

Problem set. Chapter 8

1. Describe the population and the sample.

(a) A survey of 17,096 students in U.S. four-year colleges reported that 19.4% were binge drinkers.

Population: _____ Sample: _____

(b) In a study of work stress, 100 female restaurant workers were asked about the impact of work stress on their personal lives.

Population: _____ Sample: _____

(c) A tract of forest has 584 longleaf pine trees. The diameters of 40 of these trees were measured.

Population: _____ Sample: _____

2. A study in El Paso, Texas, looked at seat belt use by drivers. Drivers were observed at randomly chosen convenience stores. After they left their cars, they were invited to answer questions that included questions about seat belt use. In all, 75% said they always used seat belts, yet only 61.5% were wearing seat belts when they pulled into the store parking lots. Explain the reason for the bias observed in responses to the survey.

Do you expect bias in the same direction in most surveys about seat belt use?

3. You see a woman student standing in front of the student center, now and then stopping other students to ask them questions. She says that she is collecting student opinions for a class assignment.

It is a convenience sample. Why?

4. Suppose, for example, that a news show asks viewers to participate in an on-line poll.

This would be a voluntary response sample. Why?

5. A teacher in an inner city school wants to know what type of music young people like to listen to. He decides to poll his classes. Explain why this poll is almost certainly biased.

6. A newspaper advertisement for USA Today: The Television Show once said: Should handgun control be tougher? You call the shots in a special call-in poll tonight. If yes, call 1-900-720-6181. If no, call 1-900-720-6182. Charge is 50 cents for the first minute. Explain why this opinion poll is almost certainly biased.

7. Use the random digits provided to select an SRS of four hotels.

01 Aloha Kai	08 Captiva	15 Palm Tree	22 Sea Shell
02 Anchor Down	09 Casa del Mar	16 Radisson	23 Silver Beach
03 Banana Bay	10 Coconuts	17 Ramada	24 Sunset Beach
04 Banyan Tree	11 Diplomat	18 Sandpiper	25 Tradewinds
05 Beach Castle	12 Holiday Inn	19 Sea Castle	26 Tropical Breeze
06 Best Western	13 Lime Tree	20 Sea Club	27 Tropical Shores
07 Cabana	14 Outrigger	21 Sea Grape	28 Veranda

Some line from the table B:

69051 64817 87174 09517 84534 06489 87201 97245

Our SRS of four hotels for the editors to contact is:

8. The walk to your statistics class takes about 10 minutes, about the amount of time needed to listen to three songs on your iPod. You decide to take a simple random sample of songs from a Billboard list of Rock Songs. Here is the list:

Miss Murder	Animal I Have Become	Steady, As She Goes	Dani California
The Kill (Bury Me)	Original Fire	When You Were Young	MakeD—Sure
Vicarious	The Diary of Jane		

Select the three songs for your iPod using a simple random sample.

Line #104 in the Table B:

52711 38889 93074 60227 40011 85848 48767 52573

Our SRS of the three songs is:

Under-coverage results from failing to include all members of a population in the analysis. Very often a complete list of the individuals in a population is not available. The possible reasons could be several. Most of the time, there is not enough time, money or resources to include everyone in a study or experiment. In such cases the results differ from the truth.

Next, there is non-response. Even though we select individuals carefully, i.e. randomly, and we eliminate under-coverage, the individuals may refuse to cooperate with us. People, especially, can be difficult to reach by phone. Some individuals do not want to be convinced to put in their time and effort for the purpose of our goal.

Response bias is one of the most obvious obstacles facing a statistician. The behavior of the respondents can seriously affect our results. As we all know, there are people who lie when asked undesirable questions. Discrimination is often one of the factors that affect opinions. There are issues that people feel uncomfortable to talk about. In addition, the interviewers can unintentionally lead respondents to give a more desirable answer. A body language of both an interviewer and an interviewee then causes bias in responses.

Finally, there is the wording of questions. There are at least two kinds of questions that are phrased incorrectly: questions that lead to a certain response and questions that confuse people. Questions should be phrased in such a way that allows the individuals to honestly express their viewpoints. There should be no hidden messages.

9. Just before a presidential election, a national opinion-polling firm increases the size of its weekly sample from the usual 1500 people to 4000 people. Why do you think the firm does this?

10. A sample of households in a community is selected at random from the telephone directory. In this community, 4% of households have no telephone, 10% have only cell phones, and another 25% have unlisted telephone numbers.

The sample will certainly suffer from_____.

11. Senator wants to know what the voters of his state think of proposed legislation on gun control. He mails a questionnaire on the subject to an SRS of 2500 voters in his state. His staff reports that 448 questionnaires have been returned, 343 of which support the legislation.

The sample will certainly suffer from_____.

12. People know that they should take the trouble to vote, for example, so many who didn't vote in the last election will tell an interviewer that they did. Which type of bias is present?

13. If people tend to respond differently to a question depending on whether the interviewer is male or female, which type of bias is present?

14. Question wording. During the 2000 presidential campaign, the candidates debated what to do with the large government surplus. The Pew Research Center asked two questions of random samples of adults. Both questions stated that social security would be "fixed." Here are the uses suggested for the remaining surplus:

Should the money be used for a tax cut, or should it be used to fund new government programs?

Should the money be used for a tax cut, or should it be spent on programs for education, the environment, health care, crime-fighting and military defense?

One of the questions drew 60% favoring a tax cut; the other, only 22%. **Which wording** pulls respondents toward a tax cut? Why?