

AMS 7: Lecture 1

Introduction & What is Statistics?

April 4, 2017

Introduction

Daily Quote

Who am I?

Syllabus Reading

What is Statistics?

Data Types

Collection of Data

Designs of Experiments

Types of Observational Studies

Sampling

"Do not fear mistakes. There are none." Miles Davis

Introduction

Daily Quote

Who am I?

Syllabus Reading

What is Statistics?

Data Types

Collection of Data

Designs of Experiments

Types of Observational Studies

Sampling

I was born in DC and went to school in Maryland and New Jersey

Past Research Experiences:

- ▶ Measuring Cocaine Uptake & Gang Dynamics
- ▶ Measuring Ability
- ▶ Test Anxiety

Something Fun

I play the saxophone and I have a deep passion for Mathematics

Introduction

Daily Quote

Who am I?

Syllabus Reading

What is Statistics?

Data Types

Collection of Data

Designs of Experiments

Types of Observational Studies

Sampling

Quick Overview.

What if we wanted to determine if a certain drug lowers a patient's higher-than-normal intraocular pressure (causes glaucoma). We want to conduct the study at Dominican Hospital.

- ▶ The individuals with higher-than-normal intraocular pressure at Dominican Hospital would be our **population**
- ▶ The medical record database would contain the **census** of individuals of interest
- ▶ Tonometry is used to measure intraocular pressure. It takes time, so we take a **sample**.

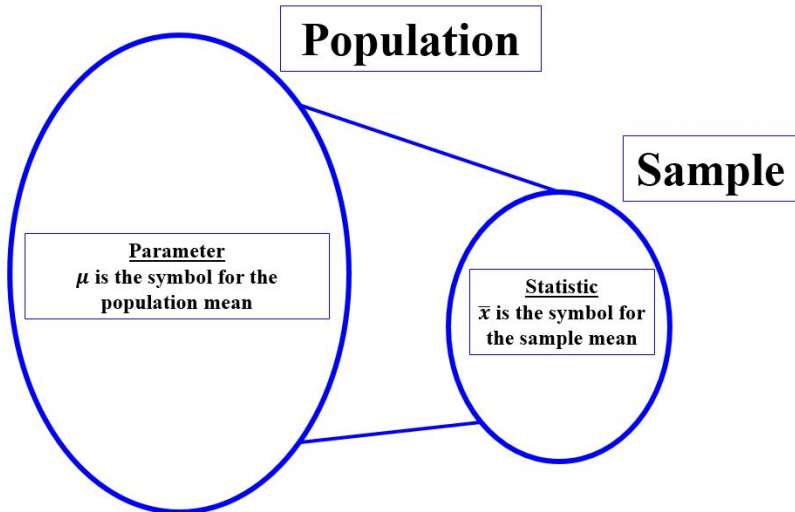


The collection of information about each patient that in our study is called **data** (i.e., blood pressure, height, weight, race, gender, etc.)

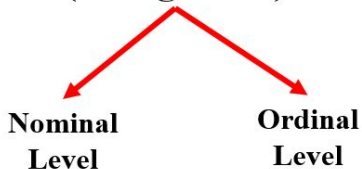
Patient ID	Height (inches)	Weight (lbs)	BP (sys.)	Race	Gender
001	68	260	150	A	F
002	42	192	120	L	F
...

The use of data to make a conclusion about the population is **statistics**

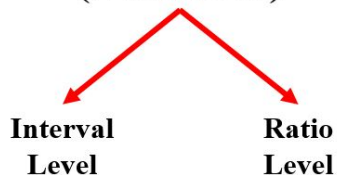
$$Y_i = \beta_0 + \beta_1 X_i + \epsilon_i \quad (1)$$



Qualitative (Categorical)



Quantitative (Numerical)



Various ways of collecting data:

1. Experiments
2. Observational Study

Introduction

Daily Quote

Who am I?

Syllabus Reading

What is Statistics?

Data Types

Collection of Data

Designs of Experiments

Types of Observational Studies

Sampling

Factors to include in collecting data in experiments:

1. Replication
2. Blinding
3. Randomization
4. Confounding

Introduction

Daily Quote

Who am I?

Syllabus Reading

What is Statistics?

Data Types

Collection of Data

Designs of Experiments

Types of Observational Studies

Sampling

Observational Studies

1. Cross-Sectional Study
2. Retrospective (or Case-Control) Study
3. Prospective (or Longitudinal or Cohort) Study

Introduction

Daily Quote

Who am I?

Syllabus Reading

What is Statistics?

Data Types

Collection of Data

Designs of Experiments

Types of Observational Studies

Sampling

Sampling Techniques:

1. Simple Random Sample (SRS)
2. Stratified Sampling
3. Others: Systematic, Convenience, Cluster, Volunteering