Cases in Field Epidemiology

A Global Perspective

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DEDICATION

To my wife, Renee, and daughters, Josie and Julie. And to my mother, Una, and to Henry and Frieda, for having made me feel like each good work I try to do has made them proud.
I wish to recognize the chapter authors who graciously donated their time to contribute to this book because of their strong commitment to public health education. I know that they are all very busy; thus, taking on writing a chapter of an investigation that, in some cases, occurred decades ago was a true labor of love. They are really special people who have spent most or all of their careers in public health and I feel honored that they accepted my request for their contributions. I also appreciate the review of the Preface and Chapter 1 by Frank Sorvillo and Bill Keane, respectively. Additionally, many persons have directly and indirectly helped me to develop an understanding of field epidemiology, including teachers, supervisors, coworkers, colleagues, public health personnel, infection control practitioners, microbiologists, and the many others I interacted with during and after these events. I am especially grateful to the Centers for Disease Control and Prevention’s Epidemic Intelligence Service program for providing me with training that opened my eyes to the exciting career that is public health. Finally, I acknowledge the students, fellows, and EIS officers I have had the privilege to instruct and the many students and public health workers for whom I hope this book will become a useful complement to the study and practice of epidemiology.
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Field epidemiology is the most exciting epidemiological work. That may be a bold statement, but I can’t think of any other public health activity that gets more people excited while they are doing their work and talking about it long after they have returned from the field. Reading field investigations in scientific publications is often very interesting. Personal stories and media coverage of field epidemiology are sometimes responsible for students deciding on public health as a career, even changing from one long-planned career to this useful and rewarding type of work. At public health conferences, it is not unusual for presentations of field investigations to attract large and enthusiastic audiences. However, what is not usually conveyed in these presentations or their subsequent scientific publications are the many challenges and unique circumstances that the investigators had to deal with along the way. There is much to be learned from what lies between the lines of the introduction, methods, results, and conclusions.

The term “epidemiology” is defined as the distribution and determinants of disease. The term “field” is used to reflect that an epidemiological investigation involved some degree of getting out of the office and into the environment where the disease distributed or gaining a firsthand account or understanding of the factors that may have been responsible for or associated with the disease. As a result, investigations of disease that involve field epidemiology have taken their investigators to all parts of the world—from urban homeless shelters to refugee camps and distant tropical islands where there may be no electricity. I think that this is one of the great benefits of a career practicing field epidemiology. It is a ticket to places that you would never otherwise have gone. In my own public health career, for one reason or another, I have gotten to work and learn inside a ham processing plant, numerous restaurants, many hospitals, many schools, a county jail, a facility for the developmentally disabled, a hotel, a recreational water park, sports competition and work out areas, sunny docks on the northern Washington state coastline, rural snow-blanketed cabins, a Catholic shrine, a village in India, abandoned houses, and the homes of the Amish. I could go on, but it is not necessary. Equally remarkable is that the list of another epidemiologist is likely to be different, but not less diverse. What makes it possible to work in so many completely different environments is a good
grounding in basic epidemiological principles, including
the steps of outbreak investigation and other epidemiological methods, as well as healthy doses of common sense, perseverance, and humility.

Outbreak investigations are a type of field epidemiology. However, an epidemiologist working in the field need not be involved in an outbreak. If the epidemiologist is involved in an outbreak, it does not have to be caused by an infectious disease. This book provides a spectrum of investigations from many countries that illustrate the unique and genuinely interesting world of field epidemiology, while teaching and reviewing scientific and epidemiological methods and facts that derive from a broad spectrum of investigations and careers investigating public health problems in the field. Compared to many other countries, field epidemiology is highly developed within the United States. As a result, this book includes more examples from the United States than elsewhere. However, excellent work is performed throughout the world and training programs are emerging that are helping to bridge the gap.

This book is not intended to replace an epidemiology textbook, but rather to complement it. Given its unique style, it does not and cannot realistically review all epidemiological methods. The methods that are reviewed are those that happen to be relevant to the investigations included. In fact, some methods are mentioned but not explained because to do so would interrupt the flow of the case study too much and the methods are better addressed in authoritative epidemiology or biostatistics textbooks. This book is intended to illustrate the application of epidemiologic methods and to demonstrate to its readers how interesting epidemiology can be. It also provides readers who have not yet selected their career path with an idea of what this work can be like. As I have read and reread each of these chapters in the preparation of this book, I found myself drawn to the story and excited by each example of a real-world application of information that may have been taught during the acquisition of a public health degree or would need to be learned afterwards in the work world. It was common for authors to tell me how much they enjoyed writing the chapter. The enjoyment of experiencing these investigations comes through in their writing and illustrates how special this kind of work can be.

It is my intention to reach out to both the experienced and less experienced investigator, students interested in any of the applications of field epidemiology, as well as anyone interested in the study of epidemics by presenting extraordinary and illustrative investigations. It is my hope that these outbreak descriptions will clarify what was involved in the investigation beyond what is found in a published scientific article. The first-person style is intended to create a reader-friendly format that is more like a story that can entertain while instructing. They also provide a context for the investigations by introducing the reader to where the authors were in their careers at the time, with whom they were working, and the real-world conditions they had to face while practicing field epidemiology. In an article titled “In Philadelphia 30 Years Ago, an Eruption of Illness and Fear” written for The New York Times by Lawrence K. Altman recalling the Legionnaires’ disease outbreak of 1976, he described an interview with a patient that left the epidemiologic team unable to explain why that patient developed the disease, but four other Legionnaires, with whom he spent a great deal of time, did not develop the disease. He goes on to recognize that dead ends like these in epidemiologic investigations are not what scientific journals publish. The concise and focused scientific article that becomes what most persons know of the outbreak investigation (along with other factors) “creates a false impression that investigations and discoveries are simpler than they really are.” (The New York Times, August 1, 2006). These investigations are typically very complex and bring together many challenges, including recalling and applying epidemiologic knowledge; making numerous decisions, often quickly and under stressful conditions; working as a team that includes team members one has never worked with before; working in an environment away from the office where most of one’s resources are located; and many more.

These examples of applied field epidemiology are appropriate for students interested in infectious disease outbreaks and students interested in noninfectious disease topics such as environmental health, cancer, substance abuse, and other chronic diseases. In fact, it is healthy for an education in infectious disease epidemiology to include exposure to the approach and tools used by persons who investigate chronic disease and environmental health problems and vice versa. A broader understanding of investigation can lead to creative and useful ideas during future investigations. Within these chapters, one finds the intersection of behavioral, environmental, and political factors that influence real public health decisions.

It is a privilege to be able to access this information because some issues that are relevant to epidemiologic investigation do not arise during epidemiology training through traditional textbooks. Yet the speed of an investigation and even its success could be influenced by the level of the investigators’ familiarity with these issues. Many field epidemiologists gain such exposure only through practice, including trial and error, or through
exposure to great mentors. This book intends to bridge the gap between the inexperienced and the experienced by offering more complete information about what happened, why decisions were made in a certain way, and even the working conditions and little pains or pleasures of the investigator. Candid accounts should not be taken for granted, because sometimes not everyone involved feels comfortable revealing how things unfolded. In fact, in the preparation of this book, one investigation was completely written in an entertaining and educational fashion, but was not cleared by the agency with the authority to do so. There were many valuable lessons from that investigation, but it is uncertain if and when those lessons will ever be shared. Because clearance was not given, it was not published in this book.

Some of these chapters deal with events that unfolded quickly (like poisonings and most infectious disease outbreaks), while other chapters review a career with selected experiences presented and lessons learned along the way or an investigation that took many months or years to complete. Not every investigation results in a slam-dunk definitive answer or involves cooperation from those who have a stake in the results. That's the real world, as opposed to a television episode. This book desires to present the real world. Therefore, such investigations are included despite their possible limitations or loose ends. And finally, some chapters simply reveal how certain kinds of applications of epidemiology were carried out, whether it involved recruiting children to be bled as part of a seroepidemiologic study, creating a survey intended for a difficult to access population, or experiencing work within a unique setting like a school system.

Readers will likely recognize that a few chapters are much longer than others. This was not an accident of editing, but a conscious decision to have certain topics expanded to allow a fuller discussion of the investigation or the circumstances in which it took place. Therefore, instructors might choose to teach or assign reading from the longer chapters into two parts.

At the end of the chapters are learning questions. The authors or I have written these questions to stimulate review of important material presented in the chapter and class discussion. They are not intended to be a complete review of all the material presented. Therefore, students or instructors will find it beneficial to identify other epidemiologic issues or methods, judgment calls, and lessons learned in the chapters as both a teaching tool and possibly a way of testing from the book.

How do you enter a career that includes field epidemiology? Many of the authors share a glimpse into their entry into this work. Often, it includes training or working for local, state, or federal government. The most famous training program in the United States is the Centers for Disease Control and Prevention’s two-year Epidemic Intelligence Service (EIS) program (http://www.cdc.gov/eis/index.html). This program is mentioned in many of the chapters because it is an excellent program for learning surveillance and field epidemiology methods while applying them to current important public health problems. Typically, persons accepted into the EIS have a professional degree, such as a PhD, MD, VMD, or equivalent. The Council of State and Territorial Epidemiologists, in partnership with other organizations including the CDC, also has a program known as the CDC/CSTE Applied Epidemiology Fellowship (http://www.cste.org). Persons who are recent masters- or doctoral-level graduates in epidemiology or a related field are placed with mentors (much like the EIS program) in state or federal programs. Some programs are offered elsewhere in the world. For example, the European Centre for Disease Prevention and Control has the European Programme for Intervention Epidemiology Training program and many countries around the world now offer epidemiology training similar to the EIS program through collaboration with the CDC’s Field Epidemiology Training Program (FETP http://www.cdc.gov/globalhealth/FETP/). There are other opportunities to get experience and readers are encouraged to speak to their local and state health departments to explore possible training, employment, and volunteer opportunities. Enjoy reading this book. I hope that it will stimulate many students to pursue the exciting and challenging work of field epidemiology and that it will be helpful to the many public health professionals who work in the field.

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Photo courtesy of the Editor, Mark S. Dworkin
Mark S. Dworkin, MD, MPH&TM, FACP, is a medical epidemiologist and is board certified in internal medicine and infectious diseases. After receiving his medical degree from Rush Medical College (Chicago), he trained in Internal Medicine at Rush Presbyterian St. Luke’s Medical Center and in Infectious Diseases at Tulane University Medical Center, he also obtained a Master’s Degree in Public Health and Tropical Medicine from the Tulane University School of Tropical Medicine and Public Health in New Orleans. He then served for two years in the Centers for Disease Control and Prevention’s (CDC) Epidemic Intelligence Service stationed at the Washington State Department of Health where he investigated many outbreaks including those due to pertussis, Salmonella, Cryptosporidium, Trichinella, and measles. Dr. Dworkin worked at the CDC in Atlanta for four years in the Division of HIV/AIDS Prevention and performed many epidemiologic analyses related to opportunistic infections. During 2000 to 2006, he was the Illinois Department of Public Health State Epidemiologist in the Division of Infectious Diseases and team leader for the rapid response team (an outbreak investigation team). He is now an associate professor in the Division of Epidemiology and Biostatistics at the University of Illinois at Chicago School of Public Health and an attending physician at the HIV outpatient Core Center of the John H. Stroger, Jr. Hospital of Cook County (formerly Cook County Hospital) and provides on-call coverage to a private practice infectious disease group in the Chicago area. Dr. Dworkin lectures at Northwestern University and the University of Chicago. He has authored or co-authored many scientific publications on various topics including outbreak investigations, surveillance, HIV/AIDS opportunistic infections, salmonellosis, tick-borne illnesses, and vaccine-preventable infections. Current research interests include food safety education of restaurant food handlers, persons with AIDS, and a variety of consumer populations. Additional information may be viewed at this web page: http://tigger.uic.edu/~mdworkin/Dworkinweb.htm. Dr. Dworkin has been awarded both the Commendation Medal and the Achievement Medal by the United States Public Health Service.

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