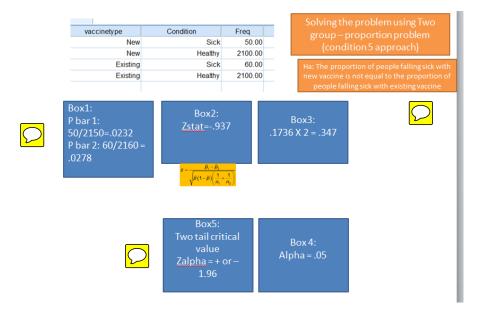
Bus Adm 216: Solving a two variable problem using ch10 (condition 5) and ch12 (equality of proportion) approach.



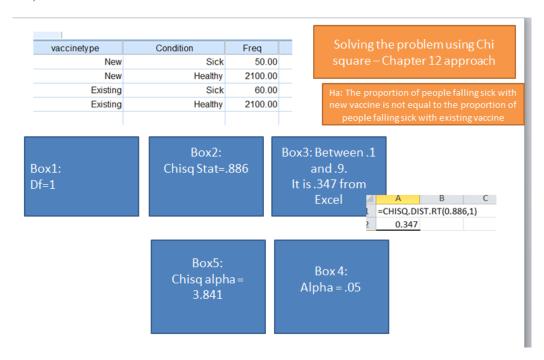
You have two vaccines: new and existing; You have two types of health conditions: Sick and healthy

If the new vaccine is effective then fewer people who got it would fall sick. We test it here using a two tail hypothesis. We show that the results from the Z test (ch10) two tail hypothesis are same as ch12 Chi square (one tail) hypothesis (note: Chi square is always upper tail test). Pay attention to how the hypothesis is worded in the problems below. It is same for both the scenarios – equal to for Ho and not equal to for Ha. It's a proportion problem and involves two groups so you could use either ch10 (proportion problem condition 5) or ch12 (equality of proportions here).

Approach1: Solving the problem using ch10 - two group - proportion approach



Approach2: Solving the problem using ch12 – equal proportion approach (I solve it using note-sheet and also SPSS – the screen shots are shown below)



Note sheet solution for the chi-square version of the problem

| | | vaccin | | |
|-----------|----------|--------|----------|-----------|
| | | New | Existing | |
| | Sick | 50 | 60 | 110 |
| condition | Healthy | 2100 | 2100 | 4200 |
| | | 2150 | 2160 | 4310 |
| | | | | |
| | | | | |
| | E | | | |
| 50 | 54.872 | -4.872 | 23.74018 | 0.4326435 |
| 60 | 55.128 | 4.872 | 23.74018 | 0.4306405 |
| 2100 | 2095.128 | 4.872 | 23.74018 | 0.0113311 |
| 2100 | 2104.872 | -4.872 | 23.74018 | 0.0112787 |
| | | | | 0.886 |

SPSS <u>soln</u> for chi-square version of the problem

| vaccinetype | Condition | Freq | |
|-------------|-----------|---------|--|
| New | Sick | 50.00 | |
| New | Healthy | 2100.00 | |
| Existing | Sick | 60.00 | |
| Existing | Healthy | 2100.00 | |
| | | | |

| Chi-Square Tests | | | | | | | | |
|------------------------------------|-------|----|--------------------------|--------------------------|--------------------------|--|--|--|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2- sided) | Exact Sig. (1- sided) | | | |
| Pearson Chi-Square | .886ª | 1 | .347 | | | | | |
| Continuity Correction ^b | .713 | 1 | .398 | 2 | | | | |
| Likelihood Ratio | .887 | 1 | .346 | | | | | |
| Fisher's Exact Test | | | | .385 | .199 | | | |
| Linear-by-Linear Association | .886 | 1 | .347 | | | | | |
| N of Valid Cases | 4310 | | | | | | | |

