



Book Review

Raj Bhopal, Concepts of Epidemiology: Integrating the Ideas, theories, Principles, and Methods of Epidemiology, 2nd Ed., Oxford University Press, New York, 2008

Choosing an introductory textbook for graduate students in epidemiology can be a daunting task. Many competing texts cover similar concepts – causal inference, study design, analysis of data, surveillance, screening, etc. They differ in their emphasis on chronic vs. infectious diseases, level of detail in describing and illustrating specific study designs, emphasis on epidemiology in clinical practice vs. discovery of lifestyle or environmental risk factors, and in the assumed level of mathematical and statistical competency of the student.

In the Second Edition of “Concepts of Epidemiology” (Bhopal, 2008) Raj Bhopal, Professor of Public Health at the University of Edinburgh, has thoughtfully considered all of these distinguishing points and has crafted a beginning textbook with many strengths, particularly in fulfilling the subtitle’s promise of “Integrating the ideas, theories, principles, and methods of epidemiology.” He has organized his book in unusual way. Where most textbooks tick off epidemiological concepts linearly, Bhopal dwells on defining and measuring population and disease in early chapters, and does not introduce effect measures such as risk ratio, rate ratio, and odds ratio until nearly two-thirds of the way into the book. This layout emphasizes concepts and their interrelationships, while abundant examples prevent it from becoming overly theoretical and pedantic.

Pedagogical uniformity and meticulous attention to definitions and details give the book its defining shape. Every chapter begins with learning objectives in the form, “On completion of this chapter you should understand ...” The student who internalizes each crisply stated objective and then works his or her way through the chapter should have little difficulty in determining whether and when each objective has been met. Each chapter progresses through its objectives in a systematic fashion, with considerable cross-referencing of concepts presented in previous chapters (and occasional look-aheads to later chapters), constantly building on the foundation established so far. For example, one objective of Chapter 6 is to understand “that the key to successful screening is a simple test, which can be applied to large populations with minimum harm and has a high degree of accuracy in separating those who need more detailed investigation from those who don’t.” In another text this could presage an immediate introduction to sensitivity, specificity, and predictive values, but Bhopal takes a more studied course. The chapter begins with the technical and ethical challenges to studying the natural history of disease, then recaps patterns of disease in populations, and finally introduces the metaphoric “iceberg of disease” concept. Only then is screening introduced and illustrated with numbers and graphs. But that is only half of the chapter. Still to be covered are the impact on screening of measurement error (building on concepts of error and bias from Chapter 4), and the impact of screening in health care service delivery. This holistic approach will leave the student with a strong appreciation of screening as an element of health care delivery and not simply an isolated concept.

Among many other strengths are an abundance of worked out problems and references to relevant literature that follow each chapter. The sections on bias and causal inference could serve as excellent study

material for students preparing for a doctoral methods exam. Risks, rates, and the concept of person-time are elegantly untangled (Sect. 7.3), and their relationship to prevalence is explained, with a useful comment (p. 218) on the inappropriate but commonplace use of “prevalence rate.”

The book is not without some weaknesses. The author’s preface states that the language level is structured to “meet the needs of students whose main language is not English ...” I am not certain that this goal has been completely met. Witness sentences such as “Rothman’s interacting component causes model (Fig. 5.11) has emphasized that the causes of disease comprise a constellation of factors.” (p. 139).

The text is preceded by an 11 page glossary of medical terms that might be of value to those without a medical background, but in this Wikipedia era is probably unnecessary. The selection of terms seems haphazard and is interspersed with biographical entries for 24 individuals, whose relevance to epidemiology is clearer for some (e.g., Lind, Berkson) than for others (Einstein, Ramanujan).

Concepts of genetics are compressed into 9 pages in an insubstantial and almost cartoonish fashion. There is not enough material to serve as an introduction to genetic epidemiology and examples drawn from modern studies of genetic epidemiology are absent.

I was disappointed by the treatment of study design and data analysis. Most textbook authors use cohort studies as a conceptual takeoff point from which effect measures such as risk and rate ratios seem “natural” analytic tools. They often begin with randomized clinical trials (RCTs) as the “gold standard” and work their way down through observational studies. Bhopal, however, reverses the order and introduces effect measures as well as attributable risk in Chapter 8. Only then does he lay out the major study designs in Chapter 9, working his way up from case series, which is given pride of place in its ability to elucidate the natural history of disease, followed by cross-sectional, case-control, cohort, and RCT designs. This order of presentation has potential to confuse the student, because it treats each design as a separate entity and ignores their underlying relationships. It especially overlooks the rapid evolution of theory of biostatistical analysis of case-control studies during the past decade or so. The nested case-control design is mentioned in a table (p. 342) but not in the text. Matched case-control designs are scarcely considered. Bhopal considers population-based case-control studies but not hospital-based studies or other design variants. The increasingly popular case-cohort design is not covered.

On balance, I would strongly recommend this as a supplementary text that can double as a study guide for the serious graduate student in epidemiology. However, because of its unusual organization and somewhat dated material, I would hesitate to use it as the sole textbook.

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