Chapter 4.6 Health-related risk modelling

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Further reading

1. Jackson JE. A user's guide to principal components. New York, NY: Wiley. 1991.

   Summary of this document: This reading provides information to understand the challenges, considerations, and methods available to measure impact in EDRM.

   This book focuses on principal component analysis (PCA), why this technique is useful in statistical analysis and how it is carried out. It establishes the properties and mechanics of PCA, considers the various inferential techniques required to conduct PCA, examines the use of grouped data with PCA and various methods of interpreting the principal components. The book covers multidimensional scaling, similarity scaling, application of PCA to linear models, principal component regression and principal component ANOVA. In addition, it presents numerous other applications and extensions of PCA. The book concludes with a discussion of factor analysis and other techniques that may be relevant in specific circumstances.

2. Wood SN. Generalized additive models: An introduction with R. Chapman and Hall/CRC. 2006.

   Summary of this document: This reading gives a brief introduction of selected statistical models which are commonly used for health-related risk assessments.

   This 6-chapter textbook is a reference on generalized additive models (GAMs), that is introductory in nature. It provides background information on linear models, linear mixed models, and generalized linear models (GLMs), before presenting a balanced treatment of the theory and applications of GAMs and related models. This book provides several practical examples and information on software implementation. Each chapter contains an extensive set of exercises, with solutions in an appendix or in the book's R data package gamair, to enable use as a course text or for self-study.

3. Gasparrini A. Distributed lag linear and non-linear models in R: the package dlnm. Journal of Statistical Software. 2011: 43(8): 1.

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   This article provides a comprehensive overview of the capabilities of the package dlnm within the statistical environment R and describes the conceptual and practical steps to define, predict the effects and interpret distributed lag non-linear models (DLNMs) with an example of application to real data. Specifically, it considers the general problem of modeling nonlinear or delayed effects, illustrates the development of the methodology (showing the specification, effect prediction and representation of DLNMs), shows an example of alternative modeling approaches and the issue of model selection, discusses specific data requirements, describes potential future developments, and presents final comments on the subject.

4. Vynnycky E, White R. An introduction to infectious diseases modelling. Oxford, UK: Oxford University Press. 2010.

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   This 9-chapter book introduces mathematical models in the context of examining questions in infectious disease control. It provides an introduction to the epidemiology of infections and models, presents how models can be set up, discusses the insights that models provide into the dynamics of infections, age patterns of infections in humans, how chance influences the dynamics of infections and the methods for developing stochastic models, how models deal with contact patterns, how contact patterns influence the transmission and control of sexually transmitted infections (STIs) and provides examples of several 'special' topics in infectious disease modelling. This book includes worked examples, a glossary of key definitions and abbreviations, and is accompanied by online files and solutions to in-text exercises.

5. McSharry P. Parsimonious risk assessment and the role of transparent diverse models. In Risk modeling for hazards and disasters Elsevier. 2018. pp. 263-9.

   Summary of this document: This chapter gives a brief introduction of selected statistical models which are commonly used for health-related risk assessments.

   Chapter 12 (*Parsimonious risk assessment and the role of transparent diverse models*) of the textbook *Risk modeling for hazards and disasters* covers all aspects of catastrophe risk modeling with the purpose of describing risk modeling concepts and use cases, reviewing current model practice and science, and explaining recent developments in the catastrophe modeling space. This chapter discusses the difference between parsimonious models and other loss models (based on a much larger number of variables) and how risk modeling techniques may be used to for example, forecast productivity of commodities.

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