

What are the assumptions that need to be tested for the Chi-square test in SPSS?

Authored by
stats writer

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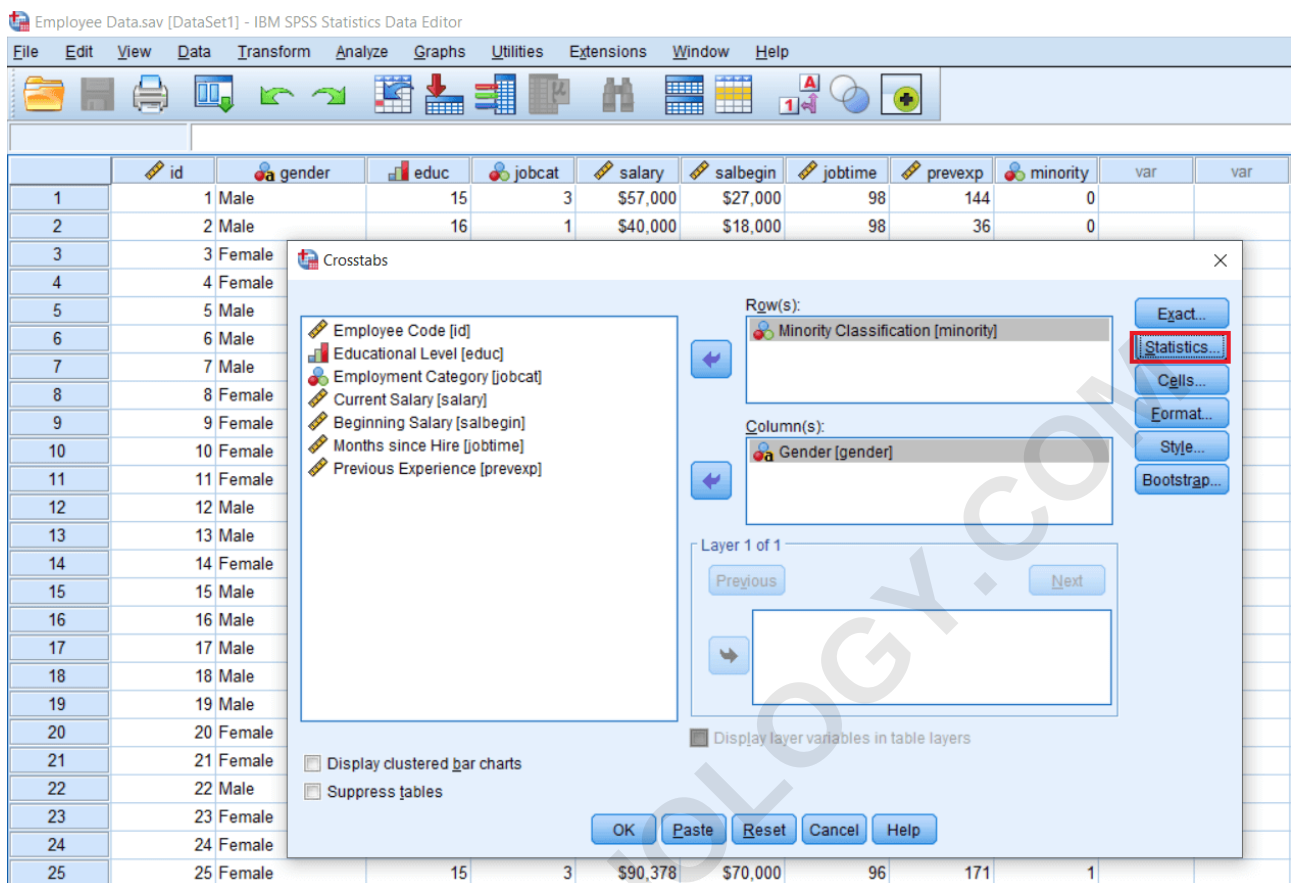
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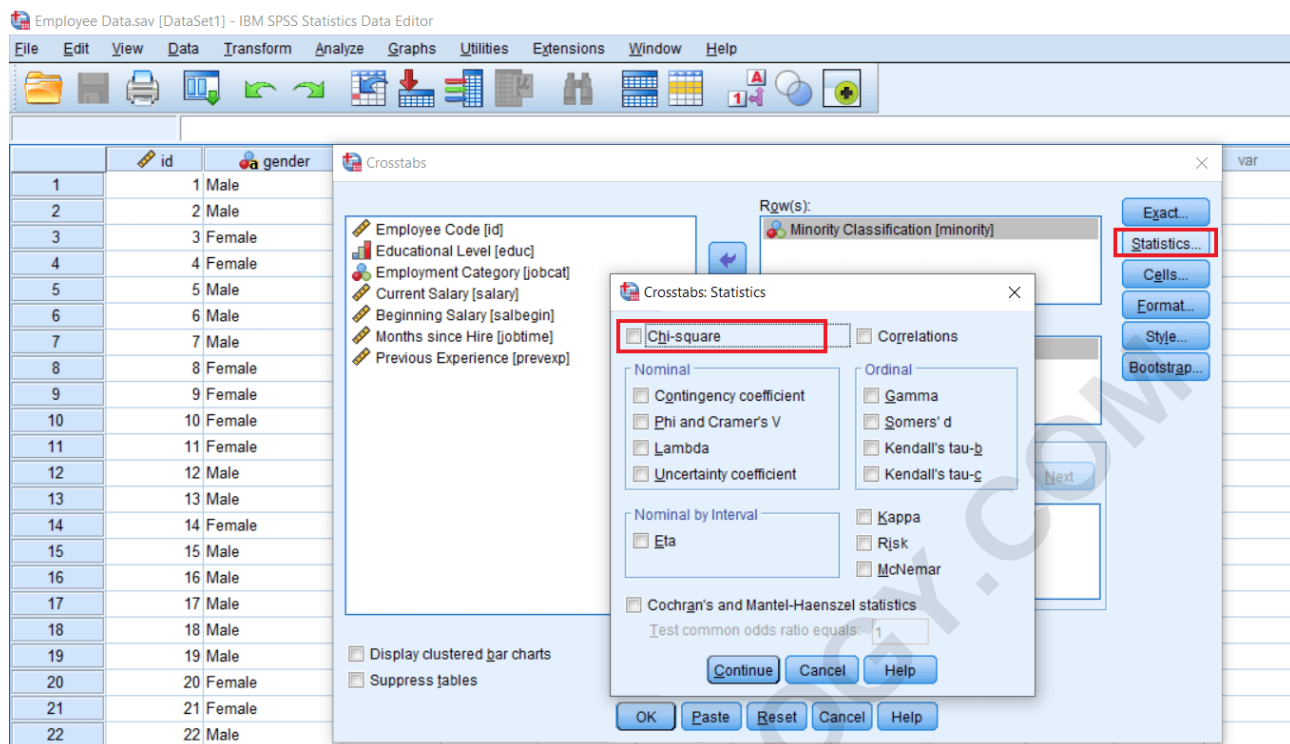
The Chi-square test in SPSS is a statistical test used to determine the association between two categorical variables. To accurately interpret the results of this test, certain assumptions need to be tested. These include the assumption of independence, which states that the observations in each category are unrelated to each other. Another important assumption is that the expected frequency for each category should be at least 5, as low expected frequencies can lead to inaccurate results. Additionally, the Chi-square test assumes that the sample size is sufficiently large, and the variables being tested are measured on a nominal or ordinal scale. These assumptions should be carefully checked before conducting a Chi-square test in SPSS to ensure the validity and reliability of the results.

Testing assumptions of Chi-square test in SPSS

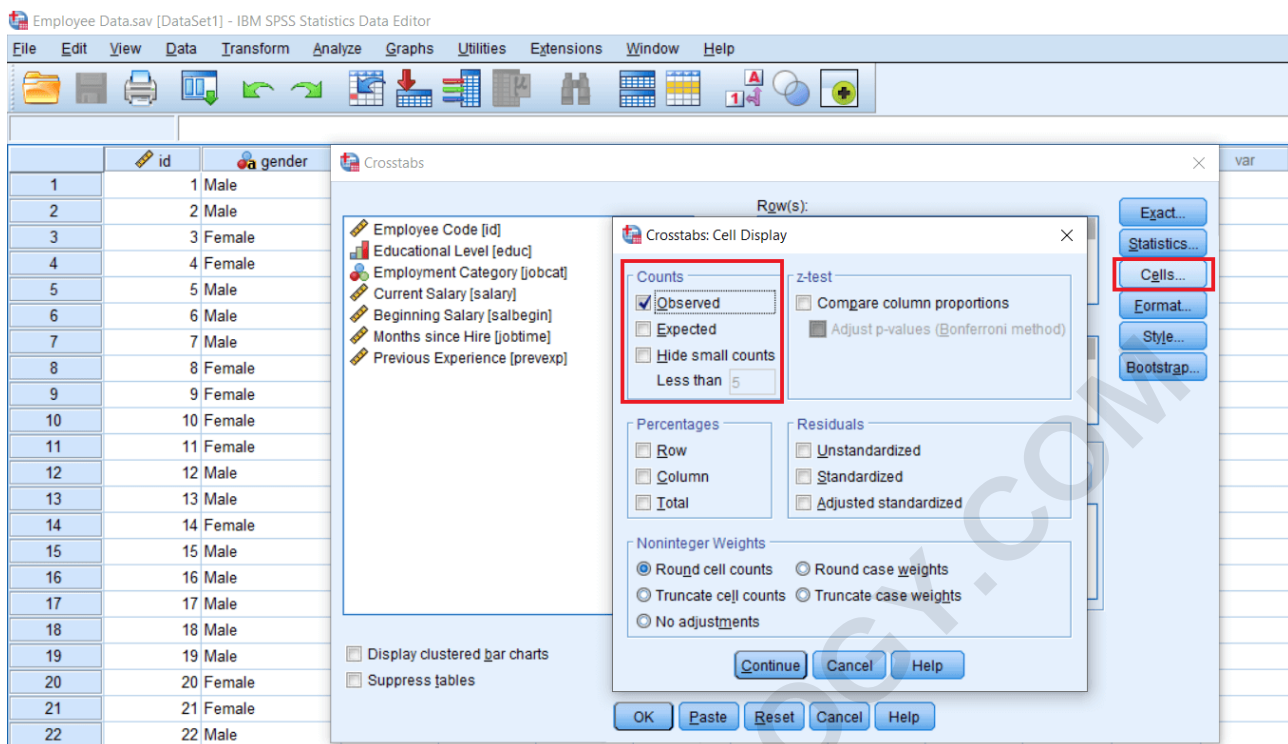
Before calculating the Chi-square test, we want to test the assumptions of the Chi-square test, whether we are meeting assumptions. So as we show in the previous file, the two measure assumption of the Chi-square test is that observations are independent of each other, and second, the expected cell count is not less than 5 in any cell. Now we want to test these assumptions. For testing this, go to this Statistics tab and click on it like this:



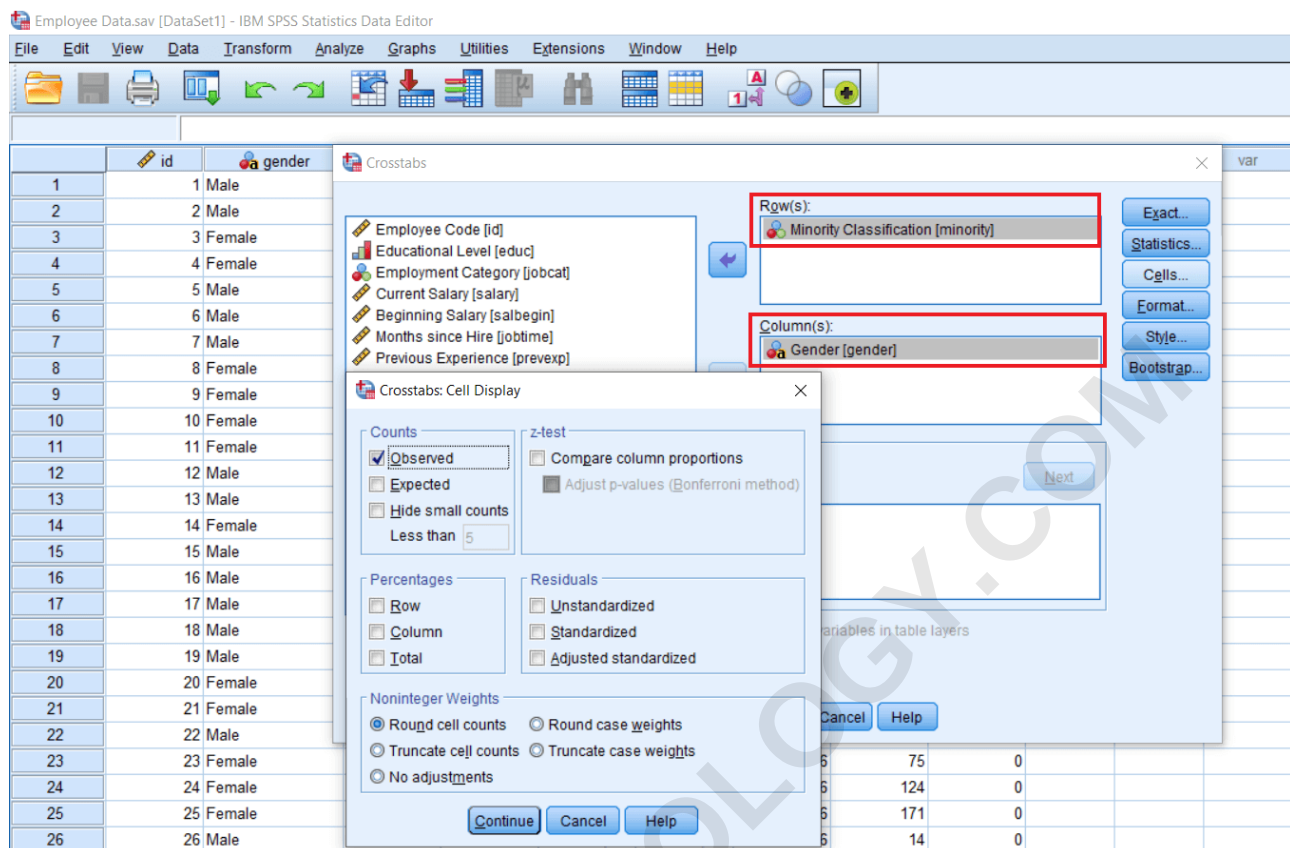
In this, we can see Chi-square. First, we are not calculating Chi-square. We are just testing the assumptions so that we will close it.



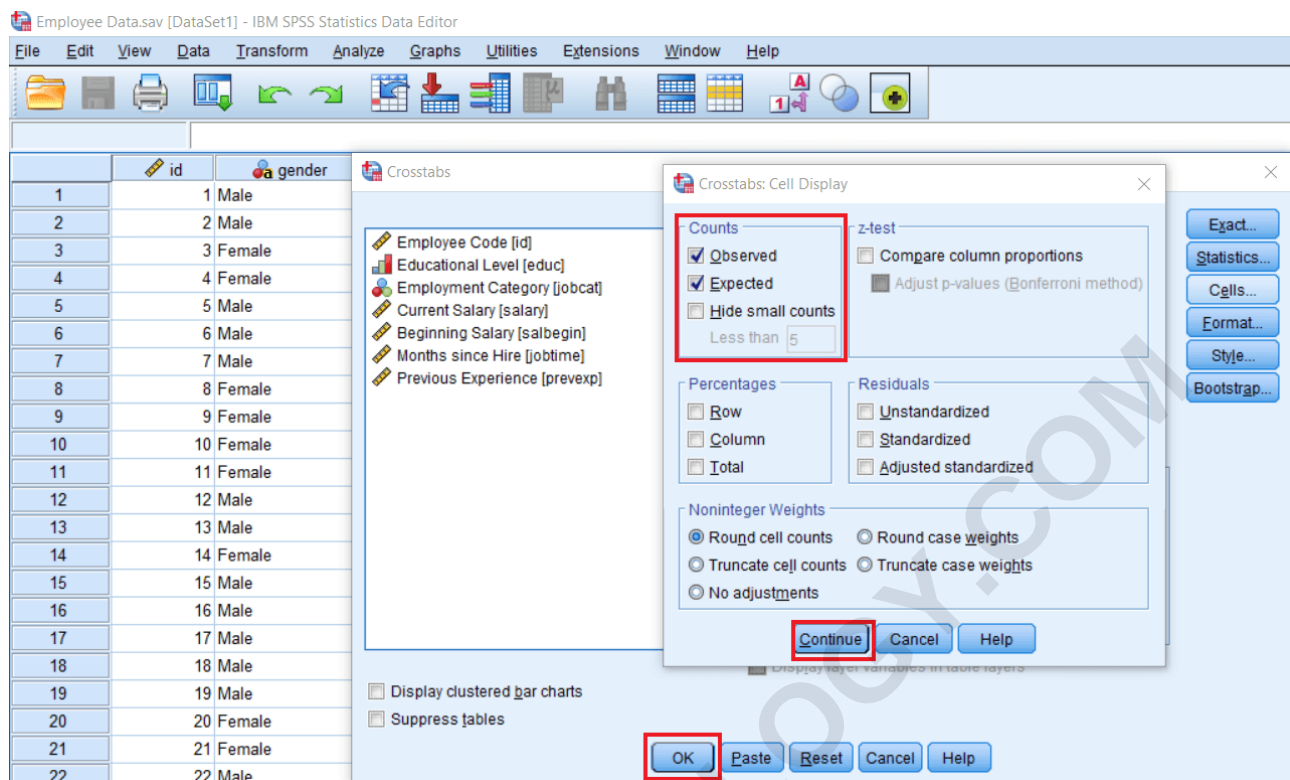
After that, we will go to Cells for testing the assumptions. In the cell, we can see observed frequencies are by default checked. So let it be checked. They give us the actually observed frequencies in each cell.



Now we will check how many cells we are expecting. So, in this case, there are two levels of gender: male and female, and two levels of minority classification: whether a person belongs to minority status or does not belong to minority status. We have two-level of minority classification and two levels for gender. So we are expecting a two * two contingency table. So all in all, there are going to be 4 observed cells.



We will check the expected counts to see if the expected count in any cell is less than 5. So, in that case, it will be a violation of the Chi-square assumption. Now click on Continue and then press Ok.



After clicking on Ok, we will get a descriptive output summary. The following Case processing summary table shows that there is a total of 50 observations, and all the observations have been taken.

*Output4 [Document4] - IBM SPSS Statistics Viewer

File Edit View Data Transform Insert Format Analyze Graphs Utilities Extensions Window Help

Output
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Crosstabs
Title
Notes
Case Processing
Minority Classifica

```

CROSSTABS
  /TABLES=minority BY gender
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL.

```

→ **Crosstabs**

Case Processing Summary

	Valid		Cases 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	24	35
		Expected Count	13.3	21.7	35.0
	Yes	Count	8	7	15
		Expected Count	5.7	9.3	15.0
Total		Count	19	31	50
		Expected Count	19.0	31.0	50.0

The second table is our interaction table between Minority classification and Gender Crosstabulation. So we have gender as male and female, and minority classification as no and Yes. In minority classification, we can see no category means people who are not from minority backgrounds. There are 11 females and 24 males. So we have a total of 35 people. The expected count is 13.3 and 21.7, which is much higher compared to 5. It means the criteria of minimum expected cell

count are met in minority classification, no category.

*Output4 [Document4] - IBM SPSS Statistics Viewer

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In the yes category, this count is 8 for females observed, 7 for males observed, and the expected count is again 5.7 for females, 9.3 for males.

*Output4 [Document4] - IBM SPSS Statistics Viewer

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None of the expected cell counts is less than 5. So the chi-square assumption is not violated. If the Chi-square assumption is violated in any case, we calculate another test called the fisher's exact test. In fact, in SPSS, we need not worry about applying fisher's tests separately if the expected cell count is less than 5. If the expected cell count is less than 5, we can apply a Chi-square test, but in that case, rather than calculating the Chi-square test, the SPSS is going to calculate the

fisher's exact test for us.

All in all, our data is ready and suitable for calculating the Chi-square test. Its assumptions are met. Observations are independent of each other, and none of the expected cell counts in any cell is less than 5.

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