AP Statistics - BS: Bias in Sampling

AP Statistics Bias in Sampling (BS) - 18 questions

18 Questions | 36 min

---

1. A typical method of telephone survey is to call a random number (with a random number generator). If there is no answer, call another number. If someone answers, check if the person is at least 18. If not, call another number; if yes, proceed with the survey. There are many concerns with this methodology. Which of the following is not a concern?

(A) People living in large households may be underrepresented.

(B) People with multiple phones may be overrepresented.

(C) People with unlisted numbers may be underrepresented.

(D) People with children under 18 years old may be underrepresented.

(E) People with caller ID and recording machines may be underrepresented.

2. Two surveys using different sampling methods were both aimed at determining the extent of illegal drug use on a college campus. The first method was able to obtain responses from only a small percentage of those selected to be surveyed. The second method received a very high rate of response; however, the answers to the question on drug use indicated a much smaller use of drugs on campus than the health counselors knew to be true. What type of bias did each sampling method illustrate?

(A) The first method illustrates response bias; the second method illustrates nonresponse bias.

(B) The first method illustrates nonresponse bias; the second method illustrates response bias.

(C) The first method illustrates selection bias; the second method illustrates nonresponse bias.

(D) The first method illustrates selection bias; the second method illustrates response bias.

(E) The first method illustrates nonresponse bias; the second method illustrates selection bias.

3. 42 percent of Americans have blood type A. In a random sample of 200 Americans, 40 percent had blood type A. What is the most likely explanation for this difference between the observed and expected percents?

(A) Selection bias

(B) Confounding between those who have and do not have blood type A

(C) Experimental design error

(D) Incomplete sampling frame

(E) Sampling variability

4. Pollsters are becoming more and more concerned about the accuracy of telephone surveys because of nonresponse bias. Which of the following best explains their concern?

(A) The attitude of the surveyor might cause the respondent to hang up.

(B) The wording of the questions might influence the way people respond.

(C) If people are uncomfortable with the questions, they might not answer truthfully.

(D) Not everyone has phones, so certain groups of people—for example, the homeless—will be missed in telephone surveys.

(E) With caller ID and answering machines, many people simply choose to not participate in telephone surveys.

5. A school district with 25 elementary schools is considering having the school day begin and end one hour later. They are considering four methods of surveying parents. Method 1: Randomly select one of the 25 schools, and contact every parent with children in that school by mail. Method 2: Send a survey home with every elementary school student, and ask parents to fill it out and return it within a week. Method 3: Randomly select 10 parents from each elementary school, send them a survey, follow up with a phone call if they don't return the survey, and follow up with a home visit if they don't return the survey or answer the phone. Method 4: Make a public announcement on a local television news program asking people to post their opinions to an online website. How many of the above methods clearly illustrate some form of bias?

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

6. An assembly line produces 1,000 circuit boards a day. As a quality check, a sample of 50 boards are checked. One day unbeknownst to everyone, the first 600 boards off the assembly line are fine but the last 400 are defective. Which sampling method would have best picked up on the fraction of defective boards produced that day?

(A) A simple random sample, randomly picking 50 of the 1,000 boards

(B) A systematic sample, randomly picking one of the first 20 boards and then testing it and every 20th board from that point on

(C) A convenience sample, randomly picking one of the first 951 boards and then testing it and the following 49 boards

(D) Go through the boards one at a time, flipping a coin for each board, and testing the first 50 boards for which the coin comes up "heads"

(E) All of the above methods involve randomization, so all are equally likely to have picked up on the fraction of defective boards produced that day

7. A home economist is interested in estimating the proportion of people who make their beds in the morning, and she plans to interview a random sample of 500 people. If instead she increases the sample size to 750, what effect will this have on bias and on the variance of the estimator?

(A) The bias and the variance will remain the same.

(B) Both the bias and the variance will decrease.

(C) The bias will decrease, while the variance will remain the same.

(D) The bias will remain the same, while the variance will decrease.

(E) The bias will increase, while the variance will decrease.

8. What fault do all of these sampling designs have in common? I. The Wall Street Journal plans to make a prediction for the Republican nominees for open Senate seats based on a survey of its readers. II. An Internet site asks viewers to vote on their choice for "Television Series of the Year." III. A college teacher randomly picks a sample of his students and interviews them concerning how much they feel they have learned during the academic semester.

(A) None of the designs satisfactorily controls for sampling error.

(B) All the designs confuse association with cause and effect.

(C) All the designs have errors that can lead to strong bias.

(D) All the designs make improper use of stratification.

(E) None of the designs makes use of chance in selecting a sample.

9. A researcher plans a study to examine the depth of belief in faith healing (the power of prayer in curing illnesses) among the adult population. She interviews a simple random sample of 50 adults leaving church one Sunday morning. All but two of them agree to participate in the survey, consisting of a series of neutrally worded questions. Which of the following is a true statement?

(A) Selection bias makes this a poorly designed survey.

(B) The high response rate makes this a well-designed survey.

(C) The use of neutral wording makes this a well-designed survey.

(D) The proper use of chance as evidenced by the simple random sample and neutral wording makes this a well-designed survey.

(E) The large sample, $n \geq 30$, helps makes this a well-designed survey.

10. Which of the following statements is incorrect?

(A) Convenience samples often lead to undercoverage bias.

(B) There is no way to fix the results if a biased sampling method was employed.

(C) Questionnaires with nonneutral wording are likely to have response bias.

(D) Voluntary response samples often underrepresent people with strong opinions.

(E) Nonresponse bias should be avoided because those who do not respond might have different views from those who do respond.

11. Two wordings for a questionnaire on whether Guamanians want independence from the U.S. are as follows. I. Would you vote for sovereignty for Guam? II. Would you support a Guam separate from the United States? One of these questions showed 32 percent support for independence while the other showed 38 percent support. Which question produced which result and why?

(A) The first question showed the 38 percent support because of lack of randomization in choice of subjects as evidenced by the wording of the questions.

(B) The first question showed the 32 percent support because of a placebo effect.

(C) The first question showed the 38 percent support due to lack of blocking.

(D) The first question showed the 32 percent support because of response bias due to the wording of the question.

(E) The first question showed the 38 percent support because of response bias due to the wording of the question.

12. When conducting surveys, bias refers to which of the following?

(A) Lack of a control group

(B) Difficulty in concluding cause and effect

(C) Confounding variables

(D) An example of sampling error

(E) A tendency to favor the selection of certain members of a population

13. To find out a town's average family size, a researcher interviews a random sample of parents at a school's PTA meeting. The average family size in the 50-family sample is 3.72. Is this estimate probably too low or too high?

(A) Too low, because of undercoverage bias

(B) Too low, because convenience samples underestimate average results

(C) Too high, because of undercoverage bias

(D) Too high, because convenience samples overestimate average results

(E) Too high, because voluntary response samples overestimate average results

14. Which of the following is a true statement about sampling?

(A) There is no such thing as a "bad sample."

(B) Sampling techniques that use probability techniques effectively eliminate bias.

(C) Sampling techniques that allow the surveyor to choose participants with care and precision go a long way in controlling bias.

(D) If bias is present in a sampling procedure, it can be overcome by dramatically increasing the sample size.

(E) When choosing a sample, sample size is more important than the fraction of the population that is surveyed.

15. In general, for a survey to yield usable results,

(A) sampling error must be avoided

(B) a sample size of at least $n = 30$ is necessary

(C) researchers must carefully choose people who they think are representative of the population

(D) researchers must be careful in the way questions are worded

(E) a census should be strived for as it is the only truly accurate methodology

16. A researcher planning a survey of high school mathematics teachers in Illinois has faculty lists for each of the 97 high school districts in the state. The procedure is to obtain a simple random sample of teachers from each of these districts rather than grouping all the districts together and obtaining a sample from the entire group. Which of the following is not a true statement about the resulting stratified sample?

(A) It is more susceptible to bias than a simple random sample.

(B) It is easier and more cost-effective than a simple random sample.

(C) It gives comparative information that a simple random sample wouldn't give.

(D) It recognizes that opinions of teachers in rural districts may differ from those in urban districts.

(E) All of the above are true statements.

17. A national magazine aimed at college students asks its subscribers if they would have chosen their current college if they had to make the choice over again. Of the 12,000 or so responses, 75 percent said no. What does this show?

(A) The survey is meaningless because of voluntary response bias.

(B) No meaningful conclusion is possible without knowing something more about the characteristics of the subscribers.

(C) The survey would have been more meaningful if it had picked a random sample of the 12,000 subscribers who responded.

(D) The survey would have been more meaningful if it had used a control group.

(E) This was a legitimate sample, randomly drawn from the subscribers and of sufficient size to allow the conclusion that most of the subscribers would have chosen a different college if they had to make the choice over again.

18. Internet surveys have been increasing dramatically. Which of the following is not true about such surveys?

(A) They allow for the use of multimedia elements not available to other survey modes.

(B) There is less response bias than associated with interviewer-administered modes.

(C) There is less nonresponse and undercoverage bias.

(D) They have a low cost compared with most other types of surveys.

(E) It is convenient for respondents to take the surveys at their own time and own pace.