

Bayesian Approach to parametric survival regression model for double censored data with the cure fraction and it's application to estimating the age of starting the smoking hookah

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Background: In estimating the age of starting smoking hookah, left and right censored data occurred with uncensored observations and double censored data are generated. This kind of censoring is popular when age is considered as a follow-up time. In addition, a fraction of the study population are cured and will never be experienced the event of interest. In this article, we extend parametric survival regression model for double censored data to account for cure fraction.

Method: We extended parametric survival regression model for double censored data to cure fraction for mixture and non-mixture models. Bayesian methods were applied to estimate the model parameters by using Openbugs software. Consistent property of the Bayes method was shown by the simulation study. As an example and motivation of this article, the extended model was used for modeling the age of stating smoking hookah for the people with more than 20 years old and the model was adjusted for Gender, education and socio-economic status. The data was extracted from the health surveillance of risk factors for non-communicable disease performed over the country (Iran) in 2011. 100000 MCMC simulation was generated and first 20000 samples were burn-in then by thin of 15 the posterior mean and 95% CI was reported.

Results: From the total study population of 9385 samples 5528 (59%) were female and 3857 (41%) were men and 338 (3.6%) of them were smoking hookah. 273 and 65 of the subject study were uncensored and left-censored data, respectively. Gender, education and socio-economic status were significant for incidence part for mixture and Non-mixture model. Median survival age of starting smoking hookah is 21.63 years old.

Conclusion: Survival data with double censoring could have cure model structure, in this article, we model this type of survival data structure in the context of Bayesian MCMC method that was not investigated before.