**ANALYSIS OF CLUSTERED WOMEN BIRTH INTERVAL IN MALAWI: APPLICATION OF PARAMETRIC AND NON-PARAMETRIC SURVIVAL MIXED-EFFECTS REGRESSION UNDER VARIOUS DISTRIBUTIONS OF RANDOM EFFECTS AND PRIORS**

In recent years, the study of birth intervals has been a main determinant of the levels of fertility in the populations, as it is associated with rates of fertility and population growth. Short birth interval is highly associated with under-five mortality, and birth spacing has a significant effect on a child's likelihood of survival. The association between birth interval and its determinate has been demonstrated by numerous observational studies. However, these covariates may fail to fully account for the true differences in birth interval. This may be due to an existence of another variable that is ignored in the model but can be explained by random frailty. Including frailty in the model can avoid underestimation and overestimation of parameters and also correctly measure the effects of the covariates on the birth interval. This study presents an extension of Cox model to parametric, semi-parametric and bayesian non-parametric frailty models in which exponential, weibull, gompertz, loglogistic, and lognormal distributions are used as the distributions of baseline hazard, and the gamma, lognormal, positive stable, inverse gaussian, and Compound poisson distributions are used as frailty distributions. We examine different types of estimation procedures and the use of quadrature method in complicated cases where explicit solutions to the likelihood functions can not be obtained in parametric frailty. We study the performance of different types of frailty distribution by using women clustered data from Malawi Demographic Survey 2015-2016. All data analysis is done R 4.1.2. The Akaike Information Criteria (AIC) is used to compare the performance of the different types of frailty models in semi-parametric and parametric while Deviance Information Criteria(DIC) is used in Bayesian non-parametric.