

Module 4, Unit 9 Lesson 13 – Using Sample Data to Estimate a Population Characteristic.

Last class we discuss the difference between a population and a sample. Keep those in mind as you answer the two questions below.

- a. A team of scientists wants to determine the average length and weight of fish in Lake Lucerne. Name a **sample** that can be used to help answer their question.

- b. Golf balls from different manufacturers are tested to determine which brand travels the farthest. What is the **population** being studied?

Example 1

For the following items of interest, describe the appropriate population, population characteristic, sample, and sample statistic.

- c. Average Time it takes all WRHS students to run a quarter mile, based on a sample of 50 students.

- d. Proportion of all US National forests that contain bald eagle nests, based on a sample of 10.

- e. Median curfew time of boys compared to girls in Santa Clarita, based on a sample of 100 SCV teens.

How do we get a representative sample?

If a sample is taken for the purpose of generalizing to a population, the sample must be **representative** of the population. In other words, it must be similar to the population even though it is smaller than the population.

There is no procedure that guarantees a representative sample. To ensure the sample has the best possible chance of being a good representation of the population, participants need to be **randomly** selected from the population of interest. We will discuss 5 different sampling methods that are used in the real world. Four of them are random.

Sampling Method	Definition/Technique	Examples
Convenience Sample	Any convenient method. No element of randomness is required.	Posting an online poll Interviewing the 20 people closest to you
Systematic Sample	Given a list of names/numbers, start with the r th item, then choose every n th item after that.	Given a list of names, choose the 3 rd name, then choose every 7 th name after that.
Simple Random Sample (SRS)	Any method that allows every possible sample of the given size the same chance to be chosen as every other possible sample of that size.	Put all names in a hat. Choose "n." Number a list of names. Use a random number generator to choose "n" numbers.
Cluster Sample	Divide the population up into groups (usually by geographic proximity). Randomly choose one or more of the groups for the sample. Every individual in the chosen group(s) is part of the sample.	Divide a campus up by classrooms. Put the room numbers in a hat. Randomly choose 3 rooms. Interview all students in those 3 rooms.
Stratified Sample	Divide the population into homogenous groups. Randomly select a few individuals from EACH group to be part of the sample.	Divide WR students up by grade level. Within each grade level, randomly choose 20 students to be part of the sample.

Example 2

Suppose you are the campaign manager for your friend who is running for senior class president. You would like to know what proportion of students would vote for her if the election were held today. You are considering the following sampling techniques. *Identify which sampling method is being described.*

- Poll everyone in your friend's math class.
- Assign every student in the senior class a number from 1 to 314. Then, use a random number generator to select 30 students to poll.
- Ask every 10th senior who comes through the gate who he/she will vote for
- Choose one building on campus at random. Interview every senior with a 4th period class in that building.
- Go to every senior English classroom. In each class, choose 4 students at random to interview.

Example 3

In a large scale school system with 20 elementary schools, the school board is considering adopting a new policy that would require all elementary school students to pass a proficiency exam each year in order to advance to the next grade level. The PTA wishes to know what district parents think about this plan. They have proposed several sampling methods. Identify the sampling technique described in each scenario.

- a. Send an email home to parents, asking them to answer an opinion poll on the PTA website.

- b. Randomly select 15 parents from each elementary school to interview.

- c. Randomly select 2 of the elementary schools and contact every parent from those schools.

- d. Using a list of district enrollments, number the households then use a random number generator to choose 400 households to call.

- e. Send a survey home with all students. Ask parents to fill it out and return it the next day.

- f. Going through district enrollment records, select every 50th household to be called.