

ODDS RATIO EXAMPLE (REVIEW)

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Suppose 100 lung cancer and 100 non-(lung cancer) patients were studied to see if they were a smoker in the last 10 years. The results are as follows.

	Lung Cancer (1)	No Lung Cancer (0)	Total
Smoker (1)	80	30	110
Non-smoker (0)	20	70	90
Total	100	100	200

Odds of lung cancer given a smoker = $\frac{80}{30}$

Odds of lung cancer given a non-smoker = $\frac{20}{70}$

$\hat{OR} = 9.3$

$\ln(\hat{OR}) = 2.233592222$

$\hat{se}[\ln(\hat{OR})] = \sqrt{\frac{1}{80} + \frac{1}{30} + \frac{1}{20} + \frac{1}{70}} = 0.331841902$

95% CI for $\ln(OR)$: $\ln(\hat{OR}) \pm 1.96 * \{\hat{se}[\ln(\hat{OR})]\}$
 $2.2336 \pm 1.96 * 0.3318$
 $(1.5832, 2.8840)$
 Lower Upper

95% CI for OR: $(e^{Lower}, e^{Upper}) = (4.870, 17.886)$
 Disease

$P(Y=1) = \frac{e^{B_0 + B_1 X}}{1 + e^{B_0 + B_1 X}}$

$P(Y=0) = 1 - \frac{e^{B_0 + B_1 X}}{1 + e^{B_0 + B_1 X}}$

$\frac{1 + e^{B_0 + B_1 X}}{1 + e^{B_0 + B_1 X}} - \frac{e^{B_0 + B_1 X}}{1 + e^{B_0 + B_1 X}}$

$= \frac{1}{1 + e^{B_0 + B_1 X}}$

odds ratio

$\frac{e^{B_0 + B_1}}{1 + e^{B_0 + B_1}}$

$\frac{1}{1 + e^{B_0 + B_1}}$

$\frac{e^{B_0}}{1 + e^{B_0}}$

$\frac{1}{1 + e^{B_0}}$

$\frac{e^{B_0 + B_1}}{e^{B_0}} = e^{B_1} = OR!$

smoke

	1	0
1	$\frac{e^{B_0 + B_1}}{1 + e^{B_0 + B_1}}$	$\frac{1}{1 + e^{B_0 + B_1}}$
0	$\frac{e^{B_0}}{1 + e^{B_0}}$	$\frac{1}{1 + e^{B_0}}$

odds for smoker

odds for non smoker