

Session 9: Practical Exercise

In a study of the incidence of heart attacks in men aged 50-69 years, the men were divided into those who had previous evidence of heart disease (angina, ECG abnormalities or previous heart attack) and those who did not. Of those who did, there were 25 new heart attacks in 512 person-years of follow-up, compared with 52 new heart attacks in 4862 person-years of follow-up in those who did not.

- (a) (i) Carry out a joint log-likelihood ratio tests of the hypothesis H_0 : the log (rate of heart attacks in those with previous evidence of heart disease) is -3 and the log (rate of heart attacks in those with no previous heart disease) is -4.5 . What do you conclude?
- (ii) [Optional] Carry out a Wald test for the same hypothesis. What do you conclude?
- (b) The conditional likelihood for the rate ratio, $\theta = \lambda_2/\lambda_1$ (where λ_1 and λ_2 are the rates in groups 1 and 2 respectively), derived in Section 9.5 of the Lecture Notes (p9.6) is:

$$l_c(\theta) = k_2 \log(\theta) - k \log(p_1 + \theta p_2)$$

for k events in total, where groups 1, 2 have k_1, k_2 events and p_1, p_2 person-years of follow-up respectively.

Use this conditional likelihood to carry out a likelihood ratio test that the rate ratio of heart attacks in men with no previous heart disease, compared to those with previous heart disease, is 0.2. What do you conclude?