

## Epidemiology training and public health practice

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There is a significant role for the practice of epidemiology throughout the world if health professionals are to work effectively towards 'Health for All'. The status quo leaves a great deal to be desired, as evidenced by recent signals from the premier international health agency, the World Health Organization (WHO). The forty-first World Health Assembly meeting in Geneva, Switzerland, in May 1988 approved a resolution stressing 'the importance of epidemiology as a tool for the formulation of rational health policy' (PAHO, 1988). In addition to its key role 'in studying the causes and means of prevention of disease', the Assembly noted epidemiology's valuable inputs in 'health systems research, information support, technology assessment, and the management and evaluation of health service'.

In commenting on the universal need for health professionals trained in epidemiology, the assembly called attention to 'discrepancy between the content of training in epidemiology in most schools of medicine, public health, and other health sciences, and the needs of member states'. The Assembly then appealed 'to schools of medicine, public health, and other health sciences to ensure training in modern epidemiology that is relevant to countries' needs regarding their health-for-all strategies and, in particular, the needs of developing countries'. This is nothing less than a call to link the teaching of public health practice with the practice itself.

In this paper, we discuss a unique epidemiology training programme initiated 37 years ago that warrants description and exposition as it may provide some instructive experience in linking the teaching of epidemiology with the practice of public health.

In 1946, the U.S. Federal Public Health Service (PHS) established a branch facility in Atlanta, Georgia, some 700 miles to the south of Washington, D.C. the Federal capital. This small beginning was to become the Centers for Disease Control, a full agency (equal in rank/status with the Food and Drug Administration, and National Institutes of Health) of the Federal Public Health Service. Its mission, when created, was to assist States with communicable disease control and prevention, incorporating the highest level of public health practice.

Epidemiology, as applied to public health practice, was the science upon which the nascent CDC based its work. The politics and personalities of the day were complex, and cannot be given justice within the scope of this paper [see P. D. Greenough, *The History of the Epidemic Intelligence Services of the Centers for Disease Control, 1951–1985*. New York: Oxford University Press (in preparation)]; yet, it

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was obvious to many that public health was not a 'glamour' speciality. The best and brightest minds by and large went into clinical medicine. Conversely, the intellectual guardians of the science of epidemiology were in academe and had only very limited knowledge of the actual practice of public health, which was almost entirely at the state and local level. There were national experts in various diseases, but they had no direct linkage with national surveillance or disease control programmes: the national public health practice analog for their discipline or subspeciality. In order to satisfy this need, the PHS initiated at the Centers for Disease Control (CDC) a preceptorial, hands on, 2-year training programme in applied epidemiology known as the Epidemic Intelligence Service (EIS) Program (Langmuir, 1980). This training programme has prospered and expanded since its inception in 1951. It is based on the same principles as training physicians in clinical medicine: the academic classroom is important for the theory, but in order to give students the basis for medical practice, on-the-job training is necessary and this is accomplished by working with patients under supervision of the medical staff. Thus, medical school provides the nucleus of information concerning diseases but clinical residency training provides the 'real world' training.

The EIS training programme in applied epidemiology utilizes the same principles. The trainee is introduced at CDC to the principles of epidemiology, biostatistics, and surveillance during a 3-week introductory course. They are then assigned 'residency' responsibilities either in one of the programme areas at CDC or in a state or local health department. Approximately 30–40% of trainees are assigned to State Health Departments, 40–50% to CDC programmes, and the remainder to other agencies, either federal, state, or local. In all assignments, the trainee is working on disease control and prevention and is supervised by one or several experienced epidemiologists. The CDC assignments are usually primarily limited to one or several related disease areas whereas the state or local health department assignments are usually broader, generalized assignments. During the 2 years, the trainees have experience not only in surveillance and epidemiological investigations, but in conducting laboratory procedures, evaluation of control and prevention measures, administration, preparation of reports, and in training other students (especially during their second year). Though most of their training is within the United States, some trainees do have opportunities to work overseas for a brief period either on an epidemiological investigation, a control or prevention programme, or as a consultant. The trainees also have opportunities to participate as students in short courses in which traditional concepts of epidemiology and biostatistics are reviewed or new concepts presented.

The initial class in 1951 consisted of 23 trainees. During the following 14 years, the annual number ranged from 11 to 48. From 1966–88, the size of the entering class has ranged from 39 to 75. The number of training opportunities and the need for trained epidemiologists have always exceeded the size of the classes which is primarily determined by the financial support available. The Atlanta-based trainees participate in several hundred investigations each year, and the state based trainees participate with varying levels of intensity in a thousand or more such investigations each year.

Since the inception of the EIS programme in 1951, more than 1300 health professionals have been trained in epidemiology with the majority being

physicians, but including veterinarians, statisticians, nurses, engineers, microbiologists, dentists, and others. Of importance in this training programme is that the output of the training activities benefits not only the federal government, but the cities and states in which the training activities occur. Thus, when an epidemiological trainee investigates an outbreak of disease, the control and prevention activities which have been developed as a result of the epidemiological investigation will directly affect the community in which the outbreak occurred.

One criterion of the success of this programme is to note the current professional activities of the graduates of the EIS Program. Forty-four percent of the graduates continue to practice public health at a federal, state, or city level. Another 27% are on the faculties of universities including Schools of Public Health teaching or conducting research. The remaining 28%, most of whom are in the private practice of medicine or business, remain committed to the concepts of preventive medicine as exemplified by their application of the principles of prevention in their daily clinical practice.

Though CDC welcomes health professionals from other countries into its training programmes, and supports the training activities of WHO, CDC recognizes the importance and value of health professionals being trained in their own country, using the local resources available to be applied to the control and prevention of their own health problems. Additionally, the output of the training activities will directly benefit the country's public health programme. This is a realistic approach that leads to continuity between training activities and the application of public health measures to disease control and prevention.

The idea of learning through actual participation is supported by others. Vartanian of the Lenin Institute for Advanced Medical Studies in Moscow has written '...more and more emphasis is being placed on systematic course design models and all forms of "learning through doing", while formal lecturing is gradually, but not without resistance, being reduced in favor of problem-solving and logical decision-making learning experiences. This kind of learning has proved to be more motivational and effective than any didactic teaching.' (Vartanian, 1987).

Recognizing the strength of preceptorial, on-the-job training of health professionals in surveillance and epidemiology, CDC in collaboration with the World Health Organization initiated a programme in 1980 to assist other countries in developing their own applied epidemiology training programmes. This CDC/WHO supported programme is known as the Field Epidemiology Training Program (FETP); and six individual programmes have now been developed in Thailand (WHO, 1981; Braudling-Bennett *et al.* 1983), Indonesia, Taiwan, Mexico, Saudi Arabia, and the Philippines, and a new programme is soon to start in Peru. CDC provides a consultant-trained epidemiologist who will be in residence in the country for approximately 5–6 years. The Ministry of Health (MOH) has to make a commitment fully to support the programme, to institutionalize it within the ministry, to provide adequate salaries for the trainees, and to support a career ladder for suitable graduates of the 2-year programme. At the time of initiating the FETP, all of these countries had either an epidemiological unit or at least an epidemiology presence within the MOH. None supported an 'in-house' epidemiological training programme.

Experiences in the six programmes clearly indicate that there are adequate numbers of young national health professionals who are interested in and willing to make a career commitment to preventive medicine. Potential trainees in considering this programme look carefully at the opportunities for employment upon completion of the 2 years of training. They are especially interested in an adequate salary and the potential for advancement.

Since this is a new programme, firm administrative arrangements have to be established within the MOH and with other governmental units as appropriate. Frequently, collaboration with a University can be very supportive of the training programme. In some countries, these contacts already existed at the time the FETP was initiated, whereas in other countries these contacts were initiated for the first time.

Although the original FETP, the EIS, has not had a direct university affiliation, there have been some arrangements for a long period of time to give credentials or some kind of academic credit for the EIS experience. CDC now operates the largest preventive medicine residency programme in the United States made up exclusively of selected second-year EIS officers whose contract is then extended for a third year to complete their preventive medicine residency. For those who do not remain at CDC for a third year, the American Board of Preventive Medicine will give 1 year credit of residency training for 2 years of experience in the EIS programme.

In other countries, however, the idea of credentials is much more important than it has been in the US, and this is quite understandable. Cohorts of medical and non-medical personnel are in a very competitive environment, and it is unthinkable to have people spend time in a training programme without getting some kind of academic credentials or some recognition of their increased skills that enhances their careers. Thus, even in the beginning in Thailand, an arrangement was made with a prestigious local university to allow graduates of the Thai FETP to proceed for a year of academic training and then become accredited as preventive medicine specialists. This programme has now evolved to the point where the preventive medicine authorities actually conduct the recruiting into the Thai FETP.

Similarly, in Indonesia the programme began with great enthusiasm with people who were committed to public health epidemiology, but after a few classes it became apparent that without university credentials the careers of these people would suffer and the quality of the applicants began to decline. An experiment is now underway in an arrangement with the Faculty of Public Health at the University of Indonesia in a combined programme that will actually award a degree in public health for graduates of this programme. In Saudi Arabia, final arrangements are under way with King Saud University and two of its colleges, the Faculty of Medicine and the College of Applied Medical Sciences, that will shortly result in the ability of the university to award a diploma recognizing specialist qualifications for 2-year graduates of this Field Epidemiology Training Programme.

The FETP programmes recruit their trainees, usually five each year, from among their country's own health professionals. In some countries the trainees are recent graduates from professional schools or hospital training programmes or

they come from the existing staff of the Ministry of Health. The 2-year training period begins with a 3–5 week course in epidemiology and biostatistics which insofar as possible utilizes faculty from within the MOH and/or a University. If necessary, the faculty can be supplemented by temporary advisors from CDC. Upon completion of the introductory course, the trainees are assigned to work in specific disease areas within the Ministry of Health. This allows them the opportunity to become involved in programmatic areas where they assume some responsibilities such as reviewing surveillance data. As requests for field investigations come to the Ministry, trainees are assigned to participate in the field investigations under the direct supervision of the CDC consultant or MOH epidemiologists who initially travel with them. Upon completion of the field investigation, the trainee(s) return to the office, analyse their data, discuss it with appropriate members of the Ministry of Health or others, and prepare a written report. After several field investigations, the trainees will conduct the investigation without direct supervision, but will remain in close contact, hopefully by telephone, with the CDC consultant or MOH epidemiologist.

In some countries, the trainees will rotate during the 2 years among different units of the Ministry of Health. In some countries, a working relationship is developed with a medical school and the trainees may participate in some academic training programmes during the 2 years in the FETP. This may help provide some additional and necessary training opportunities, and may assist in providing academic recognition for the 2 years of FETP.

The experiences that trainees have vary from country to country, but in total they have had epidemiological responsibilities in both infectious and non-infectious, acute and chronic health problem areas. Additionally, they have been exposed to the laboratory, to administrative activities, policy and development procedures, and have generally had a broad exposure to the practice of preventive medicine. Basically, the experiences in the FETP countries have been similar to those in the EIS training programme in the United States.

During the first several years, the host country should identify an individual who will assume the responsibility for directing the programme once the CDC consultant epidemiologist departs. This individual may be a member of one of the first FETP classes within the country or may be an experienced epidemiologist from within the Ministry of Health. Ideally, this position can be filled far enough in advance so there is at least 1 year overlap with the CDC consultant.

As of January 1988, there have been 75 graduates from the initial four programmes. The majority of these graduates, 72 of 75, are currently employed in positions within the Ministries of Health where they are practising epidemiology. Some of them have participated in international epidemiological meetings and some have obtained MPH degrees either from within their own country or in another country.

Qualified graduates from these programmes must be offered an opportunity to apply their skills to solving public health problems. Not only must job security be guaranteed, but the graduates must see opportunities for advancement, support, and adequate wages. Too often health professionals are trained, but because of the lack of job security or an appropriate salary, they gravitate into other jobs that do not utilize their professional skills in surveillance and epidemiology.

The FETP programme can offer significant opportunities to a government in providing trained epidemiologists to support their ongoing public health programmes. While being trained using their own national resources, the trainees are providing assistance to the programmes and their output is of benefit to their country. The FETP serves as a model programme; each country should fine tune it to meet their own public health needs. For a relatively small investment, a country can reap large public health rewards.

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