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Correlation Between the Number of Epileptic and Healthy Children in Family Size that Follows a Size-Biased Modified Power Series Distribution

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An expression for the correlation between the random number of epileptic and healthy children in family whose size follows a size-biased Modified Power Series Distribution (SBMPSD) is obtained and illustrated. As special cases, results are extracted for size biased Modified Negative Binomial Distribution (SBGNBD), size biased Modified Poisson Distribution (SBGPD) and size biased Modified Logarithmic Series Distribution (SBGLSD).

Key words: Size-biased MPSD, GNBD, GLSD, GPD correlation

Introduction

Weighted distributions arise when observations are generated from a stochastic process without an equal chance of being selected from a population. When the sampling mechanism selects units with probability proportional to some measure of the unit size, the resulting distribution is called size-biased. Such distributions arise in life several studies (see Blumenthal (1967), Scheaffer (1972), Gupta (1975, 1984) for details).

Kojima and Kellehar (1962) showed that Negative Binomial Distribution (NBD) is appropriate distribution for the discrete type random observation. The random family size could follow a NBD. Gupta (1976) obtained a general expression for the correlation coefficients 'ρ' between the random number of boys and girls in family whose size follows a Modified Power Series Distribution (mpsd). Gupta's (1974) introduced mpsd and explored its properties. The size biased modified power series distribution (SBMPSD) is considered as a distribution for family size. This class includes among others, size biased GNBD, GPD and GLSD. A general expression for the correlation coefficient for a random number of epileptic and healthy children in a family when the family size follows a size biased Modified Power Series Distribution (SBMPSD) is obtained and illustrated. As special cases, results are extracted for size biased Modified Negative Binomial Distribution (SBGNBD), size biased Modified Poisson Distribution (SBGPD) and size biased Modified Logarithmic Series Distribution (SBGLSD).

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Main Result: General Expression for ρ

Let N be a discrete random variable denoting the family size. Assume that this random variable is governed by a size-biased Modified Power Series Distribution (SBMPSD) whose probability mass function is

$$P[N=n]=\frac{b(n)\left(g(\alpha)\right)^{n}}{\mu f(\alpha)},\quad n \in T$$