Assignment Five

Due March 31

A researcher was interested in whether cholesterol levels are inherited from parents. He compared the mean cholesterol levels in three groups. In one group, both parents of the participant have high cholesterol levels. In the second group, only one parent of the participant has high cholesterol. In the third group, neither of the participant’s parents have high cholesterol. Besides recording the cholesterol level of each participant, he also recorded their age to use as a covariate.

For this assignment, address the following:

1. Use SAS to conduct two analyses: (a) an ANOVA and (b) an ANCOVA using age as a covariate. The data to analyze are contained in the file *cholesterol\_data.csv*. If you are using SAS On Demand, the *cholesterol\_data.csv* file is located in the directory */courses/d41266e5ba27fe300*.
2. Specify the null and alternative hypotheses for the ANCOVA. Report the results of the F-test (F and p-value) for the test of the group effect and state your conclusion about the null hypothesis.
3. Referring to the SAS output, compare and contrast the ANOVA and ANCOVA results in terms of the statistical significance of the group effect. Did the ANCOVA succeed in reducing error variance? Explain.
4. Compare the unadjusted unadjusted group means to the adjusted group means. Describe why the adjusted cholesterol means would differ from the unadjusted cholesterol means.
5. Conduct a test of the interaction between age and group. What does the interaction result imply about the appropriateness of using age as a covariate in this study?

2. Ho: The adjusted means of cholesterol for each parent status is the same.

Ha: The adjusted means of cholesterol for each parent status is not the same.

The F-test for the group effect , parent status, was F=3.36, p= .0486. Since the p-value was less than 0.05, we can reject the null hypothesis. I can say that I am 95% confident that the adjusted means of cholesterol for each parent status is not the same.

3. So under the anova test, the F-value for parent status was 3.23 with a p-value of 0.0536. Under the ancova test, the F-value for parent status was 3.36 with a p-value of .0486. The ancova test for parent status had a significant p-value compared to the anova test which did not have a significant p-value. Since the sum of squares of the parent status in the ancova test (1509.137) was less than the sum of squares of the anova test (3522.727), I can say that the ancova did succeed in reducing the error of variance.

4. The adjusted group means had a F-value of 7.85 with a p-value of .0019, and the unadjusted group means had an F-value of 3.36 with a p-value of .0486. The unadjusted group mean is different than the unadjusted group mean because the unadjusted group mean does not take covariate of age when evaluating the effectiveness of parent status for the cholesterol level. The adjusted does take in the covariate of age when evaluating the effectiveness of parent status on cholesterol level.

5. For my interaction between the covariate age and the factor of age status I got a p-value of 0.4149, with F-value .91. With my p-value greater than 0.05 I fail to reject my null hypothesis and conclude age did not have a significant interaction with parent status on the amount of cholesterol.

Data Code:

proc import datafile="/folders/myfolders/sasuser.v94/cholesterol\_data.csv"

out=WORK.IMPORT

dbms= csv

replace;

getnames=yes;

run;

Title "ANOVA: One Parent with High Cholesterol vs. Both Parents with High Cholesterol";

proc glm;

class parent\_status;

model cholesterol= parent\_status;

means parent\_status;

run;

Title "ANCOVA: One Parent vs. Both Parents using Age as a Covariate";

proc glm;

class parent\_status;

model cholesterol = parent\_status age/solution;

means parent\_status;

lsmeans parent\_status;

run;

Title "ANCOVA: Interaction Between Age and Group";

proc glm;

class parent\_status;

model cholesterol = parent\_status age parent\_status\*age/solution;

lsmeans parent\_status;

run;