STAT 545 Homework 3

Quan Zhou*

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1. **Problem 2.12**

   (a) (1 point each, 3 points in total) For lung cancer

$$\begin{aligned}\text{Difference of proportions} &= 0.00140 - 0.00010 = 0.00130\\ \text{Relative risk} &= 0.00140/0.00010 = 14.0\\ \text{Odds ratio} &= \frac{0.00140/(1-0.00140)}{0.0001/(1-0.0001)} = 14.02\end{aligned}$$

   For heart disease

$$\begin{aligned}\text{Difference of proportions} &= 0.00669 - 0.00413 = 0.00256\\ \text{Relative risk} &= 0.00669/0.00413 = 1.620\\ \text{Odds ratio} &= \frac{0.00669/(1-0.00669)}{0.00413/(1-0.00413)} = 1.624\end{aligned}$$

   These results mean the chance of dying from lung cancer is 0.13% higher for smokers. The risk of dying from lung cancer for smokers is 14 times that for non-smokers. The odds of dying from lung cancer for smokers is 14.02 times that for non-smokers.

   The chance of dying from coronary heart disease is 0.256% higher for smokers. The risk of dying from coronary heart disease for smokers is 1.620 times that for non-smokers. The odds of dying from coronary disease for smokers is 1.624 times that for non-smokers.

   (b) (1 point) In terms of the reduction in number of deaths that would occur with elimination of cigarettes, coronary heart disease is more strongly related, since $0.00256 > 0.00130$.

   However, we know this is mainly because heart disease is much more common than lung cancer. In terms of the reduction in number of deaths relative to the diseases prevalence, lung cancer is more strongly related since

$$\frac{0.00130}{0.00140} = 92.86\% > 38.27\% = \frac{0.00256}{0.00669}$$

*an adapted version from Quan's original homework.