

Answer on Question #45578 – Math – Statistics and Probability

A pharmaceutical firm has developed a nasal spray containing interferon, which it believes will limit the transmission of the common cold within families. In the general population, 15.1 percent of all individuals will catch a rhinovirus- caused cold once another family member contracts such a cold. The interferon spray was tested on 180 people, one of whose family members subsequently contracted a rhinovirus-caused cold. Only 17 of the test subjects developed similar colds.

- a) At a significance level of 0.05, should Farooq conclude that the new spray effectively reduces transmission of colds?
- b) What should it conclude at $\alpha = 0.02$?
- c) On the basis of these results, do you think Farooq should be allowed to market the new spray? Explain.

Solution

- a) Null hypothesis: the new spray effectively reduces transmission of colds.

$$H_0: p < p_0 = 0.151; H_a: p \geq p_0 = 0.151.$$

$$\hat{p} = \frac{17}{180} = 0.094, n = 180.$$

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1 - p_0)}{n}}} = \frac{0.094 - 0.151}{\sqrt{\frac{0.151(1 - 0.151)}{180}}} = -2.136.$$

$$p - \text{value} = P(Z \geq z) = P(Z \geq -2.136) = 1 - P(Z \leq -2.136) = 1 - 0.01634 = 0.98366.$$

Since the P-value (0.98366) is greater than the significance level (0.05), we can accept the null hypothesis.

At a significance level of 0.05 Farooq should conclude that the new spray effectively reduces transmission of colds.

- b) At a significance level of 0.02 Farooq also should conclude that the new spray effectively reduces transmission of colds, because the P-value (0.98366) is greater than the significance level (0.02).
- c) On the basis of these results, I think Farooq should be allowed to market the new spray. Because the P-value is greater than any reasonable significance level.