

Finding the Expected Counts

The expected count in any cell of a two-way table can be found using the following formula:

$$\text{Expected Count} = \frac{\text{Row Total} \cdot \text{Column Total}}{\text{Table Total}}$$

Does Background Music Influence What Customers Buy?

Compute the expected counts.

Wine	Music			Total
	None	French	Italian	
French	30	39	30	99
Italian	11	1	19	31
Other	43	35	35	113
Total	84	75	84	243

Wine	Music			Total
	None	French	Italian	
French	34.22	30.56	34.22	
Italian	10.72	9.57	10.72	
Other	39.06	34.88	39.06	
Total				

$$\frac{(99)(84)}{243}$$

$$\frac{(99)(75)}{243}$$

$$\frac{(99)(84)}{243}$$

The Chi-Square Test for Homogeneity

The hypotheses for a chi-square test for homogeneity are as follows:

H₀: There is no difference in the distribution of a categorical variable for several populations or treatments.

H_a: There is a difference in the distribution of a categorical variable for several populations or treatments.

Does Background Music Influence What Customers Buy?

State the appropriate hypotheses?

H₀: There is no difference in the distribution of wine purchases based on the type of music played.

H_a: There is a difference in the distribution of wine purchases based on the type of music played.

Does Background Music Influence What Customers Buy?

Is there evidence to conclude that background music influences what customers buy? Carry out the appropriate significance test.

$$\chi^2 = \frac{(30 - 34.2)^2}{34.2} + \frac{(39 - 30.56)^2}{30.56} + \dots + \frac{(35 - 39.06)^2}{39.06}$$

$$df = (3 - 1)(3 - 1) = 4 \quad \chi^2 = 18.28$$

(# of row categories - 1)(# of column categories - 1)

$p = .00109$ *Using my calculator, I performed a χ^2 -test. Since the p-value, .00109, is less than the significance level of $\alpha = .05$, we reject H_0 . We have sufficient evidence to conclude that there is a difference in the distribution of wine purchases based on the music played.