**Odds & ORs:**

**PART 1: categorical explanatory variable**

***Solutions***

1. **Med School Acceptance: Gender**Open the **MedGPA** data set (from the Stat2Data package) in R and use ?MedGPA to learn about the data.
   1. Based on this sample of 55 students, what are the odds of a woman getting accepted to med school? (xtabs(), tally(), or table() will be helpful here!)

Odds = #accept/#fail = 18/10 = 1.8

* 1. Based on this sample of 55 students, what are the odds of a man getting accepted to med school?

Odds = 12/15 = 0.8

* 1. Interpret the value in part (b).

The odds of a man getting accepted to med school is 0.8, which means we expect 8 men will be accepted for every 10 men denied.

* 1. What is the odds ratio of women to men?

OR = 1.8/0.8 = 2.25

* 1. Interpret the odds ratio.

The odds of a woman being accepted to med school are 2.25 times a man’s odds.

1. **ICU Survival: Infections**Open the **ICU** data set (from the Stat2Data package) in R and use ?ICU to learn about the data.  
   1. Make a table of survival status by presence of infection.

> xtabs(~Infection+Survive,data=ICU) #two-way table of infection by survival

Survive

Infection 0 1

0 16 100

1 24 60

* 1. Make a table of survival status by presence of infection, where the values in the table are the *proportion of each group (infected or not) who survived*. (That is, you should be able to look at the table and immediately know: \_\_% of infected individuals survived, \_\_% of non-infected individuals survived.)

> prop.table(xtabs(~Infection+Survive,data=ICU), 1) #proportion table of survival within each infection group

Survive

Infection 0 1

0 0.1379310 0.8620690

1 0.2857143 0.7142857

* 1. Does there appear to be a relationship between these two variables?

Probably, yes. Those who were infected were twice as likely to die as those who were (28.5% death rate vs. 13.8% death rate).

* 1. Calculate the **odds** of survival for infected individuals and the odds of survival for non-infected individuals.

odds of survival for infected = 60/24; odds of survival for non-infected = 100/16

* 1. Calculate the odds ratio of non-infected individuals to infected individuals.

odds ratio of non-infected to infected = (100/16) / (60/24) = 2.5

* 1. Interpret the odds ratio.

The odds for a non-infected person surviving the ICU are about 2.5 times the odds of an infected person surviving.

1. **Cancer data: Survival**Below is a table of various types of cancer, along with whether the patient survived at least a year.
   1. Fill out the rest of this table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Breast | Bronchus | Colon | Ovary | Stomach |
| Died (within 1 year) | 2 | 14 | 8 | 3 | 9 |
| Survived (at least 1 year) | 9 | 3 | 9 | 3 | 4 |
| Odds of survival | 9/2 | 3/14 | 9/8 | 3/3 | 4/9 |
| Log(odds) of survival | 1.50 | -1.54 | 0.12 | 0 | -0.81 |

* 1. Interpret the odds of survival for ovarian cancer.

The odds of survival for someone with ovarian cancer is 1, which means a woman has a 50% chance of survival.

* 1. Calculate the odds ratio of survival for colon cancer vs breast cancer, and interpret it.

OR = (9/8) / (9/2) = 0.25

The odds of survival for those with colon cancer is 25% the odds of survival for those with breast cancer.