

# Re: chi-squared test. hypothesis confusion

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- *From:* Bruce Weaver <[bweaver@xxxxxxxxxxxxxx](mailto:bweaver@xxxxxxxxxxxxxx)>
  - *Date:* Fri, 23 Dec 2005 19:29:35 -0500
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eblabac@xxxxxxxxxxxxxxxxxxxxxx wrote:

This is a common question when starting to do hypothesis testing. Your tests  $H_0$  is smoking and allergy are statistically independent, and  $H_a$  is smoking and allergy are not independent. From your notes you have a decision rule associated with this `chisq` test. You reject  $H_0$  if your test statistic  $\chi^2 \geq \chi^2_{\alpha}$  (where  $\chi^2_{\alpha}$ ,  $(r-1)(k-1)$  is found in a table or generated from a program depending on your level of  $\alpha$  and  $r$  and  $k$ ). Simply find the  $\chi^2_{\alpha}$  value from a table (in any stat book), then calculate the  $\chi^2$  statistic using your data. Then follow the rule ... if  $\chi^2 \geq \chi^2_{\alpha}$  - reject  $H_0$ , i.e. smoking and allergy are NOT independent, if  $\chi^2 < \chi^2_{\alpha}$  you dont accept  $H_a$ , you "fail to reject  $H_0$ ", i.e. smoking and allergy are independent. Its as easy as that. However, make sure your data satisfies any assumptions of the test. This particular test has very flexible assumptions, in that you only need your observations to be independent of each other and that each cell of your 2x2 table is greater than 0 (preferably bigger than 5, otherwise you could get skewed results).  
Hope that helps.

Eric B.

It is the expected frequencies, not observed, that need to be equal to 5 or more for a 2x2 chi-square. Here is a summary of the conditions under which chi-square tests perform reasonably well.

[www.angelfire.com/wv/bwhomedir/notes/chi\\_square\\_assumptions.txt](http://www.angelfire.com/wv/bwhomedir/notes/chi_square_assumptions.txt)

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