6. Statistical Methods

There are main 2 common methods for computing a sample size, namely:

1. **Simple Random Sampling Method without a replacement** when S.D. of the group is known

2. **Simple Random Sampling Method without a replacement** when p (proportion of the answer of the main variable) of the group is known

Points to consider when computing a sample size

1. **Desired Precision (+d).**

Researchers must determine the largest acceptable difference between the sample statistics and the population parameters, specified as an acceptable degree of sampling error

- Ask, "How precise does the measurement need to be?"

2. **Value Associated with Desired Confidence Level (z)**

The greater the desired confidence, the larger the sample size must be.

- Ask, "How confident do you want to be that the specified confidence interval takes in the population mean?"

3. **Estimator of the Standard Deviation or Proportion of the Population (s.d. or p)**

The greater the heterogeneity of the population, the larger the sample size must be.

- Ask, "How heterogeneous are the members that are being investigated?"

Methods to Estimate the Population S.D. and p

- Use information from an earlier study
- Conduct a small-scale study of the population
- Use secondary data, e.g. a Meta-Analysis
- Talk to informed people

1. Simple Random Method without a replacement when S.D. is known

$$n = \frac{N(zs)^2}{Nd^2 + (zs)^2}$$

Where
n = optimum sample size
N = population size
s = S.D.
z = a reliability coefficient
d = precision rate or error rate

- There are 1,500 students in a school. A researcher gave a 100-item proficiency test to 40 of them as a pilot test and found that the mean score was 55.47 and S.D. was 15.0. With a reliability of 95% and sampling error not more than 3, how large a sample size should the researcher use in his/her main study?

Reliability of 95%, z = 1.960 or roughly = 2.0 and that of 99%, z = 2.576 or 3.0.

An Example

$$n = \frac{N(zs)^2}{Nd^2 + (zs)^2}$$

Where:

- n = optimum sample size
- N = 1500
- s = 15.0
- z = 2
- d = 3

$$n = \frac{1500*(2*15)^2}{1500*3^2 + (2*15)^2}$$

$$n = 93.75$$

$$n = 94$$

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