

Statistics In Epidemiology Methods Techniques And Applications

This book examines statistical methods and models used in the fields of global health and epidemiology. It includes methods such as innovative probability sampling, data harmonization and encryption, and advanced descriptive, analytical and monitoring methods. Program codes using R are included as well as real data examples. Contemporary global health and epidemiology involves a myriad of medical and health challenges, including inequality of treatment, the HIV/AIDS epidemic and its subsequent control, the flu, cancer, tobacco control, drug use, and environmental pollution. In addition to its vast scales and telescopic perspective; addressing global health concerns often involves examining resource-limited populations with large geographic, socioeconomic diversities. Therefore, advancing global health requires new epidemiological design, new data, and new methods for sampling, data processing, and statistical analysis. This book provides global health researchers with methods that will enable access to and utilization of existing data. Featuring contributions from both epidemiological and biostatistical scholars, this book is a practical resource for researchers, practitioners, and students in solving global health problems in research, education, training, and consultation.

Written by a biostatistics expert with over 20 years of experience in the field, Bayesian Methods in Epidemiology presents statistical methods used in epidemiology from a Bayesian viewpoint. It employs the software package WinBUGS to carry out the analyses and offers the code in the text and for download online. The book examines study designs that investigate the association between exposure to risk factors and the occurrence of disease. It covers introductory adjustment techniques to compare mortality between states and regression methods to study the association between various risk factors and disease, including logistic regression, simple and multiple linear regression, categorical/ordinal regression, and nonlinear models. The text also introduces a Bayesian approach for the estimation of survival by life tables and illustrates other approaches to estimate survival, including a parametric model based on the Weibull distribution and the Cox proportional hazards (nonparametric) model. Using Bayesian methods to estimate the lead time of the modality, the author explains how to screen for a disease among individuals that do not exhibit any symptoms of the disease. With many examples and end-of-chapter exercises, this book is the first to introduce epidemiology from a Bayesian perspective. It shows epidemiologists how these Bayesian models and techniques are useful in studying the association between disease and exposure to risk factors.

This volume, representing a compilation of authoritative reviews on a multitude of uses of statistics in epidemiology and medical statistics written by internationally renowned experts, is addressed to statisticians working in biomedical and epidemiological fields who use statistical and quantitative methods in their work. While the use of statistics in these fields has a long and rich history, explosive growth of science in general and clinical and epidemiological sciences in particular have gone through a sea of change, spawning the development of new methods and innovative adaptations of standard methods. Since the literature is highly scattered, the Editors have undertaken this humble exercise to document a representative collection of topics of broad interest to diverse users. The volume spans a cross section of standard topics oriented toward users in the current evolving field, as well as special topics in much need which have more recent origins. This volume was prepared especially keeping the applied statisticians in mind, emphasizing applications-oriented methods and techniques, including references to appropriate software when relevant. · Contributors are internationally renowned experts in their respective areas · Addresses emerging statistical challenges in epidemiological, biomedical, and pharmaceutical research · Methods for assessing Biomarkers, analysis of competing risks · Clinical trials including sequential and group sequential, crossover designs, cluster randomized, and adaptive designs · Structural equations modelling and longitudinal data analysis

Handbook of Spatial Epidemiology explains how to model epidemiological problems and improve inference about disease etiology from a geographical perspective. Top epidemiologists, geographers, and statisticians share interdisciplinary viewpoints on analyzing spatial data and space–time variations in disease incidences. These analyses can provide important information that leads to better decision making in public health. The first part of the book addresses general issues related to epidemiology, GIS, environmental studies, clustering, and ecological analysis. The second part presents basic statistical methods used in spatial epidemiology, including fundamental likelihood principles, Bayesian methods, and testing and nonparametric approaches. With a focus on special methods, the third part describes geostatistical models, splines, quantile regression, focused clustering, mixtures, multivariate methods, and much more. The final part examines special problems and application areas, such as residential history analysis, segregation, health services research, health surveys, infectious disease, veterinary topics, and health surveillance and clustering. Spatial epidemiology, also known as disease mapping, studies the geographical or spatial distribution of health outcomes. This handbook offers a wide-ranging overview of state-of-the-art approaches to determine the relationships between health and various risk factors, empowering researchers and policy makers to tackle public health problems.

An Applied Treatment of Modern Graphical Methods for Analyzing Categorical Data Discrete Data Analysis with R: Visualization and Modeling Techniques for Categorical and Count Data presents an applied treatment of modern methods for the analysis of categorical data, both discrete response data and frequency data. It explains how to use graphical meth

Statistical ideas have been integral to the development of epidemiology and continue to provide the tools needed to interpret epidemiological studies. Although epidemiologists do not need a highly mathematical background in statistical theory to conduct and interpret such studies, they do need more than an encyclopedia of "recipes." Statistics for Epidemiology achieves just the right balance between the two approaches, building an intuitive understanding of the methods most important to practitioners and the skills to use them effectively. It develops the techniques for analyzing simple risk factors and disease data, with step-by-step extensions that include the use of binary regression. It covers the logistic regression model in detail and contrasts it with the Cox model for time-to-incidence data. The author uses a few simple case studies to guide readers from elementary analyses to more complex regression modeling. Following these examples through several chapters makes it easy to compare the interpretations that emerge from varying approaches. Written by one of the top biostatisticians in the field, Statistics for Epidemiology stands apart in its focus on interpretation and in the depth of understanding it provides. It lays the groundwork that all public health professionals, epidemiologists, and biostatisticians need to successfully design, conduct, and analyze epidemiological studies.

Mismeasurement of explanatory variables is a common hazard when using statistical modeling techniques, and particularly so in fields such as biostatistics and epidemiology where perceived risk factors cannot always be measured accurately. With this perspective and a focus on both continuous and categorical variables, Measurement Error and Misclassi

Highly praised for its broad, practical coverage, the second edition of this popular text incorporated the major statistical models and issues relevant to epidemiological studies. Epidemiology: Study Design and Data Analysis, Third Edition continues to focus on the quantitative aspects of epidemiological research. Updated and expanded, this edition shows students how statistical principles and techniques can help solve epidemiological problems. New to the Third Edition New chapter on risk scores and clinical decision rules New chapter on computer-intensive methods, including the bootstrap, permutation tests, and missing value imputation New sections on binomial regression models, competing risk, information criteria, propensity scoring, and splines Many more exercises and examples using both Stata and SAS More than 60 new figures After introducing study design and reviewing all the standard methods, this self-contained book takes students through analytical methods for both general and specific epidemiological study designs, including cohort, case-control, and intervention studies. In addition to classical methods, it now covers modern methods that exploit the enormous power of contemporary computers. The book

also addresses the problem of determining the appropriate size for a study, discusses statistical modeling in epidemiology, covers methods for comparing and summarizing the evidence from several studies, and explains how to use statistical models in risk forecasting and assessing new biomarkers. The author illustrates the techniques with numerous real-world examples and interprets results in a practical way. He also includes an extensive list of references for further reading along with exercises to reinforce understanding. Web Resource A wealth of supporting material can be downloaded from the book's CRC Press web page, including: Real-life data sets used in the text SAS and Stata programs used for examples in the text SAS and Stata programs for special techniques covered Sample size spreadsheet An introduction to classical biostatistical methods in epidemiology Biostatistical Methods in Epidemiology provides an introduction to a wide range of methods used to analyze epidemiologic data, with a focus on nonregression techniques. The text includes an extensive discussion of measurement issues in epidemiology, especially confounding. Maximum likelihood, Mantel-Haenszel, and weighted least squares methods are presented for the analysis of closed cohort and case-control data. Kaplan-Meier and Poisson methods are described for the analysis of censored survival data. A justification for using odds ratio methods in case-control studies is provided. Standardization of rates is discussed and the construction of ordinary, multiple decrement and cause-deleted life tables is outlined. Sample size formulas are given for a range of epidemiologic study designs. The text ends with a brief overview of logistic and Cox regression. Other highlights include: Many worked examples based on actual data Discussion of exact methods Recommendations for preferred methods Extensive appendices and references Biostatistical Methods in Epidemiology provides an excellent introduction to the subject for students, while also serving as a comprehensive reference for epidemiologists and other health professionals. For more information, visit www.wiley.com/mathematics

A practical guide to the most important techniques available for longitudinal data analysis, essential for non-statisticians and researchers.

The Handbook of Epidemiology provides a comprehensive overview of the field and thus bridges the gap between standard textbooks of epidemiology and dispersed publications for specialists that have a narrowed focus on specific areas. It reviews the key issues and methodological approaches pertinent to the field for which the reader pursues an expatiated overview. It thus serves both as a first orientation for the interested reader and as a starting point for an in-depth study of a specific area, as well as a quick reference and recapitulatory overview for the expert. The book includes topics that are usually missing in standard textbooks.

Quantitative Research Methods for Health Professionals: A Practical Interactive Course is a superb introduction to epidemiology, biostatistics, and research methodology for the whole health care community. Drawing examples from a wide range of health research, this practical handbook covers important contemporary health research methods such as survival analysis, Cox regression, and meta-analysis, the understanding of which go beyond introductory concepts. The book includes self-assessment exercises throughout to help students explore and reflect on their understanding and a clear distinction is made between a) knowledge and concepts that all students should ensure they understand and b) those that can be pursued by students who wish to do so. The authors incorporate a program of practical exercises in SPSS using a prepared data set that helps to consolidate the theory and develop skills and confidence in data handling, analysis and interpretation.

This well-organized and clearly written text has a unique focus on methods of identifying the joint effects of genes and environment on disease patterns. It follows the natural sequence of research, taking readers through the study designs and statistical analysis techniques for determining whether a trait runs in families, testing hypotheses about whether a familial tendency is due to genetic or environmental factors or both, estimating the parameters of a genetic model, localizing and ultimately isolating the responsible genes, and finally characterizing their effects in the population. Examples from the literature on the genetic epidemiology of breast and colorectal cancer, among other diseases, illustrate this process. Although the book is oriented primarily towards graduate students in epidemiology, biostatistics and human genetics, it will also serve as a comprehensive reference work for researchers. Introductory chapters on molecular biology, Mendelian genetics, epidemiology, statistics, and population genetics will help make the book accessible to those coming from one of these fields without a background in the others. It strikes a good balance between epidemiologic study designs and statistical methods of data analysis.

"Data collection holds an essential part in dictating the future of health sciences and public health, as the compilation of statistics allows researchers and medical practitioners to monitor trends in health status, identify health problems, and evaluate the impact of health policies and programs. Methods and Applications of Statistics in the Life and Health Sciences serves as a single, one-of-a-kind resource on the wide range of statistical methods, techniques, and applications that are applied in modern life and health sciences in research. Specially designed to present encyclopedic content in an accessible and self-contained format, this book outlines thorough coverage of the underlying theory and standard applications to research in related disciplines such as biology, epidemiology, clinical trials, and public health. Uniquely combining established literature with cutting-edge research, this book contains classical works and more than twenty-five new articles and completely revised contributions from the acclaimed Encyclopedia of Statistical Sciences, Second Edition. The result is a compilation of more than eighty articles that explores classic methodology and new topics."--Publisher's description.

The Encyclopedia of Epidemiology presents state-of-the-art information from the field of epidemiology in a less technical and accessible style and format. With more than 600 entries, no single reference provides as comprehensive a resource in as focused and appropriate manner. The entries cover every major facet of epidemiology, from risk ratios to case-control studies to mediating and moderating variables, and much more. Relevant topics from related fields such as biostatistics and health economics are also included.

Essential Statistical Methods for Medical Statistics presents only key contributions which have been selected from the volume in the Handbook of Statistics: Medical Statistics, Volume 27 (2009). While the use of statistics in these fields has a long and rich history, the explosive growth of science in general, and of clinical and epidemiological sciences in particular, has led to the development of new methods and innovative adaptations of standard methods. This volume is appropriately focused for individuals working in these fields. Contributors are internationally renowned experts in their respective areas. · Contributors are internationally renowned experts in their respective areas · Addresses emerging statistical challenges in epidemiological, biomedical, and pharmaceutical research · Methods for assessing Biomarkers, analysis of competing risks · Clinical trials including sequential and group sequential, crossover designs, cluster randomized, and adaptive designs · Structural equations modelling and longitudinal data analysis

Teaching epidemiology requires skill and knowledge, combined with a clear teaching strategy and good pedagogic skills. The general advice is simple: if you are not an expert on a topic, try to enrich your background knowledge before you start teaching. The new edition of Teaching Epidemiology helps you to do this and, by providing world-expert teachers' advice on how best to structure teaching, providing a unique insight into what has worked in their hands. This book will help you to tailor your own epidemiology teaching programme. The fourth edition of this established text has been fully revised and updated, drawing on new research findings and recently developed methods including research technologies in genetic epidemiology and method development in relation to causal analysis. Analytical tools provide teachers in the field with the skills to guide students at both undergraduate and postgraduate levels. Each chapter in Teaching Epidemiology comprises key concepts in epidemiology, subject specific methodologies, and disease specific issues, to provide expert assistance in the teaching of a wide range of epidemiology courses.

Epidemiologic studies provide research strategies for investigating public health and scientific questions relating to the factors that cause and prevent ailments in human populations. Statistics in

Epidemiology: Methods, Techniques and Applications presents a comprehensive review of the wide range of principles, methods and techniques underlying prospective, retrospective and cross-sectional approaches to epidemiologic studies. Written for epidemiologists and other researchers without extensive backgrounds in statistics, this new book provides a clear and concise description of the statistical tools used in epidemiology. Emphasis is given to the application of these statistical tools, and examples are provided to illustrate direct methods for applying common statistical techniques in order to obtain solutions to problems. Statistics in Epidemiology: Methods, Techniques and Applications goes beyond the elementary material found in basic epidemiology and biostatistics books and provides a detailed account of techniques:

The goal of this book is multidimensional: a) to help reviving Statistics education in many parts in the world where it is in crisis. For the first time authors from many developing countries have an opportunity to write together with the most prominent world authorities. The editor has spent several years searching for the most reputable statisticians all over the world. International contributors are either presidents of the local statistical societies, or head of the Statistics department at the main university, or the most distinguished statisticians in their countries. b) to enable any non-statistician to obtain quick and yet comprehensive and highly understandable view on certain statistical term, method or application c) to enable all the researchers, managers and practitioners to refresh their knowledge in Statistics, especially in certain controversial fields. d) to revive interest in statistics among students, since they will see its usefulness and relevance in almost all branches of Science.

Highly praised for its broad, practical coverage, the second edition of this popular text incorporated the major statistical models and issues relevant to epidemiological studies. Epidemiology: Study Design and Data Analysis, Third Edition continues to focus on the quantitative aspects of epidemiological research. Updated and expanded, this edition

Statistics are a vital skill for epidemiologists and form an essential part of clinical medicine. This textbook introduces students to statistical epidemiology methods in a carefully structured and accessible format with clearly defined learning outcomes and suggested chapter orders that can be tailored to the needs of students at both undergraduate and graduate level from a range of academic backgrounds. The book covers study design, disease measuring, bias, error, analysis and modelling and is illustrated with figures, focus boxes, study questions and examples applicable to everyday clinical problems. Drawing on the authors' extensive teaching experience, the text provides an introduction to core statistical epidemiology that will be a valuable resource for students and lecturers in health and medical sciences and applied statistics, health staff, clinical researchers and data managers.

Environmental epidemiology is the study of the environmental causes of disease in populations and how these risks vary in relation to intensity and duration of exposure and other factors like genetic susceptibility. As such, it is the basic science upon which governmental safety standards and compensation policies for environmental and occupational exposure are based. Profusely illustrated with examples from the epidemiologic literature on ionizing radiation and air pollution, this text provides a systematic treatment of the statistical challenges that arise in environmental health studies and the use epidemiologic data in formulating public policy, at a level suitable for graduate students and epidemiologic researchers. After a general overview of study design and statistical methods for epidemiology generally, the book goes on to address the problems that are unique to environmental health studies, special-purpose designs like two-phase case-control studies and counter-matching, statistical methods for modeling exposure-time-response relationships, longitudinal and time-series studies, spatial and ecologic methods, exposure measurement error, interactions, and mechanistic models. It also discusses studies aimed at evaluating the public health benefits of interventions to improve the environment, the use of epidemiologic data to establish environmental safety standards and compensation policy, and concludes with emerging problems in reproductive epidemiology, natural and man-made disasters like global warming, and the global burden of environmentally caused disease. No other book provides such a broad perspective on the methodological challenges in this field at a level accessible to both epidemiologists and statisticians.

This straightforward primer in basic statistics emphasises its practical use in epidemiology and public health, providing an understanding of essential topics such as study design, data analysis and statistical methods used in the execution of medical research.

A practical introduction to epidemiology, biostatistics, and research methodology for the whole health care community This comprehensive text, which has been extensively revised with new material and additional topics, utilizes a practical slant to introduce health professionals and students to epidemiology, biostatistics, and research methodology. It draws examples from a wide range of topics, covering all of the main contemporary health research methods, including survival analysis, Cox regression, and systematic reviews and meta-analysis—the explanation of which go beyond introductory concepts. This second edition of Quantitative Methods for Health Research: A Practical Interactive Guide to Epidemiology and Statistics also helps develop critical skills that will prepare students to move on to more advanced and specialized methods. A clear distinction is made between knowledge and concepts that all students should ensure they understand, and those that can be pursued further by those who wish to do so. Self-assessment exercises throughout the text help students explore and reflect on their understanding. A program of practical exercises in SPSS (using a prepared data set) helps to consolidate the theory and develop skills and confidence in data handling, analysis, and interpretation. Highlights of the book include: Combining epidemiology and bio-statistics to demonstrate the relevance and strength of statistical methods Emphasis on the interpretation of statistics using examples from a variety of public health and health care situations to stress relevance and application Use of concepts related to examples of published research to show the application of methods and balance between ideals and the realities of research in practice Integration of practical data analysis exercises to develop skills and confidence Supplementation by a student companion website which provides guidance on data handling in SPSS and study data sets as referred to in the text Quantitative Methods for Health Research, Second Edition is a practical learning resource for students, practitioners and researchers in public health, health care and related disciplines, providing both a course book and a useful introductory reference.

A thorough, practical reference on the social patterns behind health outcomes Methods in Social Epidemiology provides students and professionals with a comprehensive reference for studying the social distribution and social determinants of health. Covering the theory, models, and methods used to measure and analyze these phenomena, this book serves as both an introduction to the field and a practical manual for data collection and analysis. This new second edition has been updated to reflect the field's tremendous growth in recent years, including advancements in statistical modeling and study designs. New chapters delve into genetic methods, structural confounding, selection bias, network methods, and more, including new discussion on qualitative data collection with disadvantaged populations. Social epidemiology studies the way society's innumerable social interactions, both past and present, yields different exposures and health outcomes between individuals within populations. This book provides a thorough, detailed overview of the field, with expert guidance toward the real-world methods that fuel the latest advances. Identify, measure, and track health patterns in the population Discover how poverty, race, and socioeconomic factors become risk factors for disease Learn qualitative data collection techniques and methods of statistical analysis Examine up-to-date models, theory, and frameworks in the social epidemiology sphere As the field continues to evolve, researchers continue to identify new disease-specific risk factors and learn more about how the social system promotes and maintains well-known exposure disparities. New technology in data science and genomics allows for more rigorous investigation and analysis, while the general thinking in the field has become more targeted and attentive to causal inference and core assumptions

behind effect identification. It's an exciting time to be a part of the field, and *Methods in Social Epidemiology* provides a solid reference for any student, researcher, or faculty in public health. Based on Kahn's *An Introduction to Epidemiological Methods* (Oxford, 1983), this book contains a wealth of new material, including a substantially expanded discussion of the statistical concepts and methods fundamental to epidemiology.

Statistical Analysis of Human Growth and Development is an accessible and practical guide to a wide range of basic and advanced statistical methods that are useful for studying human growth and development. Designed for nonstatisticians and statisticians new to the analysis of growth and development data, the book collects methods scattered through *Biostatistics and Epidemiology/A Primer for Health Professionals* offers practical guidelines and gives a concise framework for research and interpretation in the field. In addition to major sections covering statistics and epidemiology, the book includes a comprehensive exploration of scientific methodology, probability, and the clinical trial. The principles and methods described in this book are basic and apply to all medical subspecialties, psychology and education. The primer will be especially useful to public health officials and students looking for an understandable treatment of the subject.

Developed with students in mind, this comprehensive book covers the use of SAS for epidemiology and public health research in a straightforward manner with a multitude of examples. Includes SAS screen shots, and exercises using real-world data sets.

This book is for anyone who has biomedical data and needs to identify variables that predict an outcome, for two-group outcomes such as tumor/not-tumor, survival/death, or response from treatment. Statistical learning machines are ideally suited to these types of prediction problems, especially if the variables being studied may not meet the assumptions of traditional techniques. Learning machines come from the world of probability and computer science but are not yet widely used in biomedical research. This introduction brings learning machine techniques to the biomedical world in an accessible way, explaining the underlying principles in nontechnical language and using extensive examples and figures. The authors connect these new methods to familiar techniques by showing how to use the learning machine models to generate smaller, more easily interpretable traditional models. Coverage includes single decision trees, multiple-tree techniques such as Random Forests™, neural nets, support vector machines, nearest neighbors and boosting.

As an area of statistical application, environmental epidemiology and more specifically, the estimation of health risk associated with the exposure to environmental agents, has led to the development of several statistical methods and software that can then be applied to other scientific areas. The statistical analyses aimed at addressing questions in environmental epidemiology have the following characteristics. Often the signal-to-noise ratio in the data is low and the targets of inference are inherently small risks. These constraints typically lead to the development and use of more sophisticated (and potentially less transparent) statistical models and the integration of large high-dimensional databases. New technologies and the widespread availability of powerful computing are also adding to the complexities of scientific investigation by allowing researchers to fit large numbers of models and search over many sets of variables. As the number of variables measured increases, so do the degrees of freedom for inferring the association between a risk factor and an outcome of interest. We have written this book, in part, to describe our experiences developing and applying statistical methods for the estimation for air pollution health effects. Our experience has convinced us that the application of modern statistical methodology in a reproducible manner can bring substantial benefits to policy-makers and scientists in this area. We believe that the methods described in this book are applicable to other areas of environmental epidemiology, particularly those areas involving spatial-temporal exposures.

Mathematical and Statistical Estimation Approaches in Epidemiology compiles theoretical and practical contributions of experts in the analysis of infectious disease epidemics in a single volume. Recent collections have focused in the analyses and simulation of deterministic and stochastic models whose aim is to identify and rank epidemiological and social mechanisms responsible for disease transmission. The contributions in this volume focus on the connections between models and disease data with emphasis on the application of mathematical and statistical approaches that quantify model and data uncertainty. The book is aimed at public health experts, applied mathematicians and scientists in the life and social sciences, particularly graduate or advanced undergraduate students, who are interested not only in building and connecting models to data but also in applying and developing methods that quantify uncertainty in the context of infectious diseases. Chowell and Brauer open this volume with an overview of the classical disease transmission models of Kermack-McKendrick including extensions that account for increased levels of epidemiological heterogeneity. Their theoretical tour is followed by the introduction of a simple methodology for the estimation of, the basic reproduction number, R_0 . The use of this methodology is illustrated, using regional data for 1918–1919 and 1968 influenza pandemics.

Many statistical innovations are linked to applications in food science. For example, the student t-test (a statistical method) was developed to monitor the quality of stout at the Guinness Brewery and multivariate statistical methods are applied widely in the spectroscopic analysis of foods. Nevertheless, statistical methods are most often associated with engineering, mathematics, and the medical sciences, and are rarely thought to be driven by food science. Consequently, there is a dearth of statistical methods aimed specifically at food science, forcing researchers to utilize methods intended for other disciplines. The objective of this Brief will be to highlight the most needed and relevant statistical methods in food science and thus eliminate the need to learn about these methods from other fields. All methods and their applications will be illustrated with examples from research literature.

Analytic procedures suitable for the study of human disease are scattered throughout the statistical and epidemiologic literature. Explanations of their properties are frequently presented in mathematical and theoretical language. This well-established text gives readers a clear understanding of the statistical methods that are widely used in epidemiologic research without depending on advanced mathematical or statistical theory. By applying these methods to actual data, Selvin reveals the strengths and weaknesses of each analytic approach. He combines techniques from the fields of statistics, biostatistics, demography and epidemiology to present a comprehensive overview that does not require computational details of the statistical techniques described. For the Third Edition, Selvin took out some old material (e.g. the section on rarely used cross-over designs) and added new material (e.g. sections on frequently used contingency table analysis). Throughout the text he enriched existing discussions with new elements, including the analysis of multi-level categorical data and simple, intuitive arguments that exponential survival times cause the hazard function to be constant. He added a dozen new applied examples to illustrate such topics as the pitfalls of proportional mortality data, the analysis

of matched pair categorical data, and the age-adjustment of mortality rates based on statistical models. The most important new feature is a chapter on Poisson regression analysis. This essential statistical tool permits the multivariable analysis of rates, probabilities and counts.

Spatial epidemiology is the description and analysis of the geographical distribution of disease. It is more important now than ever, with modern threats such as bio-terrorism making such analysis even more complex. This second edition of *Statistical Methods in Spatial Epidemiology* is updated and expanded to offer a complete coverage of the analysis and application of spatial statistical methods. The book is divided into two main sections: Part 1 introduces basic definitions and terminology, along with map construction and some basic models. This is expanded upon in Part II by applying this knowledge to the fundamental problems within spatial epidemiology, such as disease mapping, ecological analysis, disease clustering, bio-terrorism, space-time analysis, surveillance and infectious disease modelling. Provides a comprehensive overview of the main statistical methods used in spatial epidemiology. Updated to include a new emphasis on bio-terrorism and disease surveillance. Emphasizes the importance of space-time modelling and outlines the practical application of the method. Discusses the wide range of software available for analyzing spatial data, including WinBUGS, SaTScan and R, and features an accompanying website hosting related software. Contains numerous data sets, each representing a different approach to the analysis, and provides an insight into various modelling techniques. This text is primarily aimed at medical statisticians, researchers and practitioners from public health and epidemiology. It is also suitable for postgraduate students of statistics and epidemiology, as well professionals working in government agencies.

Describes statistical concepts in plain English with minimal mathematical content, giving an insight into which statistics to believe - and why.

This self-contained account of the statistical basis of epidemiology has been written for those with a basic training in biology. No previous knowledge of the subject is assumed and mathematics is deliberately kept at a manageable level. Based on a highly successful course, this book explains the essential statistics for all epidemiologists.

This book combines applied and theoretical approaches to the analysis of epidemiologic issues. It goes beyond elementary material to deal with real problems generated by disease data, and delves into less usual areas such as the analysis of spatial distributions, survival data, proportional hazards regression, and "computer-intensive" approaches to statistical estimation. Each method discussed in the text is illustrated with examples which include complete sets of data. Using actual data demonstrates the strengths and weaknesses of different analytic approaches in describing a disease process. The goal of the book is to allow the reader to develop a clear understanding of analytic approaches to problems in epidemiologic data analysis without relying on sophisticated mathematics and advanced statistical theory. For the Second Edition a new chapter on the analysis of matched data has been added. This covers both discrete and continuous outcomes and explains both the classic analytic approach and the conditional logistic regression model. New sections have also been added on contingency table data, misclassification, and additive models underlying tabular data. In all the chapters there are new applications and other revisions that make this Second Edition a clearer and more helpful exposition of the way statistical tools are used to analyze epidemiologic data.

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