Epidemiological Studies

Second Edition

Following on in the footsteps of its acclaimed and popular predecessor, this new edition builds on the successful features that engaged readers of the first edition: it explains the nuts and bolts of epidemiology and serves as a handbook for those who wish to do epidemiology; it uses relevant exercises and examples, taken from real life, to illustrate how to set up a study; it aims to help produce valid results that will satisfy grant bodies, ethical committees and journal editors; ultimately it bridges the gap between theory and practice. By making the subject so easily accessible, it will be an excellent introduction for anyone who is training in epidemiology and public health, and for all those involved in medical research. This edition includes numerous improvements and several new chapters which will further enhance its appeal and usefulness.

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A Practical Guide

Second Edition

Alan J. Silman
The Medical School, University of Manchester
and
Gary J. Macfarlane
The Medical School, University of Manchester

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Contents

PART III STUDYING ASSOCIATIONS BETWEEN RISK FACTORS AND DISEASE

PART IV SELECTION OF POPULATIONS AND SAMPLES TO STUDY

Scope of this volume

A quick browse through the epidemiology section of medical libraries and bookshops reveals that most volumes with 'epidemiology' in their title are either theoretical texts covering the concepts of the discipline, with varying degrees of biostatistical complexity, or are reviews of the available 'epidemiological' data on one disease or a group of related diseases. The problem with the latter is that such reviews, often out of necessity, present the available published data without critically reviewing the studies that lead to their generation. In this volume an attempt has been made to bridge the gap between concept and result and to provide a practical guide to epidemiological practice. It is therefore written as a handbook to those who wish to do epidemiology, rather than restricting its aim to those who wish to understand the discipline. The underlying theme, however, has been how to complete a study without compromising validity (in its broadest sense). The hope therefore is that sufficient guidance is provided to produce work that will satisfy grant bodies, ethical committees and journal editors and reviewers.

This volume has taken a deliberate 'holistic' view of epidemiological method. The practical issues, for example, of approaching potential study populations, maximising response and questionnaire design, are similarly independent of the epidemiological study design chosen.

The volume is divided into a number of parts. The first part provides the uninitiated with a list of subjects that are relevant for the application of epidemiological method and follows this with an outline of the main problem areas in undertaking epidemiological research. The remainder of the book aims to cover these issues systematically in completing an epidemiological study.

The second part addresses the options available for measuring the occurrence of disease and methodological considerations in comparing occurrence between populations and over time.

The third part focuses on the choice of an appropriate design to address the questions posed. As such, this part acts also as an introduction to the underlying concepts behind the varying options for choice of study. The objective is that this part provides sufficient material to enable the investigator to choose and justify the optimal method(s) for study.

The fourth part covers the problems inherent in selecting populations for study. The relative merits of the different choices available are discussed together with the practical issues of how to recruit subjects, including, for example, suggestions for letters of invitation. In this part as in the sections on analysis in Part VI, the separate requirements of different study approaches, for example case control and cohort studies, are considered individually.

The fifth part addresses the problems of data collection within epidemiological studies with the objective of selecting the most effective survey method to achieve the goals targeted. Practical issues covered include the assessment of validity and reproducibility of survey methods, suggestions for design of survey instruments and a detailed account of how to maximise participation, possibly the greatest practical problem in conducting a survey. These issues are also considered collectively in the section on conducting a pilot study.

The sixth part covers analysis and interpretation of the data collected. The first focus is on the preparation of data for analysis, including the important but often ignored steps of checking for data errors and ensuring a clean set of data for subsequent analysis. Chapters 16 and 17, on introductory epidemiological data analysis, are not meant to be a substitute for the necessary detailed information on this topic that is required to be obtained from statistics textbooks and the manuals accompanying analytical software packages. Their aim is to provide the necessary formulae with simple worked examples to permit the investigator to understand how measures of occurrence and effect are calculated and to undertake these on a hand calculator. These chapters assume only a limited knowledge of statistics such as an understanding of summary measures (e.g. the mean), and measures of dispersion (e.g. standard deviation). It will also be necessary to understand the concept behind statistical significance testing and particularly the use and limitations of the confidence interval. The subsequent chapters cover the topics of confounding and bias, with the goal that the investigator

will be able to assess the impact, if any, of these phenomena on the results obtained.

The final part covers two important practical areas: how to ensure that a proposed study is ethically sound and how to minimise the costs of undertaking studies.

The text is liberally illustrated with examples from many areas of medicine in an attempt to clarify the points made. Many of the examples are drawn from the real life experience of the authors and their colleagues, others are based on reports of research, both published and unpublished, with the remainder unapologetically invented to illustrate a point where necessary.

Finally, where appropriate, exercises are set at the end of a chapter, with model solutions provided at the end of the book.

Acknowledgements

From first edition

The genesis of this volume lies in the organisation of a teaching programme in epidemiology to those entering public health in the southeast of England. There was a clear need for those students to receive sufficient training to undertake simple epidemiological studies themselves. With no appropriate practical guide available, a course was developed to achieve this goal. With suitable refinements resulting from continuing feedback from the participants, the material developed for this course formed the basis of the current volume. I therefore acknowledge the contribution made by successive cohorts of attenders. The material has grown and altered in further discussions with clinical colleagues in both primary and hospital care who have themselves desired to dip their toes into the fascinating waters of epidemiological science.

I am, however, particularly grateful to my close colleagues Peter Croft, Deborah Symmons and Paul Brennan for their frank and constructive criticisms as the work has progressed; any errors or confusions that remain are mine. My secretary Cath Barrow has worked tirelessly and cheerfully and has coped with substantial rewrites without complaint.

Second edition

The second edition has further benefited from feedback of both staff and postgraduate students at the School of Epidemiology and Health Sciences, University of Manchester. In addition, Lesley Jordan has ably and willingly co-ordinated the administrative work involved in producing this revised edition.