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Identifying and reducing statistical bias

An architecture firm has been contracted to remodel a city's courthouse. The firm has a proposal and wants to gauge the opinion of the 575,000 people who live in the city on the design. The firm mails a survey to a random sample of 270 people who live in the city. The survey shows a picture of the firm's proposed design and asks this question.

Do you like or dislike our proposed design for remodeling the city's courthouse?

From the sample, the firm received 10 responses. Of the responses, 70% said they liked the design.

10 out of 575,000
Not enough

- (a) Identify and describe the most prominent source of bias in the firm's study. Choose the best answer from the choices below.
- ☒ The bias comes from having too many of the sampled people who live in the city not respond to the question. These people might answer the question differently than those who did.
 - ☐ The bias comes from the fact that the people who received the survey were not allowed to voluntarily choose to be in the sample. Volunteers are more likely to have characteristics that reflect the population as a whole.
 - ☐ The bias comes from the sampling done in the study. The firm only sampled from people who live in the city, so the sample is a sample of convenience.
 - ☐ The bias comes from the phrasing of the question and the context in which it is asked. The people who answered the survey are unlikely to truthfully respond to the question.
 - ☐ There is no or very little bias in the firm's study. The sample size is larger than 30, so it is large enough to eliminate any potential source of bias.
- (b) Describe something the firm could have done to reduce the most prominent source of bias in the study. Choose the best answer from the choices below.
- ☐ Put up billboards throughout the city letting the people there know that they can answer the question on the firm's website if they wish. This way the firm makes sure the people answering the question are volunteers.
 - ☐ Modify the study to also include people from several other countries across the globe in the sample. This way the sample is no longer a sample of convenience.
 - ☒ As a follow up, email the question to those who did not respond to the mailed survey. This way the number of people not answering the survey would be decreased.
 - ☐ Make sure that the people who were sent the survey could answer the question anonymously, and consider changing the phrasing of the question so that these people would be more likely to answer truthfully.
 - ☐ As the sample size is sufficiently large, the study has no or very little bias. So, there is nothing the company needed to have done to reduce bias.

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