ON THE EFFECT OF MEASUREMENT ERRORS ON ESTIMATION OF PARAMETERS IN FINITE POPULATION

ABSTRACT
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ABSTRACT

In the thesis I have studied some generalized estimation procedures under measurement error models especially when non-response is present in the present research work entitled "***On the effect of measurement errors on estimation of parameters in finite population***". I have studied many contemporary generalized estimation procedures from the point of efficiency and cost efficiency in presence of measurement error. Many important works in this area of sampling are now special cases of the present work.

This first chapter presents a brief introduction to the existing work done in the area of non-response error and measurement error. There seems to be no substantial work where the problems of non-response error and measurement error have been tackled simultaneously. The first seven chapters are devoted to this new area.

In chapter 2, we consider the problem of estimating the population mean of study variable using auxiliary information in presence of measurement error and non-response error simultaneously. The estimators in this chapter use auxiliary information to improve efficiency and we assume that response error is present in both the study and auxiliary variables. The properties of the suggested estimators are studied and compared with those of existing estimators. It is shown that the estimators t_g and t_d are most efficient among all the estimators considered under non-response and measurement error

simultaneously. The efficiency of the estimators seems to be drastically curtailed with increasing measurement error.

The third chapter deals with a generalized estimator for estimating the population mean of study variable using auxiliary information in presence of measurement error and non-response error occurs simultaneously. The generalized estimators in this chapter are given as an alternative to the class of estimators proposed by Singh and Kumar (2008). The properties of suggested generalized estimators are studied and compared with those of existing estimators in presence of measurement error and non-response error. The suggested generalized estimator $\bar{y}_f$ is most efficient among all the estimators proposed by Singh and Kumar (2008) under both measurement and non-response errors occurring simultaneously. The efficiency of the proposed estimator seems to be drastically curtailed with increasing measurement error.

The chapter 4 is set with the problem of estimating the population mean under double sampling using auxiliary information in presence of measurement error and non-response error simultaneously. Some modified ratio, product and difference estimators in double sampling have been adapted from Singh and Kumar (2010) and their properties are studied presence of measurement error and non-response error simultaneously. An empirical study is carried to study the merits of the estimators over conventional unbiased estimator and other known estimators where we analysed the effect of measurement error on the

adapted estimators at different levels. Both theoretical and empirical study results present the soundness and usefulness of the suggested estimators in practice under presence of measurement error and non-response error simultaneously.

The chapter 5 deals with a generalized class of double sampling estimators under measurement error and non-response error occurring simultaneously. Singh and Kumar (2010) proposed some ingenious classes of double sampling estimators which fared better in comparison to all the existing double sampling estimators under non-response. The result of the proposed generalized estimator is compared with the existing estimators theoretically in presence of measurement error and non-response error simultaneously. An empirical study is carried out to judge the merit of the proposed classes in presence of measurement error and non-response error.

In chapter 6, we have studied some cost efficient classes of estimators in the presence of measurement error and non-response for estimating population mean on the lines of the estimators proposed by Okafor and Lee (2000), Tabasum and Khan (2004) and recently by Singh and Kumar (2010). These estimators are an alternative to the double sampling estimators, when population mean of auxiliary variable is not known and fare better than the above estimators under cost efficiency criterion. The properties of these estimators have been studied in presence of measurement error and non-response error simultaneously. In order to ascertain the soundness of these estimators under

measurement error and non-response error, a comparative study is carried out both theoretically as well as empirically.

The seventh chapter deals with a couple of generalized cost efficient classes of estimators under measurement errors and non-response for estimating population mean using auxiliary information. These classes of estimators have been proposed as an alternative to the class of estimators proposed for only non-response by Singh and Kumar (2010) and Singh and Bhushan (2012). The results are derived under measurement error and non-response error simultaneously. These estimators are put to test against Singh and Kumar (2010) and Singh and Bhushan (2012) estimators under the cost efficiency criteria. A comprehensive comparative study is carried out both theoretically as well as empirically to study the effect of presence of measurement error.

Finally, in chapter 8, we have proposed three generalized classes of estimators of population mean, ratio and product of population mean using auxiliary information of two variables and one generalized class of estimator for population mean using auxiliary information on an auxiliary variable and an attribute in presence of measurement errors. Further, we also proposed the corresponding classes of unbiased estimators using the jack-knife version of Quenouille's method. The bias and mean square error of the proposed classes are obtained. We also analyzed the properties of the generalized estimators in presence of measurement errors. Also, some concluding remarks are made clearly

demonstrating that some important class of estimators is special cases of the proposed study.