Assignment 3.3

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Example:
A simple random sample of 50 items from the population with population Stand. Deviation is 6 resulted in a sample mean of 32. Provide a 95% confidence interval for the population mean.

| Qualification | Middle School | High School | Bachelors | Masters | PhD | Total |
|---|---|---|---|---|---|---|
| Unmarried | 18 | 36 | 21 | 9 | 6 | 90 |
| Married | 12 | 36 | 45 | 36 | 21 | 150 |
| Divorced | 6 | 9 | 9 | 3 | 3 | 30 |
| Widowed | 3 | 9 | 9 | 6 | 3 | 90 |
| Total | 39 | 90 | 84 | 54 | 33 | 300 |

$H_0$ = There is no link bet$^n$ married status & Degree

$H_1$ = There is a link bet$^n$ them.

$$\chi^2_{stat} = \frac{(O_i - E_i)^2}{E_i}$$

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Now, for the expected values (Ei) we get,

| Qualificat° | Middle school ($E_1$) | High school ($E_2$) | Bachelors ($E_3$) | Masters ($E_4$) | PhD ($E_5$) | Total |
|---|---|---|---|---|---|---|
| Unmarried | 11.7 | 27 | 25.2 | 16.2 | 9.9 | 90 |
| Married | 19.5 | 45 | 42 | 27 | 16.5 | 150 |
| Divorced | 3.9 | 9 | 8.4 | 5.4 | 3.3 | 30 |
| Windowed | 3.9 | 9 | 8.4 | 5.4 | 3.3 | 30 |
| Total | 39 | 90 | 84 | 54 | 33 | 300 |

Now, we have to calculate the term $(Oi-Ei)^2$ Hence we get

| | | | | | |
|---|---|---|---|---|---|
| Unmarried | 39.69 | 81 | 17.64 | 51.84 | 15.21 |
| married | 56.25 | 81 | 9 | 81 | 380.25 |
| Divorced | 4.41 | 0 | 0.36 | 5.76 | 0.09 |
| Windowed | 0.81 | 0 | 0.36 | 0.36 | 0.09 |

we have the formula,

$$\chi^2_{stat} = \frac{\sum (O_i - E_i)^2}{E_i}$$

For $\left(\frac{\sum (O_i - E_i)^2}{E_i}\right)$ the table is.

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| | | | | | | |
|---|---|---|---|---|---|---|
| Unmarried | 9.39 | 3 | 0.7 | 3.2 | 1.53 → | 11.82 |
| Married | 2.88 | 1.8 | 0.21 | 3 | 23.04 → | 30.93 |
| Divorced | 1.13 | 0 | 0.04 | 1.06 | 0.02 → | 2.25 |
| Windowed | 0.20 | 0 | 0.04 | 0.06 | 0.02 → | 0.32 |
| | | | | | | 45.32 |

we get,

$\chi^2_{stat} = 45.32$

Degree of freedom = (row-1) * (column-1)

= (4-1)(5-1)

= (3)(4)

= 12

we get,

$\chi^2_{crit} = 21.02$

$\therefore \chi^2_{stat} > \chi^2_{crit}$.

$\therefore$ There is a link betⁿ them.

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