

**Robust Estimation of Finite Population Total**

**Using**

**Local Polynomial Regression**

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## **ABSTRACT**

In this thesis, a review of the model-based, design-based, model-assisted, randomization-assisted and nonparametric approaches to finite population total estimation is explored and the properties of the estimators derived. The robust estimators of the finite population total based on the local polynomial regression are derived. The properties of these estimators are developed and comparative study with the existing model based estimators is carried to assess the performance of the estimators developed using the simulated and natural sets of data obtained from the diverse fields. In the study, it is observed that the estimators are asymptotically unbiased, consistent and normally distributed when certain conditions are satisfied.

In the thesis, it has been shown that, whether the model based or robust estimators are used in estimating the finite population total, there exists some bias. In the class of robust finite population total estimators, the local polynomial regression estimators have recorded better results in estimating the finite population total. The theoretical and empirical results led to the suggestion that the local polynomial regression estimator ( $P=2$ ) can be highly recommended in survey sampling estimation of the finite population total in the variables whose predictor measurements and response measurements record perfect or nearly perfect moment correlation coefficient.