

Corrected Score Estimation in Capture-Recapture Models with Measurement Error

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Abstract

In this study we consider zero-truncated Poisson regression models for population size estimation using capture--recapture data. In practice, covariates are often measured upon capture on individuals sampled from the population. However, some biological measurements, such as body weight may vary over time within a subject's capture history. This can be treated as a population size estimation problem in the presence of covariate measurement error. We show that if the error-prone covariate and measurement error are both normally distributed, then a naïve estimator without taking into account measurement error will under-estimate the population size. We develop new methods to correct for the effect of measurement errors. In particular, we present a nonparametric corrected score approach that is consistent for population size estimation. Importantly, the proposed approach does not require either the distribution assumption of the measurement errors or that of the true covariates. We investigate finite sample performance of the new estimator and other estimators via extensive simulated studies. The methods are applied to real data from a capture--recapture study. An extension to zero-truncated binomial regression models is also provided. This is a joint work with Jakub Stoklosa and Ching-Yun wang.