
Survey of State Health Agencies' Staff Who Practice the Epidemiology of Noninfectious Diseases and Conditions

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Synopsis

The primary causes of mortality in the United States are noninfectious diseases and conditions. Epidemiologic and intervention activities related to most of these diseases and conditions have increased in most State health agencies over the past decade. Because little was known of the practice of noninfectious disease epidemiology in State health agencies, a mail survey was undertaken in 1991.

Persons working in State health agencies who responded to the survey had a graduate degree in epidemiology, biostatistics, or related fields and actively participated in the epidemiology of noninfectious diseases or conditions. Respondents were from 48 States, predominantly male (56 percent) and white (92 percent). On an average, respondents spent roughly half of their time actually doing

epidemiology. The focus of noninfectious disease epidemiology has been categorized by risk factors (environment, occupation, nutrition, tobacco, and substance abuse), diseases (diabetes, cancer, and cardiovascular disease), and health conditions (injury, birth defects, and other reproductive conditions).

The percentage of respondents who reported epidemiologic activity in any risk factor, disease, or condition varied from 55 percent for environmental epidemiology to 9 percent in nutritional epidemiology. Respondents from 41 States reported activity in environmental epidemiology, those from 18 States reported activity in substance-abuse epidemiology, and those from 13 States reported activity in nutritional epidemiology.

Although the practice of noninfectious disease epidemiology appears to be considered important in the majority of States, the extent of practice varies markedly. Those risk factors, diseases, and conditions that are most frequently associated with morbidity and mortality are the least addressed epidemiologically in State health agencies. In addition, when events such as environmental disasters occur, appropriate surveillance systems frequently are not in place to monitor the most important health outcomes. As a result, public health planning and intervention programs may not be driven by solid epidemiologic data.

WITHIN THE PUBLIC HEALTH system, epidemiology is the critical link among the system's various parts. An epidemiologic focus is necessary for appropriate planning of interventions, for providing a population-based interpretation of laboratory findings, and for providing information as a foundation for policy development and health education activities. Surveillance provides the ability to evaluate interventions and modify efforts as needed.

During the 1950s and 1960s, surveillance and epidemiology programs for infectious diseases were established in most State health agencies. Even in the 1970s, when the importance of noninfectious diseases and conditions to morbidity and mortality

was evident, the epidemiologic focus was on infectious diseases. A 1975 study of epidemiologists in State health agencies in the 48 contiguous States identified only 19 "noncommunicable disease epidemiologists" in six States, 15 of whom were in two States, New York and California. The author noted that it was "apparent that major emphasis needs to be put on developing and funding positions for non-communicable disease epidemiologists in State health departments" (1).

In the 1980s, the practice of noninfectious disease epidemiology increased. In 1989, 117 epidemiologists were identified in 12 southern State health agencies (2). Thirty-nine percent of the epidemiolo-

gists worked in infectious diseases, including AIDS and sexually transmitted diseases. Twenty-one percent worked in environmental epidemiology; 15 percent were listed as general epidemiologists; and 23 percent worked in the areas of injuries, cancer and other chronic diseases, maternal and child health, and occupational diseases. This indicates a major shift since 1975.

Noninfectious diseases and conditions are now recognized as the primary causes of mortality in the United States, and population-based interventions to control them are increasing in health agencies across the country.

To assess the contribution of epidemiology to these efforts, the Council of State and Territorial Epidemiologists (CSTE) and the Centers for Disease Control and Prevention (CDC) identified and surveyed all noninfectious disease epidemiologists in State health agencies and the District of Columbia (hereafter included in the term "State"). The purpose of the study was better to understand the practice of the epidemiology of noninfectious diseases in State health agencies, to increase support for such activities, to assess the need for modified or additional training activities, and to increase opportunities for networking of epidemiologists.

Methods

For this study, a noninfectious disease epidemiologist is defined as a person working in a State health agency who has a graduate degree in epidemiology, biostatistics, or related fields (for example, medical doctor or demographer), and actively participates in the practice of epidemiology of noninfectious diseases or conditions.

After a review of previous studies of epidemiologists in State health agencies and discussions with epidemiologists currently working in several of those agencies, a survey questionnaire was developed, pre-tested, and modified. Noninfectious disease epidemiologists identified through the State and Territorial Health Departments section of the 1990 Epidemic Intelligence Service (EIS) Directory or discovered by querying other State health agency epidemiologists were mailed a copy of the questionnaire. In addition, the person designated as "State epidemiologist," that epidemiologist in the State health agency responsible for the reporting of notifiable diseases to CDC, received a package of questionnaires with a request to distribute them to noninfectious disease epidemiologists throughout the health agency.

All State employees and Federal assignees self-

Table 1. Number of respondents, by State, of noninfectious disease epidemiologists in State health agencies, 1991 survey

| <i>Number of respondents</i> | <i>Number of States</i> |
|------------------------------|-------------------------|
| 0 | 2 |
| 1 | 11 |
| 2 | 6 |
| 3 | 7 |
| 4 | 4 |
| 5 | 8 |
| 6-8 | 7 |
| 10-12 | 4 |
| 21 | 1 |
| 42 | 1 |

identified as epidemiologists or as doing epidemiology and working in health departments in all States and the District of Columbia were targeted for data collection. Epidemiologic activities contracted for by the health agencies were not included. In those States where environmental health activities are located in departments of the environment, epidemiologists in such agencies were asked to respond. Each questionnaire ended with a request that the respondent verify that his or her epidemiology colleagues had the opportunity to complete a questionnaire.

Telephone calls were made to the staff of health agencies where it appeared that response fell short of expectations. Calls also were made to those health agencies where only the State epidemiologist responded or no response was received.

Data collection began in July 1991, and the third and final mailing of the questionnaire was in December 1991. Data were analyzed using DBASE III and Epi-Info software. Given the response or verification of appropriate lack of response from all States and the District of Columbia, the denominator for rates based on "States" is 51.

The questionnaire listed 11 different diseases, conditions, and risk factors (and an "other" option), and respondents were asked, "Of the total time you give to the actual practice of non-infectious disease epidemiology, what percent do you give" to these areas. In addition, each respondent was assigned a "major area" of concentration. The "major area" represents that area in which greater than 50 percent of his or her epidemiologic activity occurred. Because some respondents reported 50 percent activity in both occupation and environment, and others did not focus greater than 50 percent of their activity in any one area, two new categories—"occupation/environment" and "multiple areas"—were created.

Table 2. The highest academic degree, by respondents' sex, of State health agency epidemiologists working in noninfectious diseases, 1991 survey

| Degree and focus | Men | | Women | | Total | |
|---|--------|---------|--------|---------|--------|---------|
| | Number | Percent | Number | Percent | Number | Percent |
| <i>Type of degree</i> | | | | | | |
| Doctor of philosophy, public health, or science | 56 | 38 | 36 | 32 | 92 | 35 |
| Doctor of medicine, veterinary medicine, or dentistry | 63 | 43 | 23 | 20 | 86 | 33 |
| Master's only | 27 | 18 | 54 | 48 | 82 | 32 |
| <i>Focus</i> | | | | | | |
| Epidemiology | 80 | 55 | 68 | 60 | 149 | 57 |
| Public health | 110 | 75 | 90 | 80 | 201 | 77 |

Table 3. Type of activities reported by noninfectious disease epidemiologists in State health agencies, 1991 survey

| Activity focus | Percent |
|---|---------|
| Actively practicing epidemiology, infectious diseases, conditions | 20 |
| Administrative, management activities | 71 |
| Nonepidemiologic intervention program activities | 37 |
| Supervising, directing epidemiologic activities | 49 |
| Teaching, training epidemiology | 42 |
| Activities related to health policy, regulation, and legislation | 56 |
| Other activities | 16 |

Respondents were asked to estimate the average number of hours per week they spent doing noninfectious disease epidemiology and the percentage of that time spent working with specific diseases, conditions, and risk factors. The number of hours was multiplied to estimate the approximate number of hours a person spent in a specific type of epidemiology. The area-specific hours for each respondent from any one State were summed to obtain a State estimate, and State estimates were summed to obtain a national estimate.

Results

Our survey identified 272 potential respondents, of whom 260 (96 percent) from 48 States and the District of Columbia completed the survey questionnaire. The number of respondents by State ranged from 0 to 42 (table 1). In 6 of the 11 States with only one respondent, that respondent was the designated State epidemiologist. Staff from two States verified that the lack of respondents was appropriate.

Fifty-six percent of the respondents were male (sex was unknown for one person), 92 percent were white, 7 percent were Asian, 1 percent was black, and for three respondents the race was unknown. Hispanic ethnicity was reported by four (1.5 per-

cent) respondents. Approximately one-third of the respondents had a medical, veterinary, or dental degree; roughly one-third had another doctoral degree; and approximately one-third had a master's degree as the highest degree achieved (table 2). Men were more likely than women to have a doctoral-level degree (81 percent and 52 percent); however, women were slightly more likely than men to have a degree in epidemiology (60 percent and 55 percent) or in public health (80 percent and 75 percent). Men were more likely to be in State-funded positions than women (71 percent and 59 percent), whereas women, most notably those with master's degrees as the highest degree achieved, were more likely than men to be in grant-funded positions (28 percent and 13 percent).

Since epidemiologists spend time in ways other than the actual practice of epidemiology, respondents were asked to report what percentage of time had been spent in seven defined areas of responsibility (table 3). Only 3 percent of the respondents were primarily infectious disease epidemiologists who had limited involvement with noninfectious diseases and conditions; however, 20 percent had at least some involvement with infectious diseases. More than one-third of the respondents had responsibility for intervention activities, and two-thirds had management or administrative responsibilities. Approximately half of the respondents reported responsibilities in the areas of supervision, teaching, and public health policy.

Respondents were also asked, "How many hours per week, on the average, do you actively participate in epidemiologic activities?" Responses ranged from 1 to 55 hours with a mean of 23 hours. Twenty percent of the respondents spent fewer than 10 hours; 15 percent, 10 to less than 19 hours; 27 percent, 20 to less than 30 hours; 24 percent, 30 to less than 40 hours; and 14 percent, 40 or more hours participating in epidemiologic activities.

One hundred and eighteen respondents (46 per-

Table 4. Any activity in specific areas reported by noninfectious disease epidemiologists in State health agencies, 1991 survey

| Area | Respondents reporting any activity | | Total estimated hours activity | Respondents' major area | |
|-------------------------------------|------------------------------------|---------|--------------------------------|-------------------------|---------|
| | Number | Percent | | Number | Percent |
| Risk factors: | | | | | |
| Environment | 144 | 55 | 1,586 | 78 | 30 |
| Occupation | 104 | 40 | 614 | 15 | 6 |
| Occupation, environment..... | ... | ... | ... | 11 | 4 |
| Nutrition..... | 23 | 9 | 87 | 1 | <1 |
| Tobacco..... | 48 | 18 | 165 | 4 | 2 |
| Substance abuse..... | 27 | 10 | 76 | 1 | <1 |
| Diseases: | | | | | |
| Diabetes..... | 37 | 14 | 224 | 4 | 2 |
| Cardiovascular..... | 41 | 16 | 220 | 3 | 1 |
| Cancer..... | 123 | 47 | 1,236 | 37 | 14 |
| Conditions: | | | | | |
| Birth defects..... | 49 | 19 | 168 | 4 | 2 |
| Other reproductive conditions | 52 | 20 | 458 | 17 | 7 |
| Injury | 81 | 31 | 847 | 27 | 10 |
| Multiple areas..... | ... | ... | ... | 47 | 18 |
| Other ¹ | 35 | 13 | 207 | 5 | 2 |

¹ Age-related epidemiology (pediatric, geriatric, maternal-child health) evaluation; behavioral epidemiology; pharmacoepidemiology; oral epidemiology; and general surveillance.

cent) reported publishing epidemiologic information on noninfectious diseases or conditions in peer-review journals since January 1989, and 123 (48 percent) reported publication in newsletters or other nonpeer reviewed sources (for example, Morbidity and Mortality Weekly Report). Approximately one-third published in both types of literature, about one-third in neither type, and the remaining third split almost equally into one type or the other.

Thirty-two percent of the respondents reported membership in the Epidemiology Section of the American Public Health Association, 30 percent in the Society for Epidemiologic Research, 11 percent in CSTE, and 10 percent in the American College of Epidemiology. Fifty-five percent of the respondents reported membership in at least one of the four epidemiology organizations. Not surprisingly, persons with a degree in epidemiology or public health were more likely than those without to belong to epidemiology organizations (59 percent compared with 43 percent).

Most respondents reported activity in environmental and cancer epidemiology, and considerably fewer reported activity in nutritional or substance abuse epidemiology (table 4). The total estimated hours of activity per week in all health agencies ranged from 76 hours for substance abuse epidemiology to 1,586 for environmental epidemiology. Fewer than five respondents reported a major focus in nutritional, tobacco-related, substance abuse, diabetes, cardiovascular, or birth defects epidemiol-

ogy. Despite the focus on environmental epidemiology, no such activity was reported in 10 States and, in 20 States, no respondent reported it as a major focus (table 5).

Discussion

The practice of noninfectious disease epidemiology in a public health setting is both complicated and important. When available, epidemiologic information can be used for effective planning, implementation, and evaluation of intervention programs and contribute toward health policy development. Unfortunately, programs and policy are frequently not data-based. For example, a number of health agencies have developed year 2000 objectives for diseases and risk factors for which no epidemiologic effort is reported (3). One might conclude that planning and resulting program activities in those States have little epidemiologic input.

A basic challenge to describing epidemiologic activity within health agencies nationally is that few agree on the definition of "epidemiologist." It is not an activity restricted to persons with specific degrees or training, and there is no certification or other mechanism of recognition. Each past study of epidemiologists has defined the population differently (1,2,4). In past studies, the State epidemiologist has responded for all epidemiologists in the agency. This report represents the first study of epidemiologists in State health agencies in which each person has responded for himself or herself.

Table 5. Any activity in specific areas of epidemiology, by State, reported by noninfectious disease epidemiologists in State health agencies, 1991

| Area | States with any activity reported | | States with major areas reported | |
|-------------------------------------|-----------------------------------|---------|----------------------------------|---------|
| | Number | Percent | Number | Percent |
| Risk factors: | | | | |
| Environment | 41 | 80 | 31 | 61 |
| Occupation | 34 | 67 | 8 | 16 |
| Occupation, environment | ... | ... | 7 | 14 |
| Nutrition | 13 | 25 | 1 | 2 |
| Tobacco | 30 | 59 | 4 | 8 |
| Substance abuse | 17 | 33 | 1 | 2 |
| Diseases: | | | | |
| Diabetes | 19 | 37 | 4 | 8 |
| Cardiovascular | 23 | 45 | 2 | 4 |
| Cancer | 42 | 82 | 24 | 47 |
| Conditions: | | | | |
| Birth defects | 26 | 51 | 3 | 6 |
| Other reproductive conditions | 23 | 45 | 11 | 22 |
| Injury | 35 | 69 | 15 | 29 |
| Multiple areas | ... | ... | 29 | 57 |
| Other ¹ | 21 | 41 | 5 | 10 |

¹ Age-related epidemiology (pediatric, geriatric, maternal-child health); evaluation; behavioral epidemiology; pharmacoepidemiology; oral epidemiology; and general surveillance.

Further complicating the effort is that the title “epidemiologist” and the job function of that person are not necessarily parallel. “Epidemiologist” is a title often retained, even though informally, as one moves into other areas of focus, for example, management. Evidence indicates that epidemiologists “do” much more than epidemiology and that persons who might not be identified as epidemiologists are “doing” epidemiology. Respondents most difficult to identify were those working in maternal-child health and nutrition; these programs are usually located organizationally apart from the epidemiology services within the health agency.

Results of a 1983 study indicated that 80 percent of the epidemiologists in State health agencies were male (4). The increase in the percentage of women identified in this study may reflect a true change over time or a higher percentage of women working in noninfectious, compared with infectious, disease epidemiology. The facts that women are more likely to have a master’s degree as the highest degree and that persons with a master’s degree as the highest degree are more likely to be funded with grant dollars suggest that men are more likely to be in permanent positions within the health agency while women are in the time-limited positions.

The extent to which the respondents were white was a surprising finding. Of the two black respondents, one was a health agency employee whereas

the other, not a U.S. citizen, was a temporary Federal employee assigned to a State health agency. The absence of racial diversity within the ranks of noninfectious disease epidemiologists risks an absence of diversity of thought and perspective in the epidemiology practiced.

Many epidemiologists are in supervisory and management positions and are able to influence health policy. Having an epidemiologic perspective represented in these activities is important. A number of respondents, who identify themselves as epidemiologists, spend only a few hours per week actually practicing epidemiology, further indicating the challenge to understanding how much epidemiology is actually being accomplished.

Marked variation exists in the number of respondents and the hours of epidemiology practiced by State. Some health agencies are involved in extensive grant-funded epidemiologic research activities that add to the number of epidemiologists employed. However, even if all respondents spent 100 percent of their time practicing epidemiology, the number of epidemiologists in some States would be inadequate. The complexity of the issues is such that it is unrealistic to think that one or two epidemiologists are sufficient to address adequately the expanse of noninfectious diseases, risk factors, and conditions in any State, regardless of the population.

A relatively small percentage of respondents spend at least 50 percent of their time in epidemiology.

logic activities focused on a particular risk factor, disease, or condition (table 4). For example, 123 respondents reported activity in cancer epidemiology, while only 37 of those respondents reported actually focusing in that area. This decrease is largely related to the number of environmental epidemiologists who, among other duties, are responsible for the evaluation of potential cancer clusters occurring in their State, but spend a small part of their time on such activities. Although the estimated hours of activity are approximate, they do give a general indication of the effort by professional staff of all health agencies directed toward the practice of epidemiology of any specific area of interest.

The areas of nutrition, tobacco use, and substance abuse—certainly significant underlying causes of morbidity and mortality in this country—are virtually neglected by epidemiologists in health agencies. Within these agencies, tobacco-related programs are frequently located in health promotion units and nutrition programs are frequently located in maternal-child health units, having little interaction with epidemiology units. Substance abuse activities are generally located in sections of State government other than the public health agency. Because of the substantial public health impact of substance abuse, incorporating relevant data into public health planning efforts is critical.

Failure to develop surveillance systems can result in an inability appropriately to monitor health outcomes at the time of a disaster, or to quickly identify an excess of adverse health events soon after they occur. Failure to define the issue with solid data leads to the use of anecdotal information that often magnifies the “problem.” For example, an apparent cluster of neural tube defects occurring in one county had residents of the affected communities concerned that the defects were the result of environmental exposures such as pesticides or industrial pollutants. Because the State does not have a birth defects registry, the apparent cluster was first identified by local health providers. However, after completion of a retrospective study of birth defects in the county, it became apparent that there had been a long-term high incidence of birth defects. Failure to identify the excess birth defects earlier resulted in delay of further research and in implementing environmental monitoring and potential prevention programs (5).

Numerous examples could be noted of functional data collection systems existing but not being utilized to affect positively the health of the public. For example, information is submitted to a health

agency but is not computerized or otherwise put into a usable format. Information may also be appropriately organized but never analyzed, reported, or used to direct public health actions. Because cancer registries have been notorious as inadequately used sources of data, the term “data morgue” has been applied to them. In fact, such lack of use may well be the result of absence of sufficient staff trained in epidemiology.

The considerable increase in the number of persons identified as practicing noninfectious disease epidemiology since 1975 is encouraging. Nonetheless, activity directed at those diseases and risk factors that are the primary causes of morbidity and mortality needs to be increased in all States.

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