

2-PROPORTION Z-TEST

This test is used to compare 2 proportions from a between groups design (independent samples)

In a study done in Michigan, it was determined 38 (out of 62) poor children who attended pre-school needed social services later in life compared to 49 (out of 61) poor children who did not attend preschool.

Does this study provide significant evidence that preschool reduces the need for social services later in life?

CALCULATE SAMPLE PROPORTIONS:

$$\hat{p}_1 = 38/62 = .6129 \qquad \hat{p}_2 = 49/61 = .8033$$

P) IDENTIFY POPULATION PARAMETERS:

p_1 = proportion of preschool children requiring social services

p_2 = proportion of children not preschool requiring social services

H) STATE HYPOTHESES:

$$H_0 : p_1 = p_2 \qquad H_a : p_1 < p_2$$

A) VERIFY CONDITIONS REQUIRED FOR TEST:

a) $n_1 \hat{p}_1 \geq 5$ $n_1 (1 - \hat{p}_1) \geq 5$ $n_2 \hat{p}_2 \geq 5$ $n_2 (1 - \hat{p}_2) \geq 5$

b) $N > 10n$

T) PERFORM TEST USING

a) **TABLE A:**

Calculate z-statistic and check Table:

$$\hat{p} = \frac{\text{total number of success in both samples}}{\text{total number of observations in both samples}} = \frac{87}{123} = .7073$$

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1 - \hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} = -2.32$$

P-value = .0102

b) **CALCULATOR:**

STAT ---> TESTS ---> 6: 2-Prop Z Test ---> P-value = .0102

DISTR ---> 2:normalcdf (-100, -2.32) = .01017

S) STATE CONCLUSION:

There is strong (but not overwhelming evidence) that preschool reduces the future need for social services. We can reject H_0 at $\alpha = .05$ but not at $\alpha = .01$.

CONFIDENCE INTERVAL (Use PAIS):

Construct a 95% confidence interval for the difference in proportions of people needing social services after attending preschool:

STAT ---> TESTS ---> B: 2-Prop Z Int = (-.35, -.03)

We are 95% confident that the percentage of people needing social service after attending preschool was between 3% and 35% less than those who did not attend preschool. (The interval is wide because the samples are quite small.)