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Statistics Kingdom: A Very Helpful Basic Statistical Analysis Tool for Health Students

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ABSTRACT

"Statistics Kingdom" is a website that really helps the learning process of "statistics and research" for health students. When final year health students need statistical analysis tools for their research projects, then visiting the "Statistics Kingdom" website is a very good choice. Health students can very easily enter data and then analyze it directly on the website, also provided the opportunity to ask questions and discuss further with the consultant. Thus, "Statistics Kingdom" is a web-based statistical analysis tool that health students really need.

Keywords: "Statistics Kingdom"; statistical analysis; website

INTRODUCTION

In general, health students are required to carry out a research or equivalent activity at the end of their education. Most of their research is a quantitative study, which requires statistical analysis, both descriptive analysis, hypothesis testing, and other analyzes such as forecasting, predictive analysis and so on.

So far, health students generally use statistical software that must be installed on their computers, such as SPSS (1), PSPP (2) and others. Most statistical software is full of features, so it requires a large storage space on the computer. Meanwhile, health students only need basic level analyzes, such as descriptive analysis, correlation test and comparison test. Thus, the use of statistical software is redundant or inefficient for health students.

Based on the problems above, it is necessary to choose a statistical analysis tool that is more efficient for health students. In this case, one of the right choices is to use a web-based statistical analysis tool that can be used to analyze data directly through the website.

"STATISTICS KINGDOM", A WEB-BASED STATISTICAL ANALYSIS TOOL

Currently, there are many web-based statistical analysis tools, with various features and levels. One of these websites is "Statistics Kingdom" with good and complete features, the URL is https://www.statskingdom.com (Figure 1). This website has a global perspective, which is characterized by the use of English as the language of instruction, is anonymous, is domiciled in Melbourne-Australia, and has been active since 2017 [(3)].

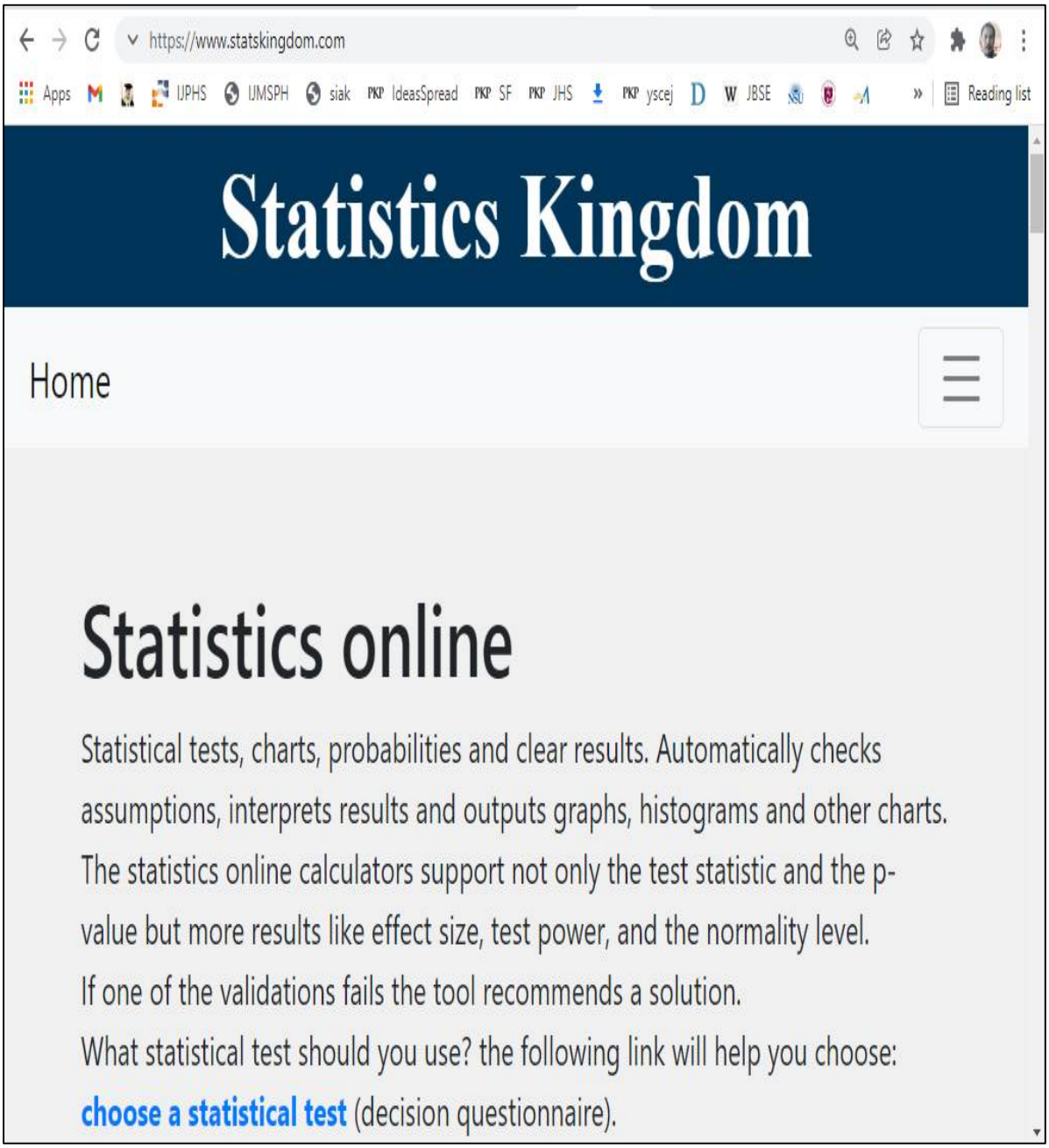


Figure 1. Homepage of "Statistics Kingdom" (source: https://www.statskingdom.com)

To perform data analysis using the "Statistics Kingdom" website, students only need to choose the appropriate statistical analysis, then enter the data, and end with calculating. For example, a health student wants to analyze the difference in upper arm circumference of 20 pregnant women, before and after receiving a specific nutrition intervention, with the following data:

Table 1. Upper arm circumference of pregnant women before and after specific nutrition intervention

No	Upper arm circumference (in centimeters)	
	Before intervention	After intervention
1	21.1	23.1
2	22.9	23.9
3	23.0	23.9
4	20.9	22.9
5	21.1	23.1
6	22.2	23.2
7	23.1	24.0
8	22.2	22.2
9	21.2	23.2
10	21.7	23.7
11	20.5	23.5
12	23.2	24.2
13	20.0	22.4
14	19.9	21.8
15	21.6	22.6
16	22.7	22.7
17	21.4	22.4
18	19.8	21.9
19	22.4	23.7
20	22.8	23.9

After the health students gets the complete data as presented in Table 1, he/she must choose the right statistical test, which in this case is the Paired T-Test. Next, students takes the following steps:

1. Visit the "Statistics Kingdom" website (https://www.statskingdom.com), then select the appropriate statistical test. In this case (Figure 2), Paired T-Test is in the "Mean Test" menu [(4)].
2. Fill in the form required for the Paired T-Test requirements, namely normality test and outliers (Figure 3)
3. Enter the data before and after the specific nutrition intervention, then calculate (Figure 4)
4. Read the results of the normality test and outliers (Figure 5)
   Figure 5 shows that there are no outliers and the data is normally distributed, so the Paired T-Test requirements have been met.
5. Read the results of the Paired T-Test (Figure 6)

Figure 6 shows that there is a significant difference in upper arm circumference between before and after giving specific nutrition interventions to 20 pregnant women. In this case there has been an increase in the size of the upper arm circumference.

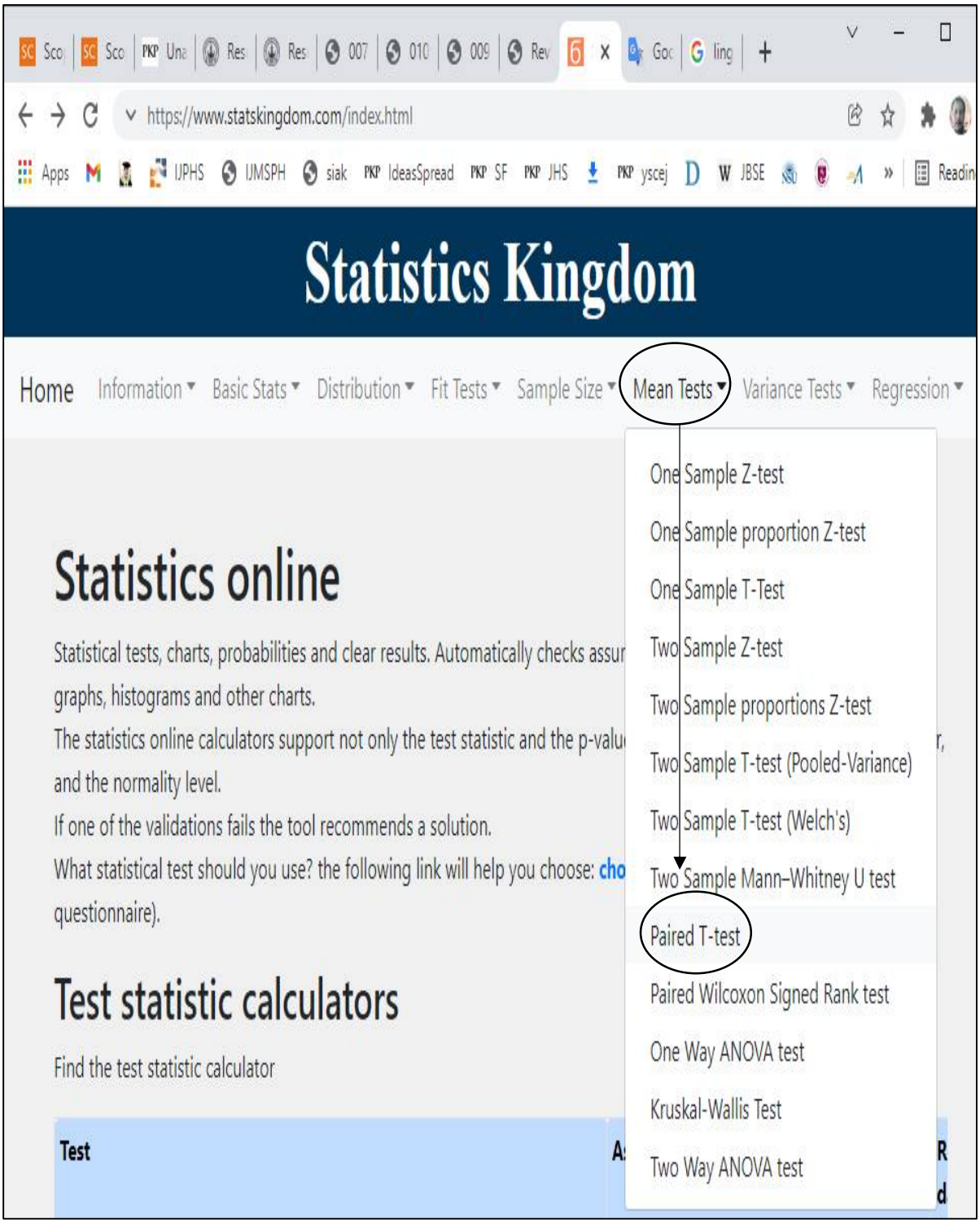


Figure 2. Selecting the appropriate statistical test (source: https://www.statskingdom.com)

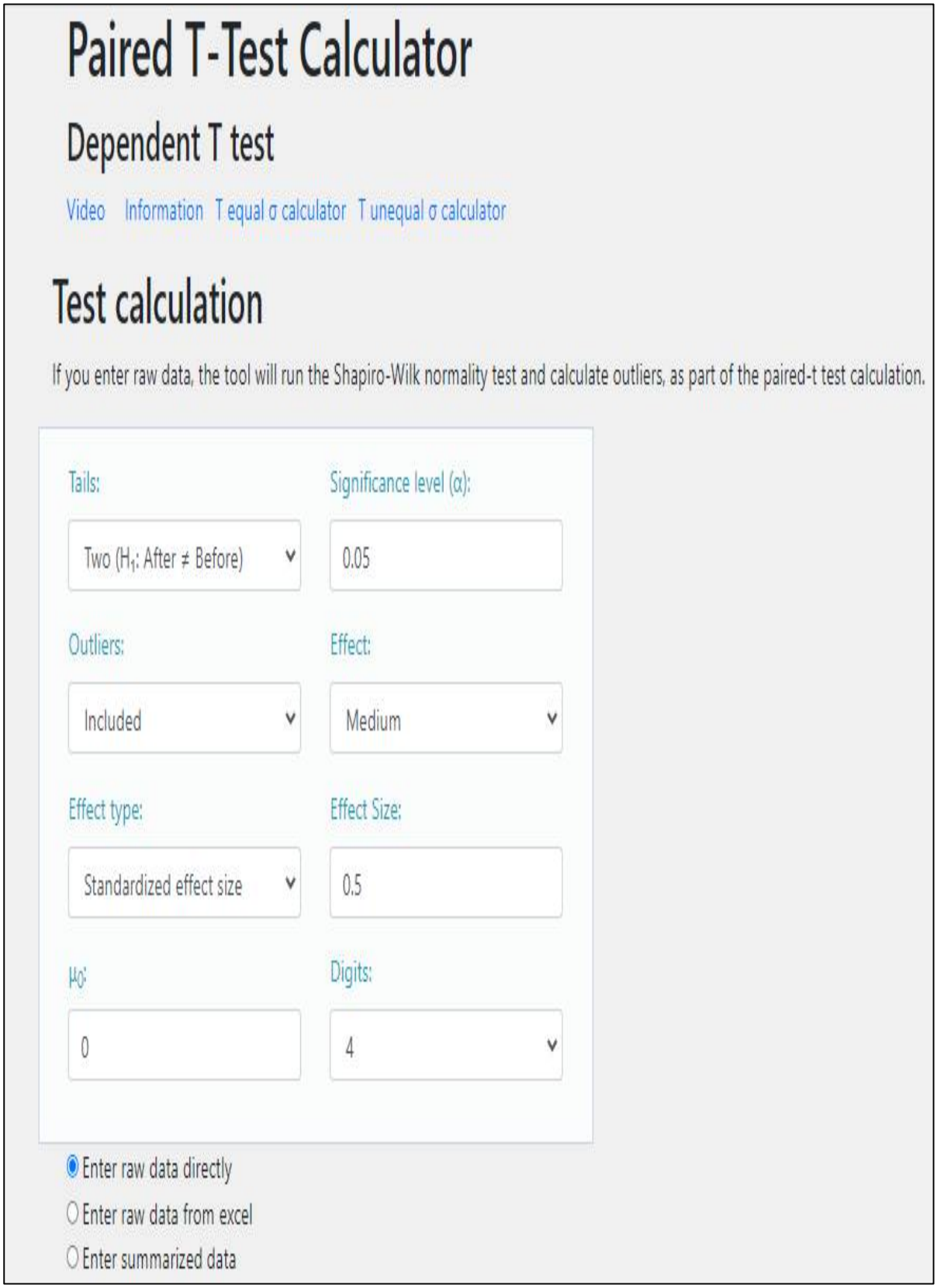


Figure 3. Filling out the required form for statistical test requirements (source: https://www.statskingdom.com/160MeanT2pair.html)

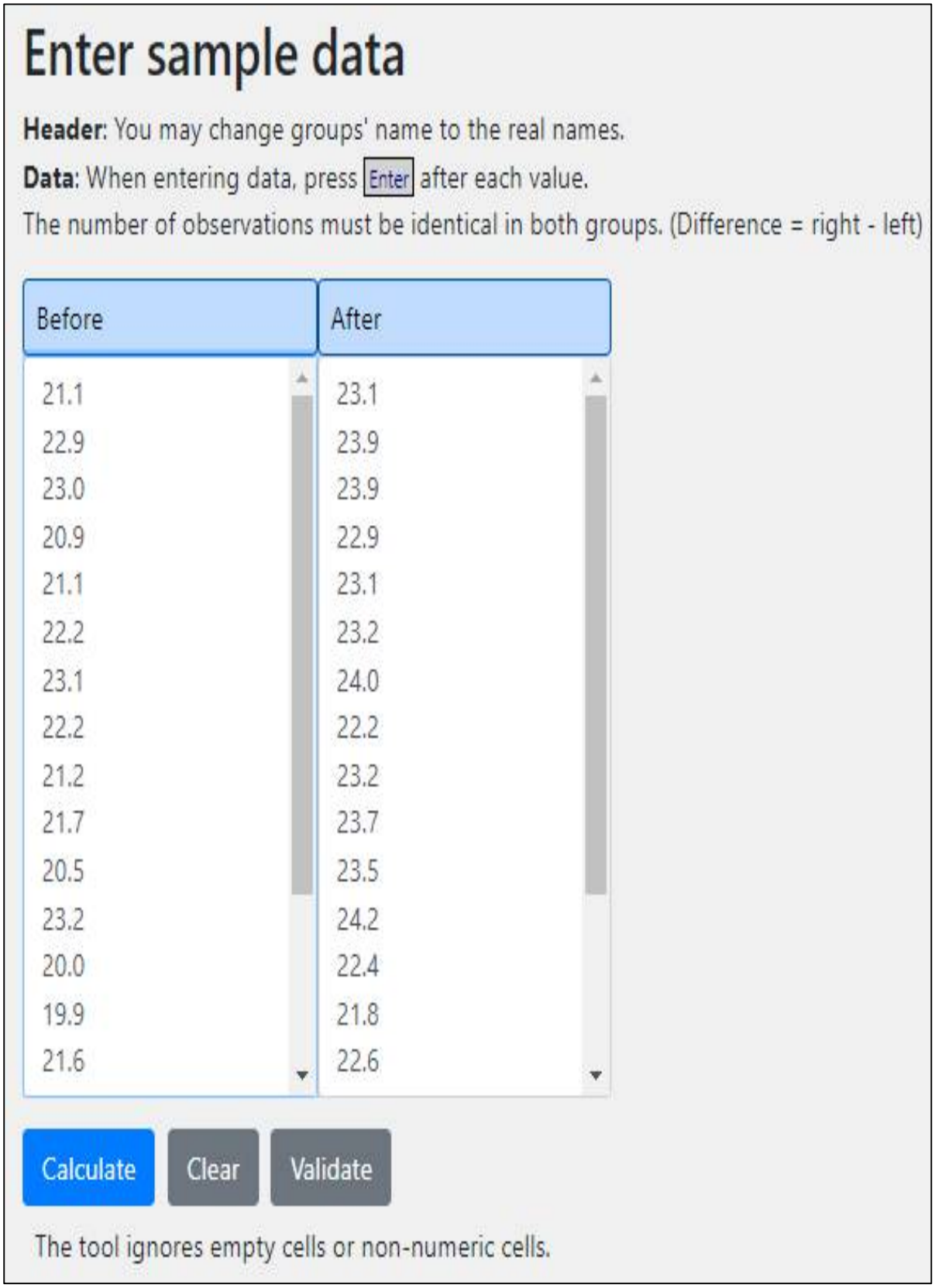
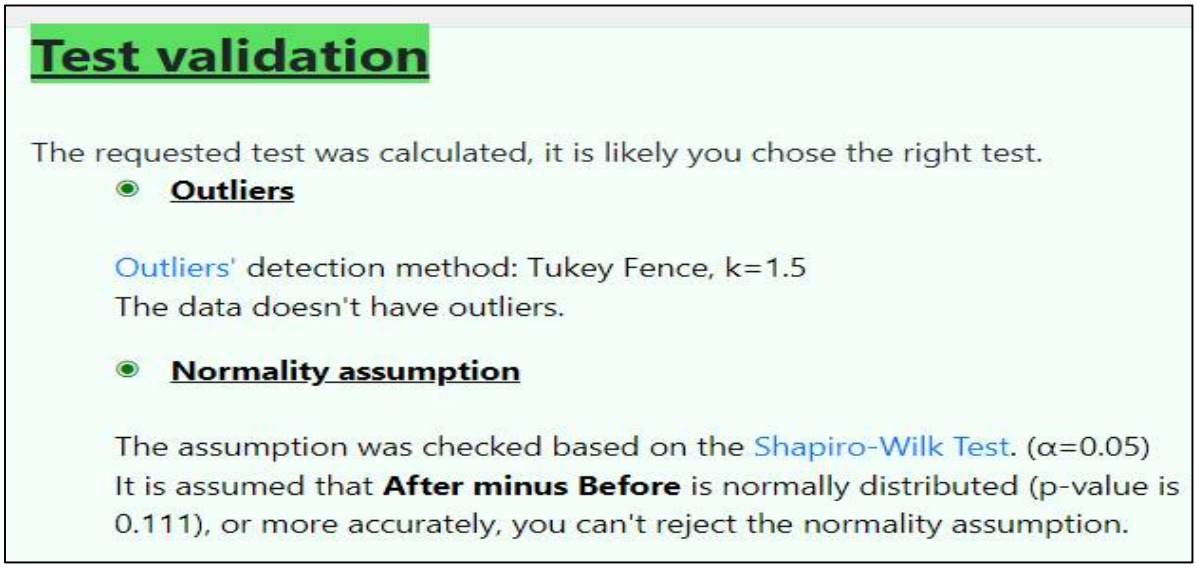


Figure 4. Entering data before and after the intervention (Source: https://www.statskingdom.com/160MeanT2pair.html)



Test validation

The requested test was calculated, it is likely you chose the right test.

- **Outliers**

Outliers' detection method: Tukey Fence, k=1.5
The data doesn't have outliers.

- **Normality assumption**

The assumption was checked based on the Shapiro-Wilk Test. (α=0.05)
It is assumed that **After minus Before** is normally distributed (p-value is 0.111), or more accurately, you can't reject the normality assumption.

Figure 5. The results of normality tests and outliers (source: https://www.statskingdom.com/160MeanT2pair.html)

Paired sample T-test, using T distribution (df=19) (two-tailed) (validation)

1. H_0 hypothesis

Since p-value < α, H_0 is rejected.
The average of **After minus Before's** population is considered to be **not equal to** the μ0.
In other words, the difference between the average of **After minus Before** and the μ0 is big enough to be statistically significant.

2. P-value

The p-value equals **1.048e-7**, (p(x≤T) = 1). It means that the chance of type I error (rejecting a correct H_0) is small: 1.048e-7 (0.00001%).
The smaller the p-value the more it supports H_1.

3. The statistics

The test statistic T equals **8.2554**, which is not in the 95% region of acceptance: [-2.093 : 2.093].
$\bar{x}$=1.43, is not in the 95% region of acceptance: [-0.3626 : 0.3626].
The standard deviation of the difference, S' equals 0.173, is used to calculate the statistic.

4. Effect size

The observed effect size d is **large**, **1.85**. This indicates that the magnitude of the difference between the average and μ0 is large.

Figure 6. The results of Paired T-Test (source: https://www.statskingdom.com/160MeanT2pair.html)

The example above shows that the data analysis process using the "Statistics Kingdom" website is very easy for health students to do and they don't need to install statistical software first. Thus, “Statistics Kingdom” is a very practical tool in order to assist health students in completing their research. Apart from providing tools, this website also accepts questions, comments and suggestions via e-mail, namely statskingdom@gmail.com. Of course, this is an additional service that is very useful for students, if they encounter difficulties or wish to discuss further with consultant.

Considering the many types of statistical analysis, lecturers who teach research methodology and statistics should introduce their students early on how to perform data analysis using web-based statistical analysis tools. In this way, it is hoped that students will find it easier to analyze data, so that they will become more interested in statistics and research.

CONCLUSION

“Statistics Kingdom” is a comprehensive web-based statistical analysis tool supported with additional services to further communicate with consultant, making it a great choice for health students.

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