Tutorial: Non-Parametric Tests in Stata

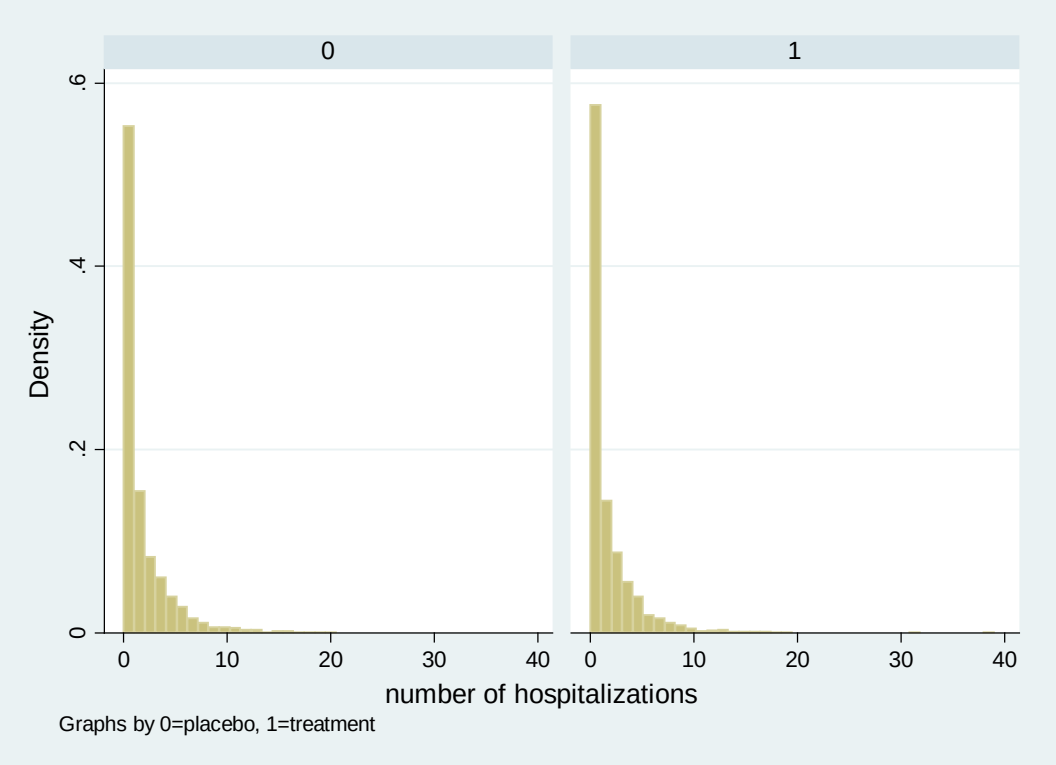
The Wilcoxon Rank Sum Test

In this tutorial we will use data from the Digitalis Investigation Group (DIG). Please read the provided data documentation before continuing with this tutorial (see DIG_Documentation.pdf). We will replicate one of the analyses from the New England Journal of Medicine paper (see NEJM_DIG.pdf).

Garg R, Gorlin R, Smith T, Yusuf S, for the Digitalis Investigation Group.. The effect of digoxin on mortality and morbidity in patients with heart failure. *N Engl J Med*, *1997*(336), 525-533.

In this trial, patients were randomized to either Digoxin or placebo. The Wilcoxon rank-sum test was used to determine if there were any differences between groups in the number of hospitalizations. The data are located in the `dig.dta` data set.

1. Examine the distribution of number of hospitalizations by treatment group. Are they similar? Are they symmetric?



The two distributions are very similar. They are not symmetric, but rather right skewed.

2. Does the rank sum test require any assumptions?

   Yes. The two samples must be independent and the distributions should have the same general shape.

3. What is the null hypothesis for the rank sum test? What is the alternative?

   The null hypothesis is that the median number of hospitalizations for the two treatment groups are identical. Thus, the alternative is that the median number of hospitalizations for the two treatment groups are not identical.

   Since we assume the two distributions have the same general shape, a difference of the medians would imply that the two distributions have the same shape but are shifted in location.

4. Perform a rank sum test in Stata with alpha = 0.05. What is your test statistic? Your p-value? Your decision? Your interpretation?

   You may use the following drop-down menus to access the `ranksum` command: Statistics / Summaries, tables, and tests / Nonparametric tests of hypotheses / Wilcoxon rank-sum test

```
. ranksum nhosp, by(trtmt)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

       trtmt |      obs    rank sum    expected
-------------+---------------------------------
           0 |     3403    11767615    11571902
           1 |     3397    11355786    11551499
-------------+---------------------------------
    combined |     6800    23123400    23123400

unadjusted variance   6.552e+09
adjustment for ties  -3.811e+08
                     ----------
adjusted variance     6.171e+09

Ho: nhosp(trtmt==0) = nhosp(trtmt==1)
             z =   2.491
    Prob > |z| =   0.0127
```

   Our test statistic is 2.491. The p-value is 0.0127. Note that this was the p-value reported in the paper. We reject the null hypothesis. Thus, we conclude that we have evidence that the median number of hospitalizations differ by treatment group. In fact we have evidence that there significantly more hospitalizations in the placebo group.