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**Problem 1**

A study at UCLA investigated factors that might result in greater attention to the health and education of girls in rural India. One such factor is information about job opportunities for women. The idea is that if people know that educated women can get good jobs, they might take more care of the health and education of girls in their families, as an investment in the girls' future potential as earners. The study focused on 160 villages outside the capital of India, all with little access to information about call centers and similar organizations that offer job opportunities to women. In 80 of the villages chosen at random, recruiters visited the village, described the opportunities, recruited women who had some English language proficiency and experience with computers, and provided ongoing support free of charge for three years. In the other 80 villages, no recruiters visited and no other intervention was made. At the end of the study period, the researchers recorded data about the school attendance and health of the children in the villages.

- (a) Did this analysis have a treatment group and a control group? If so, describe the two groups.
- (b) Was this an observational study or a randomized controlled experiment?
- (c) The study reported (Jensen, Department of Public Policy at UCLA, 2010), "Girls aged 5-15 in villages that received the recruiting services were 3 to 5 percentage points more likely to be in school and experienced an increase in Body Mass Index, reflecting greater nutrition and/or medical care. However, there was no net gain in height. For boys, there was no change in any of these measures." Why do you think the author points out the lack of change in the boys?

**Answer:**

- (a) Yes. The treatment group comprises the 80 villages visited by recruiters. The control group is the remaining 80 villages.
- (b) Randomized controlled experiment, because the villages in the two groups were chosen at random.
- (c) The lack of change in the boys, along with the change in the girls, shows that the treatment had a particular effect on girls and not in general on all children. This is important because the aim of the study was to examine treatments that result in greater attention to the welfare of girls.

**Problem 2**

An ad for ADT Security Systems says, "When you go on vacation, burglars go to work ... According to FBI statistics, over 25% of home burglaries occur between Memorial Day and Labor Day." Do the data in the ad support the claim that burglars are more likely to go to work during the summer vacation period than at other times?

**Answer:** The duration "between Memorial Day and Labor Day" consists of June, July, and August. That's 25% of the year. So the data don't support the claim that burglars are more active in the summer vacation period. The ad does say "over 25% of home burglaries" but if the percent had been much higher than 25, the ad would have said so!

### Problem 3

The Reverend Henry Whitehead was skeptical of John Snow's conclusion about the Broad Street pump. After the Broad Street cholera epidemic ended, Whitehead set about trying to prove Snow wrong. He realized that Snow had focused his analysis almost entirely on those who had died. Whitehead, therefore, investigated the drinking habits of those who had survived. Why was it important to study this group? [Note: Far from disproving Snow's claim, Whitehead ended up finding further proof that the Broad Street pump played the central role in spreading the disease. Eventually, he became one of Snow's greatest defenders.]

**Answer:** If the survivors also drank out of the Broad Street pump, it would diminish the force of Snow's claim that the pump was spreading the disease.

### Problem 4

Myopia, or nearsightedness, results from a number of genetic and environmental factors. In 1999, Quinn et al studied the relation between myopia and ambient lighting at night (for example, from nightlights or room lights) during childhood.

- (a) The data were gathered by the following procedure, reported in the study. "Between January and June 1998, parents of children aged 2-16 years ... that were seen as outpatients in a university pediatric ophthalmology clinic completed a questionnaire on the child's light exposure both at present and before the age of 2 years." Was this study observational, or was it a controlled experiment?
- (b) The study found that of the children who slept with a room light on before the age of 2, 55% were myopic. Of the children who slept with a night light on before the age of 2, 34% were myopic. Of the children who slept in the dark before the age of 2, 10% were myopic. The study concluded that, "The prevalence of myopia ... during childhood was strongly associated with ambient light exposure during sleep at night in the first two years after birth." Do the data support this statement? You may interpret "strongly" in any reasonable qualitative way.
- (c) On May 13, 1999, CNN reported the results of this study under the headline, "Night light may lead to nearsightedness." Does the conclusion of the study claim that night light causes nearsightedness?
- (d) The final paragraph of the CNN report said that "several eye specialists" had pointed out that the study should have accounted for heredity. Myopia is passed down from parents to children. In what way do you think this fact might have affected the data?

**Answer:**

- (a) The study was observational. A controlled experiment would *assign* the treatment (that is, ambient lighting at night) to some children and not to others. This study merely recorded whether the treatment had happened.
- (b) Yes. The percents of myopic children in the three groups were 10%, 34%, and 55%. That's quite a varied set of percents, pointing to association.
- (c) No. The study was observational, and thus subject to confounding. The researchers were very clear ("strongly associated") that their conclusion was not causal.
- (d) Myopic parents are more likely to have trouble seeing in the dark, therefore more likely to leave lights on at night. They are also more likely to have myopic children because myopia is inherited. Thus the parents' eyesight might have been a confounding factor.