

Statistics Economics 91

Linus Yamane

Statistical Inference

- What is the income of an American household?
- How much income inequality is there?
- How many hours do teenagers spend on their smart phones?
- How many sexual partners do most Americans have?
- How much alcohol do college students consume?

Statistical Inference



- Method by which the characteristics of the population or phenomena are studied through the observation of sample data
- From the larger **population**, we draw a **sample**.
- Sample data should be **randomly** or scientifically selected
- Consider a **random sample** of size n out of population N . Every possible sample of n objects is equally likely to be chosen.

Major Types of Errors

- Sampling error
 - Bad luck
 - Increase sample size to remedy
- Non-Sampling error
 - Data acquisition errors
 - Non-response errors
 - Selection Bias

Non-Sampling Errors

- Data acquisition errors
 - Incorrect measurement, transcription, misinterpretation, inaccurate responses
- Non-response errors
 - individuals chosen for the sample are unwilling or unable to participate in the survey
- Selection errors
 - Survivor bias, healthy user bias, *Literary Digest*
- Increasing sample size will not eliminate these problems

Statistic

- Summary measure of the sample data used to infer something about the population
- Prior to sampling
 - The statistic is called an **estimator** (formula)
 - A random variable whose value is unknown
- After sampling
 - The statistic is called an **estimate**
 - Specific value of an estimator computed from the sample data

Sampling Distribution

- Sample estimate will equal the population parameter only by pure chance
- Sample estimate has a sampling distribution
- Probability distribution of the statistic
 - Mean
 - Standard Deviation
 - Variance