

Where Do Data Come From?

The field of statistics is applicable in every discipline. To give an idea of how widespread its use is, consider the following examples illustrating the scope of applications:

From ratemyprofessors.com, STAT 110 instructors often get comments about the practice test looking like the real exam.....should you believe this claim? Here are some interesting stats from Exam 2 last semester

Summary statistics:

| Column | n | Mean | Variance | Std. Dev. | Std. Err. | Median | Range | Min | Max | Q1 | Q3 |
|--------|-----|----------|-----------|-----------|-----------|--------|-------|-----|-----|----|----|
| Exam 2 | 379 | 78.51715 | 318.37735 | 17.843132 | 0.9165401 | 82 | 102 | 0 | 102 | 70 | 90 |

A claim found on MedPageToday

http://www.medpagetoday.com/Pediatrics/GeneralPediatrics/36848?utm_content=&utm_medium=email&utm_campaign=DailyHeadlines&utm_source=WC&xid=NL_DHE_2013-01-15&eun=g387768d0r&userid=387768&email=leslieahendrix@gmail.com&mu_id=5380723

“Fast Foods Tied to Allergies, Excema in Kids”

Can we believe this claim? Let’s look at the article....

Another claim found on MedPageToday

http://www.medpagetoday.com/MeetingCoverage/AAIC/33780?utm_source=breaking-news&utm_medium=email&utm_campaign=breaking-news

“IVIG Stops Alzheimer’s in Its Tracks”

51% of adults age 18 and older are married today – 72% in 1960

<http://www.pewsocialtrends.org/2011/12/14/barely-half-of-u-s-adults-are-married-a-record-low/?src=sdt-carousel>

Statistics is the science (or art) of data.

_____ are the objects described by a set of data. Individuals may be people, but they may also be animals or things.

A _____ is any characteristic of an individual. A variable can take different values for different individuals.

The actual measurements recorded for individuals are called _____.

Example 1

| | | | | |
|---------------------------|----------------|--------------|---------------|--------------|
| What are the individuals? | | | | |
| | Name | Major | Points | Grade |
| What are the variables? | Advani, Sura | Comm | 397 | B |
| | Barton, David | Hist | 323 | C |
| | Brown, Annette | Lit | 446 | A |
| | Chiu, Sun | Psyc | 405 | B |
| | Cortez, Maria | Psyc | 461 | A |

Example 2

| | | | | | | |
|--------------|--------------|-------------------|---------------------|------------------|-------------|----------------|
| Individuals? | Make | Vehicle | Transmission | Cylinders | City | Highway |
| | BMW | Subcompact | Automatic | 6 | 19 | 27 |
| Variables? | BMW | Subcompact | Manual | 6 | 20 | 29 |
| | Buick | Midsize | Automatic | 6 | 20 | 30 |
| | Chevy | SUV (2WD) | Automatic | 6 | 16 | 21 |

Example 3

In an agricultural study in Kansas, researchers want to know which of three fertilizer compounds produces the highest wheat yield (in kg/plot). An experimenter uses 15 plots of land. Each fertilizer is applied to 5 plots of land. After harvest, the resulting yield is measured.

Individuals?

Variables?

| Fertilizer 1 | Fertilizer 2 | Fertilizer 3 |
|--------------|--------------|--------------|
| 64.8 | 56.5 | 65.8 |
| 60.5 | 53.8 | 73.2 |
| 63.4 | 59.4 | 59.5 |
| 48.2 | 61.1 | 66.3 |
| 55.5 | 58.8 | 70.2 |

Ways to Gather Data

1. Observational Study

An **observational study** observes individuals and measures variables of interest but does not attempt to influence the responses.

A **response variable** is a variable that measures an outcome or result of a study.

The purpose of an observational study is to describe some group or situation.

The _____ for a statistical study is the entire group of individuals about which we want information.

A _____ is the part of the population from which we actually collect information and is used to draw conclusions about the whole.

2. Sample Survey

A **sample survey** is a type of observational study that surveys a group of individuals by studying only some of its members (selected because they represent the larger group of individuals)

It is a *survey* because the individuals provide their own responses

It is a *sample* survey because the individuals participating in the survey are a sample of the population