

# Term Paper

## I. Identifying the question

- What is the question? (What are my hypotheses?)
- Is it possible to answer the question with statistics?
- Is the data obtainable? (birth weight, socio economic, drugs, alcohol)
- Is it ethical to obtain such data?
- If not, is there a reasonable substitute?
- Are the assumptions reasonable?
- **Define Research Hypothesis and Questions** (choose research questions or hypothesis related to the statistical inference procedures covered in this course.)

# Term Paper

## Statistical Inference Procedures:

- Test and Estimation of One Mean,  $\mu$
- Test and Estimation for Difference between Two Means,  $\mu_1 - \mu_2$
- Test and Estimation of One Proportion,  $\pi$
- Test and Estimation for Difference between Two Proportions,  $\pi_1 - \pi_2$
- Test of Correlation between Two Categorical Variables
- Test of Correlation between Two Quantitative Variables

# Term Paper

## II. Designing a Study

- Identify the population of interest
- Survey
  - Obtain a representative sample of that population
    - Simple Random Sampling
    - Stratified Sampling (M-F, Age groups)
    - Systematic Sampling (class roster, census list)
    - Multi-Stage Sampling
  - Sources of Bias
    - Voluntary Response
    - Non-response bias (day phone)
    - Response bias (people lie)
    - Undercoverage

# Term Paper

## II. Designing a Study (Continue)

(must state the “type of study” in your paper)

- Observational Study
  - Used when a designed experiment is not ethical
  - Subjects studied over a period of time in natural setting
  - Case/Control – Control must match
  - Record Variables of interest
  - Confounding is a major issue
- Experimental Study
  - Researcher has control over the subjects or units in the study
  - An intervention takes place that otherwise would not occur
  - Randomization used to assign treatments
  - Strongest case for causality

# Term Paper

## III. Data Collection

Identify variables (must state variable type in your paper)

- Identify types of variables
  - Qualitative
  - Quantitative
- Identify Limits of measurement or observation

When, where, and how the data were collected?

- If possible, try to get at least 30 pieces of data for quantitative variables.
- If possible, try to obtain a sample of more than 100 cases for categorical variables, however, if large sample estimation of proportion procedure will be used then the procedure works better if sample size is no more than 5% of the population.

In your mid-term project, you need to have

1. an **introduction section** stating and explaining your research question. I **recommend to cite at least one research paper related to your research topic** and prepare a references section at the end of the paper.
2. a **method section** explaining how the research is designed, how to properly collect the data in order to answer your research question and avoid possible bias. You must explain the variable type, quantitative or qualitative. You must explain whether the study is observational or experimental. Explain the reason that you choose your sample size and the software and the statistical methods that you used for analysis.
3. a preliminary **analysis section** that includes **at least one graph and one table** for describing the data that you have collected. It can be frequency distribution tables or statistical charts. **Charts and tables must be properly labeled with numbers and titles.**
4. a **conclusion section** or summary section that summarizes your finding based on the data that you have observed and discuss the limitation of your study.
5. a **reference section**, if you wish site references.

The following web site has good guidelines and examples for writing paper. You do not need to follow exactly what they suggested. However, it is a good reference to use for writing a paper. <http://owl.english.purdue.edu/owl/resource/560/18/>

In your mid-term paper, you only need to present descriptive statistics. For the final term project paper, you are required to show at least one confidence interval estimate and at least one statistical hypothesis test. After you applied statistical inference methods, you may find out that the outcome is not the same as what you have expected. It is perfectly alright.

In a research study, you will define your research questions and hypothesis first, and then design the study and data collection methods, and then collect the data.

Do not change your research questions and hypothesis after you have done some statistical analysis on the data. If the data you collected does not support your hypothesis, it is still a research result. You should stay with it to conclude your analysis.

# Remarks

- Tables and figures must be properly numbered and labeled. (See examples in next few slides.)
- If you have done a literature review, having a reference section near the end of your paper would be very helpful for overall paper quality.
- Although people do not state null and alternative hypotheses in a real world project report, you can state null and alternative hypothesis and perform the hypothesis testing and show your work and software output in the appendix section of your paper. (See example in the [following link](http://people.yzu.edu/~gchang/class/mph/article_examples/TermPaperDoorAtMall.pdf).)

[http://people.yzu.edu/~gchang/class/mph/article\\_examples/TermPaperDoorAtMall.pdf](http://people.yzu.edu/~gchang/class/mph/article_examples/TermPaperDoorAtMall.pdf)



Table 1: Descriptive Statistics for Out or In Variable

	<b>Frequency</b>	<b>Relative Frequency</b>
<b>Out</b>	137	.5249
<b>In</b>	124	.4751

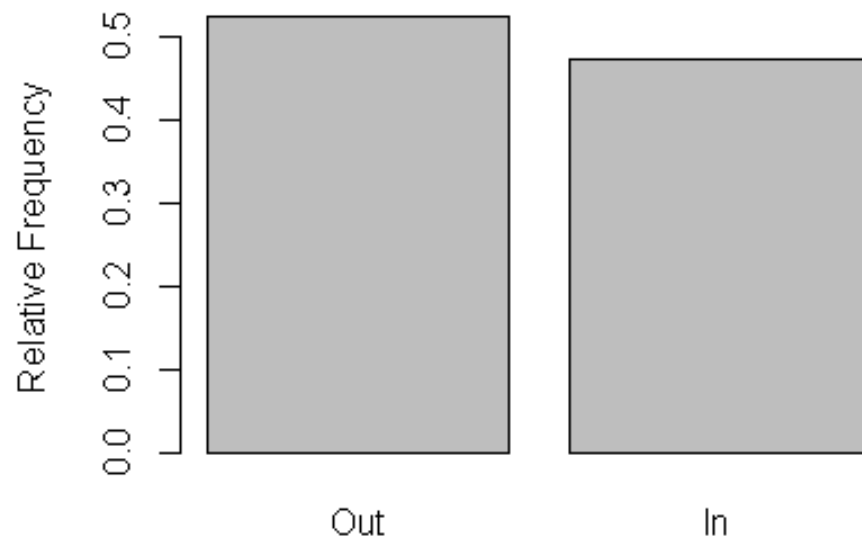


Figure 1: Bar Chart for Out or In Variable