Chi Square test

- Introduction
- Chi Square distribution
- Goodness of fit test
- Advantages of Chi square test
- Limitations of Chi square test

STEPS FOR CHI- SQUARE TEST

- Define Null Hypothesis & Alternative Hypothesis
- Obtain expected frequencies
- Compute the values of X^2 test statistic
- Find out Degrees of freedom
- Obtain table value of X^2
- Compare calculated X^2 with tabulated
- State & Interpret Result

CHI SQUARE DISTRIBUTION

- No negative values
- Mean is equal to degrees of freedom
- Standard deviation increases as degrees of freedom increases
- As the degrees of freedom become very large, the shape becomes very likely to the normal distribution

Degrees of freedom

Formula:

(df) or $(\nu) = (n - k)$

n = sample size

OR

k = no. of independent constrains

$(df) = (c - 1)(r - 1)$

c = no. of columns

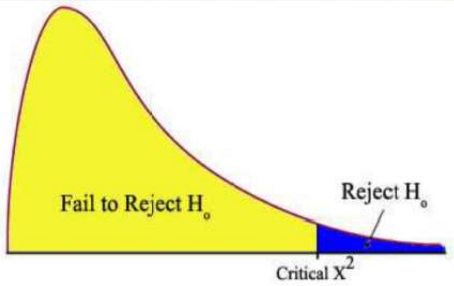
r = no. of rows

Critical Value

Is the point which demarcates the acceptance region and the rejection region

The area to the right of critical value is rejection region &

the area to its left is acceptance region



Goodness of fit test

Investigate the conformity of empirical distribution with a hypothesizes theoretical distribution

It investigate conformity by comparing observed & expected frequency count

A study was carried out on the relationship between migraine headaches in 96 subjects diagnosed with narcolepsy & 96 healthy controls. The results are shown in table, we wish to know if we may coclude on the basis of these data conclude that the narcolepsy population & healthy populations represented by the samples are not homogeneous with respect to migraine frequency

Frequency of Migraine Headaches by Narcolepsy Status

Example

Reported Migraine Headaches Total

	Yes	No
Narcoleptic subjects	21	75
Healthy controls	19	77

Total 40 152 192

ADVANTAGES OF CHI SQUARE TEST

- The additive property of Chi-square
- Sum of Chi-square values will have a X^2 distribution

with degrees of freedom equal to the sum of degrees of freedom of individual X^2 values

- Summation of values is suitable only if the sample are

Additive property is valid only for uncorrected X^2 values

LIMITATIONS OF CHI SQUARE TEST

- The chi-square test does not give us much information about the strength of the relationship. It only conveys the existence or nonexistence of the relationships between the variables investigated
- The chi-square test is sensitive to sample size
- The chi-square test is also sensitive to small expected frequencies. It can be used only when not more than 20% of the cells have an expected frequency of less than 5

Cannot be used when samples are related or matched

Chi-square test is not valid for proportions

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