

Final exam, 7 December 2007

This question for the final exam is worth 7.5% of the total course mark. It has three parts, labeled a), b), and c), that should all be answered.

The data described here were collected approximately 20 years ago at a clinic for migraine patients. When patients arrived at the clinic with a migraine, the following steps were taken to alleviate the patient's pain. Prior to any treatment, the severity of the migraine was assessed; for simplicity, the severity is given here as a dichotomous variable where the value 1 represents a severe migraine, and the value 0 represents a less severe migraine. After the assessment of severity, the patient was taken to a dark and cool room, and was subsequently given one of three medications: P (placebo), C (Chlormezanone), or D (Diazepam). (The biological mechanisms through which these medications might alleviate the migraine are not important for the considerations to follow.) After a certain time had elapsed, the patients were reassessed, and it was determined whether an improvement in their condition had occurred or not. The table below gives data for 96 patients that received medications P or C.

Improvement	Severity= 0		Severity= 1	
	Medication P	Medication C	Medication P	Medication C
yes	8	16	18	20
no	16	5	5	8

- Describe the study design, and draw a graph to represent the causal structure between the variables you find most reasonable (prior to any data analysis). Use the graph to determine the possible (epidemiological) roles of the severity and medication on the improvement; e.g., whether the severity could be a confounder for medication, or medication could be a confounder for severity, or other roles.
- Use the data in the table and the attached Stata listings (next page) to carry out an epidemiological analysis to determine the actual roles of the two variables. Summarize the relations between the variables with suitable measures of association. If you would like to compute additional measures (not present in the Stata listing), you may either compute them manually (for calculations that are not too complex) or give the relevant Stata command(s) to compute them.
- Additional results obtained for 47 patients that received medication D are shown in the table below.

Improvement	Severity= 0	Severity= 1
yes	7	22
no	13	5

Use the values of the table to examine whether medication D compares differently to placebo with respect to patient's improvement than medication C does (relative to placebo). No Stata listings are provided for this part so you will have to manually carry out any calculations you need to answer the question. Limit your calculations to the key parameter(s), and outline a Stata analysis for any additional parameters.

Stata listing for part b):

```
. list improv medic severe n, sep(8)
```

```

+-----+
| improv  medic  severe  n |
+-----+
1. |      1      P      0   8 |
2. |      0      P      0  16 |
3. |      1      C      0  16 |
4. |      0      C      0   5 |
5. |      1      P      1  18 |
6. |      0      P      1   5 |
7. |      1      C      1  20 |
8. |      0      C      1   8 |
+-----+

```

```
. cs improv medic [fw=n], by(severe)
```

```

      severe |      RR      [95% Conf. Interval]  M-H Weight
-----+-----
          0 |  2.285714   1.236695   4.224559   3.733333
          1 |  .9126984   .663927   1.254684   9.882353
-----+-----
      Crude |      1.3281   .9768965   1.805566
M-H combined |      1.289171   .9581476   1.734556
-----+-----

```

```
Test of homogeneity (M-H)      chi2(1) =    7.863  Pr>chi2 = 0.0050
```

```
. cs improv severe [fw=n], by(medic)
```

```

      medic |      RR      [95% Conf. Interval]  M-H Weight
-----+-----
          P |  2.347826   1.281568   4.301206   3.914894
          C |  .9375     .6708122   1.310212   9.142857
-----+-----
      Crude |      1.397059   1.017562   1.918088
M-H combined |      1.360335   .9999694   1.850568
-----+-----

```

```
Test of homogeneity (M-H)      chi2(1) =    7.873  Pr>chi2 = 0.0050
```