The chi-square test is a hypothesis test that is used when you want to determine whether there is a relationship between two categorical variables. For example of categorical variables, Gender- male and female.

Gender – marriage

Calculating the p-calue by hand is not feasible. To do this hand we use critical chi square value

Observation values

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Marital status | Middle school | High school | Bachelor | Master’s | PhD | Total |
| Single | 18 | 36 | 21 | 9 | 6 | 90 |
| Married | 12 | 36 | 45 | 36 | 21 | 150 |
| Divorced | 6 | 9 | 9 | 6 | 3 | 30 |
| Widowed | 3 | 9 | 9 | 6 | 3 | 30 |
| Total | 39 | 90 | 84 | 54 | 33 | 300 |

Expected values

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Marital status | Middle school | High school | Bachelor | Master’s | PhD |
| Single | 11.7 | 27 | 25.2 | 16.2 | 9.9 |
| Married | 19.5 | 45 | 42 | 27 | 16.5 |
| Divorced | 3.9 | 9 | 8.4 | 5.4 | 3.3 |
| Widowed | 3.9 | 9 | 8.4 | 5.4 | 3.3 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| o | e | o-e | o-e 2 | o-e 2 |
| 18 | 11.7 | 6.3 | 39.69 | 3.39 |

Calculated Chi-square= 23.57

Degrees of freedom = (columns – 1)(rows-1)

= (5-1)(4-1)=12

Tabular chi-square = 21.03

Calculated Chi-square = 23.57 > Tabular Chi-square= 21.03

Therefore, we reject the Null hypothesis and accept the alternate hypothesis.

Null hypothesis (Ho): There is no relationship between marital status and educational qualification.

Alternate hypothesis (Ha): There is a significant relationship between marital status and educational qualification.

The significance level must be defined.

Significance level (a)= 0.05

Expected value =

The Contingency table (also called crosstab) is used in statistics to summarise the relationship between several categorical variables.

A null Hypothesis is a general statistical statement or assumption about a population parameter that is assumed to be true Until we have sufficient evidence to reject it.

It is generally denoted by Ho.

The Alternate Hypothesis is considered as competing of the null hypothesis. It is generally denoted by H1. The general goal of our hypothesis testing is to test the Alternative hypothesis against the null hypothesis.

A P-value is used as a measure of evidence against the null hypothesis. If it is greater than our level of significance then we will accept our null hypothesis.

Generally, a significant factor or alpha value of 0.05 is chosen. This alpha value denotes the probability of erroneously rejecting H0 when it is true. A lower alpha value is chosen in cases when we expect more precision. If the p-value for the test comes out to be strictly greater than the alpha value, then we will accept our H0.