

If The Mean Of The Total Population Is Unknown:

So we would choose two samples from the community and compare between the two arithmetic means of these two samples, and here we have t-test for comparison between two sample means.

Example:

If we want to know whether English men are taller than Egyptian men? In this case we choose two samples.

Sample1: 100 English men

Sample 2: 100 Egyptian men

Then measure the height of all men and calculate the arithmetic mean and standard deviation for each sample. Then do t-test for comparison between these two arithmetic means.

Sample I: n_1 \bar{X}_1 S_1

Sample II: n_2 \bar{X}_2 S_2

Here we should calculate only one measure of dispersion estimated from the two samples and it is called pooled variance denoted (S^2_p).

$$S^2_p = \frac{S^2_1(n_1 - 1) + S^2_2(n_2 - 1)}{n_1 + n_2 - 2}$$

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{S^2_p}{n_1} + \frac{S^2_p}{n_2}}}$$

H_0 : No difference between the heights of the two groups.

H_1 : English men are taller than Egyptian men.

$n_1 = 100$, $\bar{X}_1 = 169$ cm	$S_1 = 12$ cm
$n_2 = 100$, $\bar{X}_2 = 165$ cm	$S_2 = 10$ cm

$$S^2_p = \frac{S^2_1(n_1 - 1) + S^2_2(n_2 - 1)}{n_1 + n_2 - 2}$$

$$= \frac{144 \times 99 + 100 \times 99}{100 + 100 - 2} = 122$$

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{S^2_p}{n_1} + \frac{S^2_p}{n_2}}}$$

$$= \frac{169 - 165}{\sqrt{\frac{122}{100} + \frac{122}{100}}} = 2.5607$$

The critical value (t°) at 5% level of significance and d.f ($n_1 + n_2 - 2$) = 198 is 1.96. Since $2.5607 > 1.96$ we accept H_1 , i.e.: English men are significantly taller than Egyptian men.

Example Homework

if we want to know whether mean weight of Mutah university students' is different from Jordanian university students. And we know that:

Mutah university students: $n=70$, mean weight= 86 kg, and standard deviation= 9 kg. Jordanian university students: $n=50$, mean weight= 84 kg, and standard deviation= 5 kg.

(Assuming that: level of significance or $\alpha=0.05$, and two-sided test)