Commentary

In Snow’s Footsteps: Commentary on Shoe-Leather and Applied Epidemiology

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The term shoe-leather epidemiology is often synonymous with field epidemiology or intervention epidemiology. All 3 terms imply investigations initiated in response to urgent public health problems and for which the investigative team does much of its work in the field (i.e., outside the office or laboratory). Alexander D. Langmuir is credited with articulating the concept of disease surveillance as it is applied to populations rather than individuals. He also founded the Epidemic Intelligence Service (EIS) Program in 1951, a 2-year training experience in applied epidemiology that places professionals in the field, domestically and internationally, in real-life situations. Today, 70–90 EIS officers are assigned each year to Centers for Disease Control and Prevention programs and to state and local health departments to meet the broad spectrum of challenges in chronic disease, injury prevention, violence, environmental health, occupational safety and health, and maternal and child health, as well as infectious diseases. Throughout their assignments, EIS officers are encouraged to strive for analytic rigor as well as public health consequence, which requires technical competence blended with good judgment and awareness of context. Effective applied epidemiologists must have skills beyond just epidemiology to improve a population’s health; the field of applied epidemiology requires multiple team members, all having different but complementary skills, to be effective.

book reviews; communicable diseases; disease outbreaks; epidemiologic methods; health personnel; population surveillance; public health

Abbreviations: CDC, Centers for Disease Control and Prevention; EIS, Epidemic Intelligence Service.

Note from Jonathan M. Samet, Book Review Editor: The term epidemiology is often preceded by an adjective, making reference to the topic of its application. One of the most iconic and dramatic of these adjectival descriptors is shoe-leather, raising the image of an on-the-ground investigation racing to find a solution to a deadly epidemic. In this commentary, the authors provide a historical perspective on the origins and characteristics of shoe-leather and applied epidemiology. They bring notable clarity to these terms and remind us of the key role played by Alexander Langmuir in this area. Following this commentary are reviews of 2 books on shoe-leather epidemiology, one on the Epidemic Intelligence Service (EIS) of the Centers for Disease Control and Prevention (CDC) and the other on the CDC’s Public Health Advisors. The reviews cover books that are replete with “real-world” stories of epidemiology and epidemiologists in action. Consider reading these books. The reviews suggest that those in the applied arena will be reminded of old stories and colleagues, and those in “academic epidemiology” will broaden their perspectives on the uses of epidemiology.

Two book reviews in this issue of the Journal refer to shoe-leather epidemiology when describing the contributions of EIS officers and public health advisors (1, 2). The term shoe-leather epidemiology is often synonymous with field epidemiology or, in Europe, intervention epidemiology (3). All 3 terms, especially field epidemiology, imply investigations initiated in response to urgent public health problems and for which the investigative team does much of its work in the field (i.e., outside the office or laboratory) (4). The primary goal of the field epidemiologist is to provide information as quickly as possible for the processes of selecting and implementing interventions to lessen or prevent illness, injury, or death when such problems arise. This
Definition has its roots in the work of John Snow (1813–1858). However, not all urgent health problems are acute, and applied epidemiology is a broader term that includes application and evaluation of epidemiologic discoveries and methods in public health and health care settings to improve health (5). What both definitions have in common is the public health perspective of epidemiology for action, a concept closely associated with the career of Alexander D. Langmuir (1910–1993), the first chief epidemiologist at the Communicable Disease Center (now Centers for Disease Control and Prevention) (CDC) in Atlanta, Georgia.

Langmuir’s contributions preceded and followed his tenure at CDC (1949–1970), but, during those CDC years, his critical role in developing applied epidemiology became evident (6). He is credited with articulating the concept of disease surveillance as it applies to populations rather than individuals (7). During the 1955 epidemic of poliomyelitis associated with the first inactivated poliovirus vaccine, he established a national surveillance system for daily reporting from all US states, laying the foundation for subsequent national systems (8). Public health surveillance—the ongoing systematic collection, analysis, and interpretation of health-related data essential to planning, implementing, and evaluating public health practice—closely integrated with the timely dissemination of these data to those who need to know for application to prevention and control, is now recognized as the cornerstone of public health practice and the information on which public health programs around the world are based (9).

Langmuir also founded the EIS Program in 1951, a 2-year training experience in applied epidemiology that places young professionals in the field and at CDC headquarters, domestically and internationally, in real-life situations. EIS officers learn on the job, applying what they learn to address real problems in often challenging and sometimes contentious settings (10). In addition to responding to infectious disease problems, Langmuir’s first EIS officers engaged in family planning, birth defects surveillance, cancer cluster investigations, and environmental health problems throughout the world, including global smallpox eradication, all with the purpose of using the data to control a problem and prevent future disease, disability, and death.

Today, 70–90 EIS officers are assigned each year to CDC programs and to state and local health departments to meet the broad spectrum of challenges in chronic disease, injury prevention, violence, environmental health, and maternal and child health, as well as infectious diseases (11). These officers are trained in the tools of applied epidemiology, much more sophisticated than those used by Langmuir, but still in the framework of hands-on learning, solving the health problems of the present. Nearly half of US State Epidemiologists (lead epidemiologists in each of the states) and 4 of the last 7 CDC directors, including current director Thomas R. Frieden, are EIS graduates. EIS graduates often populate schools of public health and academic medical centers and play leadership roles in global health. Multiple programs around the world are modeled after the EIS Program (12).

The full meaning of applied epidemiology can perhaps best be understood by comparing and contrasting the emphasis of applied epidemiology and academic epidemiology (Table 1), the latter referencing epidemiology practiced in a school of public health or an academic setting (13). These major categories of epidemiology obviously share 1) basic methodology and the underlying science, 2) applicability to a broad range of subject areas, and 3) a need for computer skills to perform the most sophisticated analyses. However, we highlight certain differences, or perhaps differences in emphases, in Table 1.

As underscored by the characteristics shown in Table 1, applied epidemiology incorporates analytic rigor but must balance such with the practical application of results. Applied epidemiology emphasizes use of epidemiology as a tool to improve health and to have a health impact. When
we address incoming EIS officers, we stress the importance of consequential epidemiology, a term coined in 1983 by William Foege when delivering the Wade Hampton Frost Lecture at the American Public Health Association meeting. We exhort them to strive for not only analytic rigor but also public health consequence. A difference to be a difference must make a difference. This need, in applied epidemiology, to account for contextual constraints, public pressures, and community interests and to implement interventions requires technical competence blended with good judgment and community engagement (14). CDC and the Council of State and Territorial Epidemiologists recognized the complementary nontechnical competencies needed by the public health workforce when they defined competencies for applied epidemiologists working in governmental public health agencies (15, 16). Moreover, just as effective applied epidemiologists must have skills beyond just epidemiology to improve a population’s health, the field of applied epidemiology requires multiple team members, all having different but complementary skills, to be effective.

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REFERENCES