

# **Using Excel to Create Graphs**

Final Project for PRVM 881 Performance Improvement in Public Health

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Suzette Brotton Laura Weir-Barton Ruth Wetta-Hall Ashley Moss

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#### Introduction

Effective Performance Improvement (PI) is a data driven process. The use of data enables informed, evidence based decision making. The application of data provides means for initial analysis of how a process is currently performing, assists teams in priority setting, identifying gaps, developing measurable goals and assessing the impact of interventions designed to improve processes and outcomes.

Accurately constructed graphs are important to the PI process because they provide a visual means for rapid, easy synthesis of potentially large complex quantities of data. Quantitative information is communicated in a qualitative manner through the use of graphs (Curran, 1999). This is particularly important for team members who may be less skilled in the analysis of text data, tables or other more intricate formats. Trends, comparisons and patterns from large data sets are readily apparent in well organized, formatted graphs. However, graphs that are unclear, ambiguous or unnecessarily cluttered can make interpretation difficult and may misrepresent the data. All graphs must be constructed to present a clear, undistorted, efficient view of the true picture. To accomplish the graphic display must include clear labeling, scales and data elements (Klass, 2006).

#### Labeling

- 1. Avoid all capital, script, cursive or novelty font formats (Curran, 1999).
- 2. Minimize all text that does not contribute to clarification of what the data means.
- 3. The title should be a clear and concise description of what the data represents.
- 4. Avoid repetition in the axis labels. If an axis clearly represents the year or "percentage" has been used in the title, it is unnecessary to label the axis. Is an axis label is needed, further define the measure that was used, i.e. percentage, # per 1000 births.
- 5. Use a legend in all charts that contain more than one data series. The ideal placement for a legend is at the bottom of the graph to maximize the space used for the graphic elements (Klass, 2006).

#### Scales

- 1. The scales (either axis) identify the measure of the data.
- 2. Use regular intervals for scales.
- 3. Display time scales left to right on the x-axis

#### Data elements

- 1. If used, gridlines should be light enough to not distract from the main elements.
- 2. Use most of the ink in the display for the graph elements.
- 3. Avoid the use of three dimensional effects, they distort the data and make interpretation difficult.
- 4. If a bar chart is to contain more than 8-10 elements use horizontal bars versus vertical bars (Klass, 2006).
- 5. Use a different line style or color to clearly differentiate the different data series in a line graph.
- When using color to represent different data elements there are colors that are not usually confused unless the reader is color blind. These are: black, gray, red, green, yellow, blue, pink, brown, orange and purple (Curran, 1999).

In order to choose the correct type of chart, it's necessary to understand the type of data element that you are analyzing. There are four types of data: categorical, ordinal, interval and ratio.

	Туре	Definition	Example	Appropriate chart
	Categorical	data that can be separated into mutually exclusive groups (meaning that an observation in one category cannot also fall into another category)	<ul> <li>gender (male/female)</li> <li>racial origin (Asian, Black, Native American, White)</li> <li>insurance type (private insurance, Medicare, Medicaid, Champus, self- insured, uninsured)</li> </ul>	Bar chart Pie chart Pareto chart Control chart
Discrete	Ordinal	A type of data containing limited categories with a ranking from the lowest to the highest, e.g. mild, moderate, severe. The distance between mild and moderate is not necessarily the same distance as between moderate to severe.	<ul> <li>Severity of disease (mild, moderate, severe)</li> <li>Military rank (private, sergeant, lieutenant, captain, general)</li> <li>Likert scales (1 = strongly disagree, 2 = disagree, 3 = neutral, 4= agree, 5 = strongly agree)</li> </ul>	Radar Chart Bar chart

### Getting Started

Excel provides a set of data analysis tools, the Analysis ToolPak, which can help to save steps for some statistical analyses. Activating this option may streamline some of your statistical analyses. All steps are shown with Excel 2007.

## Activating the Excel Analysis ToolPak Add-in

- 1. Click on the Microsoft icon in the upper left hand corner of the screen.
- 2. Click on Excel Options at the bottom of the drop down box.

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- 3. Click on Add Ins.
- 4. Click OK.

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- 5. If the ToolPak has not been activated it will be in the list of Inactive Application Add-ins.
- 6. Click on Analysis ToolPak.
- 7. Click Go.

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- 8. Check the Analysis ToolPak.
- 9. Click OK.



## **Formatting a Chart**

Formatting a chart can be completed in several ways. When the chart is selected, the Format, Layout, and Design tabs will appear. Quick changes can be completed through these tabs, such as color schemes, adding chart titles, axis labels, and legends.



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Current Selection

Formatting can also be completed by selecting an area of the chart and right clicking. Once you right click, select Format Data Series.



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	Vary colors by point	

From this option, you can choose various colors for specific sections (under the Fill Option), or change border styles (under Border Options). Be sure to choose colors that reflect your project. The colors should coordinate where appropriate. 

Pie Chart	
Usage	A pie chart is used to describe proportions. Pie charts work best when
	sections represent at least 25% of the data.
Data Types	Categorical Data
Interpretation	Read each section as a portion of the whole. Ex. White people make up
	88.5% of the people in Kansas.
Creation in	You will put your categories of information in one column and percentages
Excel	in the column next to it. Make sure percentages are calculated before
	starting the pie chart.

1.	Format data so	that categories are in C	Column A and	percentages a	re in Column B.
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2. Select all data that you want included in the chart.

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3. On the ribbon, select the insert tab.

#### 4. Select the pie graph and select the type of pie chart you choose.

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5. Click the type of pie chart you want. The chart will be automatically inserted into the sheet.



6. To add titles and labels, select the Layout Tab while the chart is selected. Titles, data labels, and legends can be added from that tab. For more on Formatting the chart, refer to the section on Formatting.

Histogra	am								
Usage	To his vis his ex his 41	examine the variability of the observed variable (aka stogram will visually display the (1) spread and shape sually display the count (frequency) of those values w stogram may be helpful as the initial step in analysis ample, if you are interested in understand the range stogram will "count" the number of persons whose ag -60 and > 60 years	a central tender e of a group of v vithin user defin of a problem or of age within a le falls between	ncy), a values and (2) ed ranges. A process. For population, a 0-18, 19-40,					
Data Types	<ul> <li>Single variable, continuous numerical data. Examples: age, height, weight,</li> <li>temperature.</li> </ul>								
Creatio n in Excel	<ol> <li>Format the data so that the numerical values populate a column. A minimum of 50 data points are recommended for the construction of a histogram (Tague, 2004).</li> <li>Sorting the data may be helpful when determining the range of the values and trying to determine groupings, but is not required. The Excel Help menu can be used if needed for sorting.</li> </ol>								
	3.	Determine the range limits for the groupings of interest. The number of groups is partially determined by the number of data points in the set. Additional considerations may include the	Number of data points	Number of groups					
		goal of the analysis and the intended audience.	< 00 50 100	5-7 6 10					
		Too many or too few groups may preclude reliable analysis. The number and ranges can be mathematically derived or by using general	100-250	5-8					
		guidelines (Brassard & Ritter, 2007):	>250	6-11					
	4. 5.	The group ranges are plotted on the x- axis and the The following example uses the Analysis ToolPak A 2003, 2007 and 2010. This Add-In is included in the to be activated (as described on page 7).	e frequency on t Add-In for Micro e Excel program	he y- axis. soft Excel n, but needs					
Interpre tation	1.	A normal distribution results in a bell shaped curve, approximately centered and as many data points of the other.	with a single p n one side of th	eak e center as					
	2.	Distributions that are skewed (more data points are ranges) may be due to natural limitations in a proce weight in a population. Skewing may also be the re well controlled.	present in lowe ess. Example: ir esult of a proces	er or higher hfant birth ss that is not					
	3. 4.	A histogram that is wide (has more spread) indicat The presence of more than one peak is indicative of sources of information. Example: a process that of shifts with two different results (Tague, 2004).	es variability in if two separate ccurs on two dif	the process. processes or ferent work					
	5.	The mean is an appropriate measure of center for r median may be more appropriate for skewed distrib	normal distributi outions.	ons. The					



#### Creating the histogram

- 1. The values are sorted in this example. Excel will count the number of values that belong in each group and use that information as the source for the graph.
- 2. Enter the desired group/bin limits in rows. Enter only the upper limits for each group in this step. Group limits should be entered in continuous rank order.
- 3. To create the chart:
  - a. Click Data Analysis
  - b. Click on Histogram
  - c. Click OK.

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4. A dialogue box will appear allowing the selection of the data to be included in the graph using the mouse, or the keyboard. The use of the mouse for this purpose is the method

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used in the next several examples. Click the button to the right of the Input Range and a second dialogue box will appear.

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5. Using the mouse highlight the range of data to be counted into groups.

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- 6. Press Enter after all of the applicable values have been selected. You will be returned to the histogram dialogue box.
- 7. To identify the range of values for the groups (bins) click on the arrow to the right of the Bin Range.

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8. Using the mouse select the range of values to be used as groups.

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- 9. Press enter when the appropriate range of values has been selected. You will again be returned to the Histogram dialogue box.
- 10. There are three options for placement of the resulting data and chart; (1) within the original Work Sheet, (2) in a separate Work Sheet within the existing Work Book (a new tab at the bottom of the Work Book), or (3) in a new Work Book (file). For this example

the chart will be placed in a new Work Sheet within the existing Work Book. Select where the chart will be placed by clicking the applicable button.

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11. Click OK. The resulting data will be displayed and the histogram created.

# Formatting the histogram

- 1. Changes can be made to the chart by clicking on the chart and selecting a specific element within the chart. Histograms do not have spaces between the bars, so the resulting bars representing the data within the groups will have to be formatted.
- 2. Click in the chart, then specifically on the bars. Markers will appear that designate the bars (data series) as the element to be formatted.



3. Right click on "Format Data Series"

- 4. In the Format Data Series dialogue box highlight Series Options.
- 5. Move the Gap Width slider as far left as it will go toward "No Gap". The bar color has been removed for visibility in this example. Other aspects of the data series, such as color, can be easily customized using the options found in the Format Data Series dialogue box.



- 6. To facilitate visibility and differentiate the data in each range a border has been placed around each bar.
- 7. In the Format Data Series dialogue box select Border Color on the left.

8. Then select Solid Line and a Border Color. A color should be selected that will be visible against the bar color. For the purpose of this example black was selected.



- 9. Exit the dialogue box by clicking on Close.
- 10. The chart title and axis labels are easily edited by clicking on that component of the chart and typing in the desired information.



11. The ranges for the axis labels are easily edited by typing in the cells that contain that information. The chart will be updated automatically.



Bar Chart	
Usage	Bar charts provide a visual image for comparison of values among groups or categories of data.
Data Types	Any discrete attribute or variable data Examples: race, gender, marital status, department, work shift, year
Creation in Excel	<ol> <li>One or more groups of data may be represented. Identify the groups of interest.</li> </ol>
	2. The bars may be vertical or horizontal.
	3. Groups or categories are represented along one axis. The other axis is scaled as a reference point for the numerical values represented by the height or length of the bars.
	4. Enter the data to be used for the chart as displayed in the example below.
	5. Sort the data by the variable of interest. In this example the rate of black infants born of low birth weight is the variable to be highlighted.
Interpretation	Focus on the tallest and shortest bars, the size of each bar within a group, as well as the change in size of the bars over time. The birth certificate data used in the following example highlights the substantially higher rate of low birth weight infants born to Blacks as compared to other races. Additionally, it is apparent that there was little change from 2004 to 2008.

# Creating the bar chart

- 1. Highlight the data and captions for the desired chart.
- 2. Click on the "Insert" tab in the ribbon.
- 3. Click the "Column" chart in the chart types and select the desired chart type from the drop down box.



4. The chart will automatically be placed in the existing worksheet. If the columns and rows include headers and that information was included when the data for the chart was highlighted the axis intervals will be appropriately labeled automatically.



5. The chart title, axis labels and legend are added and edited by highlighting the chart and selecting the desired component from the "Layout" tab in "Chart Tools". In this example a horizontal axis label is omitted because the category labels are self explanatory.



6. Similarly, a chart title is added by selecting "Chart Title" and the desired location in the Layout tab of Chart Tools. Type the desired title.



 The legend that is generated when the chart is created is automatically placed to the right of the plot area. The preferred placement is within or below the plot area (Klass, 2006). To move it select the Legend option and the desired placement from the drop down box.



8. A text box can be added to identify the source of the data used for the chart. Select Text Box from the Layout tab in Chart Tools. The required information can be typed in to the text box.



9. At any time the chart can be moved to a separate worksheet within the workbook by clicking on the chart and selecting the Design tab in Chart Tools, then selecting Move Chart. A dialogue box will appear allowing the user to select a different worksheet within the workbook as the location for the chart.



Pareto Char	t
Usage	The Pareto chart is used to identify areas which are causing the largest
	problems. The idea of the Pareto Chart stems from the Pareto Principle, where
	80% of the trouble comes from 20% of the problems. The Pareto Chart helps
	to identify how many issues can be addressed with limited resources.
Data Types	Categorical data which is able to be quantified.
Interpretation	The chart not only shows the areas of largest problem, but also shows the how
	much of the total those problems represent. In the case below, "Uncomfortable
	Beds", "Nothing on Television", and "Bad Food" are the categories in which
	80% of our problems are stemming from. It would be wise for the organization
	to focus on those three areas, as they will give the most return.

1. Arrange categorical data in order of largest to smallest. To do this, highlight both the categories and numbers. Then, click the Sort & Filter button.

L	· ,		
	А	В	
1	Bad Lighting	30	
2	Uncomfortable beds	68	
3	Bad Food	35	
4	Unfriendly staff	10	
5	Nothing on television	44	
6			

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K	L	M		N	-

2. Once you click the Sort &Filter button, select the "Custom Sort" option.

		_ = ×
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Cells	A↓ Z↓	Sort A to Z Sort Z to A
L	<b>₩</b>	Custom Sort
Display enables column sorts, a	s the Sort s sorting b s or rows, nd other s	dialog box which y multiple case-sensitive ort options.

3. Sort by the column you have your numbers in. In this case, we chose column B to sort by, as our numbers are in Column B. Under the Order section, choose Largest to Smallest. Select Okay.

Sort		? 🔀
Q <sub>A</sub> I <u>A</u> dd Level X <u>D</u> elete Level	Copy Level	My data has <u>h</u> eaders
Column	Sort On	Order
Sort by Column B	Values 🗸	Largest to Smallest 🗸 🗸
		3
		OK Cancel

4. Under the numbers column, total the figures. Be sure you have selected the cell under column you want totaled. Select the auto sum button.

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1 Uncomfo	rtable beds	68										1	
Nothing	on television	44											
Bad Food	1	35		/									
4 Bad Light	ing	30		/									
Unfriend	ly staff	10	/									102	
-	(Treation)		K										

 In column C, the percentages need to be calculated. You do this by dividing the category count by the total and multiplying by 100. In this case, your figures should match what is below. (68/187) \*100 = 36.36364

<u> </u>	*											
	А	В	С	3								
1	Uncomfortable beds	68	36.36364									
2	Nothing on television	44	23.52941									
3	Bad Food	35	18.71658									
4	Bad Lighting	30	16.04278									
5	Unfriendly staff	10	5.347594									
6		187										
7												

- 6. Once the percentages have been calculated, in column C, the percentages need to be added together in the following format:
  - C1 = D1 D2=D1+C2 D3=D2+C3 D4=D3+C4 D5=D4+C5

Continue this format until you have added all the categories. Your totals should reflect what is shown below.

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D6 + (* , , , , , , , , , , , , , , , , , ,										*			
	A	B	c	D	E.	33	F G	н	1	1	<b>K</b> :	M J	N
1	Uncomfortable beds	68	36.36364	36.36									1
2	Nothing on television	44	23.52941	59.89									
3	Bad Food	35	18.71658	78.61									
4	Bad Lighting	30	16.04278	94.65									
5	Unfriendly staff	10	5.347594	100.00									
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7. Format your numbers to round to 2 decimal points. Do this by highlighting the data, right click and select Format Data.



8. Select number category and set the decimal places to 2. Select okay.


9. Highlight columns A, C, and D. Select the Insert Tab on the Ribbon.

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1	Uncomfortab	le beds		68 36.36364		36.3	6
2	Nothing on te	3	44 23.5		59.8	9	
3	Bad Food	8	35 18.71658		78.6	1	
4	Bad Lighting		30	16.04278	94.63	5	
5	Unfriendly st	aff	, î	10	5.347594	100.00	8

10. From the Line Graphs, select the Lines with Markers chart.



11. The chart will be inserted in the worksheet. Right click on the red line. Select Format Data Series.



12. Under Series Options, select secondary axis. Hit close.

Format Data Series		? 🗙
Series Options Marker Options Marker Fill Line Color Line Style Marker Line Color Marker Line Style Shadow 3-D Format	Series Options Plot Series On Pirimary Axis Secondary Axis	12
		Close

13. Once the right axis is added, right click on it and select Format Axis.



14. Change the Fixed Maximum Amount to 100.00. Select close.

Format Axis		? 🔀
Axis Options	Axis Options	
Number	Minimum: <u>Auto</u> <u>Fixed</u> 0.0	14
Fill	Maximum: O Auto O Fixed 100.0	
Line Color	Major unit: ( Auto ) Fixed 20.0	
Line Style	Minor unit:      Auto      Fixed     4.0	
	Values in reverse order	

15. Select the blue line. With the blue line selected, click the Insert Tab in the Ribbon.



16. Select the Column Chart, and select the Clustered Column option. This will change the line to bars.



17. Once selected your chart will reflect what is below.



18. Select the legend and hit delete. This will remove the legend from the graph. Under the layout tab, chart titles and axis labels can be modified/added.



19. To customize the chart, refer to the formatting section.

Γ

Run Cha	art
Usage	Monitoring trends and/or changes in processes or events over time. Run charts are not very helpful for detecting special cause, but general rules regarding observation of data points for trends or shifts in the process may indicate further investigation is needed. A run chart is the precursor of a statistical process control chart.
Types	practice surveillance data is an example of events that are measured over time.
Creation in Excel	<ol> <li>A minimum of 20-25 data points is recommended for the construction of a run chart (Brassard &amp; Ritter, 2007).</li> </ol>
	2. Determine a meaningful time interval for the data of interest. This may be days, weeks, months, etc. The time sequence is plotted as a consistent interval on the x-axis.
	3. The measurement data is plotted in reference to the y-axis.
	4. The central measure, which serves as a reference point, for a run chart is the median
	5. The data elements should populate columns, with the appropriate header at the top.
	6. The chart in this example uses percentages, the number of events that occurred each month (numerator) divided by the sample size (denominator) each month multiplied by 100.
Interpre- tation	<ol> <li>When trending data over time it is extremely important that the data source, definitions used for the measure or sample size (denominator if calculating a proportion or rate), time interval, etc. remain the same. Any change in the data source, collection or analysis methods will render comparisons invalid.</li> </ol>
	<ol> <li>Interpretation of the chart should be done by someone with underlying knowledge of the process.</li> </ol>
	3. General rules that may indicate a need for further investigation of the process include:
	a. 9 consecutive values above or below the center line
	b. 6 consecutive increases or decreases
	<ul> <li>c. 14 consecutive points alternately decreasing and increasing (Brassard &amp; Ritter, 2007)</li> </ul>
	25
	0

# Performing the calculations and populating the cells needed for the chart.

1. Column D must be populated with the percentage rate. The easiest way to do this is to highlight the cell where the value is to be placed and type the formula using the column/cell where the values are found.

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4	12	361	03/09				
5	14	371	04/09				
6	13	366	05/09				
7	13	362	06/09				
8	12	369	07/09				
9	14	374	08/09				
10	11	365	09/09				
11	10	364	10/09				
12	11	359	11/09				
13	14	360	12/09				
14	12	372	01/10				
15	10	351	02/10				
16	13	357	03/10				
17	11	371	04/10				
10	10	255	05/10				

- 2. To calculate the values for the remaining months and populate the corresponding cells, place the cursor on the bottom lower right corner of the cell and a + will appear. Click the left mouse button. Holding the left mouse button down, highlight the remainder of the column where the values are to be placed.
- 3. The cells will be populated with a formula that applies to that specific row of values.

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$D2 \rightarrow f_x = A2/B2$				<i>f</i> <sub>*</sub> =A2/B2*100		D2 - f* =A2/B2*100						
	А	В	c	D E	-	А	В	С	D	E		
1	#events	Sample	Month	%	1	#events	Sample	Month	%			
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3	11	367	02/09	~	3	11	367	02/09	3.00			
4	12	361	03/09		r	12	361	03/09	3.32			
5	14	371	04/09		2	14	371	04/09	3.77			
6	13	366	05/09		6	13	366	05/09	3.55			
7	13	362	06/09		7	13	362	06/09	3.59			
8	12	369	07/09		8	12	369	07/09	3.25			
9	14	374	08/09		9	14	374	08/09	3.74			
10	11	365	09/09		10	11	365	09/09	3.01			
11	10	364	10/09		11	10	364	10/09	2.75			
12	11	359	11/09		12	11	359	11/09	3.06			
13	14	360	12/09		13	14	360	12/09	3.89			
14	12	372	01/10		14	12	372	01/10	3.23			
15	10	351	02/10		15	10	351	02/10	2.85			
16	13	357	03/10		16	13	357	03/10	3.64			
17	11	371	04/10		17	11	371	04/10	2.96			
18	12	355	05/10		18	12	355	05/10	3.38			
19	12	371	06/10		19	12	371	06/10	3.23			
20	10	357	07/10		20	10	357	07/10	2.80			
21	11	366	08/10		21	11	366	08/10	3.01			
22	14	372	09/10		22	14	372	09/10	3.76			
23	13	366	10/10		23	13	366	10/10	3.55			
24	11	364	11/10		24	11	364	11/10	3.02			
25	14	361	12/10		25	14	361	12/10	3.88			

- 4. The median value for the center line can be obtained using the statistical functions in Excel.
  - a. Place the curser in the cell where you want the value placed
  - b. Click on More Functions in the Formulas tab.
  - c. Highlight Statistical, scroll to Median and left click the mouse.

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5. A dialogue box will appear asking for the range of values that will be used to obtain the median. In the box titled Number 1 type D2:D25.

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12	11	359	11/09	3.06	1	Returns th	ne median, or	the num	ber in the r	niddle of th	ne set o	f given num	bers.			
13	14	360	12/09	3.89	11			N	umber1:	number 1,r	number	2, are 1 t	o 255 number	s or names, a	rrays, or refe	erences
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- 6. Click OK.
- 7. Alternatively, click on the arrow to the right of the box titled Number 1.
- When a new dialogue box appears (below), click the arrow on the right.
   Highlight the range of cells that contain the values to be used.
- 10. Press Enter. You will be returned to the previous dialogue box (above).
- 11. Click OK.

Function Arguments	8

- 12. There are various methods to provide the data that tells the program to chart the mean line. The simplest is to populate the values in a column that will provide the value for a data series. To populate the cells that provide the data right click the mouse in the cell that contains the median value.
  - 19 Graphs Usi Home Data Insert Page Layout Formulas Review View Developer 201 Σ ? θ 4 Tx A fr. Insert AutoSum Recently Financial Logical Text Date & Lookup & Math More Name B20 Function Used Time \* Reference \* & Trig \* Functions Manager ction Library Defin =MEDIAN(D2: Calibri 12 E2 \* - 11 · A A \$ • % , 3 C A B E B I ≣ ⊡ - 🏷 - A - 👯 👯 🔤 1 #events Sample Month % Median 2 01/09 3.71 13 350 3.2 Cut 13 \* 3 367 02/09 11 3.00 1 Copy 4 12 361 03/09 3.32 2 Paste 5 04/09 14 371 3.77 Paste Special... 6 13 366 05/09 3.55 7 06/09 13 362 3.59 Insert... 8 07/09 12 369 3.25 Delete ... 14 9 374 08/09 3.74 Clear Contents 10 11 365 09/09 3.01 Filter ۶ 11 10 364 10/09 2.75 Sort ۶ 12 11 359 11/09 3.06 Insert Comment 14 12/09 13 14 360 3.89 Format Cells... 14 2 12 372 01/10 3.23 15 10 02/10 Pick From Drop-down List... 351 2.85 16 03/10 13 357 3.64 Name a Range ... 17 11 371 04/10 2.96 Hyperlink... 2 18 12 355 05/10 3.38 19 12 06/10 371 3.23 20 10 357 07/10 2.80
- 13. Click Copy.

14. Place the cursor in the next cell down, cell E3.

15. Right click the mouse and left click on Paste Special.

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19	12	371	06/10	3.23	1	340	Lupen	in feast	-		
20	10	357	07/10	2.80							
21	11	366	08/10	3.01							
22	14	372	09/10	3.76							

16. Click Paste Link in the dialogue box that appears. This tells the program to populate cell E3 with the absolute value of cell E2.

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17. Fill the remainder of the cells in column E by placing the cursor on the lower right corner of cell E3, right click, hold, drag and highlight the cells to be filled.

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3	11	367	02/09	3.00	3.29		
4	12	361	03/09	3.32	3.29	2	
5	14	371	04/09	3.77	3.29	2	_
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7	13	362	06/09	3.59	3.29		
8	12	369	07/09	3.25	3.29		
9	14	374	08/09	3.74	3.29		
10	11	365	09/09	3.01	3.29		
11	10	364	10/09	2.75	3.29		
12	11	359	11/09	3.06	3.29		
13	14	360	12/09	3.89	3.29		
14	12	372	01/10	3.23	3.29		
15	10	351	02/10	2.85	3.29		
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19	12	371	06/10	3.23	3.29		
20	10	357	07/10	2.80	3.29		
21	11	366	08/10	3.01	3.29		
22	14	372	09/10	3.76	3.29		
23	13	366	10/10	3.55	3.29		
24	11	364	11/10	3.02	3.29		
25	14	361	12/10	3.88	3.29		
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### Creating and formatting the chart

- 1. A run chart is called a line graph in Excel. To create the chart:
  - a. Click on the Insert tab.
  - b. Highlight the data and headers that will be used to create the chart.
  - c. Click on the Line chart and highlight the desired type of chart. For this example a line chart without data markers is used as the foundation to build the chart.

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13	14	360	12/09	3.89	3.2	9			
14	12	372	01/10	3.23	3.2	9			
15	10	351	02/10	2.85	3.2	9			
16	13	357	03/10	3.64	3.2	9			
17	11	371	04/10	2.96	3.2	9			
18	12	355	05/10	3.38	3.2	9			
19	12	371	06/10	3.23	3.2	9			
20	10	357	07/10	2.80	3.2	9			
21	11	366	08/10	3.01	3.2	9			
22	14	372	09/10	3.76	3.2	9			
23	13	366	10/10	3.55	3.2	9			
24	11	364	11/10	3.02	3.2	9			
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- 2. The chart will automatically be placed in the existing worksheet.
- 3. For the sake of visibility, it may be helpful to add markers at each data point. To do this:

- a. Click on the data series. Markers will appear indicating the data series has been selected.
- b. Right click the mouse
- c. Highlight and left click on Format Data Series. A new dialogue box will appear.

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4. Select Marker Options on the left of the dialogue box that appears.

5. Select the desired marker using the radio buttons in the right side of the Format Data Series box.

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- 6. Format the chart axis, labels and legend using the Chart Tools, Layout tab options.
- 7. Add an explanatory title to the chart.

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Control Cha	urt (
Usage	A control chart builds on the run chart by adding upper and lower control limits based on statistical methods. The premise of the control chart is that the application of these methods provides guidance as to the probable cause of
	variation in the process being monitored. The underlying assumption is that almost all of the variation that occurs in a process is random, or expected, and that special cause variation is powerful, but occurs very rarely. However, the
	observation that a process is in statistical control does not mean that there is not opportunity for improvement.
Data Types	Attribute and variable. There are several different types of control charts. Selection of the appropriate chart is dependent on the type of data, sample and sample size. The calculation of control limits are specific to the type of chart used (Brassard & Ritter, 2007).
Creation in	1. The calculation of control limits should be undertaken only when a
Excel	process is believed to have been in control, i.e. no trends, unusual runs or evident issues. A minimum of 25 data points are recommended for
	the calculation of control limits. Control limits should not be recalculated
	unless there is a process change.
	2. The industrial standard for control limits is 3 standard deviations (0) above and below the mean. The use of $3\sigma$ for control limits provides a
	99.7% probability that measures within the control limits are the result
	of expected variation in a process (Hansen, 2005). There is some
	debate about the use of $3\sigma$ for healthcare because of the complex nature of human nathology and the potential seriousness of waiting too
	long to investigate the root cause of an out of control signal (Sellick,
	1993). The use of $2\sigma$ results in 95.4% probability that variation within
	the limits is random. However, there is a slight decrease in specificity,
	2003) For the purpose of this example, both 2g and 3g control limits
	are created.
	3. While it is tempting to use the Excel Standard Deviation function to
	calculate the standard deviation for all of the monthly percentage
	methods (Bennevan, 1998). For this example the standard formula is
	used to calculate control limits.
	4. The example below creates a p-chart based on the data provided for
	the creation of the run chart example above.
	ease of creation in Excel.
Interpretation	The occurrence of measurements that signal the need for further investigation
	include:
	<ol> <li>Any single measurement outside the 3σ upper or lower control limit.</li> <li>Fight consecutive measurements above or below the center line.</li> </ol>
	3. Three consecutive measurements in the range between $2\sigma$ and $3\sigma$ .
	4. Five consecutive measurements in the range between $1\sigma$ and $2\sigma$ .
	5. Patterns, runs or trends as discussed in the Run Chart example.

# Selecting the appropriate chart (Brassard & Ritter, 2007)





#### Calculating the values and populating the cells for the chart.

- 1. The p chart uses the mean for the center line and to calculate control limits.
- 2. The AutoSum function is used here to obtain the total number of events for the entire monitoring period and the total sample size. These values are used to calculate the mean.
  - a. Highlight the cell below the values to be summed.
  - b. Click the AutoSum function in the Formulas tab and press enter.
  - c. The result will be placed in the highlighted cell.
  - d. Complete this action for both the events and the samples.
- 3. To calculate the mean:
  - e. Highlight the cell where the value is to be placed.
  - f. In the formula bar type = a27/b27.
  - g. Press enter.

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4	12	361	03/09	3.32	
5	14	371	04/09	3.77	
6	13	366	05/09	3.55	
7	13	362	06/09	3.59	
8	12	369	07/09	3.25	
9	14	374	08/09	3.74	
10	11	365	09/09	3.01	
11	10	364	10/09	2.75	
12	11	359	11/09	3.06	
13	14	360	12/09	3.89	
14	12	372	01/10	3.23	
15	10	351	02/10	2.85	
16	13	357	03/10	3.64	
17	11	371	04/10	2.96	
18	12	355	05/10	3.38	
19	12	371	06/10	3.23	
20	10	357	07/10	2.80	
21	11	366	08/10	3.01	
22	14	372	09/10	3.76	
23	13	366	10/10	3.55	
24	11	364	11/10	3.02	
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6	13	366	05/09	3.55	
7	13	362	06/09	3.59	
8	12	369	07/09	3.25	
9	14	374	08/09	3.74	
10	11	365	09/09	3.01	
11	10	364	10/09	2.75	
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- 4. The value for the mean must now be placed in the column that the program will use to chart the line.
  - a. Highlight the mean value (cell B28).
  - b. Right click the mouse and click Copy in the drop down box that appears.
  - c. Click in the cell at the top of the column that will provide the data for the mean line.
  - d. Right click, highlight Paste Special and left click.
  - e. Place the cursor in the  $f_x$  bar to the right of the 8 and type \*100. This multiplies the absolute value of B28 by 100, changing the decimal to a percentage.
  - f. T fill the remaining cells in column E left click the lower right corner of cell E2, hold the mouse button down, drag and highlight.

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9	14	374	08/09	3.7433			9	14	374	08/09	3,7433	3.33	
10	11	365	09/09	3.0137			10	11	365	09/09	3.0137	3.33	
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13	14	360	12/09	3.8889			13	14	360	12/09	3.8889	3.33	
14	12	372	01/10	3.2258			14	12	372	01/10	3.2258	3.33	<b>1</b>
15	10	351	02/10	2.8490			15	10	351	02/10	2.8490	3.33	1
16	13	357	03/10	3.6415			16	13	357	03/10	3.6415	3.33	
17	11	371	04/10	2.9650			17	11	371	04/10	2.9650	3.33	
18	12	355	05/10	3.3803			18	12	355	05/10	3.3803	3.33	
19	12	371	06/10	3.2345			19	12	371	06/10	3.2345	3.33	
20	10	357	07/10	2.8011			20	10	357	07/10	2.8011	3.33	
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- 5. Now calculate the average sample size using AVERAGE in Statistical Functions.
  - a. Highlight the cell where placement of the value is desired.
  - b. Click on More Functions in the Formula bar.
  - c. Click Statistical.
  - d. Move the cursor down until AVERAGE is highlighted in the drop down box.
  - e. Click on AVERAGE.
  - f. Type B2:B25 in the Number 1 box in the dialogue box that appears.
  - g. Click on OK when done.

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	Contraction of the second s		-									

- 6. The resulting average monthly sample size will populate the cell that was highlighted.
- 7. The cell location for all calculations is a matter of user preference. For this example, column A below the Mean and Average sample size are used to identify the upper and lower control limits and the calculation is performed in the adjacent cell, column B.
- 8. The formula for calculation of p-chart control limits is: p-bar is the grand mean, the total number of defects or events divided by the total number in the sample, n-bar is the average monthly sample size
  - he  $\bar{p} \pm 3\sqrt{\frac{\bar{p}(1-\bar{p})}{\bar{n}}}$
- 9. To perform the calculation, place the cursor in the desired cell for the value and left click.
- 10. Using the mouse place the cursor in the formula bar  $(f_x)$
- 11. Type the formula using the values and the square root function. In Excel language, the formula will read: =0.0333+3\*SQRT(0.0333\*(1-0.0333)/364)
- 12. After the formula has been typed in the formula bar, press enter.

B30     fx     =0.0333+3*SQRT(0.0333*(1-0.0333)/       A     B     C     D     E       1     # events     Sample     Month     %     Mean     UCL     L       2     13     350     01/09     3.7143     3.33     I       3     11     367     02/09     2.9973     3.33     I       4     12     361     03/09     3.3241     3.33       5     14     371     04/09     3.7736     3.33	364) <del>C</del>
A         B         C         D         E         F           1         # events         Sample         Month         %         Mean         UCL         L           2         13         350         01/09         3.7143         3.33         I           3         11         367         02/09         2.9973         3.33         I           4         12         361         03/09         3.3241         3.33         I           5         14         371         04/09         3.7736         3.33         I	G CL
1         # events         Sample         Month         %         Mean         UCL         L           2         13         350         01/09         3.7143         3.33         4           3         11         367         02/09         2.9973         3.33         4           4         12         361         03/09         3.3241         3.33         4           5         14         371         04/09         3.7736         3.33         4	CL
2       13       350       01/09       3.7143       3.33         3       11       367       02/09       2.9973       3.33         4       12       361       03/09       3.3241       3.33         5       14       371       04/09       3.7736       3.33	
3         11         367         02/09         2.9973         3.33           4         12         361         03/09         3.3241         3.33           5         14         371         04/09         3.7736         3.33	
4         12         361         03/09         3.3241         3.33           5         14         371         04/09         3.7736         3.33	
5 14 371 04/09 3.7736 3.33	
b 13 366 05/09 3.5519 3.33	
7 13 362 06/09 3.5912 3.33	
8 12 369 07/09 3.2520 3.33	
9 14 374 08/09 3.7433 3.33	
10 11 365 09/09 3.0137 3.33	
11 10 364 10/09 2.7473 3.33	
12 11 359 11/09 3.0641 3.33	
13         14         360         12/09         3.8889         3.33	
14         12         372         01/10         3.2258         3.33	
15 10 351 02/10 2.8490 3.33	
<b>16</b> 13 357 03/10 3.6415 3.33	
17 11 371 04/10 2.9650 3.33	
18         12         355         05/10         3.3803         3.33	
19         12         371         06/10         3.2345         3.33	
20 10 357 07/10 2.8011 3.33	
21 11 366 08/10 3.0055 3.33	
22 14 372 09/10 3.7634 3.33	
23 13 366 10/10 3.5519 3.33	
24 9 11 364 11/10 3.0220 3.33	
25 14 361 12/10 3.8781 3.33	
26	
27 291 8731	
28 Mean 0.0333	
29 Average sample size 364	
30 UCL 0.061512	
31 LCL 0.005088	

- 13. Populate the first cell in the column used by the chart to plot the control limit line using the Copy, Paste Special, Past Link sequence and multipy by 100 to obtain the percentage value for the 3σ upper control limit. Fill the cells below it by placing the cursor on the lower right corner of that cell and dragging down.
- 14. Repeat steps 9-11 for each control limit. The formula can be copied and pasted into the remaining control limit cells and edited as appropriate for each calculation. To perform the lower control limit calculation simply replace the + with a to subtract 3σ from the mean.
- 15. To calculate the  $2\sigma$  limits replace the 3 with 2.

fx         X         X         X         X         X         X         X         X         X         X         X         X         X         X         Y	e	Hom	e Insert	Page L	ayout I	Formulas	Data	Review	View	/ De	eveloper
Jisett Function         AutoSum Recently Financial Logical Used*         Text Date & Lookup & Math Time* Reference* & Trip* Functions         Name Manage           F2         -         =\$B\$30*100           A         B         C         D         E         F         G         H         I         J           1         #events         Sample         Month         %         Mean         UCL 3c         LCL 3c         UCL 2c         LCL 2c           2         13         350         01/09         3.7143         3.33         6.15         0.51         5.21         1.45           3         11         367         02/09         2.9973         3.33         6.15         0.51         5.21         1.45           4         12         361         03/09         3.2519         3.33         6.15         0.51         5.21         1.45           6         13         366         05/09         3.5519         3.33         6.15         0.51         5.21         1.45           9         14         374         08/09         3.7433         3.33         6.15         0.51         5.21         1.45           10         1364         10/09         2.7473		f	5 🖄								A
AutoSum Recently Financial Logical Text         Date & Lookup & Math         More Name         Name           Function         Used         *         Time * Reference * & Trige * Rutions *         Name           Function         Used         *         *         Time * Reference * & Trige * Rutions *         Name           F2         *         =         Seg30*100         Sec         H         I         J           # events         Sample         Month         %         Mean         UCL 30         LCL 30         UCL 20         LCL 20           2         13         350         01/09         3.7143         3.33         6.15         0.51         5.21         1.45           3         11         367         02/09         2.9973         3.33         6.15         0.51         5.21         1.45           4         12         361         03/09         3.3241         3.33         6.15         0.51         5.21         1.45           5         14         371         04/09         3.7736         3.33         6.15         0.51         5.21         1.45           8         12         369         07/09         3.2520         3.33         6.15         0.51 <td>e</td> <td>Jx .</td> <td>Ζ 🕑</td> <td></td> <td></td> <td></td> <td></td> <td>H</td> <td></td> <td></td> <td></td>	e	Jx .	Ζ 🕑					H			
F2         Seg30*100           I         # events         Sample         Month         %         Mean         UCL 30         LCL 30         UCL 20         LCL 30           2         13         350         01/09         3.7143         3.33         6.15         0.51         5.21         1.45           3         11         367         02/09         2.9973         3.33         6.15         0.51         5.21         1.45           4         12         361         03/09         3.3241         3.33         6.15         0.51         5.21         1.45           5         14         371         04/09         3.7736         3.33         6.15         0.51         5.21         1.45           6         13         366         05/09         3.5912         3.33         6.15         0.51         5.21         1.45           8         12         369         07/09         3.2520         3.33         6.15         0.51         5.21         1.45           10         11         365         09/09         3.0137         3.33         6.15         0.51         5.21         1.45           12         11	Ir Fui	nsert Aut	toSum Recen • Used	tly Financia	I Logical	Text Date &	Lookup Referenc	& Mat e∗&Trig	h Mo g≖Functi	ore ions *	Name Manage
F2         -					Function	Library					
A         B         C         D         E         F         G         H         I         J           1         #events         Sample         Month         %         Mean         UCL 30         UCL 30         UCL 20         LCL 20           2         13         350         01/09         3.7143         3.33         6.15         0.51         5.21         1.45           3         11         367         02/09         2.9973         3.33         6.15         0.51         5.21         1.45           4         12         361         03/09         3.3241         3.33         6.15         0.51         5.21         1.45           5         14         371         04/09         3.7736         3.33         6.15         0.51         5.21         1.45           6         13         362         06/09         3.5519         3.33         6.15         0.51         5.21         1.45           9         14         374         08/09         3.7433         3.33         6.15         0.51         5.21         1.45           11         10         364         10/09         2.7473         3.33         6.15 <td< td=""><td></td><td>F2</td><td>•</td><td>• (•</td><td>je =\$E</td><td>B\$30*100</td><td></td><td></td><td></td><td></td><td></td></td<>		F2	•	• (•	je =\$E	B\$30*100					
1       #events       Sample       Month       %       Mean       UCL 30       LCL 30       UCL 20       LCL 20         2       13       350       01/09       3.7143       3.33       6.15       0.51       5.21       1.45         3       11       367       02/09       2.9973       3.33       6.15       0.51       5.21       1.45         4       12       361       03/09       3.3241       3.33       6.15       0.51       5.21       1.45         5       14       371       04/09       3.7736       3.33       6.15       0.51       5.21       1.45         6       13       362       06/09       3.5912       3.33       6.15       0.51       5.21       1.45         7       13       362       06/09       3.7433       3.33       6.15       0.51       5.21       1.45         9       14       374       08/09       3.7433       3.33       6.15       0.51       5.21       1.45         10       136       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         11       14       360       10/09       2		А	В	С	D	E	F	G	н	1	J
2       13       350       01/09       3.7143       3.33       6.15       0.51       5.21       1.45         3       11       367       02/09       2.9973       3.33       6.15       0.51       5.21       1.45         4       12       361       03/09       3.3241       3.33       6.15       0.51       5.21       1.45         5       14       371       04/09       3.7736       3.33       6.15       0.51       5.21       1.45         6       13       366       05/09       3.519       3.33       6.15       0.51       5.21       1.45         7       13       362       06/09       3.5912       3.33       6.15       0.51       5.21       1.45         8       12       369       07/09       3.2520       3.33       6.15       0.51       5.21       1.45         10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         11       10       364       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         12       11       350       11/09	1	# events	Sample	Month	%	Mean	UCL 3σ	LCL 3σ	UCL 2σ	LCL 2σ	
3       11       367       02/09       2.9973       3.33       6.15       0.51       5.21       1.45         4       12       361       03/09       3.3241       3.33       6.15       0.51       5.21       1.45         5       14       371       04/09       3.7736       3.33       6.15       0.51       5.21       1.45         6       13       366       05/09       3.5519       3.33       6.15       0.51       5.21       1.45         7       13       362       06/09       3.5512       3.33       6.15       0.51       5.21       1.45         8       12       369       07/09       3.2520       3.33       6.15       0.51       5.21       1.45         9       14       374       08/09       3.7433       3.33       6.15       0.51       5.21       1.45         10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         11       10       364       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         12       11       350       02/10	2	13	350	01/09	3.714	3.33	6.15	0.51	5.21	1.45	
4       12       361       03/09       3.3241       3.33       6.15       0.51       5.21       1.45         5       14       371       04/09       3.7736       3.33       6.15       0.51       5.21       1.45         6       13       366       05/09       3.5519       3.33       6.15       0.51       5.21       1.45         7       13       362       06/09       3.5912       3.33       6.15       0.51       5.21       1.45         8       12       369       07/09       3.2520       3.33       6.15       0.51       5.21       1.45         9       14       374       08/09       3.7433       3.33       6.15       0.51       5.21       1.45         10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         11       10       364       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09	3	11	367	02/09	2.997	3 3.33	6.15	0.51	5.21	1.45	
5       14       371       04/09       3.7736       3.33       6.15       0.51       5.21       1.45         6       13       366       05/09       3.5519       3.33       6.15       0.51       5.21       1.45         7       13       362       06/09       3.5912       3.33       6.15       0.51       5.21       1.45         8       12       369       07/09       3.2520       3.33       6.15       0.51       5.21       1.45         9       14       374       08/09       3.7433       3.33       6.15       0.51       5.21       1.45         10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         11       10       364       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.8889       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10	4	12	361	03/09	3.324	1 3.33	6.15	0.51	5.21	1.45	
6       13       366       05/09       3.5519       3.33       6.15       0.51       5.21       1.45         7       13       362       06/09       3.5912       3.33       6.15       0.51       5.21       1.45         8       12       369       07/09       3.2520       3.33       6.15       0.51       5.21       1.45         9       14       374       08/09       3.7433       3.33       6.15       0.51       5.21       1.45         10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         11       10       364       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.8889       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10	5	14	371	04/09	3.773	3.33	6.15	0.51	5.21	1.45	
7       13       362       06/09       3.5912       3.33       6.15       0.51       5.21       1.45         8       12       369       07/09       3.2520       3.33       6.15       0.51       5.21       1.45         9       14       374       08/09       3.7433       3.33       6.15       0.51       5.21       1.45         10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         11       10       364       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.8889       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10	6	13	366	05/09	3.551	.9 3.33	6.15	0.51	5.21	1.45	
8         12         369         07/09         3.2520         3.33         6.15         0.51         5.21         1.45           9         14         374         08/09         3.7433         3.33         6.15         0.51         5.21         1.45           10         11         365         09/09         3.0137         3.33         6.15         0.51         5.21         1.45           11         10         364         10/09         2.7473         3.33         6.15         0.51         5.21         1.45           12         11         359         11/09         3.0641         3.33         6.15         0.51         5.21         1.45           13         14         360         12/09         3.8889         3.33         6.15         0.51         5.21         1.45           14         12         372         01/10         3.258         3.33         6.15         0.51         5.21         1.45           15         10         351         02/10         2.8490         3.33         6.15         0.51         5.21         1.45           16         13         357         03/10         3.6415         3.33	7	13	362	06/09	3.591	.2 3.33	6.15	0.51	5.21	1.45	
9       14       374       08/09       3.7433       3.33       6.15       0.51       5.21       1.45         10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         11       10       364       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.8889       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       357       07/10 <td>8</td> <td>12</td> <td>369</td> <td>07/09</td> <td>3.252</td> <td>3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	8	12	369	07/09	3.252	3.33	6.15	0.51	5.21	1.45	
10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         11       10       364       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.8889       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10 </td <td>9</td> <td>14</td> <td>374</td> <td>08/09</td> <td>3.743</td> <td>3 3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	9	14	374	08/09	3.743	3 3.33	6.15	0.51	5.21	1.45	
11       10       364       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.8889       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10 </td <td>10</td> <td>11</td> <td>365</td> <td>09/09</td> <td>3.013</td> <td>3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	10	11	365	09/09	3.013	3.33	6.15	0.51	5.21	1.45	
11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.8889       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.05	11	10	364	10/09	2.747	3 3.33	6.15	0.51	5.21	1.45	
13       14       360       12/09       3.8889       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10 </td <td>12</td> <td>11</td> <td>359</td> <td>11/09</td> <td>3.064</td> <td>1 3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	12	11	359	11/09	3.064	1 3.33	6.15	0.51	5.21	1.45	
14       12       372       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10 </td <td>13</td> <td>14</td> <td>360</td> <td>12/09</td> <td>3.888</td> <td>3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td><math>\sim</math></td>	13	14	360	12/09	3.888	3.33	6.15	0.51	5.21	1.45	$\sim$
15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10 </td <td>14</td> <td>12</td> <td>372</td> <td>01/10</td> <td>3.225</td> <td>3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	14	12	372	01/10	3.225	3.33	6.15	0.51	5.21	1.45	
16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10 </td <td>15</td> <td>10</td> <td>351</td> <td>02/10</td> <td>2.849</td> <td>3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	15	10	351	02/10	2.849	3.33	6.15	0.51	5.21	1.45	
17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26       1       461       12/10 <td>16</td> <td>13</td> <td>357</td> <td>03/10</td> <td>3.641</td> <td>.5 3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	16	13	357	03/10	3.641	.5 3.33	6.15	0.51	5.21	1.45	
18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26       1       145       1.45       1.45       1.45       1.45	17	11	371	04/10	2.965	3.33	6.15	0.51	5.21	1.45	
19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45	18	12	355	05/10	3.380	3.33	6.15	0.51	5.21	1.45	
20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26       14       11/10       3.0220       3.33       6.15       0.51       5.21       1.45	19	12	371	06/10	3.234	.5 3.33	6.15	0.51	5.21	1.45	
21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26       1       1       1       1       1       1<1	20	10	357	07/10	2.801	1 3.33	6.15	0.51	5.21	1.45	
22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26	21	11	366	08/10	3.005	5 3.33	6.15	0.51	5.21	1.45	
23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26       14       11/10       1.47       1.45       1.45       1.45	22	14	372	09/10	3.763	3.33	6.15	0.51	5.21	1.45	
24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26       14       11/10	23	13	366	10/10	3.551	.9 3.33	6.15	0.51	5.21	1.45	
25         14         361         12/10         3.8781         3.33         6.15         0.51         5.21         1.45           26	24	11	364	11/10	3.022	3.33	6.15	0.51	5.21	1.45	
25	25	14	361	12/10	3.878	3.33	6.15	0.51	5.21	1.45	
	26			_							
27 291 8731	27	291	8731								
28 Mean 0.0333	28	Mean	0.0333								
Average		Average									
sample		sample									
29 size 364	29	size	364								
30 UCL 3σ 0.061512	30	UCL 3σ	0.061512								
31 LCL 3σ 0.005088	31	LCL 3σ	0.005088								
32 UCL 2σ 0.052108	32	UCL 2σ	0.052108								
33 LCL 23σ 0.014492	33	LCL 23σ	0.014492								

## Creating and formatting the chart

- 1. To create the chart:
  - a. Click on the Insert tab.
  - b. Highlight the data and headers that will be used to create the chart.
  - c. Click on the Line chart and highlight the desired type of chart.

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A         B         C         D         E         B         Area         State         Other         Other           1         Fevents         Sample         Month         Month         Mean         Image: Classical state         Image: Clasie	-	Hine	Insert	Page Lay	out For	mulas l	Data Ri	eview View	v Develo	per Ai	dd ins
Table         At         At         And         And <th>Ph</th> <th>17</th> <th>Picture</th> <th></th> <th>1</th> <th>Column</th> <th>1</th> <th>Dia Rat</th> <th>Area Sratte</th> <th>Other</th> <th></th>	Ph	17	Picture		1	Column	1	Dia Rat	Area Sratte	Other	
Table         Rustration         Cl         Month         A         8         C         D         E         I <thi< th=""> <thi< th=""></thi<></thi<>		*	ne	Art	*	-	*	* *	* *	Charts *	Jpc
C1         Month         Month         Month         Month         Month         Mean         LCL 20         LLCL 20           1         #events         Sample         Month         %         Mean         3.33         LCL 20         1         LCL 20 <th></th> <th>Table</th> <th></th> <th>Illustrati</th> <th>ninc</th> <th></th> <th>20100</th> <th></th> <th></th> <th>15</th> <th>Lin</th>		Table		Illustrati	ninc		20100			15	Lin
A         B         C         D         E           1         #events         Sample         Month %         Mean         LCL 20         2         1.4         5         1.4         3.7143         3.33         JLCL 20         2         1.45         2         2		C1		0	f= Mont	h	1 mil	E	-1		
1       # events       Sample       Month       %       Mean         2       13       350       01/09       3.7143       3.33       3.33       11       1.45       1       1.45         3       11       367       02/09       2.9973       3.33       3       30       1.45       1       1.45         4       12       361       03/09       3.3241       3.33       30       1.66       1       1.45         5       14       371       04/09       3.7736       3.33       21       1.45         7       13       362       06/09       3.5912       3.33       6.15       0.51       5.21       1.45         9       14       374       08/09       3.7433       3.33       6.15       0.51       5.21       1.45         10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.889       3.33       6.15       0.51       5.21 <th></th> <th>A</th> <th>8</th> <th>С</th> <th>D</th> <th>ε</th> <th></th> <th>12V</th> <th><math>\sim</math></th> <th>1</th> <th>J</th>		A	8	С	D	ε		12V	$\sim$	1	J
2       13       350       01/09       3.7143       3.33       01/09       3.241       3.33         4       12       361       03/09       3.241       3.33       30       100       21       1.45         5       14       371       04/09       3.7736       3.33       21       1.45         6       13       360       05/09       3.5519       3.33       21       1.45         7       13       362       06/09       3.5912       3.33       01.02       21       1.45         8       12       369       07/09       3.2520       3.33       01.02       02.12       02.1       1.45         10       11       365       06/09       3.0137       3.33       6.15       0.51       5.21       1.45         11       10       364       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.6415       0.51       5.21       1.45         13       14       360       12/09       3.888       3.33       6.15       0.51       5.21       1.45         14       1	1	#events	Sample	Month	%	Mean			LC	1.2σ	1
3       11       367       02/09       2.9973       3.33       21       1.45         4       12       361       03/09       3.3241       3.33       3.06       21       1.45         5       14       371       04/09       3.7736       3.33       3.33       21       1.45         6       13       366       05/09       3.5912       3.33       3.33       21       1.45         7       13       362       06/09       3.5912       3.33       3.33       21       1.45         9       14       374       08/09       3.7433       3.33       6.15       0.51       5.21       1.45         10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         12       11       359       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.889       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.249       3.33       6.15       0.51       5.21       1.45	2	13	350	01/09	3.7143	3.33	1 mil	Dav I	21	1.45	
4       12       361       03/09       3.3241       3.33       30 Line       21       1.45         5       14       371       04/09       3.7736       3.33       30 Line       21       1.45         6       13       366       05/09       3.5519       3.33       30 Line       21       1.45         7       13       362       06/09       3.5912       3.33       30 Line       21       1.45         8       12       369       07/09       3.2520       3.33       30 Line       21       1.45         9       14       374       08/09       3.7433       3.33       6.15       0.51       5.21       1.45         10       11       355       09/09       3.041       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.2248       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21 </td <td>3</td> <td>11</td> <td>367</td> <td>02/09</td> <td>2.9973</td> <td>3.33</td> <td>12</td> <td><math> \Sigma  _{\mathcal{L}}</math></td> <td>21</td> <td>1.45</td> <td></td>	3	11	367	02/09	2.9973	3.33	12	$ \Sigma  _{\mathcal{L}}$	21	1.45	
5       14       371       04/09       3.7736       3.33       21       1.45         6       13       366       05/09       3.5519       3.33       21       1.45         7       13       362       06/09       3.5912       3.33       31       21       1.45         8       12       369       07/09       3.2520       3.33       31       31       21       1.45         9       14       374       08/09       3.7433       3.33       6.15       0.51       5.21       1.45         10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.8889       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.2288       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.4	4	12	361	03/09	3.3241	3.33	3.D Line		21	1.45	
6       13       366       05/09       3.5519       3.33       21       1.45         7       13       362       06/09       3.5912       3.33       21       1.45         8       12       369       07/09       3.2520       3.33       0.10       0.15       0.21       1.45         9       14       374       08/09       3.7433       3.33       0.15       0.51       5.21       1.45         10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.041       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.889       3.33       6.15       0.51       5.21       1.45         14       12       377       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51	5	14	371	04/09	3.7736	3.33	5 0 cmc		21	1.45	
7       13       362       06/09       3.5912       3.33       21       1.45         8       12       369       07/09       3.2520       3.33       a) (Inter Types	6	13	366	05/09	3.5519	3.33	1		21	1.45	
8       12       369       07/09       3.2520       3.33       All Chart Types       21       1.45         9       14       374       08/09       3.7433       3.33       0.15       0.51       5.21       1.45         10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         11       10       364       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.8889       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.615       0.51       5.21       1.45         16       13       357       07/10       2.8011       3.33	7	13	362	06/09	3.5912	3.33	1 V		21	1.45	
9         14         374         08/09         3.7433         3.33         6.13         0.51         5.21         1.45           10         11         365         09/09         3.0137         3.33         6.15         0.51         5.21         1.45           11         10         364         10/09         2.7473         3.33         6.15         0.51         5.21         1.45           12         11         359         11/09         3.6841         3.33         6.15         0.51         5.21         1.45           13         14         360         12/09         3.8889         3.33         6.15         0.51         5.21         1.45           14         12         372         01/10         3.2258         3.33         6.15         0.51         5.21         1.45           15         10         351         02/10         2.8490         3.33         6.15         0.51         5.21         1.45           16         13         357         03/10         3.6415         3.33         6.15         0.51         5.21         1.45           18         12         355         05/10         3.333         6.15 <td< td=""><td>8</td><td>12</td><td>369</td><td>07/09</td><td>3.2520</td><td>3.33</td><td>ab and</td><td>hart Tunes</td><td>21</td><td>1.45</td><td></td></td<>	8	12	369	07/09	3.2520	3.33	ab and	hart Tunes	21	1.45	
10       11       365       09/09       3.0137       3.33       6.15       0.51       5.21       1.45         11       10       364       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.8889       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10 </td <td>9</td> <td>14</td> <td>374</td> <td>08/09</td> <td>3.7433</td> <td>3.33</td> <td>0.13</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	9	14	374	08/09	3.7433	3.33	0.13	0.51	5.21	1.45	
11       10       364       10/09       2.7473       3.33       6.15       0.51       5.21       1.45         12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.8889       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10 </td <td>10</td> <td>11</td> <td>365</td> <td>09/09</td> <td>3.0137</td> <td>3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	10	11	365	09/09	3.0137	3.33	6.15	0.51	5.21	1.45	
12       11       359       11/09       3.0641       3.33       6.15       0.51       5.21       1.45         13       14       360       12/09       3.889       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       361       10/10 <td>11</td> <td>10</td> <td>364</td> <td>10/09</td> <td>2.7473</td> <td>3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	11	10	364	10/09	2.7473	3.33	6.15	0.51	5.21	1.45	
13       14       360       12/09       3.8889       3.33       6.15       0.51       5.21       1.45         14       12       372       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10 </td <td>12</td> <td>11</td> <td>359</td> <td>11/09</td> <td>3.0641</td> <td>3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	12	11	359	11/09	3.0641	3.33	6.15	0.51	5.21	1.45	
14       12       372       01/10       3.2258       3.33       6.15       0.51       5.21       1.45         15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5219       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10 </td <td>13</td> <td>14</td> <td>360</td> <td>12/09</td> <td>3.8889</td> <td>3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	13	14	360	12/09	3.8889	3.33	6.15	0.51	5.21	1.45	
15       10       351       02/10       2.8490       3.33       6.15       0.51       5.21       1.45         16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10 </td <td>14</td> <td>12</td> <td>372</td> <td>01/10</td> <td>3.2258</td> <td>3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	14	12	372	01/10	3.2258	3.33	6.15	0.51	5.21	1.45	
16       13       357       03/10       3.6415       3.33       6.15       0.51       5.21       1.45         17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10 </td <td>15</td> <td>10</td> <td>351</td> <td>02/10</td> <td>2.8490</td> <td>3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	15	10	351	02/10	2.8490	3.33	6.15	0.51	5.21	1.45	
17       11       371       04/10       2.9650       3.33       6.15       0.51       5.21       1.45         18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26	16	13	357	03/10	3.6415	3.33	6.15	0.51	5.21	1.45	
18       12       355       05/10       3.3803       3.33       6.15       0.51       5.21       1.45         19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26       27       291       8731       23       24       24       14       24       24       25       26       24       26       27       291 <td>17</td> <td>11</td> <td>371</td> <td>04/10</td> <td>2.9650</td> <td>3.33</td> <td>6.15</td> <td>0.51</td> <td>5.21</td> <td>1.45</td> <td></td>	17	11	371	04/10	2.9650	3.33	6.15	0.51	5.21	1.45	
19       12       371       06/10       3.2345       3.33       6.15       0.51       5.21       1.45         20       10       357       07/10       2.8011       3.33       6.15       0.51       5.21       1.45         21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26	18	12	355	05/10	3.3803	3.33	6.15	0.51	5.21	1.45	
20         10         357         07/10         2.8011         3.33         6.15         0.51         5.21         1.45           21         11         366         08/10         3.0055         3.33         6.15         0.51         5.21         1.45           22         14         372         09/10         3.7634         3.33         6.15         0.51         5.21         1.45           23         13         366         10/10         3.5519         3.33         6.15         0.51         5.21         1.45           24         11         364         11/10         3.0220         3.33         6.15         0.51         5.21         1.45           25         14         361         12/10         3.8781         3.33         6.15         0.51         5.21         1.45           26         27         291         8731         23         4.15         24         14         361         12/10         3.8781         3.33         6.15         0.51         5.21         1.45           28         Mean         0.03333         4.15         9.1         9.1         9.1         9.1         9.1         9.1         9.1         9.1	19	12	371	06/10	3.2345	3.33	6.15	0.51	5.21	1.45	
21       11       366       08/10       3.0055       3.33       6.15       0.51       5.21       1.45         22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26	20	10	357	07/10	2.8011	3.33	6.15	0.51	5.21	1.45	
22       14       372       09/10       3.7634       3.33       6.15       0.51       5.21       1.45         23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26	21	11	366	08/10	3.0055	3.33	6.15	0.51	5.21	1.45	
23       13       366       10/10       3.5519       3.33       6.15       0.51       5.21       1.45         24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26	22	14	372	09/10	3.7634	3.33	6.15	0.51	5.21	1.45	
24       11       364       11/10       3.0220       3.33       6.15       0.51       5.21       1.45         25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26	23	13	366	10/10	3.5519	3.33	6.15	0.51	5.21	1.45	
25       14       361       12/10       3.8781       3.33       6.15       0.51       5.21       1.45         26	24	11	364	11/10	3.0220	3.33	6.15	0.51	5.21	1.45	
26         27       291       8731         28       Mean       0.03333         Average       Sample         29       Size       364         30       UCL 30       0.061512         31       LCL 30       0.005088         32       UCL 20       0.052108         33       LCL 230       0.014492	25	14	361	12/10	3.8781	3.33	6.15	0.51	5.21	1.45	
27         291         8731           28         Mean         0.03333           Average	26										
28         Mean         0.03333           Average         Sample         2           29         Size         364           30         UCL 30         0.061512           31         LCL 30         0.005088           32         UCL 20         0.052108           33         LCL 230         0.014492	27	291	8731								
Average Sample         364           29         Size         364           30         UCL 30         0.061512           31         LCL 30         0.005088           32         UCL 20         0.052108           33         LCL 230         0.014492	28	Mean	0.03333								
ZD         SIZE         SIGE           30         UCL 30         0.061512           31         LCL 30         0.005088           32         UCL 20         0.052108           33         LCL 230         0.014492	20	Average Sample	264								
30         CCL 30         COUDI12           31         LCL 3σ         0.005088           32         UCL 2σ         0.052108           33         LCL 23σ         0.014492	20	UCL 2m	0.061510								
31         CCL 2σ         0.052108           33         LCL 23σ         0.014492	30	UCL 30	0.001312								
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33 ULL 230 ULU1447Z	32	UCL 20	0.052108								
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2. The chart will automatically be placed in the existing worksheet.

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	A.	8 Samole	Month 3	2 H /	Mean	UCI 30	101.30	HUCI 20	10.20	- #J.	n.	L.	. IVI	74
	13	350	01/09	3.7143	3.33	6.15	0.51	5.21	1.45					
	11	367	02/09	2.9973	3,33	6,15	0.51	5.21	1.45					
	12	361	03/09	3.3241	3.33	6.15	0.51	5.21	1.45					
	14	371	04/09	3.7736	3.33	6.15	0.51	5.21	1.45					
	13	366	05/09	3.5519	3.33	6.15	0.51	5.21	1.45					
	13	362	06/09	3.5912	3.33	6.15	0.51	5.21	1.45					
	12	369	07/09	3.2520	3.33	6.15	0.51	5.21	1.45					
	14	374	08/09	3.7433	3.33	6.15	0.51	5.21	1.45					
	11	365	09/09	3.0137	3.33	6.15	0.51	5.21	1.45					
	10	364	10/09	2.7473	3.33	6.15	0.51	5.21	1.45					
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3. Right click to select the chart.

4. In the layout tab of the Chart Tools choose Chart Titles, Axis Titles, etc.. to add and format the components of the chart.

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18	12	2 155	05/10	3.3803	1.33	6.15	0.51	5.21	1.45		0.00												

Format Data Series

5. Right click on the primary data series line to add markers and further format the line as desired.

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7	13	365	06/09	3.3319	5.33	6.15	0.51	5.21	1.45					S	urgi	call	roce	edur	es	by N	lon	th				
-	43	304	00/09	3.3912	3.33	6.15	0.51	5.21	1.45	2.00										-						
6	14	274	07/09	3.2320	3.33	6.15	0.51	5.21	1.45	7.00	-															
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16. The control limits in the chart are formatted for type (dashed, dotted, etc.) and color using the same process.

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Radar Charl	t
Usage	A radar chart is used to visually display areas of strengths and weaknesses and show the gaps in various areas. These are best used to show performance improvement or to evaluate and organizations situation based upon the opinions of team members.
Data Types	Ordinal or Interval data, such as data accumulated from a survey
Interpretation	Points which are furthest from the center are considered strengths. Points closer to the center are weaknesses or areas for improvement. The points on the web usually represent the areas of evaluation. The lines represent the services/areas surveyed or analyzed.
	In the example for this radar chart, team members were asked to rate the performance (on a scale of 1 = not well at all, to 5 excellent) of their unit on several key areas, including Director's office,

1. Format data so categories are across the top and rankings will fall into the columns. Select all

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	А	В	С	D	E	F	
1		Patient Safety	Leadership	Advancement	Morally Driven	Patient Centered	
2	Director's Office	5	5	3	5	3	1
3	Staff Nurses	5	3	2	4	4	4
4	Staff Physician's	4	3	3	3	4	ł
5	Medical Administration	4	4	4	5	2	
6							Ī

2. Click on the Insert Tab in the ribbon.



3. Click Other Charts, and select the first Radar Chart under the Radar heading. The second Radar Chart has defined points. The third choice under the heading fills in the area. For this chart, the first choice was selected because it is most easily understood.



4. Once selected, your radar chart will appear. In this example, the different colored lines represent each area surveyed. The five points of the "web" represent the areas of the evaluation.

 Jre	Shapes	Text Box	t Chart	Axis Legend D fitles T T Lak	ata Data Dels ▼ Table ▼	Axes	s Gridlines	Plot Area	🕘 📠 Charl	Floor *	Trendline	🔟 Up/D
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5. Refer to the Formatting section to learn how to customize your chart to your needs.

Scatter Diag	Scatter Diagram										
Usage To display paired sets of data and evaluate for a relationship as a series of											
	single data points.										
Data Types	Interval or ratio data such as height and weight										
Interpretation	If the data progress from the lower left to the upper right, there is a positive relationship. If the data progress from the upper right to the lower left, there is a negative relationship. If a "line" cannot be defined, there is no relationship of the data. When a curve is formed, there is both a positive and negative relationship. Remember, relationship does not mean causation										
Creation in Excel	Data must be paired.										

1. Arrange data into columns, column A representing the dependent variable, column B representing the independent variable. An independent variable is the variable of interest, whereas the dependent variable may influence the outcome (dependent variable). In this case, weight is influenced by height, so it is the independent variable.

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2	104	60	
3	140	66	
4	130	66	
5	205	72	
6	157	69	
7	220	64	
8	158	68	
9	126	64	
10	120	63	
11	134	65	
12	138	67	
13	145	68	

2. Select all the data.

	А	В	С								
1	Weight	Height									
2	104	60									
3	140	66									
4	130	66									
5	205	72									
6	157	69									
7	220	64									
8	158	68									
9	126	64									
10	120	63									
11	134	65									
12	138	67									
13	145	68									
14	156	69									
15	170	70									
16	187	71									
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3. Click on the insert tab in the ribbon.

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4. Select the Scatter plot chart. In the drop down, select the first chart type. The other scatter plot options contain lines; this changes the type of chart to a line graph.



5. Once selected, the scatter plot will be inserted into the worksheet.


6. Double click on the title to change it to reflect what the graph is showing.



7. Refer to the formatting section to customize your chart to your specific needs.

## References

Benneyan, J. C. (1998). Use and interpretation of statistical quality control charts. *International Journal for Quality in Health Care*, 10 (1), 69-73.

Brassard, M., & Ritter, D. (2007). *The Public Health Memory Jogger II.* (F. Oddo, Ed.) GOAL/QPC.

Hansen, J. P. (2003). CAN'T MISS: Conquer Any Number Task by Making Important Statistics Simple. Part 2. Probability, Populations, Samples, and NOrmal Distributions. *Journal for Healthcare Quality*, 25 (4), 25-33.

Hansen, J. P. (2005). CAN'T MISS: Conquer Any Number Task by Making Important Statistics Simple. Part 8. Statistical Process Control: n, np, c, u Control Charts. *Journal for Healthcare Quality*, 27 (4), 42-52.

Klass, G. (2006, July 21). *Presenting Data*. Retrieved December 3, 2010, from Illinois State University: http://lilt.ilstu.edu/gmklass/pos138/datadisplay/sections/goodcharts.htm

Sellick, J. A. (1993). The Use of Statistical Process Control Charts in Hospital Epidemiology. *Infection Control and Hospital Epidemiology*, 14 (11), 649-656.

Tague, N. R. (2004). *Quality Tools*. Retrieved November 28, 2010, from ASQ: http://asq.org/learn-about-quality/data-collection-analysis-tools/overview/histogram.html