

Bayesian Modeling of Rare Events Data with Missing Not At Random

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Abstract: This study is motivated by a meta-analysis for drug safety in clinical trials, when a large number of rare adverse events (AEs) are not reported if they are less frequently observed. As a typical missing not at random problem, if the censored information is ignored, the inference on incidence rate of AEs would be overestimated by nearly 40%. We propose a modified Bayesian multilevel logistic regression model to accommodate the censored sparse binomial event data, and implement in JAGS based on a tailored modeling strategy. We conduct simulation studies to examine the performance of our proposed Bayesian model compared to other popular methods in finite samples under four scenarios. The proposed approach is illustrated using data from a recent meta-analysis of 125 clinical trials involving PD-1/PD-L1 inhibitors with respect to their toxicity profiles.