Statistics 305/605: Introduction to Biostatistical Methods for Health Sciences

R Demo for Chapter 14 : Inference for Proportions

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Test and CI

- Can use `prop.test()` function to get p-value and CI.

```
prop.test(c(166,122),c(8506,8102),conf.level=0.95,correct=FALSE)
```

```
##
##  2-sample test for equality of proportions without continuity
##  correction
##
## data:  c(166, 122) out of c(8506, 8102)
## X-squared = 4.8387, df = 1, p-value = 0.02783
## alternative hypothesis: two.sided
## 95 percent confidence interval:
##  0.000498629 0.008416622
## sample estimates:
##     prop 1     prop 2
## 0.01951564 0.01505801
```

Arguments

```
prop.test(c(166,122),c(8506,8102),conf.level=0.95,correct=FALSE)
```

In the call above to `prop.test()`:

- The first argument contains the numbers of "successes" (cancers) in the EP and placebo groups, respectively.
- The 2nd argument contains the numbers of "trials" (women) in the EP and placebo groups, respectively.
- `conf.level` is the level or coverage probability C of the interval (default $= 0.95$).
- `correct` specifies whether to apply a "continuity correction" that improves the statistical inference when the total size of the sample is small. The default is `correct=TRUE`, but I set `correct=FALSE` to re-create the results from using the formulas in the text.

Output

```
##
##  2-sample test for equality of proportions without continuity
##  correction
##
## data:  c(166, 122) out of c(8506, 8102)
## X-squared = 4.8387, df = 1, p-value = 0.02783
## alternative hypothesis: two.sided
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```

- Mostly like the output of `t.test()`
- `X-squared` is the square of the test statistic Z that we discussed in the non-demo part of these notes.
- `X-squared`$= Z^2$ has a chi-squared (χ^2) distribution with 1 df. Leads to a χ^2 test.
- When H_a is 2-sided, the p-values for the χ^2- and Z-tests are the same; i.e. $p = 0.02783$.