Analyzing Quantitative Data for Evaluation

This brief focuses on analyzing quantitative data that your program has collected. It includes an overview of quantitative data; planning quantitative data analysis; conducting quantitative data analysis; and advantages and disadvantages of using quantitative data.

Overview

Quantitative data are information in numeric form. They can either be counted (such as the number of people who attend a training) or compared on a numerical scale (such as the number of training participants who said that a training was "very helpful" or "somewhat helpful"). *Indicators for School Health Programs* results are an example of quantitative data that your program collects annually.

There are two main types of quantitative data:

- **Categorical data** have a limited number of possible values. For some categorical data, numbers assigned to categories have no inherent meaning and the order of the categories is arbitrary. For example, when asking about marital status, there are a limited set of possible responses and categories can be ordered in numerous ways. For other kinds of categorical data, numbers assigned to categories have inherent meaning and the order of the categories follows a logical progression in the values assigned to responses. A question where the responses range from 1 = "strongly agree" to 5 = "strongly disagree" is an example of this type of categorical data. There is no set interval between each response for categorical data.
- **Continuous data**, in contrast, have many possible values. There is a logical progression in the numerical values assigned to responses and the interval between values is meaningful. Continuous data can have almost any numeric value along a continuum and can be broken down into smaller parts and still have meaning. Age, weight, height, and income are all examples of continuous data.

Quantitative data analysis is the process of using statistical methods to describe, summarize, and compare data. Your analysis will vary based on the type of data you collect (see below). Analyzing quantitative data allows your evaluation findings to be more understandable so you can use them to strengthen your program.

Planning quantitative data analysis

Quantitative data collection can be difficult and time-consuming. It is important to plan your analysis before you collect your data to ensure that your data will be meaningful and useful.

Determine your focus. Consider the purpose of your evaluation. Each piece of information you collect should be useful in understanding and improving your program. Your data analysis will provide the information that you need to do so. Decide how you will use your data to improve your program before you collect them.

Decide who will analyze the data. Your data analyst should have training and experience in the analysis procedures and software used. When more than one person analyzes your data, everyone must use the same systematic approach.

Develop a data management system. If it is not already in place, you will need to develop a data management system to store and organize your data, such as spreadsheets or databases. This system will help to improve the quality of data entry and management. Often, you can export data directly from your data management system into quantitative data analysis software.

Clean your data. It is likely that there are occasional errors in your data. For example, some fields may have been unintentionally left blank. Once your data have been entered into your data management system, review them for errors and make adjustments as needed. More than one person should clean the data to ensure they are error-free.

Obtain data analysis software. There are many popular computer programs that can be used to analyze your quantitative data. For the basic statistical methods described in this brief, you can use spreadsheets or database programs. For more advanced statistics, you can use a statistical software package. Your data analyst

should be familiar with the software package you choose.

Conducting quantitative data analysis

There are three major steps to this process:

Conduct statistical tests. You will likely use basic descriptive statistics to explore the main characteristics of your data. Commonly used statistics include the following:

- **Frequencies**, or counts, describe how many times something has occurred within a given interval, such as a particular category or period of time. For example, the number of training participants who are classroom teachers is a frequency. Frequencies can be used for categorical or continuous data.
- A **percentage** is the given number of units divided by the total number of units and multiplied by 100. Percentages are a good way to compare two different groups or time periods. For example, if 50 of 100 training participants are classroom teachers, 50% of training participants are classroom teachers. Percentages can be used for categorical or continuous data.
- A **ratio** shows the numerical relationship between two groups. For example, the ratio of the number of students in a particular school (300) to the number of teachers in that same school (25) would be 300/25, or 12:1. Ratios can only be used for continuous data.
- **Mean, median, and mode** are three measures of the most typical values in your dataset (also called measures of central tendency). A **mean**, or average, is determined by summing all the values and dividing by the total number of units in the sample. A **median** is the 50th percentile point, with half of the values above the median and half of the values below the median. A **mode** is the category or value that occurs most frequently within a dataset.

Review and interpret your data. Following data analysis, review your findings to identify patterns in your data. Consider similarities and differences between responses from participants with different characteristics. Determine whether there are any extreme data that fall significantly above or below the mean, median, or mode. Those extreme data points may alter some statistics, such as the mean.

Summarize your data. Develop tables, graphs and charts to summarize your data findings (see *Evaluation Brief 12: Using Graphs and Charts to Illustrate Quantitative Data*). One common way to summarize data findings is a cross-tabulation table. These tables consist of rows displaying values for one variable of interest and columns displaying values for another variable of interest. Cross-tabulation tables can compare several groups or time periods at once. You can use these tables to illustrate any of the statistical methods discussed above.

Communicate your findings. When your analysis is complete, share your data with stakeholders. There are several ways to disseminate your findings, including print formats, oral presentations, and web-based distribution (see *Evaluation Brief 9: Disseminating Programs Achievements and Evaluation Findings to Garner Support*).

Advantages of using quantitative data

- Common types of analysis are relatively quick and easy.
- Answers the "what" and "how many" questions of evaluation activities.
- Findings are concrete with minimal possibility for reviewer bias.

Disadvantages of using quantitative data

- Data collection can be time-consuming.
- May not answer the "why" of evaluation activities.
- For more advanced data analysis, software and training needed for analysis can be costly.

Resources

Clayton, R.R. & Crosby, R.A. (2006). Measurement in health promotion. In: R.A. Crosby & R.J. DiClemente. *Research Methods in Health Promotion* (229-259). California: Jossey Bass.

Brief 9: Disseminating Program Achievements and Evaluation Findings to Garner Support. Available at http://www.cdc.gov/HealthyYouth/evaluation/pdf/brief9.pdf.

Brief 12: Using Graphs and Charts to Illustrate Quantitative Data. Available at http://www.cdc.gov/HealthyYouth/evaluation/pdf/brief12.pdf.

Taylor-Powell, E. *Program Development and Evaluation: Analyzing Quantitative Data.* University of Wisconsin-Extension; 1996. Available at http://learningstore.uwex.edu/pdf/G3658-6.pdf