

Contents

Table List	xi		
Preface	xvii		
1. Key Issues in Epidemiologic Research: An Overview	1	3. Types of Epidemiologic Research	40
1.0 Preview	2	3.0 Preview	41
1.1 Measuring Disease Frequency	3	3.1 Experiments	42
1.2 Problems of Validity	5	3.2 Quasi Experiments	44
1.3 Problems in Controlling for Extraneous Factors	8	3.3 Observational Studies	47
1.4 Concluding Remarks	13	3.4 Concluding Remarks	48
Notation	13	References	49
References	15		
PART I OBJECTIVES AND METHODS OF EPIDEMIOLOGIC RESEARCH	17	4. Design Options in Observational Studies	51
2. Fundamentals of Epidemiologic Research	19	4.0 Preview	52
2.0 Preview	20	4.1 Subject Selection	52
2.1 Epidemiologic Research	20	4.2 Methods of Observation	55
2.2 Etiologic Research	26	4.3 Concluding Remarks	60
2.3 Concluding Remarks	36	References	61
References	37	5. Typology of Observational Study Designs	62
		5.0 Preview	63
		5.1 Basic Designs	63
		5.2 Hybrid Designs	70
		5.3 Incomplete Designs	77
		5.4 Comparing Observational Designs	88
		5.5 Concluding Remarks	92
		References	93

6. Measures of Disease Frequency: Incidence	96	9.2 Summary of Epidemiologic Measures	169
6.0 Preview	97	9.3 Concluding Remarks	176
6.1 Measures in General	97	Notation	176
6.2 Basic Incidence Measures: Risk and Rate	99	Practice Exercises	177
6.3 Estimation of Average Rates	100	References	180
6.4 Estimation of Risk	103		
6.5 Choosing an Incidence Measure	111	PART II VALIDITY OF EPIDEMIOLOGIC RESEARCH	181
6.6 Concluding Remarks	113		
Notation	114	10. Validity: General Considerations	183
Practice Exercises	114		
References	115	10.0 Preview	184
		10.1 Brief Literature Review	185
7. Other Measures of Disease Frequency	117	10.2 Validity and Precision	185
7.0 Preview	118	10.3 Definition of Internal Validity	188
7.1 Prevalence Measures	118	10.4 Direction of Bias	189
7.2 Mortality Measures	122	10.5 Classification of Bias	190
7.3 Age, Period, and Cohort Effects	130	10.6 Concluding Remarks	191
7.4 Concluding Remarks	134	Notation	192
Notation	135	Practice Exercises	192
Practice Exercises	136	References	193
References	138		
		11. Selection Bias	194
8. Measures of Association	140		
8.0 Preview	141	11.0 Preview	195
8.1 Ratio Measures	143	11.1 General Formulation	195
8.2 Difference Measures	150	11.2 Direction of Selection Bias	197
8.3 Other Measures of Association	152	11.3 Examples of Selection Bias	198
8.4 Concluding Remarks	154	11.4 Discussion of the Examples	210
Notation	155	11.5 What Can Be Done About Selection Bias?	212
References	157	11.6 Concluding Remarks	215
		Notation	215
9. Measures of Potential Impact and Summary of the Measures	159	Practice Exercises	216
9.0 Preview	160	References	218
9.1 Measures of Potential Impact	160		
		12. Information Bias	220
		12.0 Preview	221

12.1 Literature Review	222
12.2 Examples of Misclassification in Only the Outcome Variable	224
12.3 Misclassification Bias: General Formulation	228
12.4 Independent Misclassification of Both Exposure and Disease	230
12.5 Correcting for Nondifferential Misclassification	234
12.6 Concluding Remarks	236
Notation	237
Practice Exercises	238
References	240
13. Confounding	242
13.0 Preview	243
13.1 A Working Definition of a Confounder	244
13.2 Some Examples When Controlling for One Extraneous Variable	244
13.3 Should We Perform a Statistical Test to Assess Confounding?	254
13.4 Risk Factors	255
13.5 Single-Risk Factor Confounding: General Principles	257
13.6 Concluding Remarks	258
Notation	258
Practice Exercises	259
References	265
14. Confounding Involving Several Risk Factors	266
14.0 Preview	267
14.1 Definition of Joint Confounding	268
14.2 Variable Selection and Control of Confounding	272
14.3 Concluding Remarks	278
Notation	278

Practice Exercises	279
References	280

PART III PRINCIPLES AND PROCEDURES OF EPIDEMIOLOGIC ANALYSIS **281**

15. Statistical Inferences About Effect Measures: Simple Analysis **283**

15.0 Preview	284
15.1 Hypothesis-testing Procedures	284
15.2 Confidence Interval Procedures	296
15.3 Concluding Remarks	307
Notation	307
Practice Exercises	308
References	310

16. Overview of Options for Control of Extraneous Factors **312**

16.0 Preview	313
16.1 Definition of Control	313
16.2 Reasons for Control	313
16.3 Options for Control	314
16.4 Guidelines Concerning the Choice of Control Option	316
16.5 Concluding Remarks	319
References	319

17. Stratified Analysis **320**

17.0 Preview	321
17.1 Overview of the Procedure	321
17.2 A General Example	324
17.3 Testing for Overall Association	331
17.4 Point Estimation of Overall Effect	340
17.5 Interval Estimation of Effect	351

- 17.6 Extensions to Several Exposure Categories 355
- 17.7 Concluding Remarks 358
Notation 358
Practice Exercises 363
References 374
- 18. Matching in Epidemiologic Studies 377**
- 18.0 Preview 378
- 18.1 Definition of Matching 378
- 18.2 Types of Matching Schemes 378
- 18.3 Advantages and Disadvantages of Category Matching 380
- 18.4 Category Matching: Validity and Efficiency 383
- 18.5 R-to-1 Matching 394
- 18.6 Concluding Remarks 397
Notation 397
Practice Exercises 398
References 402
- 19. Interaction, Effect Modification, and Synergism 403**
- 19.0 Preview 404
- 19.1 Literature Review 405
- 19.2 Synergism 405
- 19.3 Statistical Interaction and Effect Modification 407
- 19.4 Concluding Remarks 415
Notation 415
Practice Exercises 416
References 417
- 20. Modeling: Theoretical Considerations 419**
- 20.0 Preview 420
- 20.1 Linear Logistic Regression Model 421
- 20.2 Maximum Likelihood Estimation and Inference Making 428
- 20.3 Logistic Regression Analysis: Follow-up and Case-Control Studies 433
- 20.4 Confounder Summarization 442
- 20.5 Concluding Remarks 443
Notation 444
References 445
- 21. Modeling: Analysis Strategy 447**
- 21.0 Preview 448
- 21.1 Interaction Assessment 448
- 21.2 Confounding Assessment 455
- 21.3 Concluding Remarks 456
References 456
- 22. Applications of Modeling with No Interaction 457**
- 22.0 Preview 458
- 22.1 Examples Using the Evans County Data 458
- 22.2 Stratified Analysis Results: CAT versus CHD, Controlling for AGE and ECG 458
- 22.3 Logistic Modeling: CAT versus CHD, Controlling for AGE and ECG 461
- 22.4 Results from Other Approaches 468
- 22.5 Concluding Remarks 474
Notation 474
References 475
- 23. Applications of Logistic Regression with Interaction, Using Unconditional ML Estimation 476**
- 23.0 Preview 477
- 23.1 Interaction 477
- 23.2 Point Estimation 482
- 23.3 Interval Estimation 484
- 23.4 Hypothesis Testing 488
- 23.5 Deleting Nonconfounders 489

23.6 Concluding Remarks	490
References	491

24.3 Concluding Remarks	503
Practice Exercises	503
References	507

24. Applications of Modeling: Conditional Likelihood Estimation 492

24.0 Preview	493
24.1 Example: 4-to-1 Matching without Covariates	493
24.2 Example: 2-to-1 Matching with Covariates	496

Appendix A Answers to Selected Exercises	508
--	------------

Appendix B Statistical Tables	513
--------------------------------------	------------

Index	519
--------------	------------