

Testing of Hypothesis - Large Sample proportion Test

Introduction

Hypothesis tests are used to make decisions or judgments about the value of a parameter, such as the population proportion. There are two approaches for conducting a hypothesis test; the critical value approach and the P-value approach. Since a sample statistic is being used to make decisions or judgments about the value of a parameter it is possible that the decision reached is an error; there are two types of errors made when conducting a hypothesis test; Type I Error and Type II Error.

Test of significance of the difference between sample proportion and population proportion

$$z = \frac{p - P}{\sqrt{\frac{PQ}{n}}}$$

Procedure:

- Import the data set
- Determine the critical value and sample statistic using R functions
- Conclude the problem using R functions

Problem:

The fatality rate of typhoid patients is believed to be 17.26%. In a certain year 640 patients suffering from typhoid were treated in a metropolitan hospital and only 63 patients died. Can you consider the hospital efficient?

Codes and Results:

```
# Input the data
# Size of the sample
n=640
n

## [1] 640

# Sample proportion
Sprop=63/n
Sprop

## [1] 0.0984375

# Population proportion
Pprop=0.1726
Pprop

## [1] 0.1726

# probability of failure
q=1-Pprop
q

## [1] 0.8274
```

```
# test statistic
z=(Sprop-Pprop)/sqrt(Pprop*q/n)
z

## [1] -4.964736

#critical value
E=qnorm(.975)
# critical region
c(-E,E)

## [1] -1.959964  1.959964

# confidence interval
Sprop+c(-E,E)*sqrt(Pprop*(1-Pprop)/n)

## [1] 0.06915985 0.12771515

# Conclusion
if(z>-E && z<E){print("Hospital is not efficient")} else{print("Hospital is
efficient")}

## [1] "Hospital is efficient"
```