11.1 Statistical Questions & Variables

- Statistical Question: a question w/ data pts

Examples	Non Examples
• how many hrs of sleep? • what's your fav. sport? scatter plots, bargraphs, histographs	• yes or no question • 1 answer $y = mx + b$

(left margin: choose question)

- Statistical Variable:

  - Categorical Variable: qualitative, categories

  - Quantitative Variable: numbers

(left margin: what)

(right margin: controlled: no change)

Example: "What breed of dog is most likely to be adopted?" categorical

Example: "What is the average number of students participating per after school activity?" quantitative

- Population: all members in the group

- Sample: subset of population (small group)

(left margin: who?)

Example: "A polling organization randomly chose eligible votes in a state of Illinois to ask who they would vote for in an upcoming election for governor." sample

- Parameter: results from population

- Statistic: results from sample

(left margin: answers)

Example: "The median age of a car in 20 randomly selected spaces in the school parking lot is 7 years"
↳ sample   Statistic

Example: 53.2% of a district's eligible voters voted for the sitting U.S. House of Representatives"
parameter

more in depth

11.2 Statistical Studies & Sampling Methods

- Sample Survey: survey / questions

- Experiment: change treatments to groups

- Observational Study: look & count

Question	Study Choice
Does urban population have an effect of rates of asthma?	observation
How many students in a school would like the cafeteria to serve breakfast?	survey
A group of plants is not growing well compared to the rest. What should be changed to improve their growth?	experiment
A gym asked their customers if they would prefer the gym open earlier.	survey
A gym counts the number of customers that come in before 8AM	observation

✱ Bias: produces results that might misrepresent a population

- Simple Random Sample: everyone equally likely to be chosen

pick your sample

Question	Sampling Method & Bias?
Starting with a randomly chosen ID number every 5th student is randomly selected	systematic → no
A number of hospitals around the country were randomly chosen. Within each hospital, all of the nurses were chosen.	clustered → no
A retailer put feedback cards at the front of the store. The got responses from 22% of their customers.	self-selected → yes

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Care must be taken to avoid bias.			High Risk of Bias	
Stratified sampling is when a population is divided into groups with similar characteristics and a sample is randomly chosen from each group.	Cluster sampling is when a population is divided into convenient clusters, and entire clusters are chosen at random as the sample.	Systematic sampling is when you start with one member chosen at random then use a rule, such as "every 3rd member of the population," to select members of the sample.	Convenience sampling is only choosing subjects that are in close proximity or easy to get to.	Self-selected sampling is using a sample made up of volunteers.

groups then some from each group

groups, a whole group

patterns

easy for you

volunteers

- Experimental Group: receives change

- Control Group: no change