# Chapter 4: Designing Studies

## Key Vocabulary:

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|---|---|
| voluntary response sample | observational study |
| confounded | experimental units |
| population | subjects |
| sample | treatment |
| design | factor |
| convenience sampling | level |
| biased | placebo effect |
| simple random sample | control group |
| table of random digits | randomization |
| probability sample | completely randomized experiment |
| stratified random sample | statistically significant |
| strata | replication |
| undercoverage | hidden bias |
| nonresponse | double-blind experiment |
| response bias | block design |
| sampling frame | matched pairs design |
| systematic random sample | |

## 4.1 Sampling and Surveys (pp.206-230)

1. How does a population differ from a sample?

2. What are the steps to planning a sample survey?

3. Why are *voluntary response samples* unreliable?

4. Why might *convenience sampling* be unreliable?

5. What is a *biased* study?

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6. Define *simple random sample*.

7. What two properties of a *table of random digits* make it a good choice for creating a simple random sample?

8. State the two steps in choosing an *SRS*?
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9. How do you select a *stratified random sample*?

10. What is *cluster sampling*?

11. What is the difference between a strata and a cluster? Look at example on page 218

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12. Give an example of *undercoverage* in a sample.

13. Give an example of *non-response bias* in a sample.

14. What factors can cause *response bias* in a sample?

15. How can the wording of questions cause *bias* in a sample?

16. What is the difference between *nonresponse* and *voluntary response*?

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## 4.2 Experiments (pp.231-261)

1. How does an *experiment* differ to an *observational study*?

2. What is a *lurking variable*?

3. What is *confounding*?

4. Check Your Understanding pg 233
    1.
    2.
    3.
    4.

5. Explain the difference between *experimental units* and *subjects*.

6. Define *treatment*.

7. What is the difference between *factor* and *level* in an experiment? Example on page 235.

8. Explain how to perform a completely randomized design.

9. What is the significance of using a *control group*?

10. Check Your Understanding pg 240
    1.
    2.
    3.

11. The basic principles of statistical design of experiments are:
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12. Describe the *placebo effect*.

13. Define *randomization*.

14. Check Your Understanding pg 244
    1. 
    2. 
    3. 

15. Define *statistically significant*.

16. Describe a *block design*.

17. When does *randomization* take place in a block design, and how does this differ to a completely randomized design?

18. What is the goal of a *matched pairs design*?

19. State the two most common ways in which *matched pairs* experiments are designed.
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20. What are the advantages of a *double-blind study*?

## 4.3 Using Studies Wisely (pp.261-271)

1. What are the criteria for establishing causation?

2. What are the criteria for establishing inference for a population from a given sample?