

5-A

## Common Sampling Techniques

**Simple Random Sampling:**  
Every sample of the same size has an equal chance of being selected. Computers are often used to generate random telephone numbers.

**Convenience Sampling:**  
Use results that are readily available.

**Systematic Sampling:**  
Select every 4th member.

**Stratified Sampling:**  
Partitions the population into at least two strata, then draw a sample from each.

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- ## Identify the Sampling Method Used
- You are conducting a survey of students in a school. You choose your sample by knocking on the every 3<sup>rd</sup> classroom door.  
 Choosing every 3<sup>rd</sup> room makes this a systematic sample.  
 The sample may be representative, as long as students were randomly assigned to rooms.
  - To survey opinions on a new water line, a research firm randomly draws the addresses of 200 homeowners from a public list of all homeowners.  
 The records presumably list all homeowners, so drawing randomly from this list produce a simple random sample. It has a good chance of being representative of the population.
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- ## Types of Statistical Study
1. In an **observational study**, researchers observe or measure characteristics of the sample members but do not attempt to influence or modify these characteristics.
  2. In an **experiment**, researchers apply a treatment to some or all of the sample members and then look to see whether the treatment has any effects.
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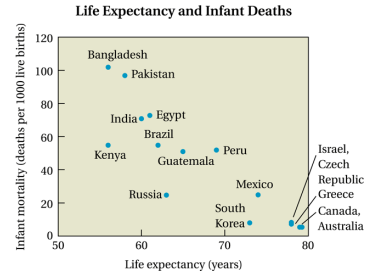
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- ## Treatment and Control Groups
- The **treatment group** in an experiment is the group of sample members who receive the treatment being tested.
  - The **control group** in an experiment is the group of sample members who do *not* receive the treatment being tested.
  - It is important for the treatment and control groups to be selected randomly and to be alike in all respects except for treatment.
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- ## The Placebo Effect and Blinding
- A **placebo** lacks the active ingredients of a treatment being tested in a study, but is identical in appearance to the treatment. Thus, study participants cannot distinguish the placebo from the real treatment.
  - The **placebo effect** refers to the situation in which patients improve simply because they believe they are receiving a useful treatment.
  - An experiment is **single-blind** if the participants do not know whether they are members of the treatment group or members of the control group, but the experimenters do know.
  - An experiment is **double-blind** if neither the participants nor the experimenters (people administering the treatment) know who belongs to the treatment group and who belongs to the control group.
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## Should I Believe a Statistical Study?

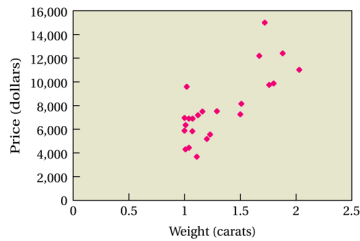
1. Identify the Goal, Population and Type of Study
2. Consider the Source
3. Look for Bias in the Sample
4. Look for Problems in Defining or Measuring the Variables of Interest
5. Watch out for Confounding Variables
6. Consider the Setting and Wording in Surveys
7. Check that Results are Presented Fairly
8. Stand Back and Consider the Conclusions

## Correlation and Causality



A scatter diagram for life expectancy and infant mortality.

## Correlation and Causality



A scatter diagram for diamond weights and prices.

## Relationships Between Two Data Variables

- No correlation:** There is no apparent relationship between the two variables.
- Positive correlation:** Both variables tend to increase (or decrease) together.
- Negative correlation:** The two variables tend to change in opposite directions, with one increasing while the other decreases.
- Strength of a correlation:** The more closely two variables follow the general trend, the stronger the correlation (which may be either positive or negative).
- In a perfect correlation, all data points lie on a straight line.**