## Contents

**Preface** ix

1 Philosophy of science and introduction to epidemiology 1  
Introduction and learning objectives 1  
1.1 Approaches to scientific research 2  
1.2 Formulating a research question 9  
1.3 Rates: incidence and prevalence 12  
1.4 Concepts of prevention 18  
1.5 Answers to self-assessment exercises 21

2 Routine data sources and descriptive epidemiology 29  
Introduction and learning objectives 29  
2.1 Routine collection of health information 30  
2.2 Descriptive epidemiology 38  
2.3 Information on the environment 46  
2.4 Displaying, describing and presenting data 48  
2.5 Summary of routinely available data 78  
2.6 Descriptive epidemiology in action 87  
2.7 Overview of epidemiological study designs 91  
2.8 Answers to self-assessment exercises 94

3 Standardisation 111  
Introduction and learning objectives 111  
3.1 Health inequalities in Merseyside 111  
3.2 Indirect standardisation: calculation of the standardised mortality ratio (SMR) 114  
3.3 Direct standardisation 119  
3.4 Standardisation for factors other than age 123  
3.5 Answers to self-assessment exercises 124

4 Surveys 129  
Introduction and learning objectives 129  
4.1 Purpose and context 130  
4.2 Sampling methods 133  
4.3 The sampling frame 143  
4.4 Sampling error, confidence intervals and sample size 145  
4.5 Response 160
CONTENTS

4.6 Measurement 164
4.7 Data types and presentation 179
4.8 Answers to self-assessment exercises 184

5 Cohort studies 193
Introduction and learning objectives 193
5.1 Why do a cohort study? 194
5.2 Obtaining the sample 196
5.3 Measurement 199
5.4 Follow-up 202
5.5 Basic presentation and analysis of results 205
5.6 How large should a cohort study be? 223
5.7 Confounding 226
5.8 Simple linear regression 232
5.9 Introduction to multiple linear regression 243
5.10 Answers to self-assessment exercises 249

6 Case-control studies 257
Introduction and learning objectives 257
6.1 Why do a case-control study? 259
6.2 Key elements of study design 265
6.3 Basic unmatched and matched analysis 273
6.4 Sample size for a case-control study 281
6.5 Confounding and logistic regression 284
6.6 Answers to self-assessment exercises 298

7 Intervention studies 307
Introduction and learning objectives 307
7.1 Why do an intervention study? 309
7.2 Key elements of intervention study design 312
7.3 The analysis of intervention studies 318
7.4 Testing more complex interventions 327
7.5 How big should the trial be? 331
7.6 Further aspects of intervention study design and analysis 335
7.7 Answers to self-assessment exercises 351

8 Life tables, survival analysis and Cox regression 363
Introduction and learning objectives 363
8.1 Survival analysis 364
8.2 Cox regression 379
8.3 Current life tables 385
8.4 Answers to self-assessment exercises 389

9 Systematic reviews and meta-analysis 393
Introduction and learning objectives 393
9.1 The why and how of systematic reviews 395
9.2 The methodology of meta-analysis 409
## CONTENTS

9.3 Systematic reviews and meta-analyses of observational studies 422  
9.4 The Cochrane Collaboration 426  
9.5 Answers to self-assessment exercises 429  

10 Prevention strategies and evaluation of screening 433  
Introduction and learning objectives 433  
10.1 Concepts of risk 434  
10.2 Strategies of prevention 438  
10.3 Evaluation of screening programmes 446  
10.4 Cohort and period effects 457  
10.5 Answers to self-assessment exercises 464  

11 Probability distributions, hypothesis testing and Bayesian methods 471  
Introduction and learning objectives 471  
11.1 Probability distributions 473  
11.2 Data that do not ‘fit’ a probability distribution 482  
11.3 Hypothesis testing 488  
11.4 Choosing an appropriate hypothesis test 515  
11.5 Bayesian methods 519  
11.6 Answers to self-assessment exercises 523  

References 527  
Index 529