The Public Health Consequences of Disasters

Edited by Eric K. Noji

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As a public health problem, disasters are highlighted by the amount of loss of life, destruction, morbidity, and disruption they cause. The use of the term *disaster* is determined by the ability of the community to deal with the acute situation, and our efforts at developing systems for disaster preparation and response aim at making the community better equipped to deal with the acute situation. Thus, by making the community better organized, we may be able to cope with some disasters and possibly eventually shift some of these acute situations out of the realm of disasters. For the epidemiologist, disasters offer an opportunity to become involved in acute problem solving situations. The parallels between disasters and epidemics in terms of investigative and problem solving approaches are many. For a number of the younger generation of epidemiologists, disasters are where the mantles of the epidemiologists are tested, as in the epidemics of 100 years ago.

This book presents succinctly the public health impact of all major disasters. The book is divided into four sections. The first section deals with general issues of epidemiology, surveillance, disease control, environmental health, and media relations. Sections II-IV deal with more specific disaster situations, which include geophysical events, weather-related problems, and human-generated problems. Throughout these chapters, there is a strong emphasis on epidemiology. Each of the chapters dealing with specific disasters presents information about prevention and control and critical knowledge gaps. Most common methodological problems in epidemiology during disasters are adequately covered in the book as well as the important issues with each of the major types of disasters. Separate chapters deal with earthquakes, volcanoes, cyclones, tornadoes, heat waves, cold environments, floods, famine, air pollution, industrial disasters, fires, nuclear reactor accidents, and complex emergencies with refugees and other populations.

The editor and the authors of the book are experienced experts in the field of disaster mitigation and response. Almost all of the authors are from the Centers for Disease Control and Prevention (CDC). The book successfully expands on the earlier limited publication by the CDC (1) similarly entitled *The Public Health Consequences of Disasters 1989*. As acknowledged by Dr. Noji, the earlier CDC publication "served as the basis and inspiration for this book."

Although the book has multiple authors for the different chapters, the contents of each of the chapters follow a standard approach, addressing some of the core issues with the specific disaster under consideration. These core issues include a state-of-the-art description of the issues, a presentation of approaches for prevention and control, identification of critical knowledge gaps, some methodological problems, and research recommendations to improve disaster preparedness. The book has much very useful and practical information for students and managers of disaster situations—for example, chapter 1 has a unique listing of myths and realities about disasters that stems from years of the authors' involvement in disaster response. Such practical information is embedded in almost all chapters of the book.

As with any of the books that deal with disasters, one can identify a number of elements that could strengthen a future edition. With regard to epidemiologic methodology, more emphasis could be placed on investigative and analytic methodologies like case-control methods and studies that are concerned with documenting longer term consequences of disasters using the cohort approach—for example, the methodological issues of setting up the classic longitudinal studies of atomic bomb survivors could have received better coverage in this book. As with other health information systems, surveillance must serve a decision process. It would have been very useful to incorporate in the discussion on surveillance a presentation of the important decisions one needs to make when involved in a disaster situation.

Other aspects of this book that the authors might like to reconsider include the chapter title "Complex Emergencies: Refugee and Other Populations." Much of what is discussed in this chapter is the result of wars. Each of the chapters in sections II-IV is titled by etiology of the disaster rather than its consequences. There is no reason why this chapter should be the exception. There is a very clear understanding of what war is; we do not need to divert our focus from this most important man-made disaster by calling it a "complex emergency." In addition, students using this book may benefit from some organizing framework or paradigm that underlies the assessment of disasters and the development of programs for mitigation. Improvements of existing models, such as the one developed by Michel Lechat (Brussels, Belgium) or others,

may be useful for such purposes. The book could also benefit from a concluding chapter comparing the different types of disasters, identifying some of the common issues, and integrating the general lessons to be learned from a review of these major disasters.

This book will become the standard text for students of disasters in epidemiology and public health. It is comprehensive, well organized, and informative; and it fills an important gap in the available literature on the subject. It is to be recommended as a textbook for courses on disasters and as a standard reference for personal or institutional libraries.

REFERENCES

1. Gregg MB, ed. The public health consequences of disasters 1989. Atlanta, GA: Department of Health and Human Services, Public Health Service, Centers for Disease Control, 1989.

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Measurement Error in Nonlinear Models

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This is a timely and well-written monograph on a topic of great importance in epidemiologic research, namely the correction of estimators (e.g., odds ratio estimators) and inferences for measurement error in predictor variables (e.g., exposure and confounding variables). Such measurement errors may well be the source of various controversies in epidemiology, for example, controversies concerning the role of dietary factors, physical activity factors, and certain environmental exposures in the etiology of major chronic diseases. This book provides a useful compilation of important strategies to reduce measurement error bias, and it will help to dispel certain myths concerning measurement error effects (e.g., nondifferential measurement error always attenuates the odds ratio toward unity).

The book appears to be written primarily for a statistical audience, although the authors have been careful to signpost the more technical material, deferring much of it to the final section of specific chapters and to a concluding technical appendix. The authors are also to be commended for incorporating comments on the basic ideas behind each modeling strategy, and on the likely emphasis of future developments, throughout the text. In spite of these efforts, some epidemiologists will find the book difficult technically. In fact, considerable technicality is inherent in this measurement error modeling topic. The authors provide helpful guidance in the preface as to which more technical sections may be skipped in an initial reading.

The book can be divided into four sections. In the introductory chapters 1 and 2, the authors provide several epidemiologic examples where measurement error in predictor variables may be important and review some measurement error results from linear regression, a topic addressed in detail in the classic book by Fuller (1). Chapters 3–6 contain much of the meat of the book. The focus is the relation between a vector X of predictor variables, which cannot be measured directly, and a response variable Y, in the presence of additional well-measured covariates Z. In chapters 3 and 4, it is assumed that one can observe a variable W, which is related to X. The regression calibration approach (chapter 3) involves replacing the unobserved X by an estimate of $E(X \mid Z, W)$ and using standard regression parameter estimation procedures (e.g., logistic regression) with appropriately corrected standard error estimates. Strong assumptions, typically including an additive error model $W = X + U$ with error U, which has a mean of zero and is independent of X, and repeat W observations, which have uncorrelated measurement errors, are invoked to estimate $E(X \mid Z, W)$. The simulation-extrapolation approach (chapter 4), pioneered by the authors, requires similar modeling assumptions and proceeds by estimating regression parameters with various specific amounts of additional simulated measurement error added to U, followed by an extrapolation of such estimates back to the no measurement error ($U \equiv 0$) situation. In chapter 5, these same strategies are considered when rather than repeat W values having uncorrelated measurement error, one has a single measurement $W = X + U$ along with a correlate T of X (a so-called instrumental variable) that need not be unbiased for X but that is independent of U. These estimation procedures tend to