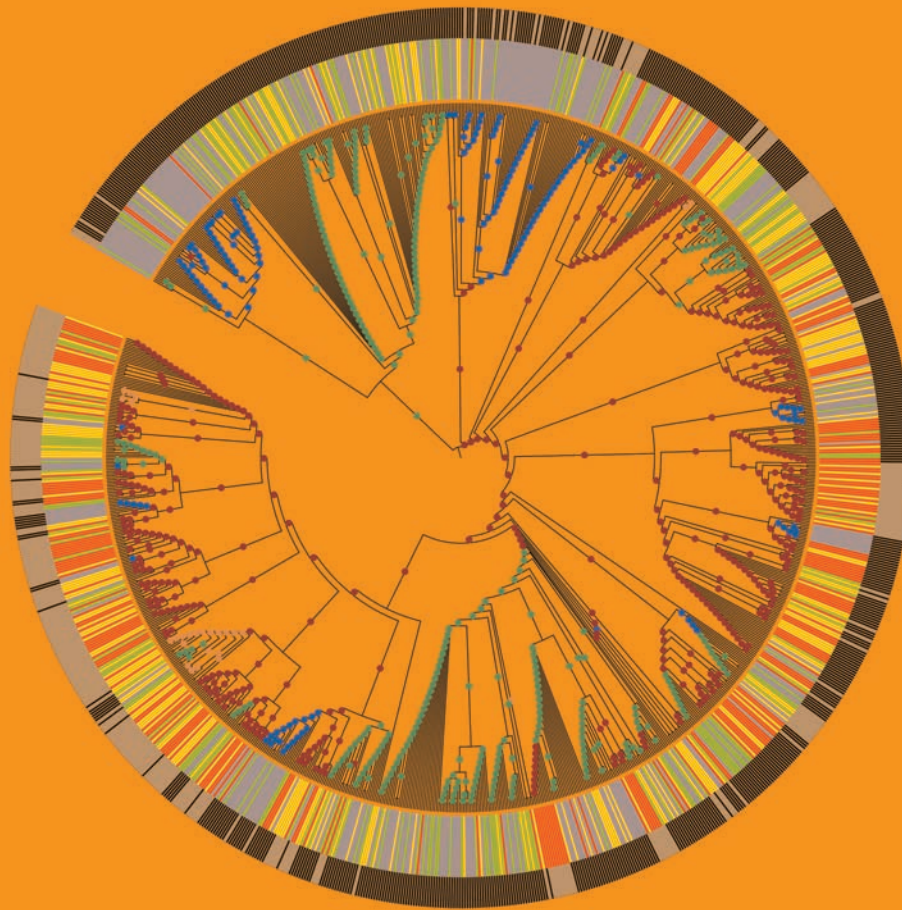


# INTRODUCTION TO EPIDEMIOLOGY

SEVENTH EDITION



Courtesy of Lawrence David, Dana Hunt, Eric Alm, and Martin Polz.

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To our son Andrew—who keeps us smiling.





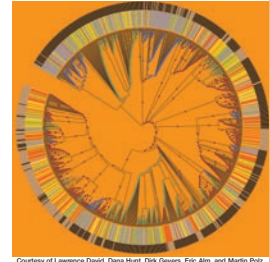
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The field of epidemiology has come a long way since the days of infectious disease investigations by scientists such as Louis Pasteur, Robert Koch, and John Snow. Historically, the main causes of death were due to a single pathogen, a single cause of disease. Epidemiologists had the challenge of isolating a single bacterium, virus, or parasite. In modern times, advances in nutrition, housing conditions, sanitation, water supply, antibiotics, and immunization programs have resulted in a decrease in various infectious diseases but an increase in many noninfectious diseases and conditions. Consequently, the scope of epidemiology has expanded to include the study of acute and chronic noninfectious diseases and conditions. Advances in biology, medicine, statistics, and social and behavioral sciences have greatly aided epidemiologic study.

This book was written as an introductory epidemiology text for the student who has minimal training in the biomedical sciences and statistics. *Introduction to Epidemiology* is based on the premise that the advanced analyses of empirical research studies, using advanced statistical methods, are more akin to biostatistics than to epidemiology and, therefore, receive less attention in this book. Many recent books bearing the title of epidemiology are in fact biostatistics books, with limited information on the basics of epidemiological investigations or the study of epidemics. Epidemiology is unique from biostatistics in that emphasis is placed on completing the causal picture in human populations. Identifying causal factors and modes of transmission, with the assistance of statistical tools and biomedical information, reflect the primary aim of epidemiology. This book maintains that focus.

Chapter 1 presents the foundations of epidemiology, including definitions, concepts, and applications. Chapter 2 covers historical developments in epidemiology. Chapter 3 looks at several important disease concepts in epidemiology. Chapters 4 through 6 focus on descriptive epidemiology and present several design strategies and statistical measures. Chapter 7 presents

design strategies and statistical methods used in analytic epidemiology. Chapter 8 covers design strategies and ethical issues relevant to experimental studies. Chapter 9 considers the basics of causal inference. Chapter 10 focuses on basic concepts and approaches used in field epidemiology. Chapter 11 presents chronic disease epidemiology. Chapter 12 presents epidemiology in clinical settings.



Epidemiology is a fun and challenging subject to study, as well as an interesting field to pursue as a career. Most undergraduate and graduate degree programs in public health, environmental health, occupational health and industrial hygiene, health education and health promotion, health services administration, nursing, and other health-related disciplines require a basic introductory course in epidemiology.

*Introduction to Epidemiology* covers the fundamentals of epidemiology for students and practitioners. It is hoped that this book will be a useful and practical source of information and direction for students of epidemiology in the classroom and for those practicing epidemiology in the field. Readers of this book may be specialists in international projects in developing countries, industrial hygienists within major industrial plants, infectious disease nurses in hospitals and medical centers, chronic disease epidemiologists in government agencies, behavioral scientists conducting health epidemiological investigations, or staff epidemiologists in local public health departments.

## ABOUT THE AUTHOR

**Ray M. Merrill, PhD, MPH**, received his academic training in statistics and public health. In 1995, he was named a Cancer Prevention Fellow at the National Cancer Institute, where he worked in the Surveillance Modeling and Methods Section of the Applied Research Branch. In 1998, he joined the faculty of the Department of Health Science at Brigham Young University in Provo, Utah, where he has been active in teaching and research. In 2001, he spent a sabbatical working in the Unit of Epidemiology for Cancer Prevention at the International Agency for Research on Cancer Administration in Lyon, France. He has won various awards for his research and is a Fellow of the American College of Epidemiology and of the American Academy of Health Behavior. He is the author of more than 250 peer-reviewed publications, including *Environmental Epidemiology*, *Reproductive Epidemiology*, *Principles of Epidemiology Workbook*, *Fundamentals of Epidemiology and Biostatistics*, *Behavioral Epidemiology*, and *Statistical Methods in Epidemiologic Research* (all with Jones & Bartlett Learning). Dr. Merrill teaches classes in epidemiology and biostatistics and is a full professor in the Department of Health Science, College of Life Sciences, at Brigham Young University.

The seventh edition of this classic text, like its previous editions, continues its mission of providing a comprehensive introduction to the field of epidemiology. Emphasis is placed on application of the basic principles of epidemiology according to person, place, and time factors in order to solve current, often unexpected, serious public health problems. Direction is given for how to identify and describe public health problems, formulate research hypotheses, select appropriate research study designs, manage and analyze epidemiologic data, interpret study results, and apply the results in preventing and controlling disease and health-related events. Real-world public health problems involving both infectious and chronic diseases and conditions are presented throughout the text.

Additions to this edition include a greater emphasis on epidemiology in international settings, causality, disease transmission, as well as updated tables, figures, examples, and conclusions throughout the text. News Files are now included in each chapter. A section on modern epidemiology was added, which presents a number of statisticians who helped advance several sound methods of scientific investigation.

This seventh edition offers an easy and effective approach to learning epidemiology, and the case reports (Appendix I) and current News Files represent applications of commonly used research designs in epidemiology. The chapter topics were selected to represent the fundamentals of epidemiology. Learning objectives are presented at the beginning of each chapter, and the chapters are divided into concise sections with several examples. Figures and tables are used to summarize and clarify important concepts and information. Key terms are bolded in the text and defined. A glossary of these terms is included. Study questions are provided at the end of each chapter.

