

Chi-Square Examples
Vartanian: SW 131

In the sample given below, there are 300 females and 200 males. Is there a significant difference between males and females in their likelihood of being in poverty?

	Females	Males	Total
In poverty	150 (cell a)	50 (cell b)	200
Out of poverty	150 (cell c)	150 (cell d)	300
Total	300	200	500

Answer:

Expected in poverty: $200/500 = .40$ or 40%

Expected out of pov: $300/500 = .60$ or 60%

Expected # in each cell:

cell a: 40% of 300 = 120

cell b: 40% of 200 = 80

cell c: 60% of 300=180

cell d: 60% of 200=120

Or this can be determined by multiplying the marginals and dividing by total N.

cell a: $200*300/500=120$

cell b: $200*200/500=80$

cell c: $300*300/500=180$

cell d: $200*300/500=120$

cell	observed	expected	difference	Difference squared	X ²
a	150	120	30	900	$900/120 = 7.5$
b	50	80	-30	900	$900/80=11.25$
c	150	180	-30	900	$900/180=5$
d	150	120	30	900	$900/120=7.5$

$X^2 = 7.5 + 11.25 + 5 + 7.5 = 31.25$

At 1 DF for a 2-tailed test, the cv is 3.84. Since the chi-square value is greater than the CV, reject.

#2. Is method A better at helping those with depression than method B? Test this at the 5% level of significance.

	Success	Failure	Total
Method A	25	75	100
Method B	40	160	200
Total	65	235	300

Answer:

Calculating the Chi-Square value:

Cell	Observed value	Expected value	Difference
a	25	$21.67=100*65/300$	3.33
b	75	$78.33=235*100/300$	-3.33
c	40	$43.33=65*200/300$	-3.33
d	160	$156.67=235*200/300$	3.33

For

cell a: $(3.33)^2/21.67=0.5117$

cell b: $(-3.33)^2/78.33=0.1416$

cell c: $(-3.33)^2/43.33=0.2559$

cell d: $(3.33)^2/156.67=0.0708$

Add these up: 0.98. Since we need a value of 2.71 to find significance at the 5% level (for a 1-tailed test), we again find that there is not a relationship between success and the method of treatment used. We thus will accept the null hypothesis.