

# What is the output of the Chi-square test in SPSS?

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## RECOMMENDED CITATION

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The output of the Chi-square test in SPSS is a statistical analysis that measures the relationship between two categorical variables. It calculates the expected frequencies and compares them to the observed frequencies, providing a p-value to determine the significance of the relationship between the variables. The output also includes a contingency table displaying the observed and expected frequencies, as well as other statistical measures such as the Chi-square statistic and degrees of freedom. This information can be used to determine if there is a significant association between the variables being tested.

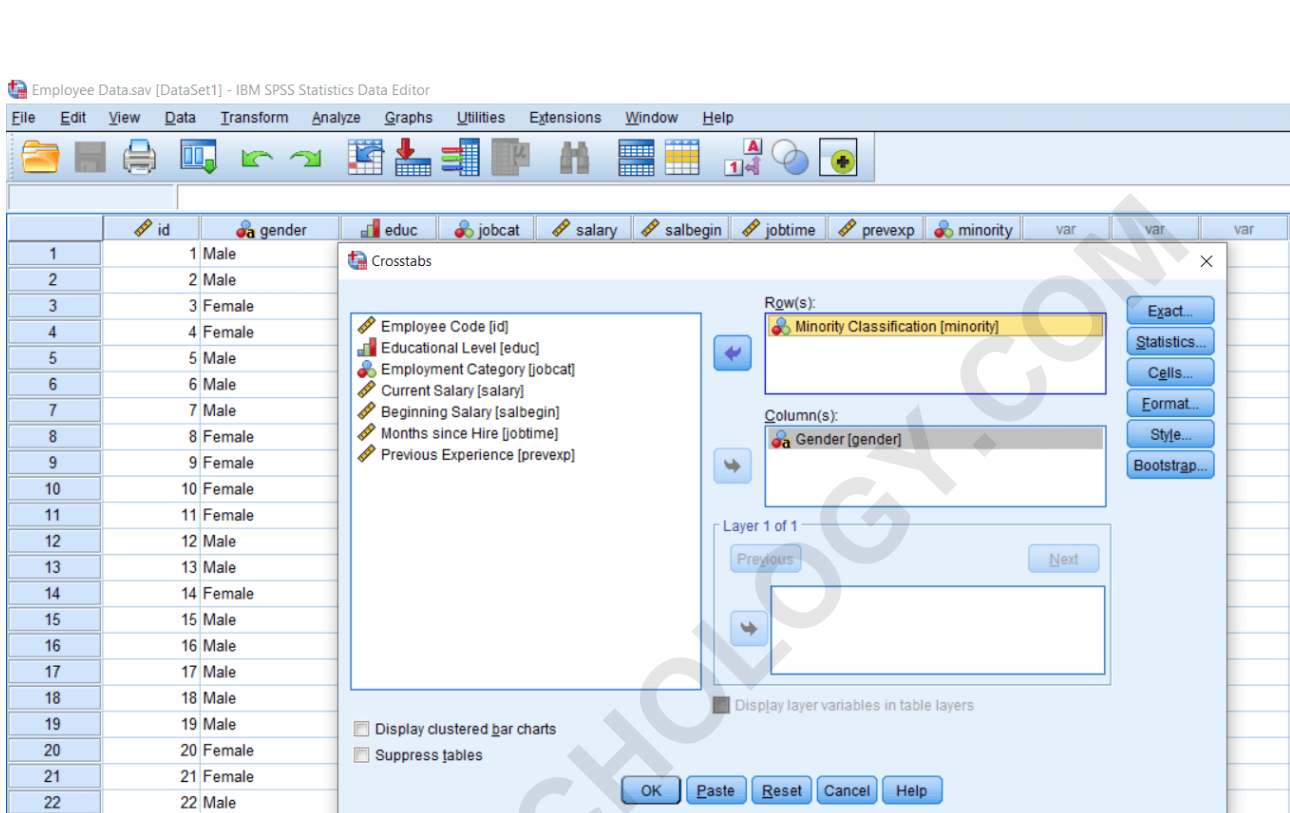
## Output of Chi-square test in SPSS

To calculate the Chi-square test, we will recall the last option. We will go to the Crosstab option like this:

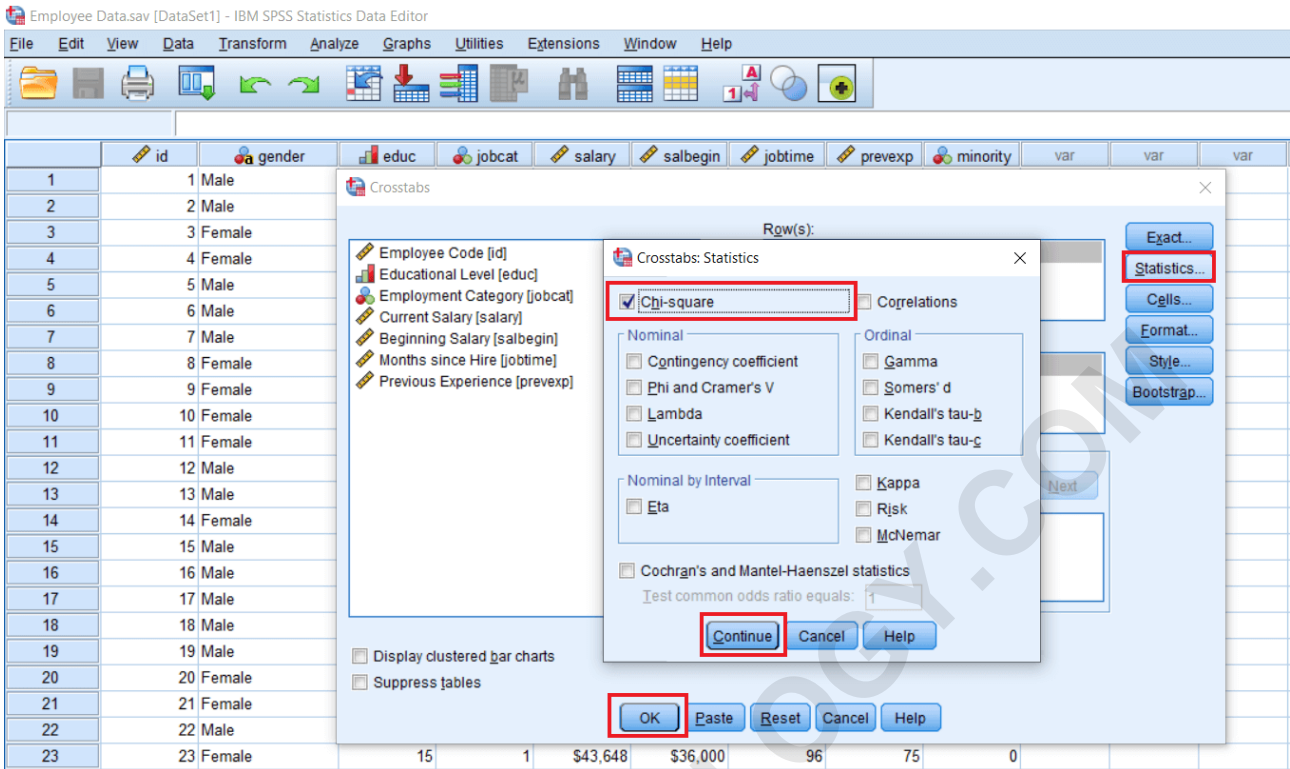
The screenshot shows the IBM SPSS Statistics Data Editor interface. The 'Analyze' menu is open, and the 'Crosstabs...' option is highlighted. The background shows a data table with columns for 'id', 'gender', 'obtime', 'prevexp', 'minority', and three 'var' columns. The data rows show employee information, including gender and various numerical variables.

id	gender	obtime	prevexp	minority	var	var	var
1	Male	98	144	0			
2	Male	98	36	0			
3	Female	98	381	0			
4	Female	98	190	1			
5	Male	98	138	0			
6	Male	98	67	0			
7	Male	98	114	0			
8	Female	98	0	1			
9	Female	98	115	0			
10	Female	98	244	0			
11	Female	98	143	0			
12	Male	98	26	1			
13	Male	98	34	1			
14	Female	98	137	1			
15	Male	97	66	0			
16	Male	97	24	0			
17	Male	97	48	0			
18	Male	97	70	0			
19	Male	97	103	0			
20	Female	97	48	1			
21	Female	97	17	0			
22	Male	96	315	0			
23	Female	96	75	0			
24	Female	96	124	0			
25	Female	96	171	1			
26	Male	96	14	0			
27	Male	96	96	0			

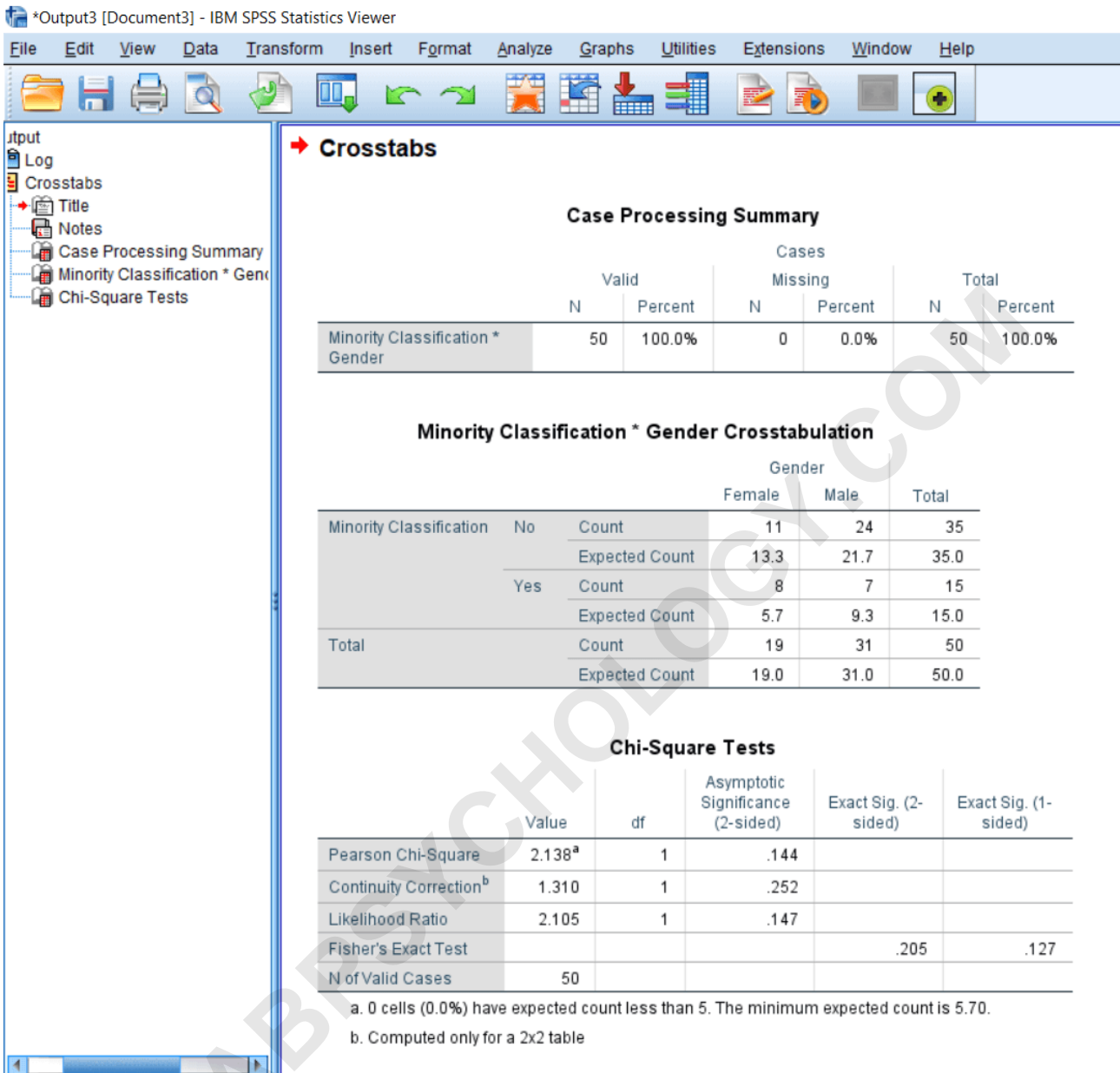
After clicking on the crosstab option, we will see the following window.



Now the extra thing we are going to do is select the Statistics option and check the Chi-square box and then click on Continue and then press Ok like this:



After this, we will get the following output where we have the Old table that we already show. The additional table we are getting is a Chi-square test table like this:



In the Chi-square test table, we can see the Person chi-square value is 2.138a, where a shows a message that 0 cells (0.0%) have expected cell count less than 5. The minimum expected cell count is 5.70. So it means our assumptions are met, and it is not being violated. So the chi-square value is 2.138, and the degree of freedom

**is 1. In a chi-square test, the degree of freedom is calculated by a formula which is as follows:**

$$\mathbf{df = (r-1) * (c-1)}$$

**Where**

**r = Number of rows**

**c = number of columns**

**In the minority classification table, we have two columns: male and female and two rows with minority classification no and minority classification yes. So the degree of freedom will be  $(2-1) * (2-1)$ , i.e., 1. That's why we got a degree of freedom as 1.**

The screenshot shows the SPSS Statistics Viewer interface with the following output sections:

### Case Processing Summary

	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Minority Classification * Gender	50	100.0%	0	0.0%	50	100.0%

### Minority Classification \* Gender Crosstabulation

		Gender		Total
		Female	Male	
Minority Classification	No	Count: 11	Count: 24	Count: 35
	Yes	Count: 8	Count: 7	Count: 15
Total		Count: 19	Count: 31	Count: 50
		Expected Count: 13.3	Expected Count: 21.7	Expected Count: 35.0
		Expected Count: 5.7	Expected Count: 9.3	Expected Count: 15.0
		Expected Count: 19.0	Expected Count: 31.0	Expected Count: 50.0

### Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.138 <sup>a</sup>	1	.144		
Continuity Correction <sup>b</sup>	1.310	1	.252		
Likelihood Ratio	2.105	1	.147		
Fisher's Exact Test				.205	.127
N of Valid Cases	50				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.70.  
 b. Computed only for a 2x2 table

Now the significance value is .144. Since this value is more than .05, so in that case, we accept the null hypothesis. Null hypothesis says that there is no significant difference between the number of males and females belonging to the minority Vs. Non-minority category. So the distribution of males and females are the same for

minority as well as non-minority category. If we look at the number in the Minority classification table, the numbers are quite different from each other. We have 11 females and 24 males in the no category and 13.3 females and 21.7 males in the yes category. But at the significance level, there is no statistical significance as such.

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SPSS Statistics Viewer interface showing the output of a Chi-square test for the relationship between Minority Classification and Gender.

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	Valid		Missing		Total	
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Minority Classification * Gender	50	100.0%	0	0.0%	50	100.0%

**Minority Classification \* Gender Crosstabulation**

		Gender		
		Female	Male	Total
Minority Classification	No	Count 11	Count 24	Count 35
		Expected Count 13.3	Expected Count 21.7	Expected Count 35.0
	Yes	Count 8	Count 7	Count 15
		Expected Count 5.7	Expected Count 9.3	Expected Count 15.0
Total		Count 19	Count 31	Count 50
		Expected Count 19.0	Expected Count 31.0	Expected Count 50.0

**Chi-Square Tests**

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
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