19 November 2020

Case-control study

Exposure	r	$n-r$
1	a	b
0	c	d

$$\begin{aligned}
\hat{\beta}_0 &= \log(\frac{c}{d}) \\
\hat{\beta}_1 &= \log(\frac{ad}{bc}) \\
Var(\hat{\beta}_0) &= \frac{1}{c}+\frac{1}{d} \\
Var(\hat{\beta}_1) &= \frac{1}{a}+\frac{1}{b}+\frac{1}{c}+\frac{1}{d} \\
Cov(\hat{\beta}_0,\hat{\beta}_1) &= -\left(\frac{1}{c}+\frac{1}{d}\right)
\end{aligned}$$

Measure of performance of the logistic model

Pseudo R^2	Formula
Cox & Snell	$R^2 = 1-\left(\frac{L_0}{L_M}\right)^{2/n}$
	$R^2_{\max} = 1-L_0^{2/n}$
Nagelkerke / Cragg & Uhler	$R^2 = \frac{1-\left(\frac{L_0}{L_M}\right)^{2/n}}{1-L_0^{2/n}}$

where L_0: the value of the likelihood function for a model with no predictors and L_M be the likelihood for the model being estimated. R^2 by Cox & Snell can be converted to R^2 in linear regression model.