data-driven procedures in their communities.

Despite these increases in the epidemiologic workforce capacity statewide, the TDOH and metropolitan regional health departments continue to face challenges in effectively utilizing the new epidemiologist workforce.

Until this project, there had not been a comprehensive assessment of the epidemiologist workforce composition, utilization and job satisfaction levels since the 2002/2003 influx of epidemiologists hired under the BT grant. This project may provide valuable insights to at least three groups within Tennessee's public health community: 1) managers responsible for delivering epidemiology services, 2) epidemiologists, and 3) human resource professionals.

III. PROJECT DESCRIPTION, OBJECTIVES & METHODOLOGY

This project addresses the first strategic element for public health workforce development defined by the CDC – 'Monitor workforce composition' (Figure 1). Subject matter experts and key stakeholders were recruited to provide input into and influence over the process as consultants or as part of a special advisory panel. Several ongoing projects and models on public health workforce development were also reviewed to help inform the process.

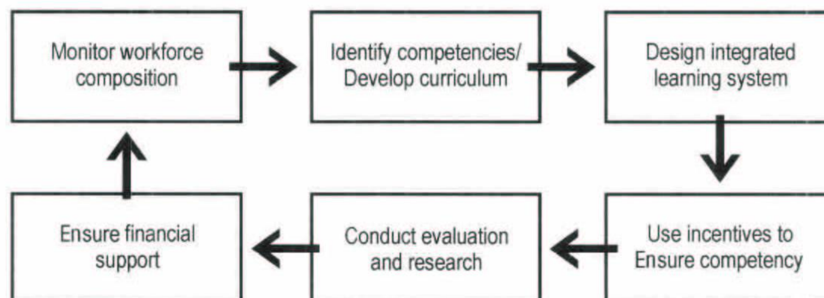

Figure 1. Strategic Elements of Public Health Workforce Development

Goals, Objectives, and Actions

The primary goals of this project are to enhance epidemiology workforce development in Tennessee and to complete the requirements of the SEPHLI leadership project (2005 theme: public health infrastructure).

The following objectives and actions were established to achieve the project goals:

A: Explore the fields of public health workforce development, individual/organizational capacity and competency-based training.
   1: Conduct a literature review of the above subject matter.
   2: Interview subject-matter experts in the above fields.

3: Self-administer the North Carolina (NCCPHP) public health workforce training needs assessment survey.

B: Provide a resource for future epidemiology workforce development activities.
1: Develop, administer and analyze a survey on epidemiologist composition in TDOH and metropolitan regions.
2: Develop, administer and analyze a manager/supervisor survey on epidemiologist utilization in Tennessee.
3: Provide summary results of current epidemiologist composition and utilization within the TDOH and metropolitan regions.
4: Provide competency recommendations for Tennessee epidemiologists.
5: Research and suggest training resources to be considered for Tennessee epidemiologists.
6: Write and distribute the final report.

C: Increase awareness of epidemiology workforce development in Tennessee.
1: Recruit the Epidemiologist Workforce Development Advisory Panel.
2: Encourage input and survey participation from a range of public health professionals.
3: Develop and provide presentations summarizing the project goals, results and lessons learned.

D: Complete all project requirements according to SEPHLI guidelines.
1: Submit and receive approval on project proposal.
2: Write and distribute the final report.
3: Develop and provide a presentation summarizing the project goals, results and lessons learned (Retreat #3).

Data & Methods

Materials review. An important step in developing a research agenda is a comprehensive review of existing evidence-based research upon which to build. Research into the development of the public health workforce has gained recent momentum; however; assessments of specialty sectors -- such as epidemiology – have yet to be fully explored. Workforce development experts from both epidemiology and the general public health workforce were consulted early in the project to establish need and direction.

Two concurrent projects addressing epidemiologist competencies are currently underway nationally. The CSTE is currently developing standard competencies for public health epidemiologists at introductory, intermediate and supervisory levels. At the same time, the Association of Schools of Public Health (ASPH) is in the process of developing academic competencies for graduates of MPH programs in epidemiology. Results from both of these processes will be summarized and presented at a later date.

Survey development. The surveys were designed to collect information for Tennessee public health policy makers to identify workforce development priorities for epidemiologists. They

were also designed to compare the perceptions of both epidemiologists and their supervisors on a range of topics related to workforce development. Drawing upon the experience of recent surveys from national public health workforce sources, two surveys were developed – one each for Tennessee public health epidemiologists (Appendix A) and one for their immediate supervisors (Appendix B). The survey questions are summarized into the following topics:

- Educational background and training
- Job activities and utilization
- Hiring, retention and job satisfaction
- Demographics

Educational background and training. The lack of nationally accepted competency standards for epidemiologists highlights the need for understanding education levels, postgraduate areas of focus, and depth and breadth of work experience of practicing epidemiologists. The survey addressed these topics and also assessed 44 technical skills used by Tennessee public health epidemiologists in their jobs. An attempt was made to avoid overlap with a concurrent TDOH survey that assesses the training needs for the general public health workforce.

Job activities and utilization. National workforce composition surveys have found that some program areas, such as chronic diseases, have less epidemiology resources than other areas (e.g. infectious diseases). An understanding of how epidemiologists are utilized across Tennessee may identify gaps in epidemiology services and may also help to identify program areas where epidemiologists are underutilized. Epidemiologists were asked to estimate the percentage of time spent doing specific activities typically considered part of an epidemiologist job description, as well as the amount of time spent working on specific program areas. Managers were also asked to estimate the amount of time each epidemiologist spent on job activities and program areas in order to identify gaps in perception between epidemiologists and their managers.

Hiring, retention and job satisfaction. Nationally, the demand for trained public health epidemiologists currently outweighs the supply. In Tennessee, the lack of an accredited MPH program in epidemiology makes it extremely difficult to recruit highly qualified candidates. An understanding of the job-related factors (ex. benefits) most important to recruiting candidates can help the state to target resources to improve or expand upon those job-related factors and compete more effectively for top epidemiologist candidates.
In addition, job satisfaction is highly correlated with retention. Identifying factors most closely related to high job satisfaction will help managers to retain their employees for longer periods; maintaining program continuity and reducing training costs. Questions about job satisfaction, effectiveness, amount of support provided and supervisor feedback were asked in an attempt to identify those factors.

Demographics. The demographics section of the survey collected information about race, sex, age, ethnicity and other demographic variables from both epidemiologists and managers.

Population. The survey was distributed to 71 epidemiologists across the state of Tennessee. Survey distribution was based upon the following definition for public health epidemiologists within Tennessee:

> **Epidemiologist:** An individual who conducts analysis of epidemiological (investigation, surveillance, evaluation or research) data to study the occurrence of disease or other health-related conditions in the population OR anyone classified as an epidemiologist according to the Tennessee Department of Health.

The surveys were administered by mail during the spring of 2005. Both the epidemiologist and manager surveys were mailed to the epidemiologists, and in turn, each epidemiologist hand-delivered a manager's survey to his/her supervisor for completion. Managers who supervised more than one epidemiologist completed one survey for each epidemiologist. *

To maintain the confidentiality of the respondents, surveys were returned by mail directly to the investigators with the identifying information for the respondent separated from the remainder of the survey.

The final response rate for the epidemiologist survey was 97% with 69 out of 71 epidemiologists completing the survey. The response rate for the manager survey was 85%, with a total of 60 out of 71 managers completing the survey.

* Demographic information was collected just once from each manager. Those managers who supervised more than one epidemiologist completed the "epidemiologist specific" survey questions several times, once for each epidemiologist supervised. A relational database was developed to collect the demographic information for each manager and relate it with the one or more epidemiologist specific survey responses depending on how many epidemiologists were supervised by that particular manager.

Data Entry & Analysis

The structure of the manager data resulted in a complex clustering structure requiring special analytical methods. Although the "epidemiologist specific" questions in the manager survey were meant to collect information about the individual epidemiologist being supervised, responses pertaining to epidemiologists who are supervised by the same manager are expected to be more similar (or correlated) than responses about epidemiologists who are supervised by different managers. Failure to account for the complex cluster structure of the data can lead to false positives, or incorrectly identifying factors as statistically significant.

A data collection program was developed and data entry was conducted using EpiInfo2002, which allowed for complex skip patterns and the relational database structure of the manager survey. Data were analyzed using SAS. Further analysis will be conducted using SUDAAN, a statistical program that can account for the increased variance resulting from the complex clustering structure of the manager data.

Barriers & Limitations

The survey response rate was a major concern for this project. In order to adequately measure differences between TDOH central-office, rural regional and metropolitan regional epidemiologists, a high response rate from each of the three groups was necessary.

Prior to release, the epidemiologist survey was piloted for clarity and time-tested by a previously employed epidemiologist. An initial barrier to the survey response was the time needed to complete the survey (30 minutes). To address this barrier, several questions were eliminated and respondents were apprised in advance of the time investment required. Another important consideration was that epidemiologists are often extremely busy, and must be given compelling reasons to do additional work. The final barrier was assuring respondents of the confidentiality of their responses. This was especially important because the project was being conducted by their coworkers and peers.

In order to improve response rates, five strategies were implemented: *

1) clear communications on project purpose and assurance of confidentiality;
2) the identification of a local point-of-contact (one epidemiologist in each program or office) to receive completion updates and reminder e-mails;
3) direct follow-up via e-mail and telephone with non-responders;
4) an incentive (gift certificates) for one epidemiologist/manager pair who completed the survey; and
5) a final reminder and opportunity to complete the survey during Tennessee's spring Quarterly Epidemiology Meeting.

* Marketing ideas were generated in part through consultation with the North Carolina Center for Public Health Preparedness.

IV. RESULTS

While the analysis is ongoing, preliminary analysis found that Tennessee's epidemiologist workforce is young (62% under the age of 40), and has a female majority (58%).

Comparing the epidemiologists and manager responses, managers ranked the importance of job characteristics similarly, with a few exceptions. Managers felt that geographic location and advancement opportunities were much less important to the epidemiologists than the epidemiologists reported, and managers thought salary was more important than the epidemiologists did (Table 1).

Job Characteristic	How Important			
	Epidemiologist		Manager	
	Mean	Rank	Mean	Rank
Job Duties	4.5	1	4.3	1
Location	4.2	2	3.7	10
Work Environment	4.1	3	3.9	4
Job Security	4.0	4	4.0	3
Advancement	4.0	5	3.7	9
Salary	4.0	6	4.1	2
Training Opportunities	3.8	7	3.8	7
Health Insurance	3.7	8	3.8	5
Vacation	3.7	8	3.8	6
Retirement	3.6	10	3.7	8
Mentoring Relationships	3.5	11	3.5	11
Travel	3.4	12	3.2	13
Publishing Opportunities	3.3	13	3.0	14
Administrative Support	3.1	14	3.3	12

Table 1. Importance of selected job characteristics – comparison of epidemiologist and manager response rankings Scale: 1 (Not at all satisfied) – 5 (very satisfied)

Epidemiologists were most satisfied with their job duties, geographic location and health insurance benefits. They were least satisfied with their advancement opportunities, mentoring relationships and publishing opportunities (Table 2).

Job Characteristic	Epidemiologist Job Satisfaction		
	Central Office (N=36)	Rural Regions (N=11)	Metro Regions (N=22)
Job Duties	4.0	3.2	3.5
Location	4.1	3.8	4.1
Work Environment	4.0	3.6	2.9
Job Security	3.9	3.3	3.2
Advancement	4.2	2.6	2.7
Salary	3.4	3.5	3.2
Training Opportunities	3.3	3.6	3.2
Health Insurance	3.7	3.3	3.8
Vacation	3.7	3.5	3.6
Retirement	3.4	3.3	3.3
Mentoring Relationships	3.4	2.9	2.1
Travel	3.8	3.5	3.4
Publishing Opportunities	3.3	2.7	2.8
Administrative Support	3.3	3.1	3.5

Table 2. Satisfaction levels of selected job characteristics, grouped by job-site classification. Scale: 1 (Not at all satisfied) – 5 (very satisfied)

There were significant differences in the level of overall job satisfaction between TDOH central office epidemiologists and regional epidemiologists, particularly the rural regional epidemiologists. Central office epidemiologists were more than three times more likely to be highly satisfied with their jobs than the regional epidemiologists in general [OR=3.15 (95% CI

1.12-8.83)]; and were nearly five times more likely to be highly satisfied than their rural region counterparts [OR=4.86 (95% CI 1.15-20.6)].

High satisfaction with job duties, advancement opportunities, accomplishments over the past year, level of effectiveness in job, and how much the current job situation aligns with what the individual really wants to do were highly predictive of overall job satisfaction.

Other factors that were predictive of job satisfaction included satisfaction with health insurance, job security, work environment, amount of travel required, publishing opportunities, mentoring relationships, training opportunities, long-term career prospects, organization, relationship with coworkers and contribution to the development of subordinates. "Fitting-in" as a member of the organization, having paid maternity leave, and the amount of support received from supervisors, coworkers, fellow epidemiologists, and the organization as a whole were also predictive of overall job satisfaction.

Modeling using multivariate logistic regression found that there were several good candidate models. The selected model found that satisfaction with accomplishments over the past year, the amount of support received from supervisors and how much the current job situation aligns with what the individual really wants to do were independently associated with overall job satisfaction. Many of the predictive variables were correlated with each other, suggesting factor analysis may be warranted to identify underlying common factors among the predictive variables.

V. CONCLUSIONS

There are many benefits that this project brings to the epidemiology workforce development process in Tennessee and the public health community as a whole. This project:

1) Provides a baseline "snapshot" of the epidemiology workforce composition in Tennessee.
2) Creates the opportunity for evidence-based adjustments in policies and programs to maintain a strong epidemiology workforce.
3) Provides talking points to help bridge the communication gap between epidemiologists and supervisors, particularly in the areas of utilization, policy priorities, performance feedback and career development.
4) Provides a survey resource for other public health organizations interested in assessing their workforce.
5) Assures epidemiology program leadership in Tennessee that, in general, epidemiologists are satisfied with their jobs and the amount of support that they receive.
6) Creates an opportunity for dialogue among the epidemiology community surrounding workforce development, epidemiology capacity and individual development planning.

This project is expected to continue for the next year or more, and the co-leaders are committed to seeing this project through to its completion. Over the next year, analysis of the survey data will be completed, including special analysis of the manager survey responses using SUDAAN. The analysis results will be presented at several upcoming professional meetings and conferences

(quarterly epidemiology meetings, APHA, CSTE), and final recommendations will be made to the TDOH based on these results.

The TDOH has been supportive of this project from its inception, and we are confident that they will take future actions as a result of the findings. Two recommendations that have already been shared in conversations with the special advisory panel are:

1) Completion of stages two through six of the public health workforce development process as defined by the CDC, and
2) Re-administration of both the epidemiologist and managers surveys in 2007 to measure progress.

VI. SPECIAL THANKS

TEWDA Advisory Panel

Dr. Stephanie Bailey
Dr. Allen Craig
Anne Duncan
Dr. Paul Erwin
Sharon Hayes
Paula Taylor
Dr. Hugh Tilson (NC)

Tennessee Epidemiologists and Supervisors

Especially Robin Elolia and Kendra Johnson for assisting with survey piloting and data entry.

Southeast Public Health Leadership Institute

Especially Claudia Fernandez for giving such great feedback on our project proposal and leadership goals.

VII. LEADERSHIP DEVELOPMENT

A. Mark McCalman

Expectations for Leadership Development

Through this project, I expected to build leadership skills in 'creating a shared vision' – one of my three Public Health Leadership goals with SEPHLI. Sub-elements of this goal included effective communication, strategic planning/implementation, and consensus building. The successful completion of this project required both SEPHLI co-leaders to create and share a unified vision for workforce development issues within Tennessee's epidemiology community.

My evaluation plan for assessing leadership development during this project included both external evaluation and self-evaluation. As a method of self-evaluation, a lessons learned logbook and summation of key leadership decisions/actions were maintained throughout the project. External evaluation consisted of verbal and written feedback from the following individuals:

- Dr. Allen Craig (State Epidemiologist, Tennessee)
- Dr. Paul Erwin (Regional Director, East Tennessee Health Region)
- Gary Mayes (Regional Director, Sullivan County Regional Health Dept)
- Dr. Martha Salyers (Medical Epidemiologist, Buncombe County Health Center)
- Ami Sklar (Regional Epidemiologist, Madison/Jackson Regional Health Office)

Topic areas covered during this feedback process included examples of effective and ineffective leadership skills observed during the project. Special consideration was given to their perceptions of our ability to 'create and share the project's vision and findings.'

Building Leadership Skills: TEWDA Lessons Learned

This project helped me to build or enhance the following leadership skills:

- Identifying a vision for policy intervention
- Creating consensus and ownership through collaboration
- Connecting a regional vision to coinciding national initiatives
- Creating a mechanism for supplying information to policy decision-makers
- Highlighting the potential benefits of future action by others

This project also provided the co-leaders with the rare opportunity to affect change within our work community (epidemiologists). Three implementation strategies were essential to the success of the project: 1.) Project co-leadership (epidemiologists with complimentary styles and skills), 2.) Support from the State Epidemiologist, and 3.) Utilization of an advisory panel. In addition, valuable insights were gained in epidemiology (survey design and analysis), project management, State government policy and administration, and workforce development.

Countless leadership lessons were learned over the nine-month course of this project. A few examples are provided below:

LESSON LEARNED	LEADERSHIP ACTION
Co-leaders lacked expertise, perspective and/or authoritative power on issues of workforce development, capacity-building, and policy intervention.	We recruited subject matter experts from within Tennessee and North Carolina to steer process and, in some cases, to allow for ownership transfer. The advisory panel reviewed and commented on all major project products (project proposal, survey design, analysis plan, initial results) through four teleconference call meetings.
Elements of the original project scope were too broad and ambiguous. (Key terminology must be consistent with industry standards.)	Adjustment in proposal language (e.g., 'workforce capacity assessment' was replaced by 'assessment of workforce development) allowed for a common understanding within the advisory panel and reduced the scope to reasonable levels.
Project success was reliant on buy-in from several work groups from across the state (e.g., epidemiologists, managers). High response rates were critical to success (to represent buy-in and establishing statistical power).	Forums were targeted to communicate the project goals, timeline and potential outcomes to epidemiologists and managers. To reach the 97% response rate, five primary strategies were implemented (referenced in report).
Some TDOH managers expressed concern for overlap between two state-sponsored surveys: the epidemiology survey and a training assessment survey initiated by TDOH for the entire public health workforce in Tennessee.	A conference call meeting was initiated by the SEPHLI co-leaders to assure the 'other' survey leadership that our objectives were complimentary and not repetitive. Although the 'other' survey was generated after our project approval, this lesson highlights the importance of broadcasting the project goals and objectives to as wide an audience as possible to avoid confusion.
Project required a greater level of effort from the co-leaders than originally anticipated. (At times, work/life balance was impacted.)	The co-leaders instituted a process for effective task assignment and decision-making. Project management software was utilized to track major milestones and schedule requirements. Support from regional health directors, staff and spouses were also very important.

B. Ami Sklar

Expectations for Leadership Development

Systems thinking skills were my leadership development focus for this project. I wanted to use this project to gain understanding of a complex system, and also work on "demonstrating the ability to grasp the big picture" and "balancing the demands of multiple constituencies and stakeholders". To complete this project, an advisory committee of experts and key stakeholders was recruited. The co-leaders were able to effectively balance the needs and concerns of these stakeholders as well as the epidemiologists and supervisors who completed the survey. Through conversations with the advisory committee, a better picture of the many considerations surrounding workforce development in Tennessee emerged. In particular, the organization of the public health system in Tennessee presents a major complication for addressing epidemiologist workforce development needs because the state health department has limited control over the

regional and metropolitan offices where many epidemiologists are employed. The survey identified several development needs that could be addressed to improve job satisfaction of epidemiologists, specifically the need for mentoring, publishing and training opportunities. Addressing these needs will not be easy and will require systemic solutions involving changes to funding patterns, human resources policies, organizational structures and management strategies. Further analysis and presentation of the survey data will provide additional information about some of the underlying structures that impact epidemiologist workforce development in Tennessee.

To assess leadership development related to systems thinking over the course of this project, I conducted a 360-performance evaluation, which included self, supervisor, peer and direct report evaluations. I also asked for feedback verbally from my coworkers and my project co-leader. The results of the supervisor evaluation showed improvement in both of the target improvement areas. My self-evaluation demonstrated that I still have things that I need to learn about systems thinking and that I can continue to improve my skills in this area.

Building Leadership Skills: TEWDA Lessons Learned
This project helped me to build or enhance the following systems thinking leadership skills:

- Demonstrating the ability to grasp the big picture
- Balancing the demands of multiple constituencies and stakeholders

In addition, teams skills and communications skills were also developed.

Important leadership development "lesson's learned" throughout the project included lessons in other skill areas in addition to systems thinking, most notably communication and teamwork skills.

Communicating effectively with each other, our advisory panel and our survey respondents were all necessary to the success of this project. Experience presenting results of this project and sharing our vision with others are skills that will continue to be exercised long after SEPHLI is officially over.

Overcoming differences and capitalizing on each individual's strengths were team-building skills developed by the co-leaders during this project. Mark has had a great deal of experience in project management in the past and I learned from him the benefit of beginning projects early, planning for each step and sticking to a timeline. Mark also brought excellent relationship building skills to the project and was fearless in approaching experts and authorities for advice and support. I brought technical skills in data analysis and survey development to the project and was able to share these strengths with Mark. I learned through working with Mark on this project that teams where each person's strengths are utilized, and tasks are assigned based on these strengths results in a much more successful project overall.

I feel that I still have a long way to go in order to become the leader that I really want to be, however, this project and SEPHLI overall has helped to know myself better, set goals and develop skills that I can continue to build upon.

APPENDIX A

APPENDIX B