

Modelling, estimation and diagnostics for longitudinal binary data with dropout

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This paper examines and applies methods for joint modelling of longitudinal binary data subject to both intermittent missingness and dropout. The work is motivated by the "Blue Bay" sanitation study carried out in Salvador, Brazil, and our objective is to evaluate the impact of the sanitation program on the morbidity of diarrhoea in children aged up to 3 years old. In total 926 children were followed up at home twice a week from October 2000 to January 2002, from which daily occurrence of diarrhoea was recorded for each child being followed up. A challenging factor in analysing these data is the presence of both intermittent missing data (average of 78 days per child) and dropout (21% of children).

We discuss modelling strategies and argue the advantages of taking an event history approach with an additive intensity model and dynamic covariates as discussed by Aalen et al (Biometrics, 2004). The additive model will be described and estimation and inference procedures discussed. Non-informative dropout can be taken into account using inverse probability of observation methods, which will be described, with estimates derived from an additive model for time under study. Methods which allow the possibility of informative dropout will be discussed. Diagnostics and model assessment, a so-far undeveloped area within joint modelling, will be considered.