

Chapter 7

Stratified Ranked Set Sampling (SRSS) for Estimating the Population Mean With Ratio-Type Imputation of the Missing Values

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ABSTRACT

In this chapter, the authors develop stratified ranked set sampling (RSS) under missing observations. Imputation based of ratio rules is used for completing the information for estimating the mean. They introduce the needed elements on imputation and on the sample selection procedures. They extend RSS models to imputation in stratified populations. A theory on ratio-based imputation rules for estimating the mean is presented. Some numerical studies, based on real-world problems, are developed for illustrating the behaviour of the accuracy of the estimators due to their proposals.

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1. INTRODUCTION

The basic theory of survey sampling discusses how to derive estimation procedures for estimating population parameters effectively. Different models are available to select the sample from the population. The properties of the sampling models mainly depend upon the availability of observation units. The estimation process may be more reliable, if we utilize adequate and reliable auxiliary information. Its used the design or in the stage of estimation may increase the accuracy of the estimators.

In many applications we deal with indexes, which are measured repeatedly. Say that we are developing a longitudinal study. The indexes are measured initially in a census. A sample of the units is selected and some of them are not giving information in the second visit. Some examples are the following:

1. The satisfaction index of the customers is measured visiting all the establishments (hotels, restaurants etc.) The firm introduces new policies and periodic evaluations of the index are to be performed by selecting a sample of them and estimating the mean of the index.
2. The psoriasis affected areas of patients provides a index . A medicament is to be used and it is evaluated in a sample of patients. The mean of the index is estimated and the efficiency of the treatment is evaluated.
3. The index of assertiveness is calculated in a population of students. After some psychological massive treatment a sample is selected for evaluating its effect by estimating the mean of the index .

Note that in the examples the populations are naturally divided into strata.

Having census information of the index is possible to rank the units selected in a sample using a high correlated auxiliary variable. Therefore we may consider the use of ranked set sampling (RSS) for estimating the population mean.

Commonly samplers deal with the existence of missing observations (MO) . Using imputation methods may commonly solve this fact. Considering the existence of MO and using of Ranked Set Sampling (RSS). In this paper we develop a study of the estimation of a population mean using ratio based methods when we deal with a stratified population.

Ranked set sampling (RSS), was proposed by McIntyre (1952, 2005). It is a sampling strategy base on ranking the units previously to measuring the variable of interest. It has been obtained that this sampling design provides more efficient statistical inferences than simple random sampling (SRS).

In this paper we will develop stratified ranked sampling (SRSS) under missing observations. Imputation based of ratio rules is used for completing the information for estimating the mean.

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