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NIMBLE RANDOMIZATION DEVICE FOR ESTIMATING A RARE SENSITIVE ATTRIBUTE USING POISSON DISTRIBUTION

TANVEER A. TARRAY

Department of Mathematical Sciences, Islamic University of Science and Technology, Kashmir, India, 192122

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Abstract. This paper addresses the problem of estimating the mean of the number of persons possessing a rare sensitive attribute utilizing the Poisson distribution in survey sampling. Properties of the proposed randomized response model have been studied along with recommendations. It is also shown that the proposed model is more efficient than Land et al. (2011) when the proportion of persons possessing a rare unrelated attribute is known. Numerical illustration is also given in support of the present study.

Keywords: randomized response technique; estimation of proportion; rare sensitive characteristics.

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1. INTRODUCTION

Warner (1965) suggested an ingenious method of collecting information on sensitive characters. According to the method, for estimating the population proportion π possessing the sensitive character "A", a simple random with replacement sample of n persons is drawn from the population. Each interviewee in the sample is furnished an identical randomization device where the outcome "I possess character A" occurs with probability P₁ while its complement "I do not possess character A" occurs with probability (1-P₁). The respondent answers "Yes" if the outcome of the randomization device tallies with his actual status otherwise he answers "No". Some modifications in the model has been suggested by Chaudhuri and Mukerjee (1988, 2011), Ryu et

E-mail address: tanveerstat@gmail.com

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