

Estimation of Finite Population Total Using Quantile Regression

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## ABSTRACT

Sometimes in sampling, we do not usually observe all the survey information. That is, the survey variable  $Y$  is not observable for all the population units. Auxiliary variable  $X$ , is often used to estimate the unobserved survey variables. One way of overcoming the above problem is the super population approach, in which a working model relating the two variables is assumed. We suppose the model

$$Y = m(x) + \delta(x)\varepsilon$$

where  $m(\cdot)$  is smooth and  $\varepsilon_i$  independent with mean 0 and a constant variance. Currently, nonparametric mean regression has been used in modeling finite population totals, but the problem of robustness always occur. In this study, we have explored the use of nonparametric quantile regression model, to construct a bias robust estimator of a finite population “parameter”.

The estimator developed was more robust than that based on nonparametric mean regression as was confirmed by the simulation study. That is, our estimator is unbiased and less variable for the optimal quantile.