

Answer on Question #46504 – Math – Statistics and Probability

In an air pollution study, a random sample of 200 households was selected from each of 2 communities. A respondent in each house was asked whether or not anyone in the house was bothered by air pollution. The responses are tabulated below:

Community	Yes	No	Total
I	43	157	200
II	81	119	200
Total	124	276	400

Can the researchers conclude that the 2 communities are bothered differently by air pollution? ($\alpha = 0.05$)

Solution

H_0 : the two populations are bothered similarly by air pollution.

H_1 : the two populations are bothered differently by air pollution.

$$\chi^2 = \frac{400(|43 \cdot 119 - 81 \cdot 157| - 0.5 \cdot 400)^2}{124 \cdot 276 \cdot 200 \cdot 200} = 16.$$

From percentiles of the chi - square distribution table,

$$\chi^2_{(1-\alpha),df} = \chi^2_{(0.95),1} = 3.841.$$

Statistical decision: reject H_0 , since $\chi^2 > 3.841$.

Clinical decision: Conclude that, on the basis of these data, the 2 communities are bothered differently by air pollution.