## → Z-Test

- Used when
  - → Sample size large ($n \geq 30$) or
  - → Population variance ($\sigma^2$) Known or we Know standard deviation ($\sigma$)

$$\text{Margin Error (ME)} = z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$C_{lower} = PE - ME$$

$$C_{upper} = PE + ME$$

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$$

- To perform the z-test
  - → Calculate ME, $C_{lower}$, $C_{upper}$, z
  - → Use z-table to get z values
  - → Take descision from stated rules of test statistic
  - → Make conclusion
- If population standard deviation not Known and still want z-test we can use sample standard deviation (s).

  Formulas : $\sigma$ will be replaced by s.
- Comparing two different groups,

$$z = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{(\sigma_1/n_1)^2 + (\sigma_2/n_2)^2}}$$

## → T-Test

- Used when
  - → sample size small ($n < 30$) and
  - → Sample variance ($s^2$) Known or standard deviation (s) Known

$$\text{Margin Error (ME)} = t_{\alpha/2} \frac{s}{\sqrt{n}}$$

$$C_{lower} = PE - ME$$

$$C_{upper} = PE + ME$$

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

- To perform the T-test
  - → Calculate ME, $C_{lower}$, $C_{upper}$, t
  - → Use T-table to get t values
  - → Take descision from stated rules of test stats
  - → Make conclusion
- To refer T table we also need degree of fredom (df)

$$df = n - 1$$

- Comparing two different groups,

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{s_p \sqrt{1/n_1 + 1/n_2}}$$

$$s_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$$

$$df = n_1 + n_2 - 2$$

## → Chi-Square Test

- Used when data is chi-square distributed
- Used to check whether variables in population are independent or not
- This test checks the difference between observed (o) and expected (e) value which can be calculated using observed frequency ($f_o$) and expected frequency ($f_e$)

⊙ Its non parameter test performed on categorical data.

$$\text{number of categories (c)} = \text{Total categories}$$

$$df = c - 1$$

$$\chi^2 = \sum_{i=1}^{n} \frac{(f_o - f_e)^2}{f_e}$$

- To perform chi-square test,
  - → calculate c, df, $\chi^2$
  - → Get critical value ($c_v$) from $\chi^2$ table using $\alpha$ and df
  - → If • $\chi^2 > c_v$, reject $H_0$
    - $\chi^2 < c_v$, fail to reject $H_0$