



## FITTING THE HAZARD RATIO FOR CLUSTER SURVIVAL DATA WITH FRAILTY EFFECT VIA WinBUGS

Ayman A. Mostafa

Received March 28, 2012; Revised September 22, 2017

### Abstract

Survival analysis examines and models the times it takes for events recorded on experimental units to occur. Interest in the use of random effects (frailty) in the survival analysis setting has been increasing. Shared frailty models are of interest when one has clustered survival data and when focus is on comparing the lifetimes within clusters and further on estimating the correlation between lifetimes from the same cluster. In this paper, we present an approach involving objective Bayesian reference analysis to the Frailty model with cluster survival time and sources of heterogeneity that are not captured by covariates. Early work in survival analysis ignored such random effects in survival data analysis. The objective of this study is, by means of simulation, to quantify the effect of ignoring individual heterogeneity in fitting the hazard ratio for cluster survival data. We adopt the idea behind the Spiegelhalter et al. [36] to estimate the parameters from a Bayesian analysis using Gibbs sampling. The Gibbs sampling is proposed to simulate the Markov chain of parameters' posterior distribution dynamically, which avoids the calculation of complex integrals of the posterior using WinBUGS package. Through the paper, the results are illustrated with survival data analyzed in the literature.

**Keywords and phrases:** survival analysis, regression models, survival frailty model, Bayesian inference, frailty models, BUGS.

ISSN: 2230-9837

Pioneer Journal of  
Theoretical and Applied  
Statistics



PSP Pioneer Scientific  
Publisher