

Question 1: Blood Pressure

Blood pressure is the pressure that the blood exerts against the walls of the arteries. When physicians or nurses measure your blood pressure, they take two readings. The systolic blood pressure is the pressure when the heart is contracting and therefore pumping. The diastolic blood pressure is the pressure in the arteries when the heart is relaxing. The diastolic blood pressure is always the lower of the two readings. Blood pressure varies from one person to another. It will also vary for a single individual from day to day and even within a given day.

If your blood pressure is too high, it can lead to a stroke or a heart attack. If it is too low, blood will not get to your hands and feet, and you may feel dizzy. Low blood pressure is usually not serious.

So, what should your blood pressure be? A systolic blood pressure of 120 would be considered normal. One of 150 would be high. But since blood pressure varies with gender and increases with age, a better gauge of the relative standing of your blood pressure would be obtained by comparing it with the population of blood pressures of all persons of your gender and age in the United States. Of course, we cannot supply you with that data set, but we can show you a very large sample selected from it. The blood pressure data on 1,910 persons, 965 men and 945 women between the ages of 15 and 20, are provided in **Blood Pressure.xlsx**. The data are part of a health survey conducted by the National Institutes of Health (NIH). Entries for each person include that person's age and systolic and diastolic blood pressures at the time the blood pressure was recorded. Use a statistical package to answer the following questions.

1. What are the variables that have been measured in this survey? Are the variables quantitative or qualitative? Discrete or continuous? Are the data univariate, bivariate, or multivariate?
2. What types of graphs can be used to describe this data set? What types of questions could be answered using different types of graphs?
3. Construct a relative frequency histogram of the systolic blood pressure data for the 965 men and another for the 945 women. Compare the two histograms.
4. Consider the 965 men and 945 women as the entire population of interest. Choose a sample of $n=50$ men and $n=50$ women, recording their systolic blood pressures and their ages. Draw two relative frequency histograms to graphically display the systolic blood pressures for your two samples. Do the shapes of the histograms resemble the population histograms from part 3?

Question 2: Batting

Which baseball league has had the best hitters? Many of us have heard of baseball greats like Stan Musial, Hank Aaron, Roberto Clemente, and Pete Rose of the National League and Ty Cobb, Babe Ruth, Ted Williams, Rod Carew, and Wade Boggs of the American League. But have you ever heard of Willie Keeler, who batted .432 for the Baltimore Orioles, or Nap Lajoie, who batted .422 for the Philadelphia A's? The batting averages for the batting champions of the National and American Leagues are provided in **Batting.xlsx**.

The batting averages for the National League begin in 1876 with Roscoe Barnes, whose batting average was .403 when he played with the Chicago Cubs. The last entry for the National League is for the year 2017, when Charlie Blackmon of the Colorado Rockies averaged .331. The American League records begin in 1901 with Nap Lajoie of the Philadelphia A's, who batted .426 and end in 2017 with Jose Altuve of the Houston Astros who batted .346. How can we summarize the information in this data set?

1. Use MS Excel to describe the batting averages for the American and National League batting champions. Generate any graphics that may help you in interpreting these data sets.
2. Does one league appear to have a higher percentage of hits than the other? Do the batting averages of one league appear to be more variable than the other?
3. Are there any outliers in either league?
4. Summarize your comparison of the two baseball leagues.

Question 3: Washing Machines

Does the price of an appliance convey something about its quality? Washers are classified as top-load high efficiency (HE), top-load agitator, and front-load washers. The best front-loaders clean better and are gentler than the best HE top-loading washing machines while using less water. Front-loaders take longer than HE top-loaders but spin faster, extracting more water, and reducing dryer time. Fifty-four different front-loading washers were ranked on characteristics ranging from an overall satisfaction score, washing performance (x1) , energy efficiency (x2) , water efficiency (x3) , gentleness (x4) , noise (x5) , vibration (x6) , capacity (x7) , and cycle time (x8) . Variables x1 through x6 are converted scores for pictograms where =5 (excellent), =4 (very good), =3 (good), =2 (fair) and =1 (poor). Use MS Excel to explore the relationships between various pairs of variables in **Washing Machines.xlsx**.

1. Look at the variables Price, Score, and Cycle Time individually. What can you say about symmetry? About outliers?
2. Look at all the variables in pairs. Which pairs are positively correlated? Negatively correlated? Are there any pairs that exhibit little or no correlation? Are some of these results counterintuitive?
3. Does the price of an appliance, specifically a washing machine, convey something about its quality? Which variables did you use in arriving at your answer?