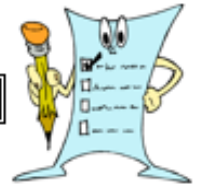


Lesson 4.2 Surveys & Questionnaires



Goal: Assess the validity of survey results based on bias and sampling technique

Terminology

Representative Sample: A sample that is typical of the entire population. If the sample is not representative, it is biased and the survey results are invalid.

Sample Size: In a survey sample size can affect its results.

- If the sample is too small, the survey results may not be reliable.
- If it's too large, the survey may cost a lot and be too difficult to conduct

Sampling Techniques

Random Techniques – Each member of the population has an equal chance of being selected

Random

- 1) Simple Random Sampling - Picked randomly
- 2) Stratified Sampling - Population is grouped and a few individuals are picked from each group
- 3) Cluster Sampling - Population is organized into groups and **one group** is chosen
- 4) Systematic Sampling - Every n^{th} individual is selected

Non-Random Techniques – Will not necessarily provide a representative sample

- 1) Convenience Sampling - Individuals who are easy to sample are chosen
- 2) Judgement Sampling - The person who is doing the sampling uses their judgement to create a representative sample
- 3) Volunteer Sampling - Participants Volunteer

EXAMPLE 1 A town has a population of 20,000 people. The town council conducts a vote at a public meeting about constructing a new ice-hockey rink.

- 50 people attend the meeting
- 40 of the people at the meeting vote in favour of the hockey rink
- Council decides to build the hockey rink since 80% of the people support the data

a) What percent of the people at the meeting voted for the rink?

voted yes $\rightarrow \frac{40}{50} \times 100 = 80\%$
 Total \rightarrow

b) What percent of the people in the town attended the meeting?

$\frac{50}{20000} \times 100 = 0.25\%$

c) Is the sample representative? Justify your answer.

No, sample size is too small.

Voluntary Sample - only people who attended the meeting could vote.

Sample might be biased - people who attend the meeting might have a particular

* Good survey
 ~ 10% of of population



Bias in Surveys

Bias: occurs when the results of a Survey do not reflect the entire population

Biased Questions: Restrict people's choices or use words that could influence people to answer in a certain way. For results to be valid, survey questions must be unbiased.

Types of Bias:

Leading Questions: Contain wording or information to prompt a specific response

Loaded Questions: Suggest a socially desirable answer or are emotionally charged.

Response Bias: When people intentionally lie or give false information

Non-Response Bias: When people fail to answer one or more questions

Sampling Bias: When you have a non-random sample

EXAMPLE 2 People walking by in the mall were asked "We harm the planet when we use pesticides on our lawns. Should the government ban all residential pesticide use?"

a) Will the survey results be valid? Justify your answer

No. The question is bias. Respondants may feel bad about disagreeing.

b) How could the survey be improved?

- Remove first sentence
- Use an anonymous written survey
- Use a random method of surveying (not convenience sampling)

EXAMPLE 3 About 4000 people visited a large sports equipment store during its annual sale. The store surveyed 100 customers after they paid for their purchases. An employee recorded their answers.

Why are the survey results invalid? How could they be improved?

To assess the survey, ask yourself these questions.

a) Is the sample size large enough?

$$\frac{100}{4000} \times 100 = 2.5\% \Rightarrow \text{Too small}$$

b) Is the sample representative?

(we want ~10%)

We're only asking customers who made a purchase (they may answer differently than those who don't buy).

c) Are the survey questions unbiased?

The first sentence makes people feel they should be buying equipment. They may exaggerate how much they spend.

d) Was the collection method appropriate?

Customers might be intimidated by the employee writing their answers. An anonymous survey would be better.

1. Good sports equipment can greatly improve performance. How much do you spend on equipment each year?	
___ \$200 or less	___ \$200-\$400
___ \$400-\$600	___ \$600-\$800
___ \$800-\$1000	___ More than \$1000
2. How much do you earn per year?	
___ Less than \$10 000	___ \$10 000-\$20 000
___ \$20 000-\$40 000	___ \$40 000-\$60 000
___ \$60 000-\$80 000	___ More than \$80 000