Essentials of Infectious Disease Epidemiology

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Dedication

For Magus, Hero, & Gryphon Magnus
with love and with gratitude
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The chance to write a textbook does not present itself every day, and it is a rare honor to develop a work that will go into the hands and minds of students of public health and epidemiology. For this I thank Mike Brown at Jones and Bartlett, Inc., as well as Katey Birtcher, Tracey Chapman, and the wonderful production crew at Jones and Bartlett. I appreciate their giving me the opportunity to write this text, and for believing in the importance of public health education. I also thank Dr. Richard Riegelman, the series editor, who provided me with the opportunity to share in his passion for educating undergraduate and introductory students in public health; without his ongoing encouragement and input, this book would not be a reality. To my students, colleagues, and friends who were supportive and helpful in reviewing and commenting upon the text, a heartfelt thanks to you for helping this to be a better book. I am indebted to the authors of books, research, and articles who have taught me so much, especially to those who created the vast number of resources available through the Centers for Disease Control and Prevention, Health Resources Services Administration, and the National Institutes of Health, without which many of the vivid examples would not be accessible.

To my family, never-ending are my thanks for your love and support.

To you, kind reader, I am hopeful that when you use this text, you feel the thrill of methods in infectious disease epidemiology—and see the vast potential to improve the public health through creative application of the epidemiologic toolkit.

In loving memory of my grandmother, Dr. Ida Russakoff Hoos, 1912–2007.
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ABOUT THE EDITOR:

Richard Riegelman, MD, MPH, PhD, is professor of Epidemiology-Biostatistics, Medicine, and Health Policy and founding dean at George Washington University School of Public Health and Health Services in Washington, DC.
I hope to have written the book I always wanted to study, but could never find:

One that provides methodologic training going beyond jargon, beyond complexity, to find the simple utility that epidemiology offers. The toolkit that epidemiology provides is powerful, yet sometimes can be lost in its detail. The goal of this text is to find the essential core of the methods, and then see them applied to examples from real-life public health and research.

The layout of this book is designed to mimic your own notebooks: lecture notes in the middle, applied notes in the boxes. This format will enable you to know where to look for the information you need at all times, and simplify assimilation of this powerful methodology.

Epidemiologic methods offer a unique approach to answering questions and dissecting relationships between exposures and outcomes. This text applies these methods to infectious disease, one of the most important public health issues we face today.

I hope that this book excites you and serves as an impetus for future learning. As we evolve, we need epidemiologists who can address emerging and re-emerging infections with creativity and enthusiasm more than ever before.

—Manya Magnus, PhD, MPH
Manya Magnus, PhD, MPH, is an Associate Professor in the Department of Epidemiology and Biostatistics, with a secondary appointment in the Department of Health Policy, at the George Washington University School of Public Health and Health Services. Dr. Magnus is co-director of the School's MPH Epidemiology Program and co-director of the Graduate Certificate in HIV/AIDS Studies. Dr. Magnus received her BA from the University of California, San Diego, and her MPH and PhD from Tulane University. Always interested in integrating research with clinical care, Dr. Magnus has collaborated on a variety of epidemiologic studies, including randomized controlled clinical trials, cohort studies, and case-control studies. She now applies epidemiologic methodology to evaluate programs on the local, state, and national level, including CDC-sponsored behavioral surveillance, and Special Projects of National Significance funded by the HIV/AIDS Bureau of the Health Services Resources Administration. Dr. Magnus also participates in a variety of other HIV- and STD-related research activities. The primary focus of her research is HIV/AIDS among women, children, adolescents, and other vulnerable populations, and includes clinical trials, observational studies, and innovative approaches to evaluation research. She also has a side interest in maternal-child health, specifically infertility and decision-making behavior among pregnant women.
If you want to learn to think like an epidemiologist, Essentials of Infectious Disease Epidemiology opens the door, turns on the lights, and leads you on the journey. It teaches you to read the scientific literature as well as the daily news. It provides an introduction to the key methods and the essential questions addressed by epidemiology.

To understand the uniqueness of Essentials of Infectious Disease Epidemiology you need to appreciate what it is not. It is not a textbook of infectious disease. It is not a textbook of statistical methods. It is not another textbook of epidemiology. Rather, it is as Dr. Magnus writes, the book "I always wanted to study but could never find."

Infectious diseases, for better or worse, represent much of the history as well as the future of public health. Understanding the methods used to investigate their cause and their impact provides an important window on issues of health and disease. Essentials of Infectious Disease Epidemiology emphases what is sometimes called "shoe leather" epidemiology. These are basic methods used by epidemiologists who roll up their sleeves, collect the data directly from the affected community, and analyze the data without the need for the latest high-powered computer or statistical technique.

In exploring infectious disease epidemiology, you will ask the basic question such as the who, when, and where of an outbreak or epidemic. You will come to appreciate what we mean when we say a particular bug or pathogen is the cause of a disease. You will understand what is implied when we say that a vaccine or treatment works. You will learn to ask the basic questions, think about the methods for answering the questions, and appreciate the meaning of the results.

As editor of the Essential Public Health series, I am delighted to have Essentials of Infectious Disease Epidemiology included in our series. It captures the spirit of the series by providing an approachable and engaging introduction. It provides a solid grounding and important insights plus the motivation and resources to continue the journey. The Reader to accompany Essentials of Infectious Disease Epidemiology will provide the types of resources needed to help you continue on your way to applying what you have learned.

And now to quote Dr. Magnus: "Let the fun begin."

Richard Riegelman, MD, MPH, PhD
Series Editor—Essential Public Health