



---

# CONTENTS

---

INTRODUCTION IX

ACKNOWLEDGMENTS XI

## CHAPTER 1: INTRODUCTION TO STATISTICS AND LEVELS OF MEASUREMENT 1

Introduction 2  
Population Versus Sample 4  
Quantitative Versus Qualitative 4  
Independent Versus Dependent Variables 5  
Continuous Versus Categorical Variables 6  
Levels of Measurement 6  
Summary 11  
Review Questions 12

## CHAPTER 2: PRESENTING DATA 19

Frequency Distributions 21  
Percentages 22  
Bar Charts 23  
Histograms 28  
Line Graphs 29  
Scatterplots 29  
Box and Whiskers Plot 30  
Summary 31  
Review Questions 31

## CHAPTER 3: DESCRIPTIVE STATISTICS, PROBABILITY, AND MEASURES OF CENTRAL TENDENCY 41

Descriptive Statistics: Properties of Variables 43  
Measures of Central Tendency 43  
Range and Sample Standard Deviation 44  
Calculating the Standard Deviation 45  
Using a Box and Whiskers Plot to Display Central Tendency and Range 47

## VI CONTENTS

Moving Forward: Inferential Statistics	51
Frequency Distributions Versus Probability Distributions	51
The Normal Distribution	54
Skewed Distributions	56
Summary	57
Review Questions	58

### CHAPTER 4: MEASURING DATA 63

Feasibility	65
Validity	65
Reliability	66
Screening Tests	68
Sensitivity	69
Specificity	69
Positive Predictive Value of a Screen	71
Negative Predictive Value	73
Efficiency	74
Summary	74
Review Questions	75

### CHAPTER 5: SAMPLING METHODS 83

Sampling Methods	84
Probability Sampling	85
Sampling Error Versus Sampling Bias	86
Sampling Distributions	87
Nonprobability Sampling	90
Inclusion and Exclusion Criteria	92
Sample Size	92
Summary	93
Review Questions	93

### CHAPTER 6: GENERATING THE RESEARCH IDEA 99

Hypothesis Testing	100
Statistical Significance	102
Statistical Significance Versus Clinical Significance	104
How Does the Test Statistic Compare to the Null Hypothesis?	106
Applying the Decision Rule	107
Test Statistics and Corresponding $p$ -Values	107
Summary	107
Review Questions	108

**CHAPTER 7: SAMPLE SIZE, EFFECT SIZE, AND POWER 113**

- Effect Size 114
- Type Two Error 117
- A Quick Review of Type One and Type Two Errors 118
- Sample Size 119
- Summary 121
- Review Questions 121

**CHAPTER 8: CHI-SQUARE 127**

- Chi-Square ( $X^2$ ) Test 128
- The Null and Alternative Hypotheses 128
- $2 \times 2$  Table 128
- Degrees of Freedom 129
- Statistical Significance 129
- Direction of the Relationship 129
- When Not to Use Chi-Square: Assumptions and Special Cases 132
- Summary 135
- Review Questions 136

**CHAPTER 9: STUDENT  $t$ -TEST 145**

- The Student  $t$ -Test 146
- The Null and Alternative Hypotheses 152
- Statistical Significance 152
- Degrees of Freedom for Student  $t$ -Tests 152
- Summary 160
- Review Questions 161

**CHAPTER 10: ANALYSIS OF VARIANCE (ANOVA) 171**

- Comparing More Than Two Samples 172
- The Null and Alternative Hypotheses 172
- Degrees of Freedom 174
- Statistical Significance 174
- Appropriate Use of ANOVA 175
- Repeat-Measures ANOVA 176
- Summary 181
- Review Questions 181

**CHAPTER 11: CORRELATION COEFFICIENTS 191**

- Looking for a Relationship in One Sample 192
- The Null and Alternative Hypotheses 192

## VIII CONTENTS

Selecting the Best Correlation Test to Use	193
Direction of the Relationship	193
Sample Size	194
Strength of the Relationship	194
Statistical Significance	194
Appropriate Use of Correlation Coefficients	195
More Uses for Pearson's $r$	195
Summary	198
Review Questions	200

## CHAPTER 12: REGRESSION ANALYSIS 207

Quantifying an Association	208
Summary	239
Review Questions	239

## CHAPTER 13: RELATIVE RISK, ODDS RATIO, AND ATTRIBUTABLE RISK 249

Epidemiology	251
Study Designs Used in Epidemiology	251
Attributable Risk	265
Summary	266
Review Questions	267

## APPENDIX A: TABLES FOR REFERENCE 277

## APPENDIX B: WORKING WITH SMALL SAMPLES 287

## REFERENCES 291

## EPILOGUE 295

## INDEX 297