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Methods in

FIELD EPIDEMIOLOGY



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Dedication

To my husband, Daniel, and my parents, Gillan and Donald.

In memory of my brother, Ian MacDonald, who provided
unwavering support of my endeavors during his lifetime.

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PREFACE

This genesis of this book occurred while I was a Centers for Disease Control and Prevention Epidemic Intelligence Service (EIS) officer assigned to the North Carolina Division of Public Health. I was in the midst of my first outbreak investigation and turned searchingly to the only field epidemiology textbook available at the time for specific guidance. I found the book fell short in describing with enough detail the many aspects of conducting an outbreak investigation. I needed more direction and instructions on how to carry out the important components that make up an outbreak investigation. The scope of this book took root during those two years as an EIS officer. Writing a book was daunting, but I felt compelled to work on this gap in the literature in a stepwise fashion. First, I launched the periodical *Focus on Field Epidemiology* (available at <http://nccphp.sph.unc.edu/focus/index.htm>). Each issue was designed to guide an epidemiologist through a facet of an outbreak investigation and other related topics by providing hands-on, practical instructions and examples to illustrate points. Later, I developed a graduate-level online course at the University of North Carolina at Chapel Hill called Methods in Field Epidemiology. As I thought through the course content and the trouble students and practitioners had with certain concepts, many more ideas came to me in terms of content for a textbook on this topic.

This book has been adapted from materials developed for other purposes. To write each chapter, I started with pieces that were developed for *Focus on Field Epidemiology* and the course Methods in Field Epidemiology, as well as other UNC Center for Public Health Preparedness training materials. These works were developed by teams and thus I have not used the term “author” for each of the chapters. The individuals listed as contributors worked on the materials used in writing the chapter text. Any errors are mine. All contributors have reviewed the materials and acknowledged their contributions to the content.

The target audience for this book is students and public health practitioners alike. The book covers many topics and is accompanied by numerous examples to illustrate the concepts. It can be used in academic courses that include topics such as outbreak investigations, applied epidemiology, and using epidemiology in public health practice.

Furthermore, it will be useful to practitioners who seek more direction and guidance to the methods used in field epidemiology, especially outbreak investigation. The chapters stand alone, generally, and follow the process that would be involved in an outbreak investigation. Additional chapters cover specific types of investigation such as forensic epidemiology, contact tracing, and environmental investigations, and resources that might be useful during investigations.

The focus of this book is applied epidemiology and how it is used in public health practice. It is not intended to replace a basic epidemiology textbook, but does go into great depth about using epidemiology in the context of applied public health such as outbreak investigation. Moreover, it is not intended to replace existing procedures or guidelines in local, state, or federal health departments. Instead, it should be used as a resource for training staff and providing further background on specific and sometimes complicated topics. This book is no substitute for experience and great mentorship.

I like to think of myself as a practicing epidemiologist. I borrow that term from physicians who, for their whole lives, say they “practice” medicine. The great thing about saying you practice a profession is that it implies you are constantly learning and building your skills. Epidemiology is much like medicine in that way. There is always more to learn, and experience is the best teacher, particularly when it is gained working as part of a team. I have learned a lot from many collaborators and colleagues. I hope this book is useful to you. I hope it helps you to keep learning, practicing, and protecting the public’s health in whatever capacity you can.

ACKNOWLEDGMENTS

This book was written from materials developed for other purposes, including *Focus on Field Epidemiology* (available at <http://cphp.sph.unc.edu/>), a series of newsletters designed to guide an epidemiologist through a facet of an outbreak investigation and other related topics by providing hands-on, practical instructions and examples to illustrate points; Methods in Field Epidemiology, a graduate-level online course at the University of North Carolina at Chapel Hill; and other training materials developed at the UNC Center for Public Health Preparedness (<http://cphp.sph.unc.edu/>). These source materials were developed by teams, and thus I have many contributors to acknowledge here and on each of the chapters, including: Laura Alexander, Lauren Bradley, Meredith Davis, Jennifer Horney, Morgan Johnson, Sandra McCoy, Sally Mountcastle, Amy Nelson, Sarah Pfau, David Rice, Matthew Simon, Cynthia Snider, Jeanette and Paul Stehr-Green, Michelle Torok, Andrew Voetsch, and Rachel Wilfert. I am very thankful to all the contributors for giving generous time to review the their affiliated chapters. Additionally, I want to thank Sarah Pfau and Gene Matthews, who charitably reviewed Chapter 14 on the topic of forensic epidemiology. Lorraine Alexander was instrumental in developing the *Focus on Field Epidemiology* periodical. Furthermore, I am very grateful to the Council to Improve Foodborne Outbreak Response (CIFOR) for allowing us to reprint a section of their *Guidelines for Foodborne Disease Outbreak* Response about the agencies that become involved in foodborne disease investigations. It is the best review of this topic I have ever seen. I wholeheartedly thank David Rice, whose help with writing and editing this work was instrumental. His persistence and commitment to seeing the book completed is greatly appreciated. I want to thank my father, Donald MacDonald, whose unrelenting enthusiasm for this project was often greater than my own, and my mother, Gillan MacDonald, who has forever been supportive of all that I do, big and small. Finally, I want to thank my husband, Daniel Rodríguez, for his constant encouragement for this work.

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Dr. MacDonald received a PhD in epidemiological sciences from the University of Michigan in Ann Arbor and an MPH in infectious disease epidemiology from Yale University and is certified in public health. From 2000 to 2002, Dr. MacDonald was an Epidemic Intelligence Service officer with the Centers for Disease Control and Prevention (CDC) assigned to the North Carolina Division of Public Health, Communicable Disease Branch.

During Dr. MacDonald's tenure with the CDC, she worked on a variety of infectious disease outbreak investigations. These included outbreaks of human and canine blastomycosis, histoplasmosis among adventure travelers to Nicaragua, tuberculosis in an inner city social network, and *Streptococcus* group A toxic shock syndrome. She was also involved in many foodborne disease outbreak investigations, among them listeriosis in the Hispanic community associated with noncommercial Mexican-style fresh cheese, statewide *Salmonella* Enteritidis associated with eggs from a certain multi-state distributor, gastrointestinal illness associated with *Staphylococcus aureus* contaminated food at a wedding, restaurant-associated *Salmonella* Heidelberg, and gastrointestinal illness associated with *Clostridium* perfringens at a large company picnic. Through the Team Epi-Aid program she has continued to be involved in outbreak investigations in collaboration with state and local health departments such as hepatitis B, HIV, foodborne diseases, influenza, and SARS.

Dr. MacDonald's work is focused on infectious disease surveillance, outbreak investigation, foodborne disease epidemiology, public health systems research, and public health workforce epidemiologic capacity development. She has authored or co-authored many scientific publications on these topics.