How to Perform a Two Sample t-test in Stata: A Step-by-Step Guide

Authored by

stats writer

March 8, 2026

A Two Sample t-test in Stata is a statistical analysis technique used to compare the means of two independent groups. It is often used to determine if there is a significant difference between the means of two populations. To perform this test in Stata, the user must first load the data for both groups into the software. Then, using the appropriate command, Stata will calculate the t-statistic and corresponding p-value, which can be used to determine if the difference between the means is statistically significant. This test is commonly used in various fields such as social sciences, business, and healthcare to make informed decisions based on the comparison of two groups.

Perform a Two Sample t-test in Stata

A is used to test whether or not the means of two populations are equal.

This tutorial explains how to conduct a two sample t-test in Stata.

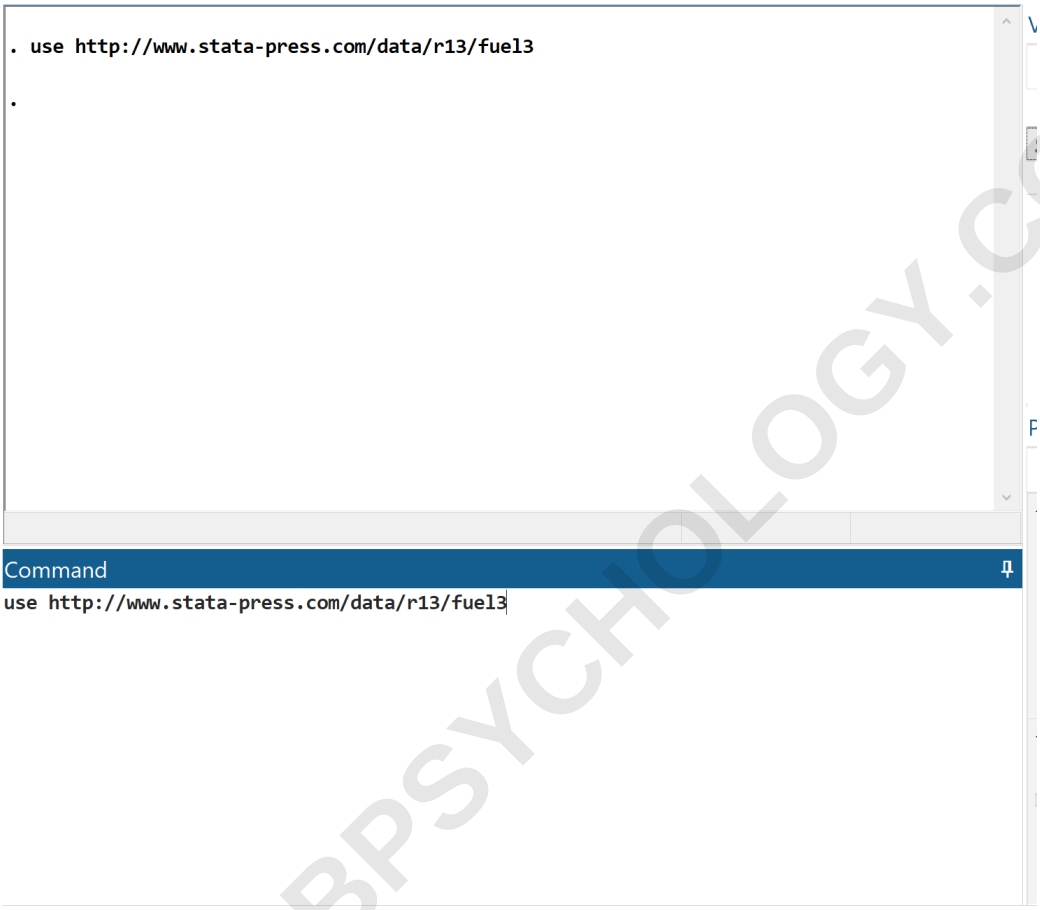
Example: Two Sample t-test in Stata

Researchers want to know if a new fuel treatment leads to a change in the average mpg of a certain car. To test this, they conduct an experiment in which 12 cars receive the new fuel treatment and 12 cars do not.

Perform the following steps to conduct a two sample t-test to determine if there is a difference in average mpg between these two groups.

Step 1: Load the data.

First, load the data by typing use http://www.stata-press.com/data/r13/fuel3 in the command box and clicking Enter.



Step 2: View the raw data.

Before we perform a two sample t-test, let's first view the raw data. Along the top menu bar, go to Data > Data Editor > Data Editor (Browse). The first column, *mpg*, shows the mpg for a given car. The second column, *treated*, indicates whether or not the car received the

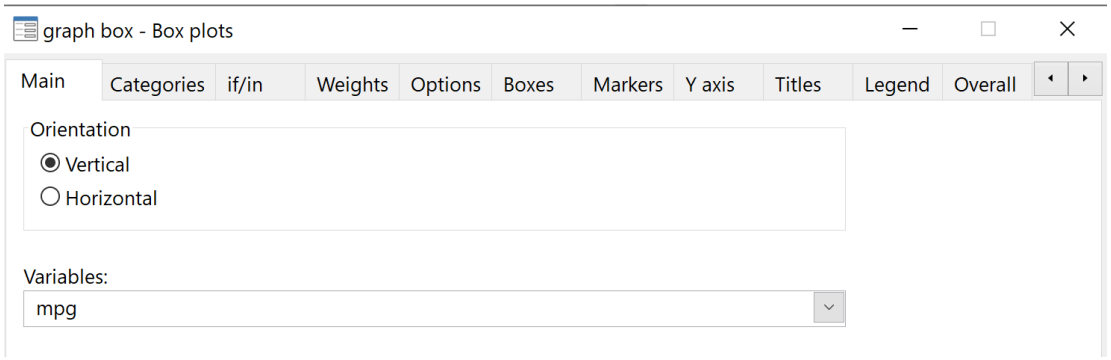
fuel treatment (0 = no, 1 = yes).

	mpg	treated
1	20	0
2	23	0
3	21	0
4	25	0
5	18	0
6	17	0
7	18	0
8	24	0
9	20	0
10	24	0
11	23	0
12	19	0
13	24	1
14	25	1
15	21	1
16	22	1
17	23	1
18	18	1
19	17	1
20	28	1
21	24	1
22	27	1
23	21	1
24	23	1

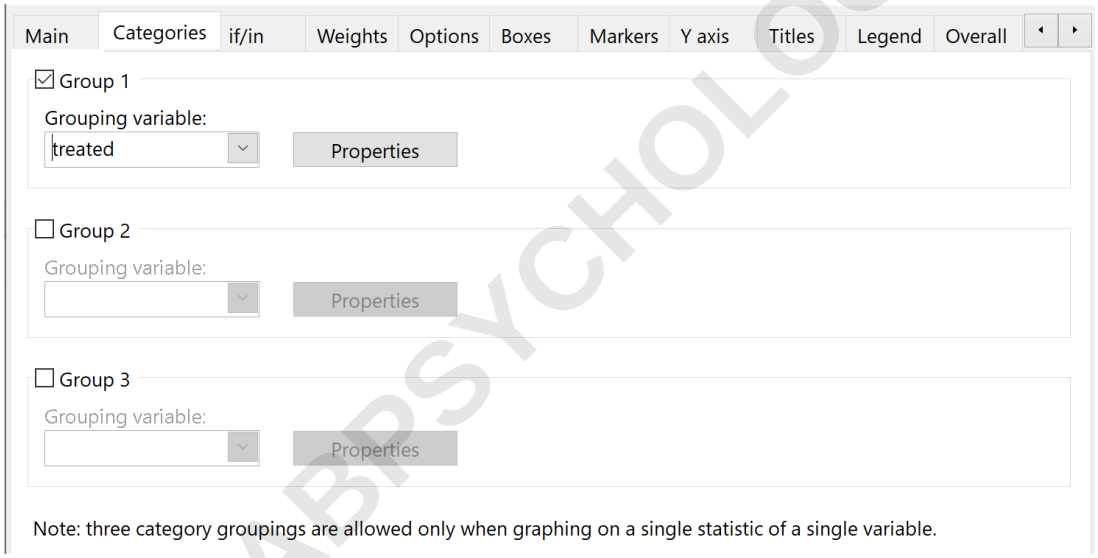
Step 3: Visualize the data.

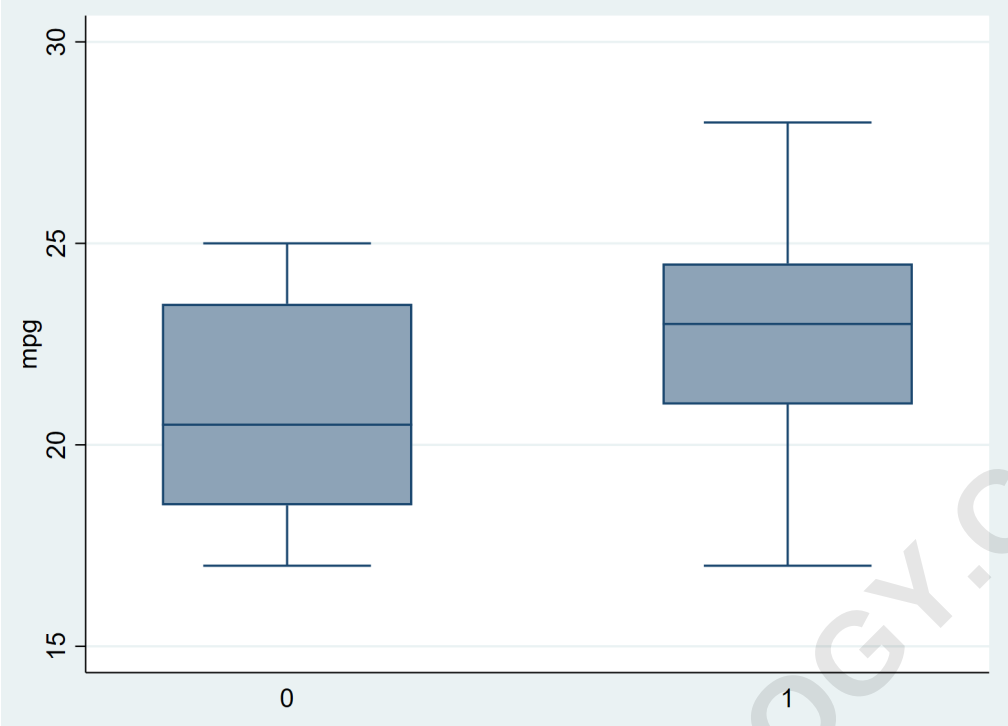
Next, let's visualize the data. We'll create to view the distribution of mpg values for each group.

Along the top menu bar, go to Graphics > Box plot. Under variables, choose *mpg*:



Then, in the Categories subheading under Grouping variable, choose *treated*:





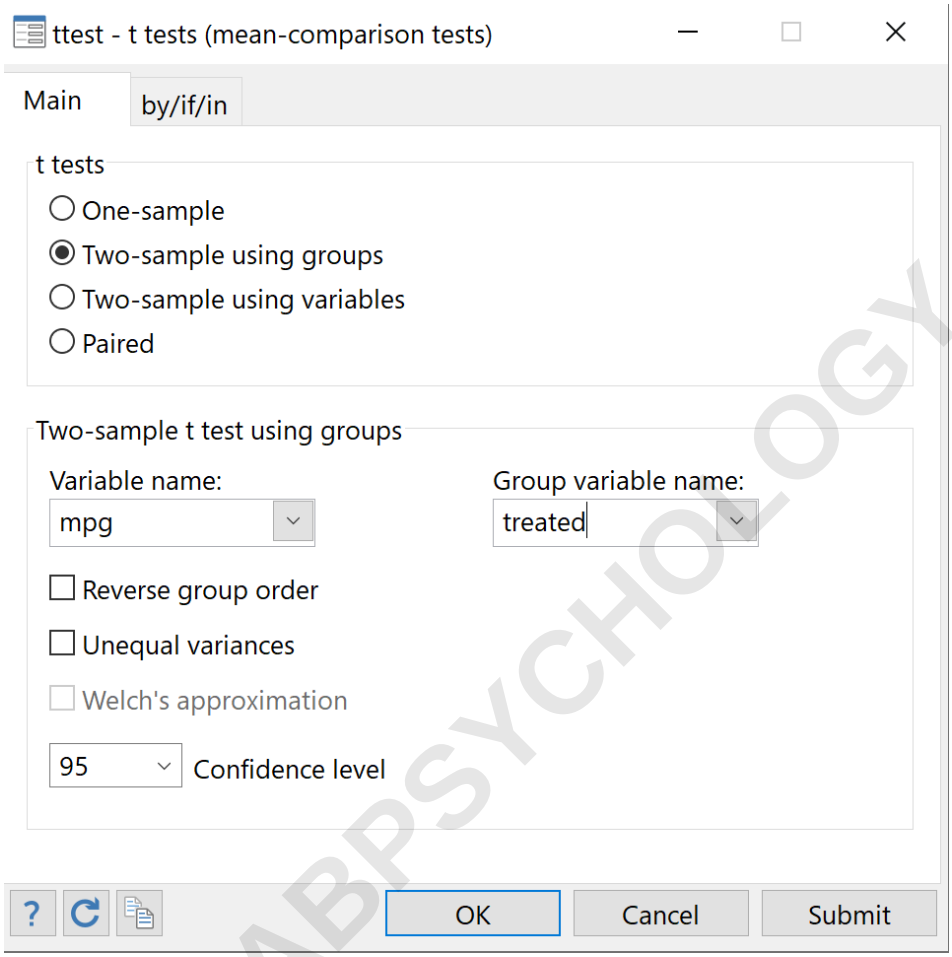
Right away we can see that the mpg appears to be higher for the treated group (1) compared to the non-treated group (0), but we need to conduct a two-sample t-test to see if these differences are statistically significant.

Step 4: Perform a two sample t-test.

Along the top menu bar, go to Statistics > Summaries, tables, and tests > Classical tests of hypotheses > t test (mean-comparison test).

Choose *Two-sample using groups*. For Variable name, choose *mpg*. For Group variable name, choose *treated*.

For Confidence level, choose any level you'd like. A value of 95 corresponds to a significance level of 0.05. We will leave this at 95. Lastly, click *OK*.



The results of the two sample t-test will be displayed:

```
. ttest mpg, by(treated)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	12	21	.7881701	2.730301	19.26525	22.73475
1	12	22.75	.9384465	3.250874	20.68449	24.81551
combined	24	21.875	.6264476	3.068954	20.57909	23.17091
diff		-1.75	1.225518		-4.291568	.7915684

```
    diff = mean(0) - mean(1)                                      t =  -1.4280
Ho: diff = 0                     degrees of freedom =       22

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0837         Pr(|T| > |t|) = 0.1673          Pr(T > t) = 0.9163
```

We are given the following information for each group:

Obs: The number of observations. There are 12 observations in each group.

Mean: The mean mpg. In group 0, the mean is 21. In group 1, the mean is 22.75.

Std. Err: The standard error, calculated as σ / $\sqrt{n}$

Std. Dev: The standard deviation of mpg.

95% Conf. Interval: The 95% confidence interval for the true population mean of mpg.

t: The test statistic of the two-sample t-test.

degrees of freedom: The degrees of freedom to be used for the test, calculated as n-2 = 24-2 = 22.

The p-values for three different two sample t-tests are displayed at the bottom of the results. Since we are interested in understanding if the average mpg is simply different between the two groups, we will look at the results of the middle test (in which the alternative hypothesis is Ha: diff !=0) which has a p-value of 0.1673.

Since this value is not smaller than our significance level of 0.05, we fail to reject the null hypothesis. We do not have sufficient evidence to say that the true mean mpg is different between the two groups.

Step 5: Report the results.

Lastly, we will report the results of our two sample t-test. Here is an example of how to do so:

A two sample t-test was conducted on 24 cars to determine if a new fuel treatment lead to a difference in mean miles per gallon. Each group contained 12 cars.

Results showed that the mean mpg was *not* different

between the two groups (t = -1.428 w/ df=22, p = .1673) at a significance level of 0.05.

A 95% confidence interval for the true difference in population means resulted in the interval of (-4.29, .79).