Models In Epidemiology And Biostatistics
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Preface

'Models In Epidemiology And Biostatistics' [MODELS] is a collection of material suitable for two one-semester graduate courses. It is assumed that anyone taking such courses has a thorough understanding of tests of significance and confidence intervals. Further, one should be familiar with t tests and χ^2 tests in [at least] the simplest of settings. No background in models is assumed. Some experience with Stata is a plus but is not, perhaps, essential. Illustrations in MODELS are given using Stata and, sometimes, using R.

MODELS provides a detailed introduction to models used in Epidemiology and Biostatistics. This material focusses on interpretation of the models and the interpretation of the fits of these models.

The material starts with two-by-two tables and the crucial tenets of confounding and modification are introduced with two-by-two tables. The basics of confounding and modification are provided first. Then, steadily more elaborate forms of confounding and modification are seen. This material then provides the framework for introducing the first model : Logistic Regression.

Many other comparable sets of material [and many textbooks] start with Linear Regression. MODELS does not introduce Linear Regression until Session 13. Linear Regression is the study of the mean of a probability distribution. Other characteristics of a probability distribution are also introduced in MODELS such as the median and the quartiles.

Linear Regression and The Analysis Of Variance remain important in Epidemiology and Biostatistics but their roles are, perhaps, not as dominant as in the past.

MODELS devotes considerable material on interpretation; careful, thorough interpretation. When one carefully interprets one often sees the shortcomings and limitations of a chosen analysis. This becomes glaringly obvious with models assuming additivity.

Accordingly, MODELS devotes several sections to models that do not assume additivity. One then sees notions like saddles and crossings that provide help to interpretation in non-additive situations.

MODELS discusses linearity and the implications of linearity. Then there is quite a bit of material to address forms of non-linearity. Again, the focus is around interpretation.

MODELS uses somewhat more mathematics than most comparable textbooks. The reader of MODELS needs to understand functions, logarithms, exponentials and the graphics needed to see these notions. There is no way to avoid the mathematics if one wants to really get the concepts.

There is a little bit of calculus in the material on 'Time-To-Event' models although attempts to explain these details [with visuals and without calculus] are also given.

Attention is given to Exact methods. Comparisons with Approximate methods are offered. The availability and the viability of Exact methods is changing rapidly with improved algorithms and the speed of computers.