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Statistical inference with empty strata in judgment post stratified samples

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Abstract This article develops estimators for certain population characteristics using a judgment post stratified (JPS) sample. The paper first constructs a conditional JPS sample with a reduced set size K by conditioning on the ranks of the measured observations of the original JPS sample of set size $H \geq K$. The paper shows that the estimators of the population mean, median and distribution function based on this conditional JPS sample are consistent and have limiting normal distributions. It is shown that the proposed estimators, unlike the ratio and regression estimators, where they require a strong linearity assumption, only need a monotonic relationship between the response and auxiliary variable. For moderate sample sizes, the paper provides a bootstrap distribution to draw statistical inference. A small-scale simulation study shows that the proposed estimators based on a reduced set JPS sample perform better than the corresponding estimators based on a regular JPS sample.

Keywords Reduced set size · Empty cell · Ranking error · Ranked set sample · Stratified sample

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