AN ANALYSIS OF CLUSTERED SURVIVAL DATA USING A NONPARAMETRIC BAYESIAN HIERARCHICAL MODEL WITH A DIRICHLET PROCESS PRIOR.

S. O. M. Manda, V. B. Nyirongo

University of Leeds, Leeds, United Kingdom

Email: *s.o.m.manda@leeds.ac.uk*

The application of Clayton-type counting process formulation for multivariate survival data and gamma frailty is now routinely implemented in WinBUGS, a simulation-based Bayesian estimation software package.

In this presentation, rather than using a specific parametric mixture distribution for frailty associated with a cluster, we propose a non-parametric approach where the frailty is "distribution free by imposing a Dirichlet process prior for it. This yields a partition of the clusters into internally homogenous latent classes, each of which has its own distinct features.

Using a stick-breaking prior characterisation of the Dirichlet process prior centred at the gamma measure, we apply the methodology to child survival data with many socio-economic and demographic covariates and clustered in 559 communities. The Gibbs sampler was used to compute posterior parameters of the fixed effect hazards regression model and he mixing distribution. We found that heterogeneity distribution of the cluster frailty effects can be reduced to a smaller number of 9 latent child mortality risk classes, which could be administratively convenient and manageable for child health intervention programmes.