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Exercises Quantitative Methods in Statistics

Worksheet: Mock Examinations

Problem:
Please open the file *1991 U.S. General Society Survey.sav* of the SPSS-Tutorial. This is a poll of 1 517 US-Americans of age 18 up to 89.

a) Use the sample data to test for the independence of the two variables "ethgr = Ethnic Group of Respondent" and "Happy = General Happiness".

   1. What is the name of the test?
   2. Which assumptions of the test must be checked to get an accurate result? Please verify these assumptions.
   3. Consider the p-value. What is your conclusion?

b) Does there appear to be a relationship between General Happiness and Number of Children? What does the result of your analysis tell the purchasing department?

c) Use $\alpha = 0.05$ and a goodness of fit test to see whether the data of the variable Number of Children fit a Normal distribution.

Solution

a. 1. Pearson Chi-Square test

2. df=4
   0 cells $\leq 20\%$ have expected count less than five
   minimum expected count $= 5.16 \geq 1$
   The rule of thumb is fulfilled.

3. p-value $\approx 0.000 \leq 0.05$
   General Happiness and Ethnic Group are stochastically dependent.

b) p-value of Pearson Chi-Square test $= 0.044 < 0.05$
General Happiness and Number of Children are stochastically dependent at a level $\alpha = 0.05$-test
$\gamma = +0.001$ i.e. very weak relationship that respondents with many children are dissatisfied.

c) p-Value Lilliefors test ≈ 0.000
p-value Shapiro-Wilk test ≈ 0.000
The variable Number of Children has no Normal distribution.
Remark: These two goodness-of-fit test are only sensitive for small sample sizes up to 30. In this example with $n = 1509$ you should check Normal distribution with a Plot-Point diagram or a Q-Q Plot.