**Week 2 Practice**

**A1:**

**Incidence:** Incidence refers to the occurrence of new cases of disease or injury in a population over a specified period of time.

**Prevalence:** Prevalence is the proportion of persons in a population who have a particular disease or attribute at a specified point in time or over a specified period of time.

**Incidence:** 5/505 \*100000 = 990.1

incidence is approximately 990 per 100,000.

**Prevalence:** 8/505 \*100000 = 1584.2

Prevalence is approximately 1584 per 100,000.

**A2:**

Risk\_treatment = Number of Disease / Total

Risk\_treatment = 165 / (165+85) = 0.66

Risk\_control= Number of No Disease / Total

Risk\_control = 245 / (245+40) = 0.8596491228070175

Risk Ratio = Risk\_treatment / Risk\_control = 0.66 / 0.8596491228070175 =

0.7677551020408164

the risk of the disease among Exposed is 0.66, the risk of the disease among Unexposed approximately 0.86, the Risk Ratio comparing exposed to unexposed approximately 0.77.

**A3:**

**confounding variable:** Confounding variable is a variable that influences both the dependent variable and independent variable, causing a spurious association.

confounder (C)

disease (D)

exposure (E)

C influences both E and D, while E influences D.

**A4:**

**OR = (46/60) / (254/640) = 1.93**

**OR\_young = (10/35) / (90/465) = 1.48**

**OR\_old = (36/25) / (164/175) = 1.54**

the OR of the old slightly higher than OR of the young, but the difference is not dramatic, Since the odds ratios for the two age groups are not significantly different, it suggests that age is likely not confounding the relationship between obesity and CVD in this particular study. However, to definitively conclude whether age is a confounder, statistical tests for interaction or stratified analysis would be required.



The Crude OR from R matches the hand calculated value.

图形用户界面, 文本, 应用程序

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The odds of CVD are about 1.51 times higher in obese individuals compared to non-obese individuals, adjusting for age. The odds of CVD are about 1.92 times higher in older individuals compared to younger individuals, adjusting for obesity.

In terms of confounding, it seems that age does somewhat confound the relationship between obesity and CVD. Before adjusting for age, the odds ratios of CVD in obese vs. non-obese individuals were 1.48 for young and 1.54 for old, but after adjusting for age, this odds ratio is 1.51. However, the effect is not very substantial as the crude and adjusted ORs are quite close. If age were a strong confounder, we would expect to see a larger discrepancy between the crude and adjusted ORs.

**A5:**

In the example, reversable defect thalassemia, asymptomatic chest pain , ST depression from exercise are some of the most important variables for prediction purposes, but should not be interpreted as causal relationship with the heart failure. If using age as example, we may find age plays an important role in both explanatory and prediction models. However, in prediction models it does not necessarily mean age is a cause for the disease. 图表

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In predictive models, variables are used to make the best prediction possible, regardless of their causal relationships with the outcome. In contrast, in explanatory or causal inference models, variables are used to understand their causal impact on the outcome, controlling for other factors to isolate these effects.

**A6:**

For this table, TP = 8, FP = 500, FN = 2, TN = 9490.

Sensitivity = TP / (TP + FN) = 8 / (8+2) = 0.8

Specificity = TN / (TN + FP) = 9490 / (9490+500) = 0.95

Type I error = 1 – specificity = 0.05

type II error = 1 – sensitivity = 0.2

表格

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