

# “How can I perform a Kruskal-Wallis Test in SAS?”

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## RECOMMENDED CITATION

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The Kruskal-Wallis Test is a non-parametric statistical test used to determine if there are significant differences between three or more independent groups. In SAS, this test can be performed by using the PROC NPAR1WAY procedure. This procedure allows for the analysis of ranked data and produces a p-value, which can be used to determine if there are significant differences between the groups. To perform the Kruskal-Wallis Test in SAS, the data must first be organized into groups and then the appropriate syntax must be used in the PROC NPAR1WAY statement. This test is useful for comparing groups that do not have a normal distribution or when the assumptions of parametric tests cannot be met.

## **Perform a Kruskal-Wallis Test in SAS**

**A is used to determine whether or not there is a statistically significant difference between the medians of three or more independent groups.**

**It is considered to be the non-parametric equivalent of the .**

**This tutorial provides a step-by-step example of how to conduct a Kruskal-Wallis Test in SAS.**

### **Step 1: Enter the Data**

**Suppose researchers want to know if three different fertilizers lead to different levels of plant growth.**

**They randomly select 30 different plants and split them into three groups of 10, applying a different fertilizer to each group. At the end of one month they measure the**

height of each plant.

We'll enter the following data in SAS, which shows the total growth (in inches) for each of the 10 plants in each group:

```
/*create dataset*/  
data fertilizer_data;  
input fertilizer $ growth;  
datalines;  
fert1 7  
fert1 14  
fert1 14  
fert1 13  
fert1 12  
fert1 9  
fert1 6  
fert1 14  
fert1 12  
fert1 8  
fert2 15  
fert2 17  
fert2 13  
fert2 15
```

```
fert2 15  
fert2 13  
fert2 9  
fert2 12  
fert2 10  
fert2 8  
fert3 6  
fert3 8  
fert3 8  
fert3 9  
fert3 5  
fert3 14  
fert3 13  
fert3 8  
fert3 10  
fert3 9  
;  
run;
```

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### Step 2: Perform the Kruskal-Wallis Test

**Next, we will use the proc npar1way statement to perform a Kruskal-Wallis test to compare the median growth of the plants between the three fertilizer groups:**

```

/*perform Kruskal-Wallis test*/
proc npar1way data=fertilizer_data wilcoxon dscf;
class fertilizer;
var growth;
run;
    
```

### Step 3: Interpret the Results

The first table in the output shows the overall Chi-Squared test statistic and the corresponding p-value for the Kruskal-Wallis test:

The NPAR1WAY Procedure

Wilcoxon Scores (Rank Sums) for Variable growth Classified by Variable fertilizer					
fertilizer	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
fert1	10	153.0	155.0	22.578089	15.30
fert2	10	205.0	155.0	22.578089	20.50
fert3	10	107.0	155.0	22.578089	10.70
Average scores were used for ties.					

  

Kruskal-Wallis Test		
Chi-Square	DF	Pr > ChiSq
6.2878	2	0.0431

The p-value of the test is 0.0431. Since this value is less than .05, we reject the null hypothesis that the median plant growth is the same for all three fertilizers.

This means we have sufficient evidence to conclude that the type of fertilizer used leads to statistically significant differences in plant growth.

The last table in the output shows the p-values for the pairwise comparisons between each of the three groups:

The NPAR1WAY Procedure			
Pairwise Two-Sided Multiple Comparison Analysis			
Dwass, Steel, Critchlow-Fligner Method			
Variable: growth			
fertilizer	Wilcoxon Z	DSCF Value	Pr > DSCF
fert1 vs. fert2	-1.3700	1.9374	0.3567
fert1 vs. fert3	1.2220	1.7281	0.4401
fert2 vs. fert3	2.4402	3.4509	0.0390

From this table we can see that the only p-value less than .05 is the comparison between fertilizer 2 and fertilizer 3, which has a p-value of 0.0390.

This means there is a statistically significant difference in plant growth between fertilizer 2 and fertilizer 3, but not between any other pairwise comparisons.

**Additional Resources**

**The following tutorials explain how to perform other common statistical tests in SAS:**

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