This assignment focuses on nonparametric methods. When a researcher is not in a situation to be able to assume parametric statistical methods requirements, known distribution, or dealing with small sample size, then nonparametric statistical methods need to be used, which make fewer assumptions about the distributional shape.

**Click**[**here**](http://resources.online.southuniversity.edu/minitab/default.aspx?s=1%20)**to install Minitab Software.**

Nonparametric Methods  
In this assignment, we will use the following nonparametric methods:

* The Wilcoxon signed-rank test: The Wilcoxon signed-rank test is the nonparametric test analog of the paired t-test.
* The Wilcoxon rank-sum test or the Mann-Whitney U test: The Wilcoxon rank-sum test is an analog to the two-sample t-test for independent samples.

For each exercise, there will be a sample problem that shows how the calculations are done and the problems for you to work on.

**Part 1: Wilcoxon Signed-Rank Test**

Let's take a hypothetical situation. The World Health Organization (WHO) wants to investigate whether building irrigation systems in an African region helped reduce the number of new cases of malaria and increased the public health level.

Data was collected for the following variables from ten different cities of Africa:

* The number of new cases of malaria before the irrigation systems were built
* The number of new cases of malaria after the irrigation systems were built

**Table 1: Cases of Malaria**

|  |  |  |
| --- | --- | --- |
| **City** | **Before** | **After** |
| 1 | 110 | 55 |
| 2 | 240 | 75 |
| 3 | 68 | 15 |
| 4 | 100 | 10 |
| 5 | 120 | 21 |
| 6 | 110 | 11 |
| 7 | 141 | 41 |
| 8 | 113 | 5 |
| 9 | 112 | 13 |
| 10 | 110 | 8 |

Using the Minitab statistical analysis program to enter the data and perform the analysis, complete the following:

* Run a sample Wilcoxon signed-rank test to show whether there is a statistically significant difference between the number of cases before and after the irrigation systems were built.
* Obtain the rank-sum.
* Determine the significance of the difference between the groups.
* Determine whether building these systems helped reduce new cases of malaria.

In addition, in a Microsoft Word document, provide a written interpretation of your results in APA format. Refer to the **Assignment Resources: Wilcoxon Signed-Rank Test Example** to view an example of the Wilcoxon signed-rank test. The same resource is also available under lecture **Nonparametric Methods.**

**Submission Details:**

* Name your Minitab output file **SU\_PHE5020\_W2\_A2a\_LastName\_FirstInitial.mtw**.
* Name your document **SU\_PHE5020\_W2\_A2b\_LastName\_FirstInitial.doc**.
* Submit your document to the **Submissions Area** by **the due date assigned**.

**Part 2: Wilcoxon Rank-Sum Test**

Let us consider another hypothetical situation. The WHO wants to compare the mortality rates of children under the age of five years of underdeveloped and developed regions of the world. There were two independent samples of ten countries from each of the groups drawn at the same time, and the yearly mortality rates of children under the age of five years (per 100,000) inhabitants were reported **(MRate1 and MRate2).**

**Table 2: Mortality Rates of Children**

|  |  |  |
| --- | --- | --- |
| **Country** | **MRate1** | **MRate2** |
| 1 | 120 | 11 |
| 2 | 110 | 9 |
| 3 | 105 | 13 |
| 4 | 61 | 11 |
| 5 | 45 | 14 |
| 6 | 114 | 11 |
| 7 | 118 | 10 |
| 8 | 138 | 8 |
| 9 | 85 | 6 |
| 10 | 70 | 6 |

Using the Minitab statistical analysis program to enter the data and perform the analysis, complete the following:

* Run the Wilcoxon rank-sum test to show whether there is a statistically significant difference between the mortality rates of children under the age of five years of the regions. Results may be used in making decisions regarding which region needs to receive help to improve the public health issues of morality.
* Obtain the difference in the mortality rates and whether there is a statistically significant difference.

In addition, in a Microsoft Word document, provide a written interpretation of your results in APA format.