Delta Method for Relative Risk Estimation in Binary Response Study on Indonesian Family Life Survey Data (IFLS)

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ABSTRACT

Comparison of two proportions in logistic regression can be developed by taking their ratio referred as a relative risk. A confidence interval can be used to describe how reliable the relative risk estimator. The relative risk can be estimated using a maximum likelihood method, however the approximate normal distribution for the relative risk has poor performance. An alternative is to transform logarithm at the relative risk. The new relative risk is a function of the relative risk itself, so the estimated variance cannot be obtained directly. The general method that is often used to estimate the variance of a random variable function is the delta method. This study aims to estimate the relative risk and its variance using the delta method and apply it to binary response study from the Indonesian Family Life Survey (IFLS) data. The IFLS is a large-scale longitudinal survey and available for a long time which is few conducted in Indonesia. The variance formula for log(relative risk) derived from the delta method is then used to construct a Wald confidence interval. The simulation results show that the Wald confidence interval for relative risk is conservative. The research variables are seven binary response variables, namely insurance ownership status, education, sex, occupation, health condition, chronic condition, and history of hospitalization. The application results show that people who have higher education are more likely to have health insurance than those who do not. Likewise for people who work or have poor health condition, chronic condition, and history of hospitalization. Men and women show equal opportunities in having health insurance ownership.