

Analysis of the Hybrid Censored Log-logistic Distribution

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Author Note: Seunggeun Hyun, Associate Professor of Statistics, has published numerous articles in statistics and has become more engaged in reliability and risk engineering in recent years. Jimin Lee, Associate Professor of Statistics, has published many articles in statistics and has also published in international industrial engineering journals and conference proceedings. Robert Yearout, Professor of Industrial Engineering Management, has published a significant number of articles in international journals and proceedings.

Abstract: In experiments on product lifetime and reliability testing, it is natural that researchers are facing problems in obtaining real failure times of products for reliability prediction and that Type-I and Type-II censoring schemes are the most common and popular censoring schemes. In Type-I censoring scheme, the termination time is pre-fixed, but the number of observed failures is a random variable. However, if the mean lifetime of experimental units is somewhat larger than the pre-fixed termination time, then far fewer failures would be observed and this has a significant disadvantage on the efficiency of inferential procedures. On the other hand, in Type-II censoring scheme, the number of observed failures is pre-fixed, but the experiment time is a random variable. In this case, the termination time is clearly a disadvantage from the experimenter's point of view. To overcome some of the drawbacks in those schemes, the hybrid censoring scheme, which is a mixture of the conventional Type-I and Type-II censoring schemes, has received much attention in recent years. In this paper, we consider the analysis of the hybrid censored data where the lifetimes of items follow the log-logistic distribution. We present the maximum likelihood estimators of unknown parameters, and a simulation study is provided to evaluate the proposed methods and corresponding asymptotic confidence intervals in terms of probability coverage.

Keywords: Hybrid Censoring, Log-logistic Distribution, Maximum Likelihood Estimators, Type-I and Type-II Censoring