# MSDS 6372: Homework 1

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## 1/12/2021

#Question 1, Chapter 23 Problem 18

"Does consuming nine small snack-sized meals each day, rather than consuming three meals reduce LDL cholesterol levels?" We are interested if nibbling can result in a drop of 6% or more in the mean cholesterol level.

Steps to design a study:

1) State the objective:

We are interested in measuring mean difference in LDL cholesterol levels between those who nibble and those who don't.

2) Determine the scope of inference: Will this be a randomized experiment or an observational study? This will be a randomized experiment with groups random chosen to nibble and to eat regular meals

What experimental or sampling units will be used? The sampling units will be cholesterol levels

What are the populations of interest? The populations of interest are groups of people who either nibble or eat three meals per day.

3) Understand the system under study: The system under study are mean LDL cholesterol levels.

4) Decide how to measure a response: We are concerned with a difference in mean LDL cholesterol level.

5) List factors that can affect the response: Design factors:

Factors to vary (treatments and controls) Nibbling or three meal diet

Factors to fix

Confounding Factors: Factors to control by design (blocking) Lifestyle

Factors to control by analysis (covariates) Groups with entirely different eating patterns Actual eating patterns

Factors to control by randomization Grouping

6) Plan the conduct of the experiment (time line): This study should be able to be accomplished in three months, this is an adequate amount of time for LDL levels to change in the general population based solely on diet.

7) Outline the statistical analysis: The responses will be in terms of LDL levels. We have both before and after treatment measurements for both groups. We will use a 2 sample paired t-test to conduct the experiment.

8) Determine sample size:

```
PROC POWER;
ONECORR SIDES = 1
ALPHA = 0.05
CORR = 0.5
NTOTAL = .
POWER = 0.8;
RUN;
```
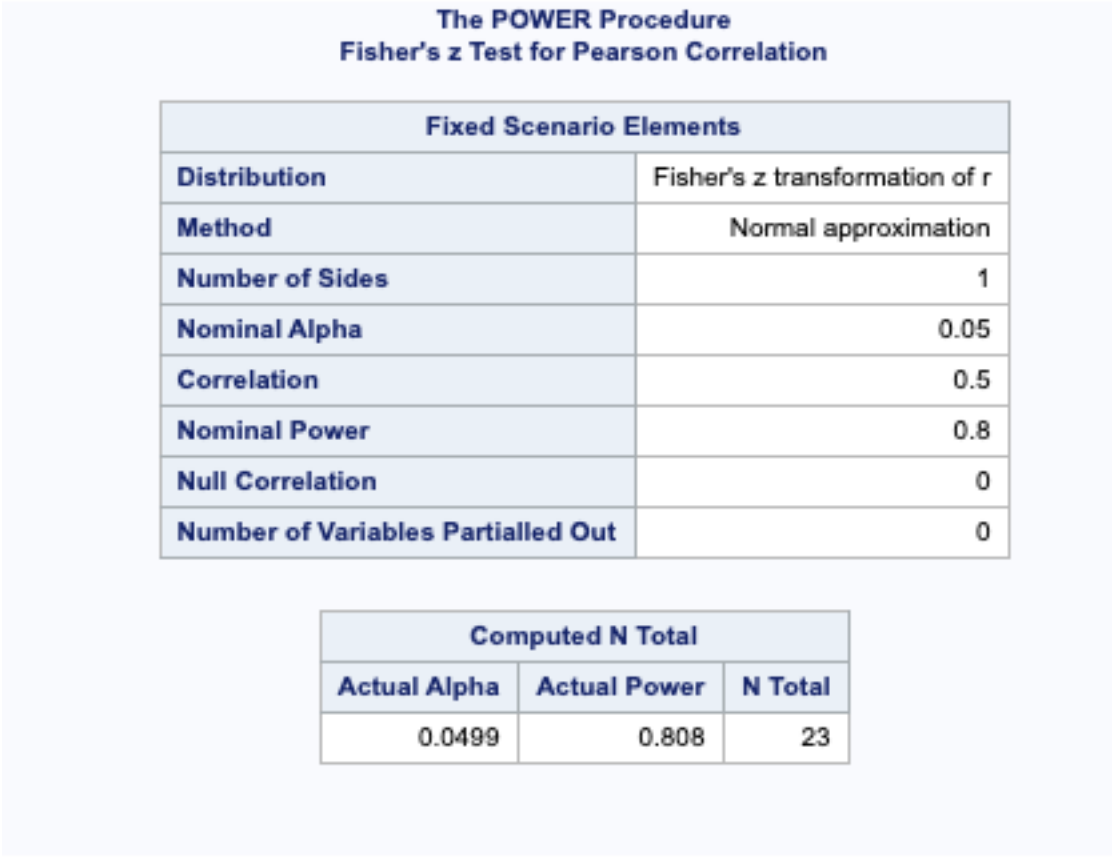
**The POWER Procedure**
**Fisher's z Test for Pearson Correlation**

| Fixed Scenario Elements | |
|---|---|
| Distribution | Fisher's z transformation of r |
| Method | Normal approximation |
| Number of Sides | 1 |
| Nominal Alpha | 0.05 |
| Correlation | 0.5 |
| Nominal Power | 0.8 |
| Null Correlation | 0 |
| Number of Variables Partialled Out | 0 |

| Computed N Total | | |
|---|---|---|
| Actual Alpha | Actual Power | N Total |
| 0.0499 | 0.808 | 23 |

Figure 1: unchanged image

Formula from 709

$$n = \frac{[t_{df}(1-\alpha/2)]^2 S_e^2}{(Practically\ significant\ diference)^2}(C_1^2 + C_2^2 + ... + C_k^2) = 23$$

##Question 2

Figure 2: unchanged image



Figure 3: unchanged image