PRACTICE OF MEDICAL STATISTICS AND RESEARCH METHODOLOGY

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Contents

Preface	i
Dedication	iii
Acknowledgements	iv
Chapter 1 Introduction to Biostatistics	1-26
Chapter 2 Measures of Central Tendency	27-59
Chapter 3 Measures of Dispersion	60-88
Chapter 4 Skewness and Kurtosis	89-103
Chapter 5 Correlation Analysis	104-123
Chapter 6 Regression Analysis	124-138
Chapter 7 Probability Theory	139-155
Chapter 8 Testing of Hypothesis	156-199
Chapter 9 Non-parametric Methods	200-234
Chapter 10 Chi-square Test	235-260
Chapter 11 Design of Experiment	261-329
Chapter 12 Blocking and Confounding	330-346
Chapter 13 Fitting Regression Model	347-376
Chapter 14 Research Methods	377-404

Chapter 15 405-460
Sample Size Determination

Chapter 16 461-500
Sampling Theory

Chapter 17 501-560
Vital Statistics

Chapter 18 561-576
Diagnostic Test

Chapter 19 577-590
Logistic Regression Models

References 591-593

Appendix 594-617

Index 618-629

Preface

This book is intended for medical students, teachers, and researchers to enhance their statistical and research skills. I am delighted to present it. I trust that this book covers the research methodology and medical statistics syllabus of numerous Indian medical universities that are related to the disciplines of MBBS, MD, MS, undergraduate and postgraduate degrees in pharmacy, nursing, and allied health sciences.

This book explores the fundamental principles of medical research and the practice of medical statistics, addressing a variety of issues. Furthermore, this book is intended to facilitate evidence-based medical research and is straightforward to comprehend through self-learning. I anticipate that this book will help address a variety of medical-related issues, including the diagnosis of disease, the identification of disease characteristics, the estimation of treatment or drug effects, the prevention and control of disease, surveillance, and the formulation of health policies.

Each section is elaborated upon in this book through an introduction, significant subheadings, assumptions, explanations, advantages, limitations and an extensive number of problems. The concepts were introduced through the use of schematic charts and figures. Step-by-step explanations were provided for several intricate experimental designs and statistical tests. Each topic was subjected to a systematic computation of the numerous examples. Certain intricate issues were resolved through the use of software such as SPSS, R and Microsoft Excel. Presently, software and artificial intelligence are employed for statistical analysis in research. However, the operation of these technologies necessitates a thorough understanding of the subject matter and the methodology for addressing medical issues. A significant number of exercises were included at the end of each chapter for self-practice, and the corresponding answers were provided in the appendix. Multiple statistical tables were included in the appendix to compute medical problems.

I am optimistic that this book will exhaustively explore the applications of a variety of chi-square tests and non-parametric tests. The chapter on experimental design examines the methodology for estimating single factor experiments, including CRD, RBD, and LSD. In the same manner, $2^2, 2^3$- factorial designs were introduced in the medical field and detailed the methods for estimating different main and interaction effects. The blocks effects were evaluated using the concepts of blocking, and several main and interaction effects were estimated for confounding the factorial designs. The outcomes of experimental designs were incorporated into a simple and multiple linear regression model and model adequacy was also discussed. There was a discussion of the analysis procedures of numerous observational and experimental study designs. The determination of sample size for many kinds of qualitative and quantitative data types was addressed in the medical field. Numerous formulas and examples for sample sizes were presented and resolved in this book. Various probability and non-probability sampling techniques were examined with examples, and the estimation of population characteristics was also addressed. Several types of sources of vital statistics were thoroughly examined. Multiple examples were provided to elucidate the measures of fertility, mortality, and projection. The sensitivity, specificity, PPV, NPV, and likelihood ratios of the diagnostic test were measured and discussed for both qualitative and quantitative data.

I would like to express my gratitude to Shanlax publication for their acceptance of this book for publication. Any suggestions or remarks from readers will be gratefully acknowledged.

Madurai, India S. Kumaresan
2026

Dedication

Dedicated to My Loveable Daughters

Kovarthini
Rubini
Mahizhini

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I sincerely thank students from a variety of fields, including medicine, pharmacy, nursing, and allied health professions, for contributing fresh ideas to the creation of this book.