STAT 110: Practice Problem 8 Solutions
Fall 2017

A Gallup poll asked 1,010 adults ages 18 and over about their ideal weight. The survey found that 112 interviewees thought that they were currently *under their ideal weight*, 180 thought that they were at *about their ideal weight*, and 718 thought that they were *over their ideal weight*. The National Health Interview Survey estimates, based on people's actual body mass index (computed from both weight and height), that 1.8% of the U.S. adult population is underweight, 36.7% has a healthy weight, and 61.5% is either overweight or obese.

Research Question: Does the Gallup poll provide evidence that the self-perceptions of adults differ from the reality of the weight distributions in the United States?

a. Write the null and alternative hypotheses for investigating this research question.

H_o: the self-perceptions of adults do not differ from the reality of weight distributions in the U.S. ($\pi_{underweight} = 0.018$, $\pi_{healthy} = 0.367$, $\pi_{overweight} = 0.615$)

H_a: the self-perceptions of adults do differ from the reality of weight distributions in the U.S.

b. How many of the 1,010 adults surveyed do we expect to see give each response if the self-perceptions of adults do *not* differ from the reality of the weight distributions in the United States? Be sure to give the expected count for each possible response. Show your work to justify your answer.

Underweight: 1.8% of 1010 = 18.18
Healthy/Ideal: 36.7% of 1010 = 370.67
Overweight: 61.5% of 1010 = 621.15

c. Find the chi-square test statistic for investigating this research question by hand. Show your work to receive full credit.

$$\sum\left(\frac{\text{(Observed - Expected}}{\text{Expected}}\right)^2 = \frac{(112-18.18)^2}{18.18} + \frac{(180-370.67)^2}{370.67} + \frac{(718-621.15)^2}{621.5} = 597.35$$

d. Carry out the chi-square test in JMP, and find the p-value for investigating this research question (you must attach your JMP output to receive full credit).

Test Probabilities

Level	Estim Prob	Hypoth Prob
healthy	0.17822	0.36700
over	0.71089	0.61500
under	0.11089	0.01800

Test	ChiSquare	DF	Prob>Chisq
Likelihood Ratio	355.2957	2	<.0001*
Pearson	597.3492	2	<.0001*

Method: Fix hypothesized values, rescale omitted

p-value: **<u>≤0.0001</u>**

e. Write a conclusion in the context of the research question.

The survey results provide evidence that the self-perceptions of adults differ from the reality of the weight distributions in the United States.