SPSS: kxk Pearson's Chi-Square Test of Independence

Application: To test for a relationship between two categorical/qualitative variables.

Research Hypothesis: The researcher hypothesized that stores carrying only snakes and stores only carrying lizards would tend to be stores without separate reptile department, while those stores carrying both types of reptiles would tend to be stores with separate reptile departments.

H0: There is no pattern of relationship between whether or not pet stores have separate reptile departments and whether they display only lizards, only snakes or both.

Analyze → Descriptive Statistics → Crosstabs

- highlight the variable you want to define the rows (be sure it is qualitative/categorical) and click arrow
- highlight the variable you want to define the columns (be sure it is qualitative/categorical) and click arrow
- "Statistics" check that you want a "Chi-square analysis"

	Row(s): Statistics
strnum	When or reptile departme
rating of reptile quality - 1	
type of fish available fish	Column(s):
Prating of fish quality - 1-1	Reptile Types CarriedIr
number of fish at stole [fi	*
type of store [chain]	
Inumber of mammals [m]	Layer 1 of 1
	Previous
<u>/</u>	
	Display layer variables in table ayers
Display clustered <u>b</u> ar charts	
Suppress tables	

✔ Chi-square	Correlations
Nominal	Ordinal
Contingency coefficient	🔄 <u>G</u> amma
Phi and Cramer's V	Somers' d
🔄 Lambda	🔲 Kendall's tau- <u>b</u>
Uncertainty coefficient	📃 Kendall's tau- <u>c</u>
Nominal by Interval	🕅 Kappa
Eta	Risk
	McNemar
Cochran's and Mantel-Hae	enszel statistics
Test common odds ratio	equals: 1

~

SPSS Syntax

CROSSTABS

/TABLES=reptdept BY reptype /STATISTICS=CHISQ /CELLS=COUNT ROW COLUMN TOTAL.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	29.986 ^a	2	.000
N of Valid Cases	90		

a. 6 cells (100.0%) have expected count less than 5. The minimum expected count is 1.50.

"row variable" BY "column variable"

- ← get Chi-square significance test
- ← get various row, column and/or total cell percentages (optional)

The p-value of .000 means that there is less than a .1% chance that this result is a Type I error.

Remember, even if the printout shows it, never report p = .000, because that would suggest there is no possibility of a Type 1 error. Instead, report "p < .001"

type or reptile department * Reptile Types Carried Crosstabulation

Count

		Reptile Types Carried						
		Lizards	Snakes	Both	Total			
type or reptile department	not separate	19	20	8	47			
17 Hour	separate dept	5	6	32	43			
Total		24	26	32	90			

Chi-square results are "suspicious" if more than 15% of the cells have expected frequencies less than 5. With $X^2 < 3.84$, p > .05 – there is no relationship between type of reptile carried and type of store. As hypothesized, stores that carry only lizards and stores that carry only snakes both tend to not have separate reptile departments.



With X² > 10.83, p < .001 -- there is a relationship between type or reptile carried and type of score. As hypothesized, stores that carry only lizards tend not to have separate reptile departments, whereas those stores that carry both snakes and reptiles tend to have separate reptile departments.



Having found an overall effect, we need to perform followup analyses to test if the pattern of data matches the research hypothesis.

Do do this we need to look at pairwise comparisons, specificaly, looking at each 2x2 table.

One "challenge" to doing follow-ups in this way is that the 2x2 follow-ups have less power than the original kxk omnibus test. Thus, it is possible to find a significant overall data pattern, but have none of the pairwise follow-up analyses be significant.

With X² > 10.83, p < .001 -- there is a relationship between type or reptile carried and type of score. As hypothesized, stores that carry only snakes tend not to have separate reptile departments, whereas those stores that carry both snakes and reptiles tend to have separate reptile departments.



Reporting the Results:

For the sample of 90 stores shown in Table 1, there was about an equal number that had and did not have separate reptile departments. With regard to the types of reptiles displayed, about an equal number displayed only snakes as displayed only lizards, with somewhat more displaying both types. There was a relationship between the variables, $X^2(2)=29.987$, p<.001. Follow-up analyses revealed that, as hypothesized, stores that carry only lizards and stores that carry only snakes both tend to not have separate reptile departments, $X^2(1)=.036$, p>.05, stores that carry only lizards tend not to have separate reptile departments, whereas those stores that carry both snakes and reptiles tend to have separate reptile departments, whereas that carry only snakes tend not to have separate reptile departments, whereas that carry only snakes tend not to have separate reptile departments, whereas those stores that carry only snakes tend not to have separate reptile departments, whereas those stores that carry only snakes tend not to have separate reptile departments, whereas those stores that carry only snakes tend not to have separate reptile departments, $X^2(1)=22.529$, p<.001, and stores that carry only snakes tend not to have separate reptile departments, $X^2(1)=20.903$, p<.001.