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ABSTRACT

We offer a new semiparametric regression estimator for the total parameter of a finite population when the interest variable is modeled by an asymmetric probability distribution. Regression estimators had demostrated that can improve the performance of more simple estimators, such as the Horvitz-Thompson (HT) estimator. For example, general regression estimator (REG) or generalized linear regression estimator (GEREG) may be useful when the relationship between interest and auxiliary variables is well represented by a Gaussian or generalized linear model, respectively. Nevertheless, in some situations, such as estimating totals of right skewed variable or when the auxiliary variables have nonlinear effect in the interest variable, these estimators may not obtain good results. We propose a novel class of semiparametric regression estimators to solve the previous drawbacks of the REG or GEREG estimators. This class of models give us a superpopulation model that is more adequate for capturing complex relationships between the interest and auxiliary variables. The variable of interest's finite population distribution is viewed in such scenario as if generated by an generalized gamma distribution which includes, among other families, Exponential, Gamma, Inverse Gamma, log-normal, half-normal, Weibull, and Inverse Weibull. The resulting estimator is a semiparametric model regression estimator (SREG). Through Monte Carlo simulations, under several sampling designs, the design bias and mean square error of the SREG estimators are evaluated and compared with some natural competing estimators, such as HT, REG, and GEREG. Finally, one application is presented in which the SREG estimator shows a decent performance, in contrast of the HT, REG, and GEREG estimators.