One-Sample T-Test

The **ONE-SAMPLE T-TEST** compares the mean of a normally distributed variable with a hypothesized value (*true mean*). The test uses the standard deviation of the sample *s* to estimate the population standard deviation σ. To run t-test for multiple variables at the same time, simply select the *variable* with hypothesized values *instead* of entering the hypothesized *value*.

Assumptions

The test assumes the population is normally distributed.

In case the population is not normally distributed, the test statistic has different and unknown distribution and, strictly speaking, the t-test cannot be used. However, according to the central limit theorem, if the sample size is large enough, we can use the t-test even if the normal distribution requirement is not met. Unfortunately there is no easy way to determine what N is large enough. In each particular case there is a separate limit that depends on how strongly the distribution differs from the normal distribution. Some sources quote N=30 as large enough, but even this sample size may turn out to be not large enough. Non-parametric tests may work as an alternative in this case.

How To

✓ Run **STATISTICS->BASIC STATISTICS->ONE SAMPLE T-TEST**...

✓ Select one or more variables.

✓ Select a variable with hypothesized values (if you have a distinct hypothesized value for each variable) or enter a hypothesized value as a number (if you have the same hypothesized value for each variable or you are running the t-test for one variable).

✓ Null hypothesis is defined as H_0: $\mu = \mu_0$. Optionally, you can define the alternative hypothesis H_1 in the **ADVANCED OPTIONS**:

  ○ **H_1: LESS THAN (LOWER-TAILED)** $\mu < \mu_0$,

  ○ **H_1: NOT EQUAL (TWO-TAILED)** $\mu \neq \mu_0$,

  ○ **H_1: GREATER THAN (UPPER-TAILED)** $\mu > \mu_0$.

  Default value is **H_1: NOT EQUAL (TWO-TAILED)**.

Results

Report includes descriptive statistics summary and results of the one sample t-test for each variable.

MEAN, MEAN LCL, MEAN UCL, STANDARD ERROR (OF MEAN), SAMPLE SIZE – see the **DESCRIPTIVE STATISTICS** procedure for more information.

HYPOTHESIZED VALUE (TEST CONSTANT, H$_0$ VALUE) - the hypothesized value (fixed estimate) μ.

DIFFERENCE – difference between the sample mean and the hypothesized value.

TEST STATISTIC– the number t defined as

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

where s is the standard deviation of the sample, $\bar{x}$ – sample mean, N – sample size.

Test statistic either exactly follows or closely approximates a t-distribution with *N-1* degrees of freedom under the null hypothesis.

D.F. - appropriate degrees of freedom for each variable.

P-VALUE (*-TAILED) –p-value for the test, corresponding to the selected H$_1$.

H1: NOT EQUAL (TWO-TAILED): If the p-value is less than default α (default value 0.05), statistically, the sample mean is significantly different from the hypothesized value.