

epidemiology

state epidemiologist



State Epidemiologist Checkpoint

Are you interested in tracking disease in human populations?

Would you enjoy interacting with people across the full spectrum of public health professions?

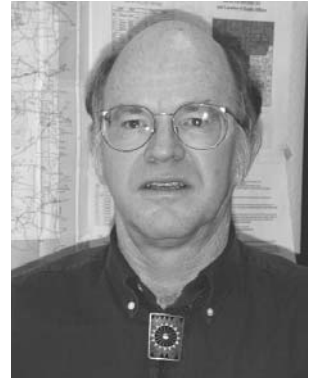
Do you enjoy solving mysteries?

Does working in the field appeal to you?

If so, read on

A TRUE TALE

Growing up in Santa Fe, New Mexico, C. Mack Sewell, DrPH, MS, was keenly interested in the sciences, particularly the biological sciences and especially the investigation of diseases and their transmission. After graduating from New Mexico State University, he received a master's degree in microbiology from Colorado State University. Dr. Sewell worked for several years as a microbiologist before heading to the University of Texas School of Public Health, where he received a doctorate in public health in 1982. A native New Mexican, Dr. Sewell returned to his home state in 1984 to work as an epidemiologist with the New Mexico State Health and Environment Department in Santa Fe. "I found in the field of epidemiology a way to combine my interests in science, human health, microbiology and infectious diseases into one powerful discipline," says Dr. Sewell, "That was tremendously appealing to me." He then became State Epidemiologist and Director of the Office of Epidemiology in 1989. "There is a certain thrill about working as an epidemiologist," adds Dr. Sewell. "In this field we are identifying risk factors that can lead to effective interventions *before* the etiology of a disease or condition is fully understood."



C. Mack Sewell, DrPH, MS

Profiling the job

Epidemiology is the most fundamental practice of public health and preventive medicine. The aspects of medical detective work inherent in epidemiologic sciences keep even seasoned practitioners intellectually stimulated. The word derives from *epidemic*, Greek for "upon the people."¹ It is the study of the distribution of diseases, health determinants and disease risk in human populations. Goals are met by testing hypotheses using data garnered from population studies. Epidemiological studies provide the basis for preventive approaches in medicine and public health. Because of the investigative nature of tracking and reporting information, epidemiologists are often called "the disease detectives." The importance of this work, particularly as the world "shrinks" as a result of faster, easier and cheaper air travel and the resulting capability of disease spreading from one far-flung corner of the

globe to another in a day, make this an important area for maintaining and protecting public health.

Although most state and even local epidemiologists are generalists, there are various types of subspecialists as well. Some epidemiologists specialize in the investigation of immediate, time-sensitive events such as food-borne or infectious disease outbreaks. Chronic disease epidemiologists study disease states that take years to develop, such as cancer and cardiovascular disease. They investigate disease clusters — a higher than expected incidence of disease in a community. For example, if a Long Island community believed that high-tension electrical wires were a contributing factor to a high incidence of breast cancer among residents, the epidemiologist would investigate the cluster and determine the potential causal link between the occurrence of disease and the exposure.

Other subfields include environmental or occupational epidemiology, which examine and seek to cure problems stemming from conditions of the general physical environment (pollution, climate, etc.) or in the workplace (indoor air quality, ergonomics). “One subspecialty we’ve developed in our health department is behavioral epidemiology because it is a significant public health issue in this state,” says Dr. Sewell. “This specialty includes specific studies around substance abuse, including alcohol, tobacco and abused prescription drugs.”

There are different paths to the profession of epidemiology. Probably the shortest, quickest way is for someone with an undergraduate degree to get a master’s in public health with a concentration in epidemiology. A second, longer, but popular route is that selected by physicians, nurses and others, such as nutritionists, who may go on to become epidemiologists by earning their master’s in public health, either before or after graduation from medical, nursing, or other professional schools. Some individuals earn a doctorate in epidemiology (PhD) or public health (DrPH) with a concentration in epidemiology.

A third means of entry into epidemiology is through the Centers for Disease Control and Prevention (CDC) program called the Epidemic Intelligence Service (EIS). Dr. Alexander Langmuir established the EIS at the CDC in 1951, after he identified the need to train physicians and other scientists to be prepared to deal with biological warfare. Over the past 50 years, the



“To be a successful epidemiologist, you need to have an inquisitive mind.”

C. Mack Sewell,
DrPH, MS

scope of the program has broadened dramatically to teach physicians and other health professionals the applied epidemiological skills needed to investigate infectious disease outbreaks and epidemics. The EIS is a two-year training program that recruits MDs, PhDs and veterinarians, and occasionally nurses, pharmacists and laboratorians as well. Public health professionals, at varying points in their careers, can take part in the EIS program to obtain additional hands-on experience in epidemiology. The EIS recruits spend several weeks in Atlanta in intensive training in the latest developments in epidemiology and biostatistics. They then either remain at one of the CDC Centers in Atlanta, or are detailed out to state health departments or international locations for a field-based epidemiological experience to gain hands-on training working on outbreaks and special projects.

Epidemiology at the state level

The staff of the New Mexico State Department of Health Office of Epidemiology, over 50 people, includes physicians, veterinarians, nurses and PhD and MPH epidemiologists. The staff works in the departmental offices and in the field doing surveillance, investigation, data analysis and evaluation, and frequently interacts with medical providers, data collectors, statisticians, laboratory scientists, program managers and public health policymakers. As the State Epidemiologist, Dr. Sewell says that emergency preparedness is very much a part of his agenda, particularly in these times of easy international travel and threats of biological and chemical terrorism and other public health threats. Such threats include pandemic influenza, large outbreaks of known, re-emerging, or newly emerging agents, or other chemical and environmental threats of natural or manmade origin. “We’re making good progress with emergency preparedness,” he says. “We’ve developed our health alert network capabilities so that we can send e-mails to literally thousands of people very, very quickly. We have an emergency broadcast fax as well as an e-mail list that consists of hospitals and emergency rooms, physicians, nurses, hospital-based infection control practitioners and some of our own health department staff.”

Dr. Sewell’s department is working with both Los Alamos National Laboratory, the Sandia National Laboratory and the University of New Mexico Hospital to improve surveillance in local emergency rooms. They are using a method called *syndromic surveillance*, which examines a collection of symptoms in an attempt to identify a course of illness before lab

testing has been completed. The idea is to move quickly from a public health perspective, taking precautions and preparing the necessary treatment measures, before knowing the diagnosis for certain. “Let’s say, hypothetically, there was an anthrax spore release. People would show up in the emergency



room with a variety of symptoms and signs but the diagnosis would normally not come until later in the course of their illness. We’re improving systems so that this type of bioterrorist-related illness can be identified much more quickly. Better yet, the same systems we are building can help us track some of the other terrors that Mother Nature herself has in store.”

Tracking a new hantavirus

In May 1993, the NMDOH received reports that a couple had died within five days of each other from an illness tentatively diagnosed as pneumonic plague, a disease that occasionally occurs in New Mexico. This event occurred in the northwestern part of the state, an area inhabited predominantly by Native Americans. The cases were characterized by fever, myalgia, headache and cough, followed by rapid development of respiratory failure. When they were examined and tested by the state Office of the Medical Investigator’s forensic pathologists, the results showed no evidence of plague. Within a week, another physician called the health department to say he had treated patients presenting with symptoms similar to those in the deceased couple. In each of these cases, nothing obvious about the patients’ illness, or in some cases their deaths, could be explained. These reports occurred with increasing frequency over a period of two weeks until it became clear an outbreak of some unknown etiology was occurring. “At that point, with 12 dead and no etiology and diagnosis,” Dr. Sewell says, “we notified the other regional health departments in the Four Corners region, in Arizona, Colorado and Utah, and called in the CDC.”

The CDC team, along with state investigators and the Indian Health Service, collected blood, serum and tissue specimens, conducted exhaustive antibody tests at the state laboratory, performed autopsies, and sent additional specimens to Atlanta. The CDC laboratories ran tests of the New Mexico sera

against a variety of known agents from other parts of the world. What they discovered was a hantavirus much like Korean hemorrhagic fever and Puumala virus, the second found primarily in Scandinavia, northern Europe and northern Russia. “It turned out,” Dr. Sewell says, “that what we had in New Mexico was a hantavirus that had never been previously described in the United States.” There are a number of different hantaviruses and this one was eventually named the *sin-nombre* virus, which is Spanish for “no-name.” The original intention had been to name it based on the Four Corners region, because frequently viruses are named based on a specific geographical location, but no community wanted its name given to the virus. The North American strain produces a disease called “hantavirus pulmonary syndrome.”



The New Mexico case brought together the CDC, regional health departments, the Indian Health Service, the University of New Mexico School of Medicine, local and state physicians, epidemiologists and laboratory personnel. The time lapse from the initial recognition of the disease cluster in the laboratory to description of the hantavirus in blood specimens was 21 days. “It was just a really intense sort of operation,” Dr. Sewell says. “Compare to that the amount of time it took from the discovery of the initial cluster of Legionnaire’s disease at the Legionnaire’s convention to the ultimate elucidation of a new bacterial species, which was many months in discovery, and you’ll see how extraordinary it was.” There are still *sin-nombre* cases each year, although the incidences of new U.S. cases have decreased over the past few years.

A day in the life

When he’s not traveling on business or delivering lectures, Dr. Sewell is likely to be found in his office in Santa Fe. While he views himself as “less at the grassroots level” than the field workers he supervises, his work involves daily engagement with the myriad public health issues that face New Mexico. Dr. Sewell’s style is clearly hands-on, collaborative and participatory. In his

position as State Epidemiologist and the office's head administrator, it couldn't be any other way.

It's 8:00am, and Dr. Sewell is on the phone. At the other end is a field epidemiologist who has been investigating several drug overdose deaths in a small town in northern New Mexico. "Since drug abuse is an important issue to the economic health of the community and thus the state, addressing it is vital," Dr. Sewell later explains. The field epidemiologist is working with the vital records staff and the state Office of the Medical Investigator to ascertain that their data sets and statistics are consistent with one another. But their most challenging task is to go from household to household, knocking on doors and surveying residents about what they know and have experienced about substance abuse in their community.

"Drug abuse is a sensitive issue," Dr. Sewell explains, "and gathering information privately and discreetly is the only way to guarantee that we'll be getting honest answers." A critical mass of accurate and reliable epidemiological data, he adds, "is essential if we're to craft workable solutions."

Notwithstanding the pivotal role played by field epidemiologists, epidemiologists in the home office in Santa Fe also do much of the department's most critical work. New Mexico's 54 local health offices, which are part of the state public health system, assist with day-to-day surveillance and control of such infectious diseases as *E. coli* 0157 H:7, salmonella and hepatitis, gathering reports from laboratories, physicians, nurses and other sources. Following a recent outbreak of meningococcal meningitis, the state mobilized broad resources to deal with the crisis. Within a two-week period, thousands of individuals were vaccinated, thus minimizing the total number of infections and fatalities. A central factor in the success of the effort was the vigilance, skill and medical detective work of field investigators and state health department personnel in Santa Fe.

Direct communication — by phone or in person — with field and home office staff figures importantly in Dr. Sewell's workday. Maintaining close contact with field-level epidemiologists and applying their findings to the task of protecting the public health is as exciting and demanding as work in any major intelligence organization, he says. At the same time, he often joins staff in intensive brainstorming sessions aimed at analyzing pressing health issues, especially those involving infectious and chronic disease concerns, as well as top-level policy concerns.



"The strongest lure of this field lies in the opportunity it presents to the epidemiologist to influence government policy, and how we, as a society, deal with illness and conditions that affect the health of populations."

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DrPH, MS

Staying in touch outside the office is just as critical, he adds. As State Epidemiologist, Dr. Sewell is responsible for interpreting field reports and communicating their significance to key government decision makers. “It’s a matter of assuring that the agency has the necessary resources to accomplish its mission,” he says. “Because this is such a poor state, much of our funding comes from the federal level, which means frequent contact with the guardians of the treasury.”

>>> career at a glance

C. Mack Sewell, DrPH, MS

- 1989–Present **State Epidemiologist** Office of Epidemiology, Public Health Division, New Mexico Department of Health
- 1987–1989 **Deputy State Epidemiologist** Office of Epidemiology, New Mexico Health and Environment Department
- 1984–1987 **Epidemiologist** New Mexico Health and Environment Department
- 1979–1984 **Hospital Epidemiologist** Veterans Administration Medical Center, Albuquerque, New Mexico
- 1978–1979 **Microbiologist** Hermann Hospital, Houston, Texas
- 1976–1977 **Section Chief Microbiologist** New Mexico Medical Reference Laboratory
- 1974–1975 **Microbiologist** Colorado Department of Agriculture
- 1973–1974 **Microbiologist** Colorado Department of Health

1 <http://witn.psu.edu/2227/word.html>