

**GENERALISED BERNOULLI MODEL FOR CORRELATED  
BINARY RESPONSES: APPLICATION TO THE  
NATIONAL INCOME DYNAMICS STUDY (NIDS) DATASETS**

**Mawutor Fleku, Ezekiel N.N.Nortey, Anani Lotsi  
and Kwabena Doku-Amponsah**

University of Ghana

E-mail: kdoku-amponsah@ug.edu.gh

*(Received: November 22, 2017)*

**Abstract:** The bivariate Bernoulli model was used to estimate covariate parameters for conditional as well as marginal models for the NIDs datasets. The covariate parameters were estimated by first expressing the proposed model in the exponential family form, finding the log-likelihood function and then the corresponding estimating equations. The Nelder Mead method of iteration was used to estimate the covariate parameters. The research revealed that the bivariate Bernoulli model fitted bivariate binary response data significantly better than the conditional logistic and the Generalized Estimating Equation (GEE) logistic marginal model. The result was same for both artificial and real-life data.

**Keywords and Phrases:** Correlated binary responses, longitudinal study, joint modeling, pre and post testing, likelihood ratio test.

**2010 Mathematics Subject Classification:** 62J12.

## **1. Introduction**

In longitudinal studies, outcomes are normally taken from same subjects over a period of time. In such situations, there is likely to be correlation between the outcomes. The possibility of correlations between repeated outcomes need to be taken into account when analyzing such data. Using standard statistical models and assuming independence for correlated responses may lead to misleading results particularly, estimation of regression parameters. One therefore, needs a statistical model that takes the dependence in response variables into consideration.