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## Research Article A New Approach to Randomized Response Model Using Fuzzy Numbers

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## Abstract

The crux of this study is to consider a randomized response model using allocation problem in presence of non-response based on model and minimize the variance subject to cost constraint. The costs (measurement costs and total budget of the survey) in the cost constraint are assumed as fuzzy numbers, in particular triangular and trapezoidal fuzzy numbers due to the ease of use. The problem formulated is solved by using Lagrange multipliers technique and the optimum allocation obtained in the form of fuzzy numbers is converted into crisp form using  $\alpha$ -cut method at a prescribed value of  $\alpha$ . Numerical illustrations are also given in support of the present study and the results are formulated through LINGO.

Key words: Unrelated randomized response technique, optimum allocation, stratified random sampling, sensitive attribute, fuzzy logic

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Data Availability: All relevant data are within the paper and its supporting information files.