# Research Methods 8RM - Graphs and Charts

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**Note to the Instructor:** This is the eighth in a series of 13 exercises that were written for an introductory research methods class.  The first exercise focuses on the research design which is your plan of action that explains how you will try to answer your research questions.  Exercises two through four focus on sampling, measurement, and data collection.  The fifth exercise discusses hypotheses and hypothesis testing.  The last eight exercises focus on data analysis.  In these exercises we’re going to analyze data from one of the [Monitoring the Future Surveys](http://monitoringthefuture.org/) (i.e., the 2015 survey of high school seniors in the United States).  This data set is part of the collection at the Inter-university Consortium for Political and Social Research at the University of Michigan.  This data set is freely available to the public and you do not have to be a member of the Consortium to use it.  We’re going to use SDA (Survey Documentation and Analysis) to analyze the data which is an online statistical package written by the Survey Methods Program at UC Berkeley and is available without cost wherever one has an internet connection.  A weight variable is automatically applied to the data set so it better represents the population from which the sample was selected.  You have permission to use this exercise and to revise it to fit your needs.  Please send a copy of any revision to the author so I can see how people are using the exercises. Included with this exercise (as separate files) are more detailed notes to the instructors and the exercise itself.  Please contact the author for additional information.

[This page](http://ssric.org/files/Research_Methods_8RM.docx) in MS Word (.docx) format is attached.

## ****Goals of Exercise****

The goal of this exercise is to explore graphs and charts for frequency distributions. The exercise also gives you practice in using FREQUENCIES in SDA.

### ****Part I – Pie Charts****

Data analysis always starts with describing variables one-at-a-time.  Sometimes this is referred to as univariate (one-variable) analysis.  Graphs and charts are useful tools for displaying visually what the distribution of responses to a question look like.

A pie chart is a chart that shows the frequencies or percents of a variable with a small number of categories.  It is presented as a circle divided into a series of slices.  The area of each slice is proportional to the number of cases or the percent of cases in each category.  It is normally used with nominal or ordinal variables (see exercise [6RM](http://ssric.org/node/628)).

We’re going to use the Monitoring the Future (MTF) Survey of high school seniors for this exercise.  The MTF survey is a multistage cluster sample of all high school seniors in the United States.  The survey of seniors started in 1975 and has been done annually ever since. To access the MTF 2015 survey follow the instructions in the Appendix.   Your screen should look like Figure 8-1.  Notice that a weight variable has already been entered in the WEIGHT box.  This will weight the data so the sample better represents the population from which the sample was selected


Figure 8-1

MTF is an example of a social survey.  The investigators selected a sample from the population of all high school seniors in the United States.  This particular survey was conducted in 2015 and is a relatively large sample of a little less than 14,000 seniors.  In a survey we ask respondents questions and use their answers as data for our analysis.  The answers to these questions are used as measures of various concepts.  In the language of survey research these measures are typically referred to as variables.  Often we want to describe respondents in terms of characteristics such as the region of the country in which the respondent’s school is located (variable name is v13), respondent’s sex (v2150), father’s education (v2163), and mother’s education (v2164).  These are all variables in the 2015 MTF survey.

Run FREQUENCIES in SDA for the variables v13, v2150, v2163, and v2164. To run the frequency distributions, enter the variable names in the ROW box.  Your screen should like Figure 8-2. Separate the variable names by either a space or a comma.  Notice that the WEIGHT box is filled in.


Figure 8-2

Once you have selected the variables, click on the down arrow next to TYPE OF CHART and select PIE CHART.  Click also on the box to SHOW PERCENTS so SDA will print the percents on the pie chart.  If you want, you can check the box for SUPRESS TABLE which is under TABLE OPTIONS so SDA will not print out the frequency distribution.  Now click on RUN THE TABLE at the bottom.  SDA will draw the pie chart for each of these variables.  Write a sentence or two for each variable describing the distributions based on these pie charts.

### ****Part II – Bar Charts****

A bar chart is a chart that shows the frequencies or percents of a variable and is presented as a series of vertical bars.  The height of each bar is proportional to the number of cases or the percent of cases in each category.  It is normally used with nominal or ordinal variables (see exercise 6RM).

Run FREQUENCIES for the same variables that you used in part 1 (v13, v2150, v2163, and v2164).  This time click on the down arrow next to TYPE OF CHART and select BAR CHART.  Click also on the box to SHOW PERCENTS so SDA will print the percents on the bar chart.  Now click on RUN THE TABLE to produce the bar charts.  Write a sentence or two for each variable describing the distributions based on the bar charts.

### ****Part III – Stacked Bar Charts****

SDA will also produce what it calls a stacked bar chart.  To get a stacked bar chart, click on the down arrow next to TYPE OF CHART and select STACKED BAR CHART.  Now click on RUN THE TABLE to get the stacked bar charts for the variables in parts 1 and 2.  Write a short paragraph describing the stacked bar chart and how it is different from a bar chart.  Which do you prefer – bar charts or stacked bar charts?  Why?

### ****Part IV – Line Charts****

The last type of chart that SDA will produce is called a LINE CHART.  To get a line chart, click on the down arrow next to TYPE OF CHART and select LINE CHART.  Now click on RUN THE TABLE to get the line charts for the variables in parts 1, 2, and 3.  Write a short paragraph describing the line chart and how it is different from the other types of charts.  Do you think a line chart is clearer than or not as clear as the other types of charts?  Why?

### ****Part V – Conclusions****

We have talked about four different types of graphs – pie charts, bar charts, stacked bar charts, and line charts.  Are there limitations on when you should use a particular type of chart?  Why?