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Emad M Abdurasul* (abduraem@jmu.edu), 273 Emerald DR, Harrisonburg, VA 22801. *Small Sample Inference for The Product Limit survival function Estimator*. Preliminary report.

Our contribution is developing a saddlepoint-based method for generating small sample confidence interval for product limit estimator (PLE), under the proportional hazards model. In the process, we derive the exact distribution of these estimators and developed mid-population tolerance interval for it. Our saddlepoint method depends upon the Mellin transform of the zero-truncated survival estimator. This transform is inverted via saddlepoint approximations to yield highly accurate approximations to the cumulative distribution function of the respective cumulative hazard function estimator and this distribution function is then inverted to produce our saddlepoint confidence interval. Then we compare our saddlepoint confidence interval with confidence interval that is obtained from competing large sample method as well as that obtained from the exact distribution. In our simulation study, we found that the saddlepoint confidence interval is very close to the confidence interval derived from the exact distribution, while being much easier to compute, and outperforms the competing large sample method in terms of coverage probability. (Received September 13, 2019)