

# The activity of Biostat

## $\chi^2$ "Chi-square" using SPSS

\* We use Chi-square test when we have

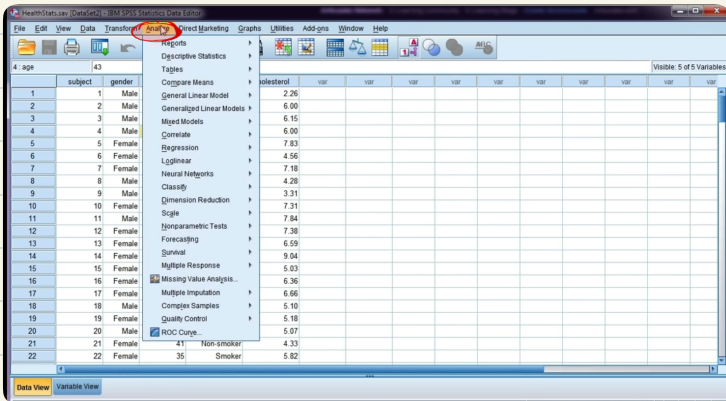
**Nominal variables**

it's the data that has NO meaningful rank

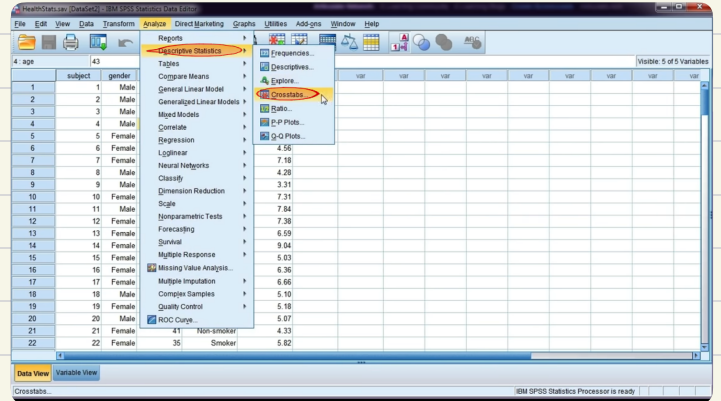
↓  
Smoker / non-Smoker - Male / Female

subject	gender	age	smoker	cholesterol
1	Male	44	Smoker	2.26
2	Male	20	Non-smoker	6.00
3	Male	35	Non-smoker	6.15
4	Male	43	Non-smoker	6.00
5	Female	17	Non-smoker	7.83
6	Female	22	Non-smoker	4.56
7	Female	48	Smoker	7.18
8	Male	68	Smoker	4.28
9	Male	30	Non-smoker	3.31
10	Female	44	Non-smoker	7.31
11	Male	53	Smoker	7.84
12	Female	40	Non-smoker	7.38
13	Female	32	Non-smoker	6.59
14	Female	17	Smoker	9.04
15	Female	29	Non-smoker	5.03
16	Female	21	Non-smoker	6.36
17	Female	31	Smoker	6.66
18	Male	55	Non-smoker	5.10
19	Female	56	Smoker	5.18
20	Male	48	Non-smoker	5.07
21	Female	41	Non-smoker	4.33
22	Female	35	Smoker	5.82

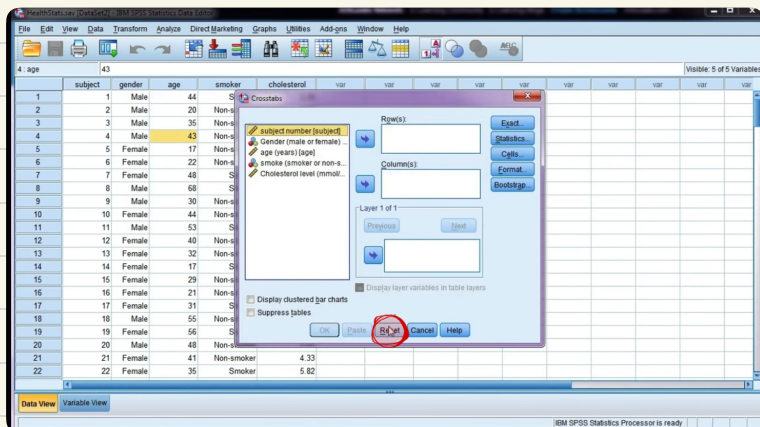
1<sup>st</sup> Step: Analyze



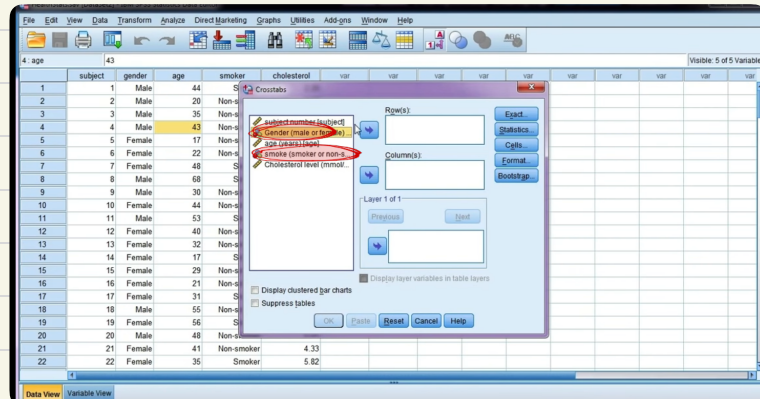
2<sup>nd</sup> Step: Descriptive Stat → Crosstabs



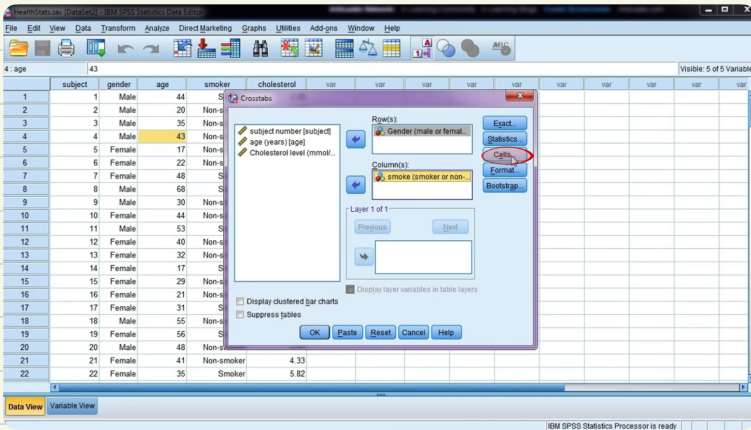
3<sup>rd</sup> Step: Reset



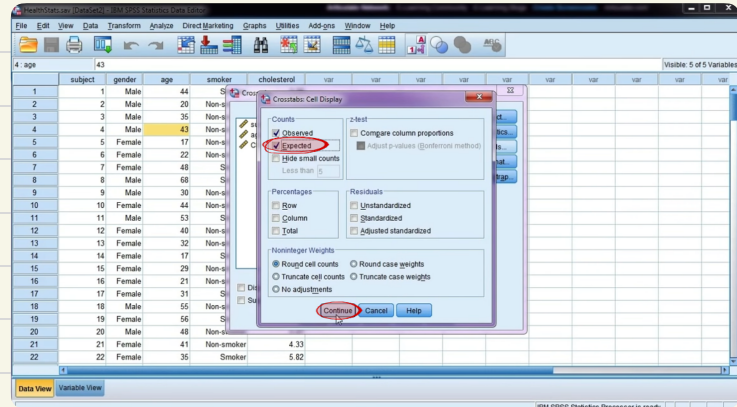
4<sup>th</sup> Step: Gender & smoker



5<sup>th</sup> Step: cells

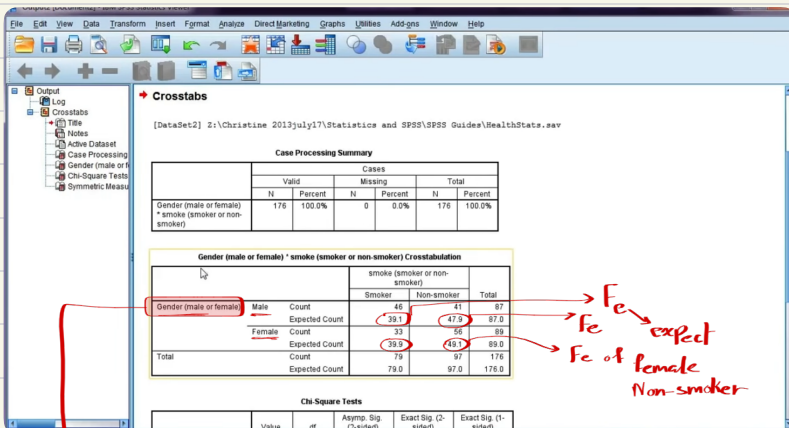
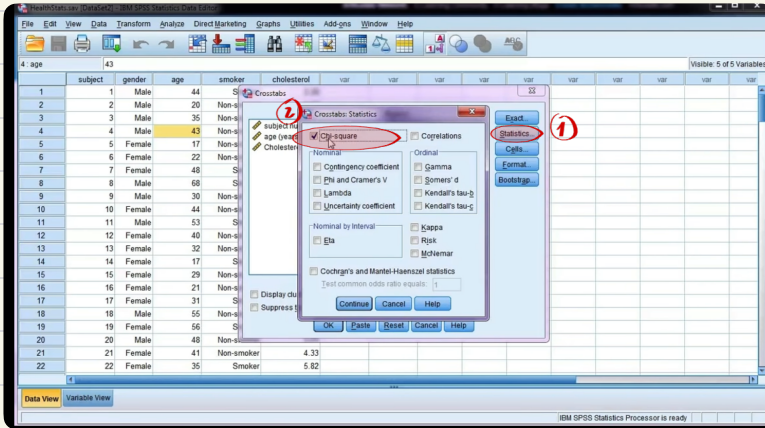


6<sup>th</sup> Step: expected → continue



7<sup>th</sup> Step: Statistics then → Chi-square

→ test for independence & a test for an association is significant but doesn't tell u how strong it is.



→ There is No relationship with smoking status so Gender were Independent



IBM SPSS Statistics Viewer

	Expected Count	39.1	47.9	87.0
Female	Count	33	56	89
	Expected Count	39.9	49.1	89.0
Total	Count	79	97	176
	Expected Count	79.0	97.0	176.0

*degree of freedom*

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.437 <sup>a</sup>	1	.035		
Continuity Correction <sup>b</sup>	3.821	1	.051		
Likelihood Ratio	4.455	1	.035		
Fisher's Exact Test				.049	.025
Linear-by-Linear Association	4.411	1	.036		
N of Valid Cases	176				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 39.05.  
b. Computed only for a 2x2 table

Symmetric Measures		
	Value	Approx. Sig.
Nominal by Nominal	Phi	.159
	Cramer's V	.159
N of Valid Cases		176

a. Not assuming the null hypothesis.  
b. Using the asymptotic standard error assuming the

→ Chi-square test table

→  $0.035 < \alpha$  value

→ result will be significant  
& Accept Alternative Hypothesis



There is a significant association  
between Gender & smoking status

Not independent "Dependent"

All of the following about degree of freedom is correct except:

Advantages of large degree of freedom often depends on the type of the analysis

Degrees of freedom typically (but not always) relate the size of the sample.

A higher degree of freedom means more power to reject a false null hypothesis and find a significant result.

✓ Higher degrees of freedom generally mean smaller sample sizes