

Applications of χ^2

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

$$\text{d.f.} = (R-1) * (C-1)$$

"a comparison of variances"

1. Independence (if any) between variables
2. Whether various subgroups are homogeneous
use difference between observed rather than O-E
3. Whether there is a significant difference in proportions in the subclasses among subgroups.

Limitations:

Approximation of a continuous distribution--no good for "small" frequencies, e.g. if expected < 1, or more than 20% of values < 5

Relationship between smoking and alcohol consumption during pregnancy.

	Alcohol				
	None	Low	Medium	High	Total
Smoker	1,880	2,048	194	76	4,198
Nonsmoker	4,290	2,430	172	37	6,929
Total	6,170	4,478	366	113	11,127