

# Development of an Evidence-Based Data Skills Curriculum for Public Health Professionals

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**ABSTRACT**

***Background:*** *This article examines the development and implementation of "Prove It! Let the Data Tell the Story", a day-and-a-half replicable training curriculum designed to enhance the data and information skills of public health professionals.* ***Purpose:*** *Prove It! emphasizes the importance of reliable and valid health data collection, analysis, and reporting in identifying the surrounding issues that have a measurable impact on communities.* ***Methods:*** *A total of 56 participants attended Prove It! in 2004 and 2005 during three sessions across New Hampshire. Participants were administered pre- and post-tests to evaluate knowledge and satisfaction.* ***Results:*** *Attendees showed marked improvement in the understanding of statistical concepts, and a majority of attendees felt the course would assist them personally in their work and reported that they would recommend Prove It! to colleagues.* ***Discussion:*** *The Prove It! curriculum provides an effective and user-friendly format for enhancing data and information skills within a train-the-trainer format.* ***Translation to Health Education Practice:*** *Prove It! allows organizations to enhance the analytic skill sets of the public health and social service workforce personnel within their communities.*

## BACKGROUND

Education is core to the mission of public health, which has been defined as "fulfilling society's interest in assuring conditions in which people can be healthy."[1] Achieving this goal requires activities designed to promote health or prevent disease within the three core functions defined by the Institute of Medicine, which are:

- Assessing and monitoring of the health of communities and populations at risk to identify health problems and priorities
- Formulating public policies, in collaboration with community and government leaders, designed to solve identified local and national health problems and priorities
- Assuring that all populations have access to appropriate and cost-effective care, including health promotion and disease prevention services, and evaluation of the effectiveness of that care.[1]

Central to the attainment of these three foundational public health functions is the ability for state and local health departments and programs to have the skills necessary to assess and evaluate the needs of communities.

In addition to being important components of achieving the assessment-related core function, finding and collecting reliable and valid health data, being able to analyze that data, and reporting on that data in a comprehensive and clear way are also skills fundamentally related to each of the ten essential public health services.[1] Healthy People 2010's objectives around data and information systems require that public health agencies be able to "…apply data and information to public health practice…, to make information available to the public in the past year on the Leading Health Indicators, Health Status Indicators, and Priority Data Needs… among others."[2]

Engendering these competencies has recently become of even greater importance as many have criticized that some public health programs are implemented and maintained without thoughtful evaluation, and that the success and failures of many interventions go untested, or at best are understood through lacking evaluative

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methods and evidence.[3,4] This in turn has led to a call to focus on scientifically driven, evidenced-based criteria when examining public health programs and practice. Taken from the field of medical sciences, evidence-based public health practice affects "…the development, implementation, and evaluation of effective programs and policies in public health through the application of principles of scientific reasoning, including systematic uses of data and information systems, and appropriate use of program planning models."[5,6] What is clear, though, is that the need for enhancing data-centric and evaluative skills is essential to promote evidence based public health practice. In its 2002 report, *The Future of the Public's Health in the 21st Century,* The Institute of Medicine recommended that:

"The federal, state, and local government public health agencies should develop strategies to ensure and support public health worker competency in the public sector and to encourage competency development for private-sector public health workers."[7]

In response to this many states have more recently identified data collection, analysis, and dissemination as focal areas for improvement. This, in turn, has led to efforts to enhance the public health workforce that focus more on workers' competencies than on the disciplines they occupy[8]. A 2001 study conducted by the Missouri Department of Health and Senior Services, Center for Local Public Health Services examined the infrastructure and needs across the state's 114 local public health departments.[9] They defined 14 elements in the performance of the Core Public Health Functions. Of those, the first four: data gathering, data analysis, data dissemination, and data management were identified as needing enhancement.[10]

The public health system of the past is not adequate when dealing with the realities of the present or the rapidly evolving future. Changes in information systems, data collection, analysis, and reporting are changing daily. Linkages between vast clinical information sets such as patient level medical records and claims data, survey data, and administrative and census data are on the horizon, if not already occurring. Also of importance is the ability to augment the skills of workers currently in the community to accomplish these goals in an effective, yet efficient way.

## PURPOSE

In 2002, the Empowering Communities project being conducted at the University of New Hampshire Institute for Health Policy and Practice, with several NH-based partners, asked local public health practitioners about their gaps in skills and training needs. Through that process, the project learned that there was a lack of statistical expertise, despite an appreciation of the importance of those skills. Specific issues identified with using data included locating data, choosing the best indicators, and translating the data into actionable information for the community benefit.

These identified needs led to the development of a resource that would assist in understanding the language of data, what it means, how to analyze it, how to explain the results to the community, and how to understand the surrounding issues that have a measurable impact on the community. This is the underlying concept of the "Prove It! Let the Data Tell the Story" (Prove It!) training curriculum.

The development of the Prove It! curriculum was a joint effort of the University of New Hampshire and the State of New Hampshire Department of Health and Human Services. The curriculum was also reviewed by local and national public health professionals. It was developed through an iterative process, and the first delivery of the program provided an opportunity to gather important information that influenced the final design. In its current design, Prove It! is delivered over one-and-a-half-days in an in-person session, with access to computers for hands-on activities.

Prove It! is designed for a variety of health data users—particularly those with grant writing and program administration functions—who would like to learn more about how to locate, use, and interpret data. The major course goals and objectives are to: (1) Provide a basic understanding of why and how we use health data in public health, using the specific context of writing grant applications as the example; and (2) Introduce tools and resources to make using data easier and more efficient for participants.

The Prove It! course walks participants through the grant application process using a community-based intervention, the Livable, Walkable Communities Project.[10] Attendees participate in small group exercises, hands-on computer activities, and group discussions designed to address six skill areas:

- Determining why data are necessary
- Learning how to find and evaluate health-related data
- Learning about commonly used health statistics and how to know what data are appropriate and available
- Determining how to get the data analysis needed by asking the correct questions
- Learning how to interpret data analysis
- Discussing how to share the story that the data tell.

The course is centered on a written curriculum that is organized into sections, each of which reflects a major question along a continuum of needing, locating, using, and sharing health data. Each section is divided out in a binder that participants receive and follow through the day-and-a-half-training.

Each section contains hands-on activities that reinforce the concepts covered in that section. The sections are designed to build on one another and follow a path that is commonly used by organizations seeking to use health data to support their missions. Participants use real data from the CDC and the US Census to reinforce the information introduced in the program.

Section 1 of Prove It! provides examples of why data are necessary for public health practice. Through the activities in this section, participants explore many of the uses of data in public health, including the primary example of this course; using data in grant writing. The participant-developed result of

section 1 is the creation of a list of possible health-related outcomes that participants could investigate to support their application for the grant funding.

Section 2 introduces tools to locate secondary data sources, as well as ways to evaluate data quality and utility. Participants learn about web-based resources for locating health data at the state and national levels. Section 2 also introduces participants to guiding principles for evaluating potential data. This includes introducing participants to some of the characteristics that should be considered to determine if the data are of good quality. This section also helps participants understand how to evaluate how much data is sufficient to tell their story.

In Section 3 of Prove It!, participants are introduced to some of the basic principles of statistics in order to help them better understand what type of data analysis is appropriate for answering different kinds of questions or telling different aspects of the story. While it is beyond the scope of Prove It! to be a comprehensive statistics course, Section 3 defines certain concepts that are commonly used for analyzing health data. This includes measures of central tendency (median, mean, and mode) and measures of dispersion (standard deviation and variance), the use and construction of confidence intervals, and rates and adjusted rates. Participants utilize provided data to practice analytic skills and answer questions through interpretation of results.

Using information provided about data resources in Section 2 and introductory knowledge of statistics from Section 3, Section 4 instructs participants about how to shape their questions so that they will be able to make a data request, then review and understand analysis from the data request. Participants fill out actual data requests, focusing on how to define the population of interest, the time frame of interest, and the outcomes of interest.

Section 5 of Prove It! walks participants through the interpretation of each of the data analyses from Section 4. Section 6 provides participants suggestions and instructions for ways to share the story that the data tell. This includes a discussion of how to use tables and graphs appropriately and effectively. Further, hands-on analysis is conducted with provided data.

### *Curriculum Skills and Satisfaction Assessment*

To examine both the curriculum and the skills acquired, participants were asked to: (1) rate their satisfaction with the course, and (2) complete a skills assessment before and after the course. Evaluation responses were both anonymous and unmatched. That is, the pre-test and post-test components to assess skills-change after the training are not linked by participant name or other identifier, thus all data are aggregated across participants. Evaluations were purposefully de-identified to ensure participants felt no sense of data being used in a pejorative manner. However, those replicating this course may wish to identify pre-post respondents for statistical evaluation.

## RESULTS

Data here are provided for five offerings of Prove It! in 2004 and 2005. The sessions occurred in three geographic locations in the south central, southern coastal region, and northern central part of the state. A total of 56 participants attended Prove It! in 2004 and 2005. Participants were geographically spread throughout the state. Participants also represented a variety of public health disciplines, with the majority (59%) identifying with a State or local health and human service organization (N=32); in addition, 26% of the participants were academic researchers or students (N=14). The other categories were state or local government agency (not health and human services) in NH (9%), NH resident (4%), and member of NH media organization (2%).

Marked improvement was observed in the understanding of all concepts measured except for crude rate (the percentage of participants answering correctly about the crude rate in the pre-test was over 75%). After Prove It! course completion, over 75% of participants were able to correctly identify each statistical concept evaluated. The concepts measured were mean, mode, median, crude rate, age-specific rate, and age-adjusted rate (standard deviation was measured in the 2004 sessions, but was not in 2005 due to a technical error).

For the evaluation of participant satisfaction, participants were asked to complete a questionnaire about the course, including rating of their satisfaction with various aspects of the course (e.g., instructors, curriculum materials, etc.), as well as their intention to share the course materials and recommend the course to others. For example, participants were asked to rate their satisfaction with the knowledge and instructional methods of the instructors on a 5-point scale ranging from very satisfied to very dissatisfied. Participants reported high levels of satisfaction with all aspects of the course. One hundred percent of participants were somewhat or very satisfied with the knowledge and instruction method of instructors, curriculum materials, and hands-on computer activities. Timing of the course, length, and other activities were also reported to have high levels of satisfaction (> 90%). The course scheduling over two days caused the most dissatisfaction (20%).

Over 80% of Prove It! attendees who completed the course evaluation said that they would share materials, recommend Prove It! to colleagues and community health professionals, and felt the course would assist them personally in their work with community health. Participants who did not answer "yes" to these questions answered "Don't know." That is, participants were not unwilling to share the materials or recommend Prove It! to others. Instead, they seemed unsure if they would do so.

## DISCUSSION

Assessment of the Prove It! curriculum clearly indicates that participants gained knowledge of data and information skills and were highly satisfied with course materials and methods. Data analysis and interpretation skills are a vital part of a prepared public health workforce. Experience with Prove It! attendees indicated that data tend to be intimidating for many public health professionals. What was clear was

even though public health professionals understood the importance of having data-driven and evidence-based public health programs, many were not confident in their current data-related skills. Prove It! was designed to train a range of public health professionals with a range of backgrounds in a hands-on, dynamic curriculum. While not an analytical training course, it does seek to help with understanding, applying, and interpreting data analysis – key skills for anyone in public health.

*Limitations*

While the improvement of scores on the pre- and post- tests indicated that Prove It! improved the understanding of statistical techniques, not having linked surveys precluded statistical testing. Future sessions will include pre- and post- test evaluations linked to an individual, and those wishing to replicate the course may wish to consider this option. With respect to scheduling, the second day of each course-offering occurred on a Saturday morning. Anonymous responses precluded identifying the contributing factors to this dissatisfaction, but one might suspect that it is difficult for state or social services employees to arrange compensatory time or remuneration for attending a half-day Saturday session. As a result, weekend time was sacrificed in order to attend, and in three cases, individuals did not attend the second day of the session. A course offered on two workdays may prove to have even better turnout than what has been experienced to date.

Also of note is that 67% of participants would recommend Prove It! to other professionals. This was lower than other measures of interest in sharing materials and recommending to others. This could reflect the uncertainty of utility to others, as some individuals come from smaller organizations. Clarity in who was being referred to in the question (i.e. who "others" are) might make this easier for participants to answer.

## TRANSLATION TO HEALTH EDUCATION PRACTICE

The Prove It! curriculum could easily be replicated in other locations. While the data used in the curriculum was based in New Hampshire, no part of the curriculum limits Prove It!'s utility to only New Hampshire-based public health professionals. Prove It! also utilizes the Livable, Walkable Communities program as its example; however this too could be altered to lend relevance to other audiences. The curriculum was designed to be an "off-the-shelf" product; public health professionals—and trainers, in particular—should be able to take the curriculum and deliver the training to public health professionals of any type. It was also designed to use a train-the-trainer delivery model. This would be useful to a number of public agencies, not-for-profit organizations, and in education programs. The program as described is offered in affiliation with the University of New Hampshire as a stand-alone community training program, as well as a workshop within the University's Certificate in Public Health with the Masters of Public Health program. The curriculum is freely available at: http://www.nhhealthpolicyinstitute.unh.edu/courses.html.

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