

Quantitative Research Questionnaire



Surveys are used in practically all walks of life. Whether it is deciding what is for dinner or determining which Hollywood film will be produced next, questionnaires will likely be used. The terms *survey* and *questionnaire* are often used interchangeably, but there is a subtle difference. A questionnaire is the tool that is used to get the data, where survey usually refers to the analysis of the data.

In this project, you will create and administer a questionnaire for some sort of issue. This may be (but not limited to) a social issue, a political issue, a community issue or a school issue. Before we scribble down questions and rush to hand out a questionnaire, there are nuances that must be learned. As opposed to asking random questions, a quantitative questionnaire will have questions specifically designed to yield numerical data which can be used to uncover evidence and draw conclusions.

Why is quantitative questionnaire an important research method?

Quantitative Research Questionnaires seek to ask questions specifically designed to yield numerical data. Questionnaires are particularly helpful when trying to collect opinions of many people.

Through giving a questionnaire, the researcher creates a *sample*. In order to achieve the best results, the sample should be *random*. For example, asking every tenth person who enters a popular mall would achieve better results than asking your friends because the mall customers would likely have more diverse perspectives and include people of different ages, races, genders, and socioeconomic statuses. Ideally, this will create a *representative sample*.

Definition:

sample - a set of individuals or items selected from a population for analysis to estimate the whole population.

Definition:

quantitative - related to the measurement of an amount or size of something. Usually objective in nature.

A *sample size* typically relates to the amount of people that are given a questionnaire. If the sample size is larger then there is more confidence in the results. Collecting 1,000 questionnaires would yield more accurate results than collecting 3.

Once collected, in a quantitative questionnaire the answers are converted to a numeric score. With this numerical data, **statistical measures** such as median, mean, and standard deviation and the margin of error can be used as evidence to draw conclusions.

Name _____

Date _____

Period _____



Sampling Techniques



A **random sample** is one in which every member of the population has an equal chance of being selected.

A **convenience sample** is a sample that is chosen to be easy for the researcher.

A **stratified random sample**, the population is divided into subgroups so that each member is in only one subgroup. Individuals are randomly selected from each subgroup.

A **census** is the count or measure of the entire population.

Below are examples of different sampling techniques for studies. Identify the sampling technique being used from the samples listed above.

- A. A journalist asks his family how they feel about water pollution.

- B. For quality assurance, every 10th engine part is selected from an assembly line and tested for durability.

- C. A study on attitudes about smoking is conducted at Otterbein College. The students are divided by class (freshmen, sophomore, junior and senior). Then a random sample is selected from each class and interviewed.

- D. A student asks 12 friends to participate in a psychology experiment.

- E. Law enforcement officials use a radar gun to measure the speed of every 5th vehicle on an interstate.

- F. A journalist interviews all 123 people after they leave a restaurant and asks them how confident they are that the food is safe.

- G. Twenty-five students are randomly selected from each grade level at a high school and surveyed about their study habits.

- H. Calling randomly generated telephone numbers, a study asked 1001 U.S. adults which medical conditions could be prevented by their diet.

- I. Soybeans are planted on a 48-acre field. The field is divided into one acre subplots. A sample of plants is taken from each subplot to estimate the harvest.



To create a good questionnaire...



Clearly state your intentions with the research

At the top of your survey, write a brief statement explaining why you are collecting the information and reassure each respondent that the information is anonymous. If you need to know specifics about a person, respect their privacy by identifying them as subject1, subject2, etc...

Include instructions with your survey questionnaire

To ensure that you collect valid survey results, make sure you include instructions on how to answer the questions. There should be a short introductory set of instructions at the top of the survey questionnaire, and additional instructions for specific questions as needed.

Your overall instructions may be something like: "Please mark the appropriate box next to your answer choice with an "x"."

Don't ask for personal information unless you need it

Asking individuals to provide personal or demographic information (age, race, income level, etc...) may irritate some respondents. However, in many instances, this information is necessary for the research. If you need to ask for this type of information it is best to place the questions at the END of your survey questionnaire.

Keep the questions short and concise

The wording for survey questions should be short and concise. Each question should be clearly stated so there is no misunderstanding about what is being asked.

Make sure the questions are unbiased

When developing your survey questionnaire, you want to make certain that you are asking questions in a neutral way, so that you are not leading toward a particular answer.

Ask questions that can be answered by your subjects

Make sure that the questions you are asking are questions that people will be able to answer. The most common mistake is to ask questions that most people simply cannot remember.

Test the survey questionnaire

Once you have developed your survey questionnaire, you should conduct a small test (5 -10 people) to make sure that respondents clearly understand the questions you are asking and that you are capturing the information that you need for your study.



Types of Questions



For a quantitative research questionnaire, the types of questions that will be most often used are called **fixed response questions**. In other words, they are questions where options are given. It is important to understand when and how to use these questions when designing your questionnaire.

When writing the responses for a **structured question**, you should make certain that the list covers *all possible alternatives* that the respondent might select AND that *each of the answers is unique* (i.e. they do not overlap).

Examples of Structured Questions

Do you have a driver's license? <input type="checkbox"/> Yes <input type="checkbox"/> No	Which subject do you enjoy the most at school? <input type="checkbox"/> Math <input type="checkbox"/> Science <input type="checkbox"/> English <input type="checkbox"/> World Language <input type="checkbox"/> History / Government <input type="checkbox"/> Art / Music <input type="checkbox"/> Other	How many hours a day do you spend doing homework? <input type="checkbox"/> 0 to 1 hour <input type="checkbox"/> 2 to 3 hours <input type="checkbox"/> 4 to 5 hours <input type="checkbox"/> more than 5 hours
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Example of a Rating Question

A **rating question** asks respondents to explain the degree with which they feel about a certain topic, subject, event, etc...

Please describe how you felt about the Homecoming Pep Rally.				
Unsatisfied	Somewhat Satisfied	Satisfied	Very Satisfied	Extremely Satisfied
(1)	(2)	(3)	(4)	(5)

Example of a Ranking Question

Please rank the following Homecoming activities in order of preference (starting with 1 for your favorite activity).

- ___ Homecoming Pep Rally
- ___ Homecoming Parade
- ___ Homecoming Football Game
- ___ Homecoming Dance

A **ranking question** asks respondents to explain how they feel about something by comparing it to other items in a list.

In general, if you are trying to get a respondent's opinion about something, it is best to have them do a **rating** rather than a **ranking**. A ranking asks respondents to list their responses in order of preference. This type of question leads you to an answer where the respondent is comparing one thing to another rather than giving you their feeling about each individual item. The disadvantage to a ranking is that if the respondent feels the same about two or more items, they are still forced to sort them into a ranking.



The Bad Question Game



While asking a question seems easy, there are many ways this can go poorly. Below are examples of bad questions. For each example, try to determine the weakness in each question and offer a solution to improving.

Example #1

Which subject do you enjoy the most at school?

- Math
- Science
- English
- World Language
- History
- Government
- Art / Music
- Football Practice
- Other

What seems to be the problem?

How can this question be improved?

Example #2

How many hours a day do you spend doing homework?

- 0 to 1 hour
- 120 to 180 minutes
- 4 to 5 hours
- more than 5 hours

What seems to be the problem?

How can this question be improved?

Example #3

Do you think that the new cafeteria lunch menu offers a better variety and assortment of healthy and fresh foods versus the old one?

- Yes
- No
- No Opinion

What seems to be the problem?

How can this question be improved?

Example #4

How much did you spend on groceries last year?

- \$0 - \$1,000
- \$1,000 - \$2,000
- \$2,000 - \$3,000
- over \$3,000

What seems to be the problem?

How can this question be improved?



Mean, Median & Mode Refresh



After giving a questionnaire, it's important to make sense of the results. Sometimes tallying the results is enough to make a meaningful measure. However with other questions, more calculation must take place. One such way is with a *measure of central tendency*. In some cases, this will allow a researcher to find evidence and make analysis.

To find the appropriate type of measure of central tendency, use the following guidelines:

Definitions:

Mean – the average of the numbers. Find the sum of the numbers. Divide the sum by the number of items.

Median – the middle number of a list ordered from least to greatest. If the list of numbers is even, divide the sum of the two middle numbers by 2.

Mode – the number which appears most often in a list of numbers.

Generally the mean will be the best measure of central tendency *if there are no outliers*.

Generally the median will be the best measure of central tendency *if there are outliers*.

Determine the mean, median and mode of the responses to the survey question below.

After giving a questionnaire regarding the satisfaction of the Homecoming Pep Rally, Sarah must try to make sense of the data.

Her results are as follows:

(1)Unsatisfied	10
(2)Somewhat Satisfied	12
(3)Satisfied	26
(4)Very Satisfied	30
(5)Extremely Satisfied	14

Please describe how you felt about the Homecoming Pep Rally.

Unsatisfied	Somewhat Satisfied	Satisfied	Very Satisfied	Extremely Satisfied
(1)	(2)	(3)	(4)	(5)

Sarah's Sample Size _____

Mean	Median	Mode

Interpret the Results

Blank area for interpreting results.

Determine the mean, median and mode of the responses to the survey question below.

After giving a questionnaire on the satisfaction with Homecoming activities, Javon must try to make sense of the data.

His results are as follows:

Rank	Pep Rally	Parade	Football Game	Dance
1	3	6	3	8
2	10	1	5	4
3	2	6	7	5
4	5	7	5	3

Please rank the following Homecoming activities in order of preference (starting with 1 for your favorite activity).

- ___ Homecoming Pep Rally
- ___ Homecoming Parade
- ___ Homecoming Football Game
- ___ Homecoming Dance

Javon's Sample Size _____

Since this is a ranking question, Javon needs to determine the Mean, Median & Mode for EACH of the four categories.

Pep Rally	Mean	Median	Mode
Parade	Mean	Median	Mode
Football Game	Mean	Median	Mode
Dance	Mean	Median	Mode
Interpret the Results			

Advanced Stats



In order to get a more clear picture of the data, other measurements are very important and useful.

Standard deviation is a measurement that shows how much variation exists from the average in a data set. For instance the in the set {0, 5, 10}, the mean is 5, but the spread is large whereas in the set {4.5, 5, 5.5} the mean is also 5, but the spread is much less. Standard deviation helps make this determination. To calculate standard deviation you must use technology or the formula...

$$\sigma = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$$

Margin of error is a measure that acknowledges inaccuracy of a sample's results, but provides a range of acceptable values that the correct survey result would be in. The larger the sample size, the smaller the error. Margin of error, expressed as a percent can be calculated with the formula

$$\pm \frac{1}{\sqrt{n}} \text{ where } n \text{ is the sample size.}$$

Given Javon's survey results, calculate the Margin of Error and the Standard Deviation of each category.

Margin of Error

Rank	Pep Rally	Parade	Football Game	Dance
1	3	6	3	8
2	10	1	5	4
3	2	6	7	5
4	5	7	5	3

Pep Rally	Parade	Football Game	Dance
mean: 2.45	mean: 3.2	mean:	mean:
sd: 1.02	sd:	sd:	sd:

<p>Interpret your results (which had the highest sd? which had the lowest? what does that mean?)</p>

Pulling it All Together



The College of Medicine is welcoming a new class of 24 students. The student's ACT (American College Test) scores are below. Calculate the mean, median and mode, standard deviation and margin of error to analyze their distribution.

ACT Scores: {27, 34, 21, 28, 29, 28, 29, 35, 30, 33, 36, 29, 31, 26, 28, 31, 22, 25, 32, 26, 24, 28, 33, 30}

Mean	Median	Mode
Standard Deviation		Margin of Error
Interpret the Results		



Question Writing



The first International High School Prom is fast approaching. The swaggiest of all the swagg is coming out for a swaggy good time. However there are many important decisions that need to be made and not much time to make them. Ms. Principal has charged the student council with the task of designing a questionnaire to help make important decisions such as the colors, music and food.

TASK: Write three survey questions. Be sure to include one *structured question*, one *rating question* and one *ranking question*.

Purpose of Questionnaire / Instructions
Question 1
Question 2
Question 3
Demographic Information