

Extensions of Buckley-James-Type Estimators to Modified Case-Cohort Studies

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Abstract

We consider the estimation problem with case-cohort data. The case-cohort design was first proposed by Prentice [?]. Most studies focus on the Cox regression model. In this paper, we consider the censored linear regression model or the accelerated failure time model. We extend the Buckley-James estimator to a modified case-cohort design where the censoring time of the subjects not in the subcohort are also available. Due to the biased sampling nature of case-cohort data, we advocate a weighted estimator in an effort to use all available data. This estimator corrects for biased sampling in estimating both the nonparametric likelihood and underlying error distribution. We conduct simulation studies to compare the weighted estimator to other ad hoc estimators. It is seen to be the best based on our simulation studies under various sample sizes, distributions and subcohort sizes. We also perform analysis on a real data set and compare the results. A proof of the consistency and asymptotic normality is given under some simple regularity conditions.

Keywords: Buckley-James estimator, case-cohort study, censored linear regression model, right-censorship, survival data.

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