

## Estimation of a Finite Population Mean under Random Non Response Using Improved Nadaraya and Watson Kernel Weights

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**Abstract :** Non-response is a potential source of errors in sample surveys. It introduces bias and large variance in the estimation of finite population parameters. Regression models have been recognized as one of the techniques of reducing bias and variance due to random non-response using auxiliary data. In this study, it is assumed that random non-response occurs in the survey variable in the second stage of cluster sampling, assuming full auxiliary information is available throughout. Auxiliary information is used at the estimation stage via a regression model to address the problem of random non-response. In particular, the auxiliary information is used via an improved Nadaraya-Watson kernel regression technique to compensate for random non-response. The asymptotic bias and mean squared error of the estimator proposed are derived. Besides, a simulation study conducted indicates that the proposed estimator has smaller values of the bias and smaller mean squared error values compared to existing estimators of finite population mean. The proposed estimator is also shown to have tighter confidence interval lengths at a 95% coverage rate. The results obtained in this study are useful, for instance, in choosing efficient estimators of the finite population mean in demographic sample surveys.

**Keywords :** mean squared error, random non-response, two-stage cluster sampling, confidence interval lengths

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