

# Cochran-Armitage trend test with XLSTAT

[demoTrend.xls](#)

## Cochran-Armitage trend test

The Cochran-Armitage trend test, also sometimes referred to as the trend on proportions test, allows to test if a series of proportions (or the corresponding counts, stored in Rx2 contingency table), can be considered as varying linearly with an ordinal or continuous score variable. It is related to the Chi-square independence test that allows to test if there is relationship between the rows and the columns of a contingency table. The Cochran-Armitage test allows you to take into account a ranking among the rows, based on scores.

## Dataset for running a Cochran-Armitage trend test

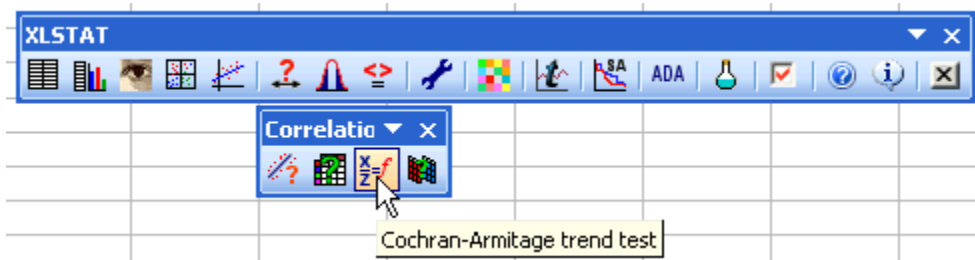
An Excel sheet with both the data and the results can be downloaded by clicking [here](#).

The data used in this tutorial have been published in [Cochran W.G. (1954). Some methods on strengthening the common Chi-square tests. Biometrics, 10, 417-451], and are also used in [Agresti A.(1990), Categorical Data Analysis. Wiley]. The data correspond to a study where drugs have been given to patients with leprosy at two different levels (Low/High).

The clinical impact of the drugs is recorded on a five level scale (Worse, Stationary, Slight improvement, Moderate improvement, Marked improvement). Our goal is to determine whether there is a linear dependence between the impact and the level of drugs.

## Setting up a Cochran-Armitage trend test

To activate the Cochran-Armitage trend test dialog box, start XLSTAT, then select the **XLSTAT / Correlation-Association tests / Cochran-Armitage trend test** command, or click on the corresponding button of the Correlation/Association tests toolbar (see below).

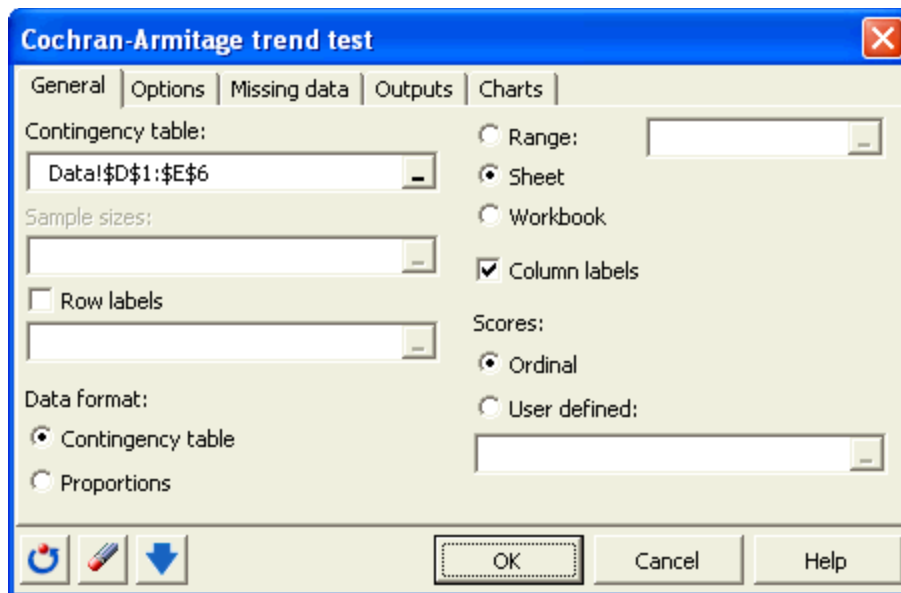


Once you have clicked on the button, the dialog box appears.

You should select the data corresponding to the two columns where the counts for each level are stored. This **format** corresponds to a **contingency table**.

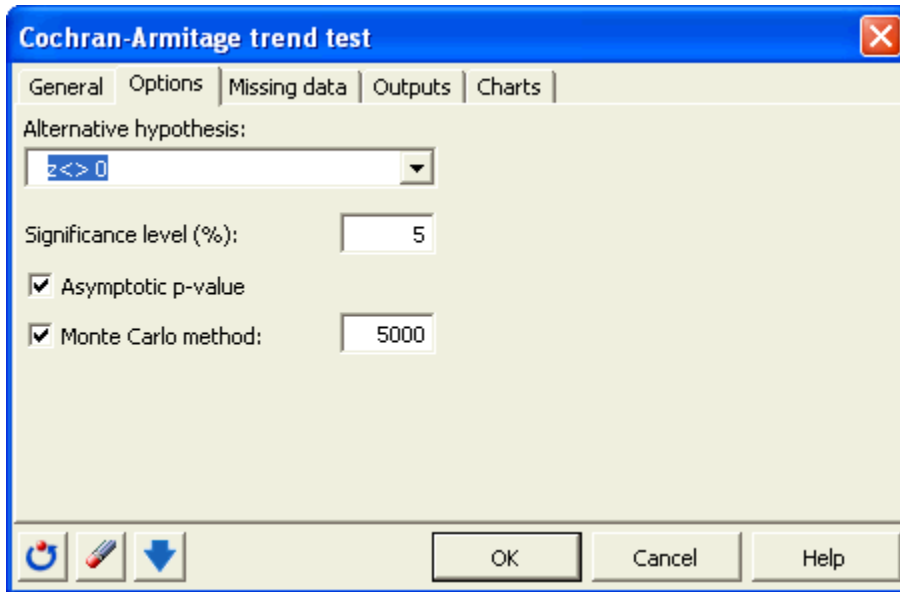
As the scores (here the clinical impact which is a response variable) are **ordinal** data and already sorted, we do not need to select them.

As the **Column labels** have been selected with the counts, the corresponding option is checked.



In the **Options** tab, we select the two-sided alternative hypothesis for the test: we only want to know if there is a linear trend or not.

We also activate the **Monte Carlo method** in order to obtain results that are closer to an exact test (the classical Cochran-Armitage trend test is based on an approximation).



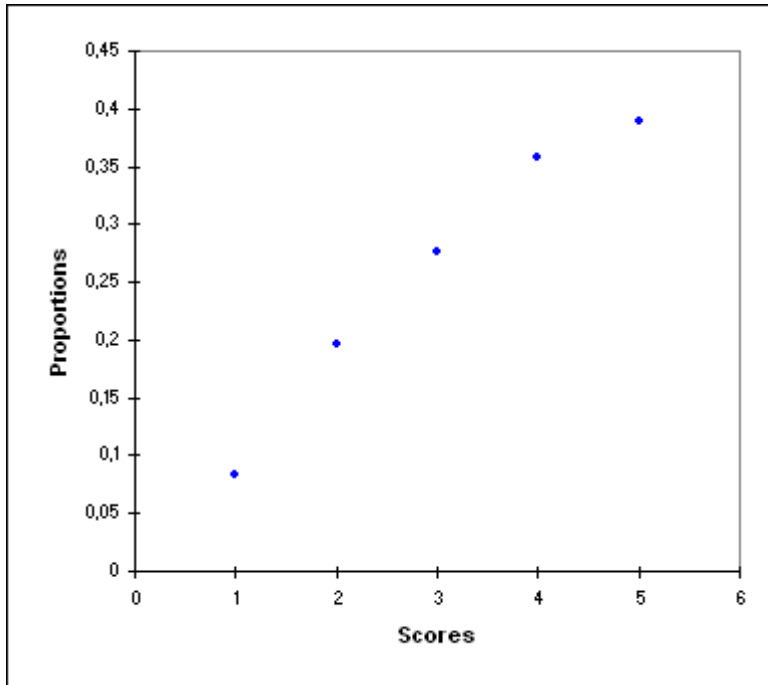
After you have clicked on the **OK** button, the computations start and the results are displayed on a new Excel sheet.

## Interpreting the results of a Cochran-Armitage trend test

The first result is a summary based on the selected data.

Summary statistics:					
Scores	High	Low	Total	Proportions	
1	1	11	12	0,083	
2	13	53	66	0,197	
3	16	42	58	0,276	
4	15	27	42	0,357	
5	7	11	18	0,389	
Total	52	144	196	1,000	

A scatter plot is displayed so that you can visually see if there is a trend or not. We can see here that there is a trend, and that it is almost perfectly linear.



Last, the results of the two tests (approximated, and simulations based) are displayed. The two results are close and lead us to conclude, with a very low risk of being wrong, that there is a linear trend in the proportions.

Cochran-Armitage trend test (Asymptotic p-value) / Two-tailed test:

z  (Observed)	2,582
z  (Critical)	1,960
p-value (Two-tailed)	0,010
alpha	0,05

Test interpretation:

H0: There is no association between the observed proportions and the score variable.

Ha: There is an association between the observed proportions and the score variable.

As the computed p-value is lower than the significance level alpha=0,05, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha.

The risk to reject the null hypothesis H0 while it is true is lower than 0,98%.

Cochran-Armitage trend test (Monte Carlo method - Number of simulations = 5000) / Two-tailed test:

z  (Observed)	2,582
z  (Critical)	1,769
p-value (Two-tailed)	0,002
alpha	0,05

Test interpretation:

H0: There is no association between the observed proportions and the score variable.

Ha: There is an association between the observed proportions and the score variable.

As the computed p-value is lower than the significance level alpha=0,05, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha.

The risk to reject the null hypothesis H0 while it is true is lower than 0,15%.