

SIMPLE COMPUTATIONAL FORMULAS FOR INCLUSION PROBABILITIES IN RANKED SET SAMPLING

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Abstract

In this study, we derived new formulations for the first and second order inclusion probabilities of a ranked set sample in a finite population setting. Gökpinar and Özdemir (2010) developed a formula to calculate the first order inclusion probabilities. However, the formula given in this study is much easier than the one given by Gökpinar and Özdemir (2010). Second order inclusion probabilities are computed based on the formulas which are used for the calculation of first order inclusion probabilities. Also, we give a numerical example to show the calculation of the formulas and Matlab codes which give first and second inclusion probabilities for any set and population sizes.

Keywords: Ranked Set Sampling, First Order Inclusion Probability, Second Order Inclusion Probability, Finite Population Setting.

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1. Introduction

Ranked Set Sampling (RSS) is an efficient sampling technique than the simple random sampling (SRS) for improving the accuracy of the estimation of means. RSS was first introduced by McIntyre (1952) for estimate the mean of pasture yields. In recent years, RSS is used in many fields such as the environment, ecology and agriculture. Some applications in these fields can be found in the studies of Johnson et.al. (1993) and Al-Saleh et al(2000). Also, some recent ideas about RSS can be found in Bouza(2005).

In RSS, the inclusion probabilities of the population units are different from each other, and it is difficult to determine the inclusion probabilities for all sample sizes. Al-Saleh and Samawi (2007) obtained the inclusion probabilities in RSS for the set size 2 and 3. Özdemir and Gökpinar (2007) obtained the inclusion probabilities in RSS for all set sizes when the cycle size is one, and Özdemir and Gökpinar (2008) have adapted

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