On the
"Equal Expected Frequencies"
vs.
"Goodness-of-fit" CHI SQUARE

The Setup: Imagine that we have conducted an analysis of the rates of occurrence of 4 serious medical conditions in the state of Rhode Island. Our research has determined that out of every 1000 individuals in the state, 18 will develop lung cancer, 35 heart disease, 30 HIV syndrome, and 17 liver failure.

Situation 1: If we wished to test whether or not these rates of occurrence were significantly different from what CHANCE would predict, we could perform the following Chi Square analysis. Here, CHANCE would predict EQUAL EXPECTED FREQUENCIES (Fe's). The Fe's are calculated by dividing the SUM by the number of categories here which is 4, viz., 100/4 = 25.

	Lung Cancer	Heart Disease	HIV Syndrome	Liver Failure	SUM	
Fo	18	35	30	17	100	
Fe	25	25	25	25	100	
Fo-Fe	-7	10	5	-8		
(Fo-Fe)^2	49	100	25	64		
((Fo-Fe)^2)/Fe	1.96	4	1	2.56	9.520	=Chi Square

$\chi^2_{.05}$ (3) = 7.81, Reject Ho (Using the Chi Table) [Actual p = .023]

Situation 2: In this case suppose that we know what the rates of occurrence are of these diseases per 1000 population NATIONALLY and we wish to determine if Rhode Island's statistics are comparable, whether they match, WHETHER THEY FIT "GOOD," whether our rates per 1000 are the pretty much the same or very different. Accepting Ho would mean that our rates do match the national rates reasonably well(they do not have to match exactly). Rejecting Ho would mean they do not.

The national rates for these conditions per 1000 are 22 for lung cancer, 24 for heart disease, 38 for HIV, and 16 for liver failure. These values will be used as our EXPECTED FREQUENCIES for our Chi Square analysis.

	Lung Cancer	Heart Disease	HIV Syndrome	Liver Failure	SUM	
Fo	18	35	30	17	100	
Fe	22	24	38	16	100	
Fo-Fe	-4	11	-8	1		
(Fo-Fe)^2	16	121	64	1		
((Fo-Fe)^2)/Fe	0.727273	5.041667	1.684211	0.0625	7.516	=Chi Square

$\chi^2_{.05}$ (3) = 7.81, Accept Ho (Using the Chi Table) [Actual p = .057]

Anthony A. Walsh, Ph.D. ~ 17-March-2004