

# **Reproductive Epidemiology**

## **Principles and Methods**

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*In Memory of Rose and Martell Hodson*



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# ABOUT THE AUTHOR

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Ray M. Merrill, PhD, MPH, MS has been actively involved in epidemiology since his professional career began in 1995. As a Cancer Prevention Fellow at the National Cancer Institute, he worked with leading researchers in the area of cancer epidemiology. In 1998, he joined the faculty in the Department of Health Science at Brigham Young University, Provo, Utah, where he continued his research in epidemiology. Since 1999, he has also held an adjunct faculty position in the Department of Family and Preventive Medicine at the University of Utah. In 2001, he spent a sabbatical working in the Unit of Epidemiology for Cancer Prevention at the International Agency for Research on Cancer Administration, Lyon, France. He has won various awards for his research in epidemiology and is currently a Fellow of the American College of Epidemiology. He teaches various classes in epidemiology and biostatistics and is the author of over 150 peer-reviewed publications. Dr. Merrill is currently a full professor of epidemiology and biostatistics at Brigham Young University.





# PREFACE

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The branch of epidemiology that involves reproduction is called reproductive epidemiology. The primary aim of reproductive epidemiology is to describe and provide information about the distribution and determinants of reproductive-related health states or events in human populations. The application of this study is intended to promote complete physical, mental, social, spiritual, emotional, and environmental health as they relate to the reproductive health system and its functions and processes.

This book introduces epidemiology students and health practitioners to a range of methods used to collect data and conduct analysis in reproductive epidemiology. The focus is to provide a guide on the use of methods appropriate for challenging and sensitive research topics, which include sexual behavior, abortion, illicit drug use, and sexual abuse. The latter part of the book involves application of these methods to specific conditions associated with reproduction.

This book was written as an introductory text for the student who has minimal training in the biomedical sciences and statistics. Epidemiology is unique from biostatistics and in that emphasis is placed on completing the causal picture. Identifying causal factors and modes of transmission, with the assistance of statistical tools and biomedical information, reflects a primary focus in this book.

This book is divided into two sections: Section I, “Foundations and Methods in Reproductive Epidemiology,” and Section II, “Applications of Reproductive Epidemiology.” Section I consists of Chapters 1 through 7. Chapter 1 presents the foundations of reproductive epidemiology, including definitions, concepts, and applications of the field. How reproductive epidemiology contributes to public health is addressed. Chapter 2 considers the full range of existing environments as they relate to reproduction: the physical, chemical, biological, and psychosocial environments; the inner versus outer environment; the personal versus ambient environment; and the solid, liquid, and gaseous environments. Chapter 3 presents the different phases of the research process in the context of reproductive

health. Chapter 4 develops public health surveillance for monitoring birth defects and other reproductive disorders. Chapter 5 presents a number of health indicators commonly used for characterizing various dimensions of reproductive health. Chapter 6 presents several design strategies and statistical measures for investigating reproductive health problems. Selected challenges sometimes encountered in applying these study designs in human reproduction are considered. Chapter 7 presents selected concepts in causal theory and criteria for establishing cause–effect associations. Section II consists of Chapters 8 through 13. Chapter 8 focuses on the association between malnutrition (overnutrition and undernutrition) during pregnancy and reproductive health problems. Chapter 9 addresses issues associated with contraception in selected regions throughout the world. Chapter 10 provides an in-depth assessment of the influence mercury, lead, and environmental estrogen exposure has on reproductive health. Chapter 11 examines associations between marriage and health, clinical abortions and health, and female circumcision practices and health. Chapter 12 presents maternal health, social, and economic consequences associated with early age at first birth. Chapter 13 addresses the risk of selected cancers in the mother associated with early and late maternal age at first birth.