**Problem Statement for Chi-Square Test Example March 2, 2015**

A retrospective study was conducted for Blew Cross Insurance. A random sample of 113 knee-replacement patient records for June 2013 was collected. Each record was categorized as to Location (FL, GA, NY, AZ) and Gender (M,F).

The results are tabulated in the following table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Gender* | *FL* | *GA* | *NY* | *AZ* |
| *Female* | 6 | 22 | 21 | 9 |
| *Male* | 4 | 23 | 24 | 4 |

Do the data indicate that there is an association between Location and Gender for knee-replacement claims? NOTE: The data in the table are counts, not values. The correct hypothesis test is the Chi-Square Test for Independence.

**Chi-Square Test: FL, GA, NY, AZ**

Expected counts are printed below observed counts

Chi-Square contributions are printed below expected counts

 FL GA NY AZ Total

 F 6 22 21 9 58

 5.13 23.10 23.10 6.67

 0.147 0.052 0.190 0.812

 M 4 23 24 4 55

 4.87 21.90 21.90 6.33

 0.155 0.055 0.201 0.856

Total 10 45 45 13 113

Chi-Sq = 2.467, DF = 3, P-Value = 0.481

1 cells with expected counts less than 5.

**Interpretation (independence)**

Null Hypothesis: Location and Gender are independent.

Alternate Hypothesis: Location and Gender are not independent.

The p-value of 0.481 suggests that Location and Gender are independent with respect to knee-replacement claims during June 2013.

**Interpretation (association, relationship)**

Null Hypothesis: There is no association between Location and Gender.

Alternate Hypothesis: There is an association between Location and Gender.

With respect to knee-replacement claims during June 2013, the p-value of 0.481 suggests that Location and Gender are not associated.

NOTE: Some texts prefer the word “association”; others use the word “relationship”.