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The Health Agency Training Program: Continuing Education Courses in Biostatistics and Epidemiology

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S Y N O P S I S

The authors describe the development and evaluation of a continuing education program in biostatistics and epidemiology. Short courses were presented to public health and mental health professionals using teaching strategies that included lecture, discussion, practice-oriented examples, and interactive problem-solving. A total of 1723 health professionals attended one or more of the 120 courses presented from 1992 to 1996 in seven US states. Most course participants were female; the highest education level for 40% was a bachelor's degree, while 42% had advanced degrees. Approximately 66% of participants signed up for continuing education credits. The program represents a successful partnership between an academic institution and health agencies in a seven-state region.

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The Health Agency Training (HAT) program is a continuing education program in biostatistics and epidemiology for public health, mental health, and Indian health personnel from a seven-state region. Aided by funding from the Health Resources and Services Administration (HRSA), the program was initiated in 1991 by the Department of Biostatistics and Epidemiology at the University of Oklahoma College of Public Health. The goals of the program are to enhance health agencies' ability to collect data and to apply epidemiologic and biostatistical principles and methods to program planning, evaluation, and policy development.

Changes in the health care system and changing health needs have increased the number and complexity of the demands placed on the public health and mental health workforces. The Institute of Medicine's report on *The Future of Public Health*¹ as well as other reports²⁻⁴ have pointed to state and local public health agencies' need for training in the sciences of public health: epidemiology and biostatistics. Two additional reports highlight the need for biostatistics and epidemiology training for mental health personnel, particularly those working in the public sector.^{5,6}

In 1992, we conducted a needs assessment of selected target audiences in the seven states to determine the educational interests and needs of public health and mental health professionals in the areas of biostatistics and epidemiology. The needs assessment revealed a strong interest in continuing education courses and guided the development and delivery of short courses in these areas.

The HAT program represents a successful partnership between an academic institution and public health, mental health, and Indian health agencies in a seven-state region. In 1991, the University of Oklahoma College of Public Health was the only accredited school of public health in the seven-state region (Arkansas, Colorado, Kansas, Missouri, Nebraska, New Mexico, and Oklahoma). To ensure involvement by each of the states, a Steering Committee chaired by present author BRN was established to guide the program. The Steering Committee includes representatives from state and local public health and mental health agencies and the Indian Health Service. Members of the Steering Committee are selected by the head of the state health agency or the governor in each state. A majority of the original Steering Committee members remain actively involved in the program today.

The implementation of the HAT program involved significant commitment from the participating states.

Steering Committee members in each state established an Education Committee. A local coordinator, either a Steering or Education Committee member, managed the local arrangements. The local coordinator and the Education Committee were responsible for scheduling and selecting course sites, marketing the courses, and enrolling participants from their states. The state Education Committees also identified target audiences. Some states targeted public health agency personnel exclusively, while some included mental health and Indian health organizations and other groups that collaborate with traditional public health agencies, such as community-based organizations and managed care organizations. Courses were advertised to target audiences in a variety of ways, depending on the preferences of the individual state Education Committees. For instance, some states relied solely on distribution of flyers via mail, while others used e-mail messages as well.

Although the bulk of the funding for this project came from HRSA, the states were responsible for expenses related to advertising, personnel time for coordinating the courses and registering participants, and meeting room rentals, if any. In addition, employers supported the program by allowing participants to attend during the work week and paying for participant travel in some cases. HRSA funding paid for faculty travel, materials, and project personnel time. Two faculty members (present authors BRN and NRA) were partially funded by this project, along with an average of two graduate research assistants at a time (including present author LAB). Course faculty were compensated for teaching the courses.

We presented courses in biostatistics and epidemiology in each of the seven states from 1992 to 1996. This article describes the development of this series of tuition-free short courses, the characteristics of participants in these courses, and the results of an evaluation of the program for 1992-1996.

SHORT COURSES

From 1992 through 1996, the three present authors developed and offered 12 different short courses; the majority were of two days' duration. We used presentation techniques that included a combination of lecture, discussion, and group exercises. Because the teaching methods were interactive, class size was generally limited to 25 participants.

The course development process required approximately six months to complete. In collaboration with

Steering Committee members, we first identified major topic areas or concepts to be included, then developed specific learning objectives, along with course content and material. For each course, we incorporated practice-oriented examples and created exercises appropriate for public health practitioners, using real health data, studies from the public health field, or simulated data representing plausible public health scenarios. The courses were approved by the International Association for Continuing Education and Training for continuing education units.

To ensure the applicability and effectiveness of content and methods, we first presented each course as a pilot course, generally in Oklahoma. We selected participants for the pilot course based on their work experience and ability to provide appropriate feedback given their experience or professional roles. Whenever possible, Steering Committee members also attended the pilot presentations. After the pilot, each course was modified as needed to appropriately meet the needs of the target audience. When necessary, we continued to make modifications as determined by participant and instructor feedback.

The HAT program presented 120 courses in the seven-state region from 1992 to 1996 (Table 1). Based on the results of the needs assessment and recommendations of the HAT Steering Committee, Introduction to Basic Epidemiology was the first course developed. It was presented 38 times in the seven-state region from 1992 to 1996. Introduction to Basic Statistics was the second course developed. It was presented 34 times from 1993 to 1996. These two basic courses were periodically revised and updated. Together, the two basic courses accounted for approximately 60% of all courses offered.

Intermediate courses developed and offered regularly throughout the project included Design of Studies and Questionnaires; Application of Biostatistics and Epidemiology to Planning, Assessment, and Evaluation of Health Programs; and Biostatistical Methods for Health Professionals. (See Table 1.) A Communicable Diseases Workshop, a one-day course, was offered four times, and two courses, Evaluation of Health Programs and Mental Health Epidemiology, were also presented on a limited basis. Prior participation in the Basic Epidemiology and/or the Basic Statistics course, or other relevant training, was required for the intermediate courses.

Because of the success of the basic and intermediate courses and the continued interest in training, we developed combined, or extended, courses for specific audiences: Planning, Assessment, and Evaluation PLUS; Basic Epidemiologic and Biostatistical Methods for Public Health: Application to Program Planning and Evaluation; Design of Studies and Questionnaires PLUS; and Data for Decision-Making.

Course completion was defined as completing an evaluation form for the course. Overall, the completion rate for all courses was 90%. Nearly 66% of participants signed up for CEUs.

Course content. The content of the two basic courses included fundamental concepts relevant to public health practice. For example, the Basic Epidemiology course focused

Table 1. Number of times short courses presented and enrollment, Health Agency Training program, 1992–1996

Course	Number of times presented	Total enrollment
Basic courses		
Introduction to Basic Epidemiology	38	873
Introduction to Basic Statistics	34	681
Intermediate courses		
Design of Studies and Questionnaires	15	246
Application of Biostatistics and Epidemiology to Planning, Assessment, and Evaluation	13	248
Biostatistical Methods for Health Professionals	6	88
Communicable Diseases Workshop	4	110
Evaluation of Health Programs	3	75
Mental Health Epidemiology	1	8
	<u>114</u>	<u>2329</u>
Combined or extended courses		
Planning, Assessment, and Evaluation PLUS	1	15
Basic Methods for Public Health	1	21
Design of Studies and Questionnaires PLUS	1	25
Data for Decision Making	3	61
	<u>6</u>	<u>122</u>
Total	120	2451

NOTE: While total enrollment was 2451, the number of unduplicated participants was 1723.

on the role of epidemiology in public health and addressed measures of frequency, measures of association, and issues related to using data. The Basic Statistics course covered the use of summary statistics, confidence intervals, a brief overview of hypothesis testing, and presentation of data. The intermediate courses built on the material covered in the two basic courses and provided more detailed coverage of issues such as questionnaire development, evaluating health programs, and public health inferential statistical methods. The content of each course remained relatively stable over time, with some modifications to examples and the time allotment for specific concepts. The underlying theme for all courses was an emphasis on the skills needed to apply the scientific methods of biostatistics and epidemiology to program development, program evaluation, and policy development.

PARTICIPANTS

To monitor course enrollment patterns and the extent the target audience was being reached, we collected administrative data on course participants through a registration form completed at the start of each course. This standardized form included demographic information on the participant, along with information on job classification and place of employment. This registration system allowed us to track the number of courses taken by an individual, which courses were taken, and when and where they were taken. Other administrative data included attrition rates and the number of continuing education units (CEUs) provided.

A total of 1723 health professionals in the seven-state area attended one or more of the 120 short courses offered by the HAT program. Of these, 71% attended only one course, 20% attended two courses, and 9% attended three or more courses. Total course registration was 2451.

Table 2 summarizes the characteristics of the 1723 unduplicated course participants. The majority of participants (70%) were female. The mean age of registrants when they attended their first course was 42 years (range 20 to 73 years). The highest education level for 40% of participants was a bachelor's degree, while 42% had advanced degrees. Of the 313 participants without a bachelor's degree, 131 (42%) were nurses with an associate's degree or registered nursing diploma.

Participants represented a wide range of ages, indicating that the training was successful in reaching people at all stages of their professional careers, including those new to the discipline and those who had been in the field for many years but wanted to update their skills.

Table 2. Characteristics of participants in Health Agency Training short courses, 1992–1996 (N = 1723 unduplicated participants)

Characteristic	Percent
Gender	
Male	30
Female	70
Education	
High school graduate or non-nursing associate's degree	10
Nursing degree: associate's or diploma.	8
Bachelor's degree.	40
Master's degree	34
Doctorate or professional degree.	8
Job classification	
Administrative/managerial	36
Professional/technical	61
Paraprofessional/clerical	3
Organization classification	
Public health	76
Mental health	13
Indian health	6
Other ^a	5
Agency level	
Statewide	58
Local	38
Other ^b	4

^aIncludes organizations that collaborated or contracted with public health or mental health agencies, such as nonprofit community groups and managed care corporations.

^bMost of these were federal agencies, such as the US military and Indian Health Service regional offices.

People from a wide variety of health professions attended the short courses. Participants were asked to classify their job duties as falling into one of three categories: administrative/managerial, professional/technical, or paraprofessional/clerical. Thirty-six percent of participants reported administrative or managerial roles. These included associate directors of state public health agencies, directors of local health departments, and division or project managers. Sixty-one percent of participants reported working in a professional or technical capacity. This was a broadly defined category representing a heterogeneous group of professions, including nurses, health educators, sanitarians, substance abuse counselors, analysts, and health planners. Those participants reporting paraprofessional or clerical duties (3%)

represented mostly data entry and abstraction personnel in vital statistics and other departments. A majority of participants reported that among their primary job functions was the collection and use of data on a regular basis.

Among course participants, 47% of those reporting managerial or administrative duties reported having master's degrees, compared with 27% of professional/technical workers. While the original target audience for the training included professionals with a minimum of a bachelor's degree, people with a high school or associate's degree were included in the courses on a case-by-case basis—these were mostly medical records abstractors and health statistics analysts. During the courses, the instructors often gave these participants extra guidance in applying and relating the concepts presented.

While more than three-quarters of participants worked for public health agencies, 13% were from mental health organizations and 6% from Indian health agencies. Five percent of participants worked for organizations classified as "other." This category included organizations that collaborate or contract with public health or mental health agencies, such as managed care organizations and nonprofit community groups.

In most courses, attendees represented both state and local agencies. More than half of the participants (58%) worked for statewide agencies. Statewide agencies were defined as those whose focus or funding was statewide. These included state departments of public health, mental health, and human services; state-run or university-associated hospitals; and universities. Thirty-eight percent of participants reported working for local agencies, defined as community-focused agencies such as local, regional, or district public health offices, tribal health programs, hospitals, clinics, and public school nursing departments. Four percent of participants worked for agencies coded as "other"—neither statewide nor local. Most of these were federal agencies, such as the US military and Indian Health Service regional offices.

Participants reported that interaction between practitioners at different levels and from different arenas enhanced the courses and provided opportunity for communication and collaboration that extended beyond the boundaries of the short courses.

EVALUATION

We evaluated the effectiveness of the program using a variety of methods, focusing on both the process of delivering short courses and participant outcomes, including

increased knowledge and integration of skills. All data were entered and validated using EpiInfo version 6.0.⁷

Course content and delivery. The methods used to evaluate the course curriculum and delivery included "minute papers" and a course evaluation form. Participants submitted "minute papers" after completion of each of the broad topics covered in a given course. In these short papers, participants described the clearest and muddiest concepts presented and rated the applicability of the topic to their jobs on a scale of 1 to 10, with 10 representing the positive end of the scale. Project staff periodically abstracted the job applicability data and analyzed these data to assess the relevance of the course curriculum and direct necessary modifications.

The applicability of course content was consistently rated high (Table 3). All of the Basic Epidemiology topics and three of the four Basic Statistics topics were rated as moderately or highly applicable by more than 75% of the respondents. Although this subject is not as frequently encountered in public health practice, 66% of the participants rated topic three of the Basic Statistics course, inferential statistical procedures, as moderately or highly applicable.

Participants completed course evaluation forms at the end of each course. The evaluation form used a five-point Likert-type scale, with answer choices ranging from "excellent" to "poor." We performed summary analyses by combining individual questions on the course evaluation form into four categories and generating a mean score for each category for each individual. The four evaluation categories were: overall satisfaction, objectives and materials, presentation methods, and speaker. We characterized mean scores <2.5 as indicating "poor" performance, mean scores ≥ 2.5 but <3.5 as indicating "acceptable" performance, mean scores ≥ 3.5 but <4.5 as "good," and mean scores of 4.5 to 5 as "excellent." Table 4 shows the results from the two introductory courses. For both courses, more than 80% of participants rated each of the evaluation categories as either good or excellent. For both courses, the speaker evaluation received the highest proportion of excellent responses. Presentation methods received the lowest proportion of excellent responses.

Participant outcomes. The evaluation of participant outcomes focused on pre-test/post-test data and follow-up survey results. Participants completed a brief written skills and knowledge test by all participants upon entering and completing the course. The open-ended questions emphasized the definition, interpretation, and appropriate use of

Table 3. Applicability of course content to professional responsibilities, Basic Epidemiology and Basic Statistics courses, Health Agency Training program, 1992–1996

Course	Number of "minute papers" submitted	Rating		
		High ^a Percent ^b	Moderate Percent	Low Percent
Introduction to Basic Epidemiology				
Topic 1: Terminology and methods	816	49	34	17
Topic 2: Measures of health and disease	751	45	32	23
Topic 3: Measures of association	745	43	37	20
Topic 4: Data issues	694	53	32	15
Introduction to Basic Statistics				
Topic 1: Overview and basic terminology	607	52	36	12
Topic 2: Organizing and summarizing data	548	53	33	14
Topic 3: Inferential statistical procedures	469	32	34	34
Topic 4: Interpretation of statistics	316	53	27	20

^aHigh = ratings of 8–10; moderate = ratings of 5–7; low = ratings of 1–4 on a 10-point scale

^bPercentage of "minute papers"

key concepts. Each question was scored according to a standardized key. Scores of 0 to 2 were possible for most questions, allowing for partial credit. Although the scoring system was somewhat subjective due to the open-ended nature of the questions, the use of a standardized answer key and reliability checks assured consistency in scoring.

The pre-test and post-test were both anonymous, thus matching of responses was not possible. Instead, we compared group mean scores.

The pre-test/post-test results showed increases in participant knowledge. For both the Basic Epidemiology and Basic Statistics courses, most participants entered the

Table 4. Participant satisfaction, Basic Epidemiology and Basic Statistics courses, Health Agency Training program, 1992–1996

Course	Rating			
	Excellent ^a Percent ^b	Good Percent	Acceptable Percent	Poor Percent
Introduction to Basic Epidemiology (n = 795)				
Overall satisfaction	60	30	8	2
Objectives and materials	59	27	11	3
Presentation methods	42	41	14	3
Speaker	77	20	3	1
Introduction to Basic Statistics (n = 604)				
Overall satisfaction	62	28	8	2
Objectives and materials	48	38	12	2
Presentation methods	48	39	11	2
Speaker	86	12	1	1

^aExcellent = mean score 4.5–5; good = mean score ≥ 3.5 but < 4.5 ; acceptable = mean score ≥ 2.5 but < 3.5 ; poor = mean score < 2.5

^bPercentage of respondents

Table 5. Pre- vs post-test comparison of participant knowledge, Basic Epidemiology and Basic Statistics courses, Health Agency Training program, 1992–1996

Course	Percent of participants			
	Answered <25% of questions correctly	Answered 25%–49% of questions correctly	Answered 50%–75% of questions correctly	Answered >75% of questions correctly
Introduction to Basic Epidemiology				
Pre-test (n = 843)	60	24	13	3
Post-test (n = 751)	12	20	48	20
Introduction to Basic Statistics				
Pre-test (n = 654)	64	22	11	3
Post-test (n = 626)	23	23	36	18

course with a minimum of knowledge, as demonstrated by the majority of participants scoring less than 25% on the pre-test (Table 5). On the post-test, 68% of Basic Epidemiology participants and 54% of Basic Statistics participants scored 50% or higher.

Follow-up surveys. We mailed follow-up questionnaires to participants approximately six months after course completion. The survey assessed the applicability of the course content to the daily activities of the practicing health professional. The questionnaires included three questions designed to evaluate whether the use of spe-

cific epidemiologic or statistical measures had increased. A fourth question focused on the integration of these principles into decision-making and problem-solving. A final open-ended question asked the respondent to give a specific example of how the course helped him or her with a work-related activity. A self-addressed postage paid envelope was provided. The survey was anonymous, but coded by course and state.

The response rate for the six-month follow-up survey of participants was the same for both courses, 52%. About 60% of respondents reported increased use of specific principles and concepts for both the Basic Epidemiology and Basic Statistics courses (Table 6). For Basic Epidemiology, the number of respondents reporting increased use of specific tools ranged from 21% to 35%, while the range was 27% to 61% for respondents who had attended the Basic Statistics courses.

Table 6. Respondents reporting increased use of specific concepts, Basic Epidemiology and Basic Statistics course participants, Health Agency Training program, 1992–1996

Course	Percent reporting increased use six months after course
Introduction to Basic Epidemiology (n = 422)	
Use of incidence and/or prevalence rates	35
Use of relative risk and/or odds ratio	21
Use of surveillance data	35
Integration of epidemiologic principles	62
Introduction to Basic Statistics (n = 340)	
Use of summary statistics	33
Use of confidence intervals	27
Use of tables and graphs	61
Integration of statistical principles	60

CONCLUSION

Through a unique partnership with state and local health agencies, the HAT program provided continuing education in biostatistics and epidemiology to more than 1700 health professionals in the seven-state region. The marketing and targeting of courses resulted in a broad spectrum of participants, in terms of both demographic characteristics and job capacity. While other training programs described in the literature have been limited to health pro-

professionals of a certain level or job description,^{2,8,9} the HAT program used innovative and inclusive methods to train health professionals at all levels and from many agencies. The use of applied examples, small group exercises, and discussion allowed people with diverse educational backgrounds and experiences to participate.

Although 12 different short courses were developed, the basic courses, Introduction to Basic Epidemiology and Introduction to Basic Statistics, accounted for 60% of the courses presented. This corresponds to the training needs of the public health and mental health practitioners in this region, as indicated by a needs assessment conducted at the beginning of this project. The sustained demand for the two basic courses also reflects the turnover in personnel that was likely to occur over the five years of course presentation, as well as the large number of targeted personnel.

Overall, the courses were well received by participants, as evidenced by the sustained demand and low attrition rates. Results from the minute papers and course evaluations indicate that the courses were relevant and

appropriately delivered. The availability of CEUs was an added incentive for participation.

The HAT program is currently working toward institutionalizing short courses in each of the seven states through a train-the-trainer initiative. Representatives from each state have participated in training in the methods and delivery of the Basic Epidemiology and Basic Statistics courses, and many of the states have incorporated these short courses into their training schedules.

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