Multilevel Analysis of G.C.E. Ordinary Level Performance of Schools in North-East Provinces

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Multilevel data structure generally consists of multiple units of analysis, one nested within the other. This type of data structure can be discovered in a natural way or as designed experiments. Many types of data that are available in the fields of Education and Medicine have a multilevel data structure. The modelling of multilevel data on various aspects has been developed for several years. However, the area of multilevel modelling for ordinal categorical response is a novel application. The study mainly aimed at finding out whether the time period together with the other factors (i.e. Grade, Gender, Race and School Size) have a significant effect on the General Certificate of Education Ordinary Level (G.C.E. O/L) pass rate of schools in Northern and Eastern Provinces of Sri Lanka While observing the hierarchical structure of the data into Schools and Districts levels, and determining how these levels impact with the G.C.E. O/L pass rates. In this study, the time period has been taken from 2005 to 2014 while it is categorized as war period (from 2005 to 2009) and post-war period (from 2010 to 2014). The application of advanced analysis in this study focused on modelling a two level Generalized Multilevel Ordinal Model using the Bayesian Markov Chain Monte Carlo (MCMC) estimation method from MLwiN 2.10 software. The response variable was the G.C.E. O/L pass rates of Schools. Here, the number of students at first attempt have been considered for the G.C.E. O/L pass rate while explanatory variables were Grade, Gender, Time Period, Race and School Size. 8,455 schools were selected for the sample. In Advanced Analysis of this study, Generalized Multilevel Ordinal Model was developed under two approaches. One approach was to develop a proportional odds model and the second approach was to develop a partial non-proportional odds model. Ultimately, the partial non-proportional odds model based on the DIC diagnostic was selected as the most appropriate model for the data. In the final model, the variable time period provided a significant main effect. It has been proved that the odds ratio of a school having a less than or equal pass rate opposed to a greater pass rate during the post-war period is lower than during the war period in Northern and Eastern provinces of Sri Lanka.

Keywords: Bayesian Method, Education, Multilevel data, Ordinal categorical response, Partial non-proportional odds model

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