Solutions: Exercise 5

	Not Exposed	Exposed	Total
Disease	d_0	d_1	d
No Disease	h_0	h_1	h
Total	n_0	n_1	n

Q1.

	No coffee	$\leq$ 6 cups
cases	122	19
Non-controls	7768	2473
Total	7890	2492

(a)

$$RR = \frac{Risk_{\leq \text{ 6 cups}}}{Risk_{\text{No coffee}}} = \frac{\frac{19}{2473+19}}{\frac{122}{7768+122}} = 0.493$$

(b)

$$logRR = log(RR) = log(0.493) = -0.707$$

$$SE = \sqrt{\frac{1}{d_1} - \frac{1}{n_1} + \frac{1}{d_0} - \frac{1}{n_0}}$$

$$= \sqrt{\frac{1}{19} - \frac{1}{2492} + \frac{1}{122} - \frac{1}{7890}} = 0.246$$

$$95\ \%\ \text{CI for } logRR = logRR \pm 1.96 \cdot SE$$

$$= -0.707 \pm 1.96 \cdot 0.246 = (-1.188, -0.226)$$

$$\text{CI for RR} = e^{-0.707 \pm 1.96 \cdot 0.246} = (0.305, 0.798)$$

(c) Very similar to published age adjusted RR (of 0.49 (0.30 to 0.80)), suggesting no confounding by age.

Q2. (a)

$$OR = \frac{Odds_{\text{Highest exposure}}}{Odds_{\text{Lowest exposure}}} = \frac{\frac{25}{163-25}}{\frac{16}{163-16}} = 1.664$$

(b)

$$\begin{aligned} logOR &= log(OR) = log(1.664) = 0.509 \\ SE &= \sqrt{\frac{1}{d_1} + \frac{1}{h_1} + \frac{1}{d_0} + \frac{1}{h_0}} \\ &= \sqrt{\frac{1}{25} + \frac{1}{163-25} + \frac{1}{16} + \frac{1}{163-16}} = 0.341 \\ 95\ \%\ \text{CI for } logOR &= logOR \pm 1.96 \cdot SE \\ &= 0.509 \pm 1.96 \cdot 0.341 = (-0.160, 1.179) \\ \text{CI for OR} &= e^{-0.509 \pm 1.96 \cdot 0.341} = (0.85, 3.25) \end{aligned}$$

(c) Published table reports crude HR of 1.7 (0.9, 3.3), very similar to our OR. However, adjusted HR is different (2.2) so there was confounding by the adjustment factors.

Q3.

	0-9 years	13+ years
Cases	685	208
Controls	512	122

(a)

$$OR = \frac{Odds_{\text{Highest exposure}}}{Odds_{\text{Lowest exposure}}} = \frac{208/122}{685/512} = 1.274$$

(b)

$$\begin{aligned} logOR &= log(OR) = log(1.274) = 0.242 \\ SE &= \sqrt{\frac{1}{d_1} + \frac{1}{h_1} + \frac{1}{d_0} + \frac{1}{h_0}} \\ &= \sqrt{\frac{1}{208} + \frac{1}{122} + \frac{1}{685} + \frac{1}{512}} = 0.128 \\ 95\ \%\ \text{CI for } logOR &= logOR \pm 1.96 \cdot SE \\ &= 0.242 \pm 1.96 \cdot 0.128 = (-0.009, 0.493) \\ \text{CI for OR} &= e^{-0.242 \pm 1.96 \cdot 0.128} = (0.99, 1.64) \end{aligned}$$

(c) The result is not quite significant (CI includes 1.0.... just!)