

# Re: Ordinal logistic regression and the relative risk

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Jack-of-all-trades wrote:

In binary and ordinal logistic regression we obtain odds ratios as measures of effect. Because the odds ratio is only a good measure of the relative risk when the outcome is rare, often it is desirable to convert the odds ratio to a relative risk. In binary logistic regression, the relative risk can be approximated by:

$$RR = OR / [(1-P_0) + (P_0*OR)]$$

Where,

RR = relative risk

OR = odds ratio from logistic regression

P<sub>0</sub> = probability of outcome in the unexposed group

However, in ordinal logistic regression (let's assume proportional odds ordinal regression), what the probability of the outcome in the unexposed group would be is not evident. Furthermore, I have no idea whether this approximation is even valid for ordinal outcomes.

Does anyone know how to estimate the relative risk from a proportional odds ordinal logistic regression coefficient?

Here is a thought. Why not estimate the probabilities directly from the model and then form whatever ratios you are interested in? For example, in binary logistic regression with a single independent variable, the predicted probability for  $x = 1$  is:

$$\exp(a + b*1) / (1 + \exp(a + b*1))$$

and for  $x = 2$ , it is:

$\exp(a + b*2) / (1 + \exp(a + b*2))$ , where  $a$  and  $b$  are the estimates of the intercept and slope from the fitted model. Then just take the ratio of these two and you get the estimated relative risk when  $x = 1$

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vs. when  $x = 2$ .

In a proportional odds model, you can calculate the predicted probability  $P(Y \leq j)$ , where  $j$  denotes the response category. From this, you can calculate  $P(Y = j) = P(Y \leq j) - P(Y \leq j - 1)$ . Now you can do this for the various  $j$ , get the predicted probabilities, and form ratios to get estimated risk ratios. You could do this for various values of whatever independent variables are in the model. I hope this makes sense.

m00es

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