

Histogram

Before taking steps to improve our work, we often collect data to see how we are doing at the present time. One way to describe and evaluate our performance is to display this data in a chart called a "histogram". In a histogram, data are grouped into defined intervals and displayed according to their frequency of occurrence in each interval. This method provides insights about performance and, in particular, the variation that normally occurs in work.

There are numerous situations where histograms can be used to show how much variation exists in work, e.g., how much time it takes an EMS organization to complete a routine job. If you repeatedly measure the length of time it takes to complete a job, you will observe that the time varies in each instance. You will also, see, however, that all of the measurements fall within a certain range.

How to Construct a Histogram

Once you have collected a set of data for a repeated activity, complete the following:

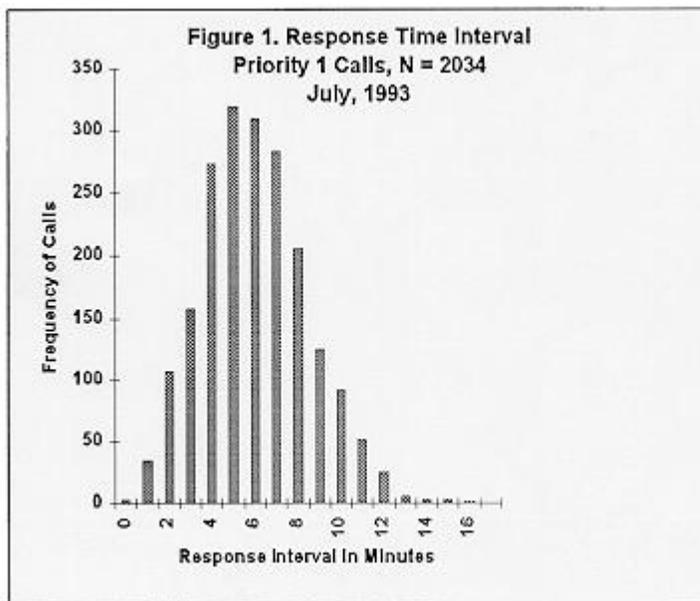
1. Count the number of observations in the data set.
2. Determine the range of the data. This is obtained by subtracting the smallest value from the largest value.
3. Decide the number of intervals, displayed as bars, to use. A good rule is five to seven for 20 to 50 observations, and six to 10 for more than 50 observations.
4. Divide the range by the number of intervals then round the number to a whole number.
5. Select the boundaries for each interval so that they are not overlapping.
6. Count the number of observations that fall within the boundaries for each interval.
7. Draw, scale, and label the horizontal (x-axis) and vertical (y-axis) axis lines of the chart. Label the x-axis for the intervals that cover the data range. Mark the vertical axis from zero until the highest frequency is included.
8. Draw vertical bars for each interval. The height of the bars equals the number of observations at that interval. The width of each of the bars should be the same.
9. Title the completed chart. The title should describe the nature of the observations being made summarized in the chart and the time frame in which the data was collected.

Why Use Histograms?

A histogram is a picture of the data distribution that includes its spread and shape. This can provide clues about the variation that exists in the work performed. Distributions can be skewed in either a positive (tail of the distribution to the right) or negative (tail of the distribution to the left) direction from the center. By examining the spread and shape of a distribution, the extent of variation in a work process can be determined. This can provoke further discussions to identify the cause of variation and the measures needed to either control or reduce it.

A foundation of any continuous improvement effort is data collection. Data are used to better understand variation in a work process and determine how well we are doing in meeting standards based on patient and other stakeholder expectations. A histogram is a useful tool to display these findings in order to identify our current performance and show how we are improving work processes over time.

In the example in Figure 1, the Histogram shows the response interval performance of an EMS agency to emergencies during one month. This chart shows how well the organization is meeting the needs of its patients.



Source: <http://www.nhtsa.dot.gov/people/injury/ems/leaderguide/#qitat>