

How can I use R to calculate the P-value for a given Chi-Square statistic?

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April 18, 2024

RECOMMENDED CITATION

stats writer (2024). *How can I use R to calculate the P-value for a given Chi-Square statistic?*. PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=136498>

R is a widely used statistical software that allows users to perform various calculations and analyses. One of its features is the ability to calculate the p-value for a given Chi-Square statistic. This can be achieved by using the built-in functions and packages specifically designed for Chi-Square tests. By providing the necessary input data and specifying the desired significance level, R can accurately calculate the p-value and provide the necessary information for interpreting the results. This functionality makes R a valuable tool for researchers, statisticians, and data analysts in conducting Chi-Square tests and drawing meaningful conclusions from their data.

Calculate the P-Value of a Chi-Square Statistic in R

Whenever you conduct a Chi-Square test, you will end up with a Chi-Square test statistic. You can then find the p-value that corresponds to this test statistic to determine whether or not the test results are statistically significant.

To find the p-value that corresponds to a Chi-Square test statistic in R, you can use the `pchisq()` function, which uses the following syntax:

```
pchisq(q, df, lower.tail = TRUE)
```

where:

q: The Chi-Square test statistic

df: The degrees of freedom

lower.tail: If **TRUE**, the probability to the left of **q** in the Chi-Square distribution is returned. If **FALSE**, the probability to the right of **q** in the Chi-Square

distribution is returned. Default is TRUE.

The following examples show how to use this function in practice.

Example 1: Chi-Square Goodness of Fit Test

A shop owner claims that an equal number of customers come into his shop each weekday. To test this hypothesis, an independent researcher records the number of customers that come into the shop on a given week and finds the following:

Monday: 50 customers

Tuesday: 60 customers

Wednesday: 40 customers

Thursday: 47 customers

Friday: 53 customers

After performing a Chi-Square Goodness of Fit test, the researcher finds the following:

Chi-Square Test Statistic (X²): 4.36

Degrees of freedom: (df): 4

To find the p-value associated with this Chi-Square test

statistic and degrees of freedom, we can use the following code in R:

```
#find p-value for the Chi-Square test statistic  
pchisq(q=4.36, df=4, lower.tail=FALSE)
```

0.3594721

The p-value turns out to be 0.359. Since this p-value is not less than 0.05, we fail to reject the null hypothesis. This means we do not have sufficient evidence to say that the true distribution of customers is different from the distribution that the shop owner claimed.

Example 2: Chi-Square Test of Independence

Researchers want to know whether or not gender is associated with political party preference. They take a simple random sample of 500 voters and survey them on their political party preference. After performing a Chi-Square Test of Independence, they find the following:

Degrees of freedom: (df): 2

To find the p-value associated with this Chi-Square test

statistic and degrees of freedom, we can use the following code in R:

```
#find p-value for the Chi-Square test statistic  
pchisq(q=0.8642, df=2, lower.tail=FALSE)
```

0.6491445

The p-value turns out to be 0.649. Since this p-value is not less than 0.05, we fail to reject the null hypothesis. This means we do not have sufficient evidence to say that there is an association between gender and political party preference.

How to Perform a Chi-Square Test of Independence in R

Find the complete documentation for the `pchisq()` function [here](#).