EVALUATION OF LOGISTIC–NORMAL BINOMIAL MODEL AS AN ALTERNATIVE TO BINOMIAL MODEL IN ANALYSING CLUSTERED CLINICAL DATA

S. Samita, and S. D. Dharmaratne

University of Peradeniya, Peradeniya, Sri Lanka

Email: ssamita@pdn.ac.lk

The logit model is often used in analysing grouped binary (binomial) data. If the fitted model satisfactory, it is expected that goodness of fit statistics such as Deviance (G^2) to be distributed as χ^2_{n-m} , where *n* is the number of binomial observations and *m* is the number of parameters in the fitted model. A problem encountered in analysing binomial data especially when they are clustered is that, even after fitting the saturated model, the G^2 significantly exceeds χ^2_{n-m} . Fitting the logistic-normal binomial model (LNBM) for several such datasets exhibited substantial improvement compared to fitting the logit model. The principle in LNBM is that the true response probability (θ_i) is assumed to be distributed normally with $E(\theta_i) = \eta_i$ where η_i is the linear predictor from the standard logit model. Then the response probability has a logistic-normal distribution. When the logistic-normal distribution is compounded with the binomial distribution, the response probability has a logit scale and the resulting distribution is logistic normal binomial distribution. The additional parameter in the LNBM is capable of accounting substantial amount of extra variability that cannot be accounted for by the logit model. A consequence of taking extra variability into account is the inflated standard errors of the estimates and there by reducing the type I error. The LNBM is therefore a useful alternative to the logit model in analysing binomial data when the observations are clustered.