

Department of Mathematics and Statistics Colloquium

*Small Sample Confidence Intervals for the Kaplan-Meier Estimators under the Proportional Hazards Model*

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Abstract: We develop a saddlepoint-based method for generating small sample confidence bands for the population survival function from the Kaplan-Meier (KM) estimators, under the proportional hazards model. In the process we derive the exact distribution of this estimator and developed mid-population tolerance bands for said estimators. Our saddlepoint method depends upon the Mellin transform of the zero-truncated survival estimator which we derive for the KM estimators. This transforms are inverted via saddlepoint approximations to yield highly accurate approximations to the cumulative distribution functions of the respective cumulative hazard function estimators and this distribution function is then inverted to produce our saddlepoint confidence bands. Then we compare our saddlepoint confidence bands with those obtained from competing large sample methods as well as those obtained from the exact distribution. In our simulation studies we found that the saddlepoint confidence bands are very close to the confidence bands derived from the exact distribution, while being much easier to compute, and outperform the competing large sample methods in terms of coverage probability.

**Monday, October 9 at 3:50 in Roop 103**

**Refreshments at 3:30**