

Chapter 6

Longitudinal Data Analysis for Counts and Binary Outcomes: Generalized Estimating Equations (GEE)

In many settings, the outcomes recorded on individuals are counts or binary responses. In this chapter we extend the theory in the preceding chapters to permit a regression analysis which does not require the mean responses to be linear in X_i . In the univariate setting, the generalized linear model (GLM, McCullagh and Nelder, 1989) offers an approach which unifies linear, log and logistic regression analysis. It was extended to the distribution free multivariate setting by Liang and Zeger (1988) and Zeger and Liang (1988). Extensions of the likelihood approach and the random effects models to the nonlinear setting is more complex; we will review some of the suggested approaches in subsequent chapters. In this chapter, we begin by reviewing the basic ideas for GLM's in the univariate setting, and then discuss the GEE extension to correlated data.