ABSTRACT

Some estimation procedures for estimating a finite population mean have been discussed by using multivariate auxiliary information, where partial auxiliary information is known apriori.

In Chapter one, the historical background of survey sampling has been given. Some prominent survey statisticians, who played the important role to make the survey sampling as a different discipline of statistics have been also introduced. Some initial works are mentioned, where auxiliary variables are properly used to increase the efficiency of the estimators. In case of univariate as well as multivariate situations, some important works by using ratio and regression estimator are also discussed.

In Chapter two, Chain ratio, product and ratio-product mixed estimators both weighted as well as unweighted by utilizing several correlated variables are considered. We propose the two classes of estimators and their improve versions. The properties of these estimators for the general sampling scheme are studied. Detail results are given for the sampling scheme simple random sample without replacement (SRSWOR) along with cost function. A comparison is made with some known well established estimators in case of two auxiliary variables. The relative gain in efficiency of the optimum estimator of these estimators over the other estimators is shown for the natural population data.

In Chapter three, a class of estimators is proposed, which includes several known and unknown estimators as particular members. The properties of this class for a general sampling scheme are studied. Results for the simple random sampling without replacement (SRSWOR) are studied and the optimum sample sizes are given for the suitable cost function. The class is defined for two auxiliary variables where the population mean of one is known while that of other is unknown and it is shown that most of the recently developed estimators are the members of this class. A comparison has been given with respective to mean square error. We have given the percentage gain in efficiency of the optimum estimator of the proposed class over the other known estimators for three natural population data.

In Chapter four, the above study has been extended for stratified sampling. The combined and separate class of estimators two different cases along with their properties for the general sampling design. Detail results for the simple random sampling without replacement (SRSWOR)
and the allocation problems have been discussed. Numerical illustrations have been given for the natural population data set in case of proportional allocation.

In Chapter five, we have carried forward to estimate the population means of several study variables simultaneously by considering general set up of multiple auxiliary variables. The class of estimators has been proposed and its properties for the general sampling design are studied. We have given the detailed results for the simple random sampling without replacement (SRSWOR) scheme and the optimum sample sizes are given for a suitable cost function. Numerical illustrations have been given for two natural population data set.

A comprehensive bibliography has been given at the end, which we have consulted during our research.