



An Effective Estimation Strategy for Population Mean over Successive Sampling of h Occasion

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Abstract Two-occasion sampling might only provide a snapshot of the phenomenon under investigation. Extending to h occasions allows researchers to capture long-term trends, patterns, and changes that may emerge over time. In h -occasion successive sampling, the effective estimation of population mean is an important factor for agriculture, socioeconomic, pandemics surveys when reliable estimates are required at the h -th occasion (recent-occasion). A difference-type model of an estimator is suggested for the estimation which is escorted with the information on two auxiliary variables. The optimal estimator is the combination of the matched and unmatched sample units in the h -occasion successive sampling. Empirical studies with the competent natural mean estimator and difference type estimator based on bias and mean square errors have been demonstrated in the estimator's efficiency context. A data analysis has been conducted for the applicability to the suggested model. The approach of this work provides valuable insights into long-term trends, developmental trajectories, causal relationships, and the dynamic nature of the real-world problems.

Keywords h -Occasion successive sampling · Difference estimator · Auxiliary information · Variance · Mean square error · Bias

AMS Subject Classification 62D05

1 Introduction

Some survey statisticians have given the concept and training of measuring the same type of population at different points in time, theoretically, it is called repetitive sampling or sampling over h consecutive occasions. When a population unit is subjected to change over a survey on a specific occasion will extract the evidence of characteristics of the assessed population for that occasion that cannot be fit on the nature of altering of the characteristics over the occasions. Therefore, successive sampling is employed and in this sampling scheme, the selected units of a section on current occasions are familiar with some units drawn on the previous occasions. In these successive surveys, the population parameters are estimated over the different points of time or occasions. For example, a survey of the average production of apples in different seasons in Kashmir Valley may be considered as primarily important.

Initially to improve the estimate of the population parameters on recent occasions with the help of information available on the previous occasion was made by Jessen (1942) [5]. In the further paper, this approach was explored by Yates (1949) [29], Patterson (1950) [8], Tikkiwal (1951) [28], Eckler (1955) [3], Rao and Graham (1964) [9], Binder and Hidirolou (1988) [1], Kish (1998) [6], McLaren and Steel (2000) [7], Singh et al. (2001) [12], Steel and McLaren (2002) [26], among others. Sen (1971) [10] has given the concept of using the report on two auxiliary variables to improve estimation procedures which were readily available on the first occasion in a two-occasion successive survey. Singh et al. (1991) [25], Singh and Singh (2001) [18], and Singh (2003) [15] uses information on present occasion as

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