Efficiency of Domain Mean Estimators in the Presence of Non-response Using Two-Stage Sampling with Non-linear and Linear Cost Function.

Abstract

This study compares the efficiency of the estimators of the domain population mean computed using double sampling for ratio estimation design with linear, non-linear or logarithmic cost functions. In the estimation of the domain mean, information of the study and auxiliary variables which suffers from non-response at the second phase sampling has been used. Optimal stratum sample sizes for a given set of unit costs have been computed using Lagrangian multiplier partial differential equations and Taylor's linearization series. The relative precision of the domain population mean estimate obtained has been compared using mean square error, relative efficiency, Bias and absolute relative bias. From the results obtained, the estimator of the domain population mean computed using auxiliary information had better efficiency on average compared to those computed without auxiliary information. It is also noted that of the three cost functions used in the computation of estimators, logarithmic cost function produced superior estimator compared to that computed using linear or non-linear (quadratic) cost function. This method of estimation can be used in estimating efficiently, infected population incidence rate by a given pandemic using optimal sample size at a minimum survey cost.

Authors.

David A. Alilah, C. O. Ouma & E. O. Ombaka