

Brillinger, David R.

The natural variability of vital rates and associated statistics (with discussion). (English)

Zbl 0611.62136

Biometrics 42, 693-734 (1986).

The author develops approximations to the distributions of crude mortality rates, age-specific mortality rates, age-standardized rates, standardized mortality ratios, and the like for the case of a closed population or period study.

Assuming Poisson birth times and independent lifetimes, it is found that the number of deaths and the corresponding midyear population have a bivariate Poisson distribution. It is suggested that it will be satisfactory to approximate the distribution of the number of deaths given the population size, by a Poisson with mean proportional to the population size. It is further suggested that situations in which explanatory variables are present may be modelled via a doubly stochastic Poisson distribution for the number of deaths, with mean proportional to the population size and an exponential function of a linear combination of the explanatories. Such models are found to fit to mortality data for Canadian females. The models with extra-Poisson variation are found to lead to substantially improved fits.

Reviewer: [I.Křivý](#)

MSC:

62P10 Applications of statistics to biology and medical sciences; meta analysis

Cited in **43** Documents

Keywords:

vital statistics; approximations; mortality rates; closed population; midyear population; bivariate Poisson distribution; doubly stochastic Poisson distribution

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