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An Instrumental Variable Approach to Estimation in Logistic Regression Measurement Error Models

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Scientists often have to determine disease patterns using noisy or indirect measurements as covariates. It is not possible to perform a direct statistical analysis of the dependence of a response, such as the presence of absence of a disease, on the covariate measured with error. We consider parameter estimation in logistic regression models with measurement error using an instrumental variable approach. The conditional-scores method of Stefanski and Carroll (1987) is used. We obtain sufficient statistics for the unobserved predictors and the conditional distribution of the observed data given these sufficient statistics. Unbiased score functions that are free of the unknown predictors are then used to derive unbiased estimating equations for the model parameters. This work generalizes that of Buzas and Stefanski (1996) to non-normal instrumental variables. Simulation results and an application to real data are presented to illustrate this method.