Percent Difference and Percent Change

When looking at a table or a graph, it is useful to understand the meaning between changes in different data points. For instance, if you are looking at a table or graph that is broken up into time periods, and there is an increase or decrease over time, how do you describe that change? There are two methods and both of them can be useful when trying to describe trend data.

First, understanding the difference between the two is very important. Let's say that a small auto dealership sells on average 2 cars per day. One day the dealership sells 6 cars. This is an increase of 4 cars, or 200%. The larger dealership across the street sells on average 10 cars per day and sold 14 cars that same day. Here the larger dealership had the same increase in cars sold as the small dealership but it only increased its car sales by 40%. So even though the larger dealership sold more in total it didn't increase its sales by more than the small dealership.

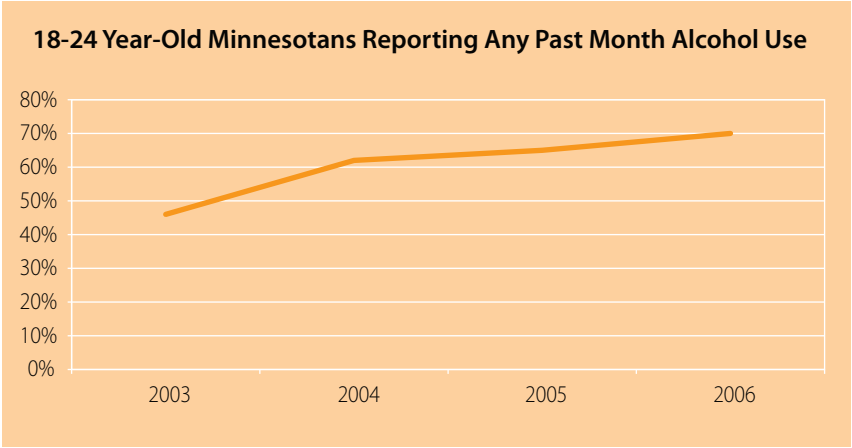
Percent Difference

One method for presenting data is percent difference. This is a basic subtraction of one data point from another. By taking the two points and subtracting the old point from the new, you find the difference between them. If the data points are decreasing, the calculation will produce a negative number. When interpreting the change, all that is needed is the absolute value of the difference. An absolute value is found by simply removing the minus sign and turning the negative number into a positive number. Here are two examples that illustrate this.

If in 2003 the number of adults in Minnesota, ages 18 thru 24 who reported using alcohol within the past 30 days was 46.1% and in 2006 it was reported that 70.1% of those same aged adults in Minnesota used.

$70.1 - 46.1 = 24.0$

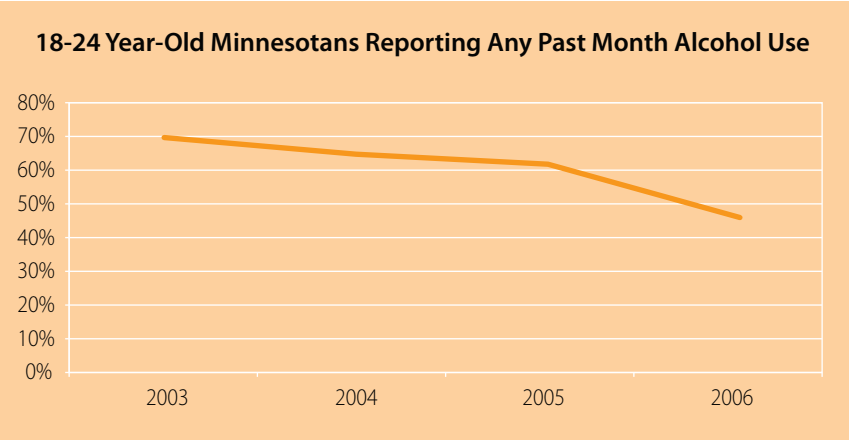
The percent difference is 24.0%. This is to say that *between the years 2003-2006, the percent of adults in Minnesota, ages 18 thru 24 who reported using alcohol within the past 30 days had increased by 24.0 percentage points.*



Conversely, if in 2003 70.1% of adults aged 18 thru 24 reported using alcohol within the past 30 days and in 2006 the percent was 46.1%. There was still a percent difference of 24.0%.

$46.1 - 70.1 = |-24.0|$
$= 24.0$

Again, this is to say that between the years 2003-2006, the percent of adults in Minnesota, ages 18 thru 24 who reported using alcohol within the past 30 days had decreased by 24.0%.



Percentage Change

Another way to describe changes in data points over time is to calculate a percentage change. This is similar to the percent difference however it is used to describe that change as a percent of the old value.

Using the previous example, in the year 2003, 70.1% of adults reported using alcohol within the past 30 days. And in 2006 it was reported that the same indicator, adults reported using alcohol within the past 30 days, had decreased to 46.1%. It would be easy to misconstrue this information by saying that there is a 24.0% decrease in adults using alcohol within the past 30 days.

To find out exactly what the percentage change is, take the amount of change (in this case, 24.0%) and divide it by the initial value (70.1%), then multiply by 100:

Change in percentage = 24.0 ÷ 70.1

= 24.0/70.1 x 100 = 34.2%

This indicates that there was a 34.2% decrease in alcohol use over those 4 years. A way to interpret or state this is, *there was a 34.2% decrease in the* ***number*** *of adults who used alcohol within the past 30 days over the 4 year period.*

The same approach is used when calculating increases in percentage. If in 2003, 46.1% of adults reporting using alcohol within the past 30 days, and in 2006 use had increased to 70.1%.

Again, take the percent amount of change and divide it by the initial percent then multiply by 100.

Change in percentage = 24.0 ÷ 46.1

= 24.0/46.1 x 100 = 52.1%

This indicates that there was a 52.1% increase in alcohol use over those 4 years. Again a way to interpret or state this is, *there was a 52.1% increase in the* **number** *of adults who used alcohol within the past 30 days over the 4 year period.*

The percent change can also quantify how much one group differs from another group relative to that other group. In 2002, 31.4% of surveyed males reported past-30-day binge-drinking compared to only 11.4% of females. Thus, in 2002 male binge drinking was { [(31.4 - 11.4) / 11.4] (100)] = 175.44 = } about 175% higher than female binge drinking. Female binge drinking was { [(11.4 - 31.4) / 31.4] (100) = - 63.69 = } about 64% lower than male binge drinking.

Both methods to evaluate changes in data over time are very helpful. But you have to be careful which one that you use. As seen in the car sales example you can easily overstate what happened within the certain time period. This gives you a picture of when to use which method. Usually you are going to be working with larger datasets and quantities, so it is more important to use the percentage change method because as you can see the percentage change method gives a more precise description as to how the data has changed over a period of time. When working with smaller datasets and sample sizes the percent difference method makes more sense.

Percent change and percent difference can also be presented collectively. Going back to the car sales example if you said that we sold 4 more cars than usual today, for an increase of 40%, which was a good day. But if you were the other dealership and sold 4 more than usual and increased sales for that day by 200%, this was a great day. By using both, you can really get a more detailed description and a better sense of which method to use.