

# **The Importance of Prior Specification in Bayesian Analysis of Power Variance Frailty Model**

## **Abstract**

In survival analysis, the frailty is often used to describe heterogeneity between individual due to unobserved individual risk factors. It is taken into the model as a random effect, yielding mixture model for survival time. A power variance function frailty model is a general frailty model because it includes characteristic of gamma, inverse Gaussain and positive stable distribution. We consider the mixture Weibull hazard rate with power variance function frailty model. The Weibull is mostly to use in survival model since it is applied to various failure situations. This mixture Weibull hazard rate with power variance function frailty model includes four unknown parameters.

In survival model, the parameter estimation is importance. The maximum likelihood method is commonly used for estimating parameters in the survival model. Hougaard (1986, 2000) and Aalen (1988, 1992) use the maximum likelihood method for estimating parameter in a power variance function frailty distribution under real data set. This paper, we assess the performance of maximum likelihood estimation and investigate Bayesian estimation under simulation data.

The result found that the maximum likelihood method may not convergence in some sample and mean square error (MSE) is large in some parameters. The Bayesian approach is the choice of estimation approach. We discuss the appropriate prior parameter for prior distribution in two way; small variance and large variance. And, we propose the median survival function as prior information for Bayesian method. In Bayesian method, the prior distribution with small variance is the best outcome, following as the median survival prior information. Comparison Bayesian approach to maximum likelihood approach, most of estimated parameters from Bayesian method gives the values of MSEs smaller than maximum likelihood method. The methods in this study are applied to the AIDs data set from San Francisco Men's Health Study (SFMHS). The result from AIDs data found that the Bayesian method with small variance of prior distribution gives the best outcome and the median survival prior information is secondary.