

## **Bayesian MCMC approach in prognostic modelling of cardiovascular disease In Malaysia: a convergence diagnostic**

### **ABSTRACT**

Most studies that considered the Bayesian Markov Chain Monte Carlo (MCMC) approach in prognostic modelling of cardiovascular disease were only focused on the application of the Bayesian approach in variable selection, model, and prior distribution choice. Yet rarely of these studies have explored the convergence of Markov chains in the model. In this study, convergence diagnostics were performed using both visual inspection and other diagnostic to assess the convergence of Markov chains. This study analysed 7180 male patients with STElevation Myocardial Infarction (STEMI) from the National Cardiovascular Disease Database-Acute Coronary Syndrome (NCVD-ACS) registry from 2006 to 2013. Six significant variables were identified in the multivariate Bayesian model, namely diabetes mellitus, family history of cardiovascular disease, chronic lung disease, renal disease, Killip class and age group. Based on these significant variables, the trace plots showed no particular patterns, and the model's MCMC mixing is generally good. As for the Gelman plots, almost all the parameters stabilise around a value of 1.0 for chain segments containing the 100,000 iterations and the chains are converging near the end of the sampling period. Also, the GelmanRubin diagnostic showed model convergence where all variables with estimated potential scale reduction factors (PSRF) were equal to 1.0. Concerning generic use of the MCMC approach, the application of a variety of plots and other diagnostic tool in this study indicated that the Markov chains have reached convergence.