

## Abstract

**Title:** Parameter Estimation under Two-phase Stratified and Cluster Sampling

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**Abstract:** In this thesis we present methods of parameter estimation under two-phase stratified and cluster sampling. In contrast to classical sampling theory, we do not deal with finite population parameters, but focus on model parameter inference, where the observations in a population are considered to be realisations of a random variable. However, we consider the sampling schemes used, and thus we incorporate much of survey sampling theory. Therefore, the presented methods of the parameter estimation can be understood as a combination of the two approaches. For both sampling schemes, we deal with the concept where the population is considered to be the first-phase sample, from which a subsample is drawn in the second phase. The target variable is then observed only for the subsampled subjects. We present the mean value estimation, including the statistical properties of the estimator, and show how this estimation can be improved if some auxiliary information, correlated with the target variable, is observed for the whole population. We extend the method to the regression problem.

**Keywords:** cluster sampling, Horvitz-Thompson estimation, model-based inference, two-phase sampling, stratified sampling