

# HW 01

Stat140-02

Due 10/28/2020

## Problem 1

The Buteyko method is a shallow breathing technique developed by Konstantin Buteyko, a Russian doctor, in 1952. Anecdotal evidence suggests that the Buteyko method can reduce asthma symptoms and improve quality of life. In a scientific study to determine the effectiveness of this method, researchers recruited 600 asthma patients aged 18-69 who relied on medication for asthma treatment. These patients were randomly split into two research groups: one practiced the Buteyko method and the other did not. Patients were scored on quality of life, activity, asthma symptoms, and medication reduction on a scale from 0 to 10. On average, the participants in the Buteyko group experienced a significant reduction in asthma symptoms and an improvement in quality of life.

Identify population of interest and samples, name the variables, specify for each variable whether its use indicates that it should be treated as categorical or quantitative, and for any quantitative variable.

An example answer (one a different description) is here:

The magazine is interested in the performance of tablets currently offered for sale. It tested a sample of 46 tablets, which are the “Who” for these data. Each tablet selected represents all similar tablets offered by that manufacturer. The variables used in this study are

- manufacturer (categorical)
- battery life (quantitative)
- performance score (quantitative)
- memory card reader (categorical)

## Problem 2

COVID-19 has become an ongoing global pandemic. Infections can cause mild to extremely severe respiratory illness. Read the following news from NIH (National Institutes of Health):

Early results show benefit of remdesivir for COVID-19

Identify the W's in this news.

- What is the research question?
- What is the population of interest?
- What are the observational units/samples?
- Name all the variables
- Specify for each variable whether its use indicates that it should be treated as categorical or quantitative.

### **Problem 3**

Consider transactions at the on-campus snack bar to be the observational units in a statistical study. State a research question that involves a categorical variable and a numerical variable for these observational units. Also clearly identify and classify the two variables.

Write in complete sentences. An example answer is here:

Do people who pay with cash take longer to serve, on average, compared to people who pay with a card? The variables to help answer the question is: one, whether the customer pays with cash or card, which is categorical; two, how long the transaction takes to complete, which is quantitative.

### **Problem 4**

Create your own example of Simpson's paradox. For example, we have two softball players (call them Amy and Barb), where Amy has a higher proportion of successes (hits) than Barb in June and also in July, but Barb has a higher proportion of hits than Amy when June and July are combined. This sounds weird, perhaps impossible, but it could happen. Think of how this example could be analogous to the admissions example we worked in class on Friday.