Inquiries, Investigation and Immersion

Quarter 2- Module 5: Finding the Answers to the Research Questions (Quantitative)
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Inquiries, Investigations, and Immersion
Quarter 2 – Module 5:
Finding the Answers to the Research Questions (Quantitative)

This Instructional material is collaboratively developed and reviewed by educators from public and private schools, colleges, and/or universities. We encourage teachers and other education stakeholders to email their feedback, comments and recommendations to the Department of Education at action@deped.gov.ph

We value your feedback and recommendations.
What is the first thing that enter to your mind when you see data? The first instinct is to find patterns, connections, and relationships. We look at the data to find for the significance in it. In the same way, in research, once data is collected, the next step is to get meaning from it.

What I Need to Know

Data is all around us, it’s everywhere and in every actions we do results in a new data and information. Research data such us questionnaires, Focus Group Interview (FGI), Focus Group Discussion (FGD) and other related documents should be collected, observed, or created for the purpose of analysis to come up with an original research results. You cannot simply move into conclusion in your research study without doing the correct process and methodology used in the analysis and interpretation of your data gathered. In other words, data analysis, interpretation and implications are needed. It is as important to a researcher like you as it is important for a doctor to cure the sickness of the patient before giving him any treatment and medicines. Data analysis help the researcher to come up to a valid and concrete conclusion.

This module will guide you on how to do the interpretation of data and descriptive data analysis method. It contains some activities that can help you enhance your knowledge and skill in data analysis and interpretation and implication. You can improve your hidden skills in this area. You can make it.

At the end of this module you are expected to learn the following:

- Interpretation of Data
- Descriptive Data Analysis Method
How to learn from this module?

To achieve the objectives of this module, do the following:

- Take your time reading the lessons
- Follow the directions and/or instructions in the activity exercises diligently
- Answer all the given tests and exercises
- Follow the process of interpretation and analysis of the sample data
- Familiarize yourself with following terms;

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research data</td>
<td>- is any information that has been collected, observed, generated or created to validate a research study.</td>
</tr>
<tr>
<td>Data analysis</td>
<td>- a process that involves examining, and molding collected data for interpretation to discover relevant information, draw or propose conclusions and support decision-making to solve a research problem.</td>
</tr>
<tr>
<td></td>
<td>- The arithmetic mean, the sum of the numbers divided by how many numbers.</td>
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What I Know

Multiple Choice: Encircle the letter of the best answer

1. What does quantitative data refers to?
   a. graphs and tables.
   b. numerical data that could usefully be quantified to help you answer your search question(s) and to meet your objectives.
   c. any data you present in your report.
   d. Statistical analysis

2. Which measure of central tendency is obtained using the middle score when all scores are organized in numerical order?
   a. Mean
   b. Median
   c. Mode
   d. None of these

3. Which measure of central tendency is obtained by calculating the sum of values and dividing this figure by the number of values there are in the data set?
   a. Mean
   b. Median
   c. Mode
   d. None of these
4. Which measure of central tendency is derived from the most common value?
   a. Mean   c. Mode
   b. Median d. None of these

5. What method is used to compute average or central value of collected data?
   a. measures of positive variation
   b. measures of central tendency
   c. measures of negative skewness
   d. measures of negative variation

6. What does standard deviation refers to?
   a. a way of measuring the extent of spread of quantifiable data.
   b. inappropriate in management and business research.
   c. a way of describing those phenomena that are not the norm.
   d. a way of illustrating crime statistics.

For question 7 – 9, refer to the following problem

A survey was conducted to know the audience feedback on a dance presentation. It asked this question:

“In your opinion, the dance presentation was entertaining, boring or neither?”

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Entertaining</th>
<th>Boring</th>
<th>neither</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

7. What percentage of the respondents said that the dance presentation is entertaining?
   a. 50%   c. 70%
   b. 60%   d. 20%

8. What percentage of the respondents said that the dance presentation is boring?
   a. 50%   c. 70%
   b. 60%   d. 20%

9. What percentage of the respondents said that the dance presentation is neither entertaining or boring?
   a. 50%   c. 70%
   b. 60%   d. 20%

10. The total marks obtained by few students in mathematics exam are 100, 160, 154, 95 and 82. What is the mean?
    a. 117.2   c. 119.2
    b. 118.2   d. 120.2
11. The following are the methods use in quantitative data analysis **except**
   a. Data Validation c. Data Coding
   b. Data Editing d. Data Correction

12. What are the two commonly used tool in quantitative data analysis
   a. Descriptive Statistics c. Measures of Central Tendency
   b. Inferential Statistics d. both a and b

For question 13 - 14, refer to the following problem

A study conducted to determine G10 students of ABC National High School to enroll in ABM strand based on their academic performance and NCAE result. The following data were given.

<table>
<thead>
<tr>
<th>Profile of the Participants</th>
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</thead>
<tbody>
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<td>Age</td>
</tr>
<tr>
<td>15</td>
</tr>
<tr>
<td>16</td>
</tr>
<tr>
<td>17</td>
</tr>
<tr>
<td>18</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

**Mean 16.07**

<table>
<thead>
<tr>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

13. Based on the age of the respondents, what can be inferred?
   a. Most of the Grade 10 students were at their correct age level which is grade 10
   b. Only 3.6% of the respondent is 18 years old
   c. Most of the grade 10 students age is 16 years old
   d. All of the above

14. Based on the respondent’s gender, what can be inferred?
   a. Most of the Grade 10 students are female
   b. Most of the Grade 10 students are male
   c. Both a and b
   d. None of the above

15. The following are descriptive statistics use in quantitative research **except** one.
   a. Mean c. Feasibility Study
   b. Percentage d. Mode
WHAT’S IN

What is Research

Research is a systematic process of inquiry that involves collection of data; documentation of substantial information; analysis and interpretation of that data/information, in accordance with the appropriate methodologies set by specific professional fields of disciplines.

What is Quantitative Research

Quantitative research is defined as a systematic investigation of phenomena or inquiry by gathering quantifiable data and doing the statistical, mathematical, or computational strategies.

WHAT’S NEW

LESSON 1: INTERPRETATION OF DATA

Interpretation of data refers to the implementation of certain procedures through which data results from surveys is reviewed, analyze for the purpose of achieving at valid and evident based conclusion. The interpretation of data denotes a meaning to the information analyzed and determines its significance and implications to the study.

The first stage of analyzing data is data preparation, where the main goal is to transform raw data into something meaningful, significant and user friendly. It includes the following steps:

Step 1: Data Validation
The goal of data validation is to check whether the gathered data was performed according to the set standards. It is a four-step process, which includes

. Fraud - to ensure whether each respondents was actually interviewed.
. **Screening** - to check that respondents were chosen according to the standard research criteria.

. **Procedure** - to make sure whether the data collection process was followed

. **Completeness** - to make sure that the interviewer asked the respondent all the necessary questions, rather than just choosing a few ones.

To do this, you as a researcher would have to choose a random sample of completed surveys and validate the data collected rather than have the whole population as the respondents.

For instance, suppose a survey with 900 respondents divided into 9 barangays. The researcher can pick a sample of 50 random respondents from each barangay.

**Step 2: Data Editing**

Usually, many data sets include errors. For example, respondents may fill fields incompletely or skip them. To ensure that these errors will not occur, the researcher should conduct the initial data checking and edit the raw research data to identify and clean out any points that may become the barrier to come up with an accurate results.

For example, an error could be fields in the data information that were left empty by respondents. While editing and checking the data, it is important to ensure that empty data/information will be removed or has to be filled in.

**Step 3: Data Coding**

This is the number one significant process in data preparation. Data coding refers to grouping and assigning values/codes to responses from the conducted survey.

For example, if a researcher has interviewed 1000 people and now wants to find the average daily allowance of the respondents, the researcher will create daily allowance brackets and categorize the daily allowance of each of the respondent as per codes. (For example, respondents who has a daily allowance of Php10.00 - below Php20.00 and Php20.00 – below Php3000 would have their daily allowance coded as 1, Php10.00 – below Php20.00 as 2, Php20.00 – below Php30.00 as 2, etc.)
Then during analysis, the researcher can come up with simplified daily allowance, rather than having many ranges of individual daily allowances.

Quantitative data interpretation comprises studying the results taken from various questions in a survey. The results are commonly shown numerically and by percentage in the data tables.

After doing the three steps mention above, the data is now ready for the analysis. The two most widely used quantitative data analysis methods are descriptive statistics and inferential statistics.

LESSON 2: QUANTITATIVE DATA ANALYSIS METHODS

Data collection comprises a major area of the research process. This data however has to be analyzed to have its meaning. There are many methods of analyzing quantitative data collected in surveys. They are:

**Cross-tabulation.** This is the most commonly used quantitative data analysis methods. It is the most preferred method since it uses a basic tabular form to draw inferences between different data-sets of dependent and independent variable. It contains data that have some connection with each other.

**Steps to conduct Quantitative Data Analysis**

For quantitative data, raw data has to showed in a significant manner using analysis methods. Quantitative data should be analyzed in order to find evidential/factual data that would help in facilitating the research process.

**Relate measurement scales with variables:** Associate scales of measurement such as Nominal, Ordinal, Interval and Ratio with the variables – dependent and independent variables. This step is of utmost important to arrange the data in proper sequence/order. Data can be entered/encoded into an excel sheet to organize it in a specific data format.

**Connect descriptive statistics with data:** Connect descriptive statistics to contain available data. It can be hard to establish a pattern in the raw data. Some commonly used descriptive statistics are:

- **Mean** - An average of values for a specific variable
- **Median** - A midpoint of the value scale for a variable
- **Mode** - For a variable, the most common value
- **Frequency** - Number of times a particular value is observed in the scale
Minimum and Maximum Values - Lowest & highest values for the scale

Percentages - Format to express scores and set of values for variables

Range: the highest and lowest value in a set of values.

Decide a measurement scale: It is important to decide the measurement scale to conclude a descriptive statistic for the specific variable.

For example, a nominal variable score will never have a mean or median and so the descriptive statistics will vary. Descriptive statistics will suit in a situation where the results are not to be generalized to the whole population.

Select appropriate tables to represent data and analyze collected data:

After deciding on a suitable measurement scale, researchers can use a tabular format to represent data. This data can be analyzed using various techniques such as Cross-tabulation.

WHAT IS IT

Descriptive statistics provide absolute/whole numbers. However, they do not explain the reasoning behind those numbers. Before applying descriptive statistics, it’s important to think about which one is the most appropriate for your research question and what you want to present. For instance, a percentage is a good way to present the age distribution of respondents.

It should be noted that visual presentations of data findings are insignificant unless a sound decision is made regarding scales of measurement.

Before any data analysis can begin, the scale of measurement must be decided for the data as this will have a long-term impact on data interpretation. The varying scales include:

Nominal Scale: non-numeric categories that cannot be ranked or compared quantitatively. Variables are exclusive and exhaustive.

Ordinal Scale: exclusive categories that are exclusive and exhaustive but with a logical order. Quality ratings and agreement ratings are
examples of ordinal scales (i.e., good, very good, fair, etc., or agree, strongly agree, disagree, etc.).

**Interval:** a measurement scale where data is grouped into categories with orderly and equal distances between the categories. There is always an arbitrary zero point.

**Ratio:** contains features of all three.

### Quantitative Data Examples

Listed below are some examples of quantitative data that can help understand exactly what this refers to:

- I updated my laptop **2 times** in a year.
- Our youngest sister grew by **5 inches** last year.
- **68 people** uploaded the latest mobile application.
- My nephew lost his **Php500** last week.
- **100 respondents** were of the opinion of their product preference
- There will be **50% increase** in revenue with the inclusion of a new product.
- **200 people** attended the seminar.
- **35% people** prefer shopping online instead of going to the mall.
- It has **12 holidays** in this year.
- Product X costs **Php500**.

As you can see in the above examples, there is a numerical value assigned to each are and this is known as quantitative data.

### WHAT’S MORE

Descriptive statistics are most helpful when the research is limited to the sample and does not need to be generalized to a larger population.

For example, if you are comparing the percentage of adults vaccinated in four different barangays, then descriptive statistics is enough.

Since descriptive analysis is mostly used for analyzing single variable, it is often called univariate analysis.
The importance of data interpretation is evident and this is why it needs to be done correctly. Data is very likely to arrive from multiple sources and tends to enter the analysis process with topsy turvy ordering. Data analysis tends to be extremely subjective. While there are several different types of processes that are implemented based on individual data nature, the two broadest and most common categories are “quantitative analysis” and “qualitative analysis”.

**WHAT I HAVE LEARNED**

The significant of data interpretation is indisputable. Data analysis and interpretation are crucial to develop sound conclusions and make better informed decisions. As such, below is a list-summary of how to interpret data and some tips:

**Collect your data and make it as readable as possible.**

**Choose the type of data analysis to perform:** qualitative or quantitative, and apply the methods respectively.

**Qualitative analysis:** observe, document and interview notice, collect and think about things.

**Quantitative analysis:** research with a lot of numerical data to be analyzed through various statistical methods such as the descriptive – mean, standard deviation or frequency and inferential statistics – Chi square, Pearson Product moment correlation and the like.

**Think:** Ponder about your data from various point of views, and what it means for various respondents.

**Reflect:** Be aware of the many danger of data analysis and interpretation brings on. Correlation with causation, subjective ideas and bias, wrong information and inappropriate data.
Suppose a study is conducted to one of the companies in El Salvador city Misamis Oriental to determine the factors affecting customer preferences among the residence of one barangays of El Salvador City ages 22 to 60 years old. The following data were given.

### Table 1
**Distribution of Respondents by Age**

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 – 30 yrs. old</td>
<td>170</td>
<td>45.33%</td>
</tr>
<tr>
<td>31 – 40 yrs. old</td>
<td>90</td>
<td>24.00%</td>
</tr>
<tr>
<td>41 – 50 yrs. old</td>
<td>80</td>
<td>21.33%</td>
</tr>
<tr>
<td>51 – 60 yrs. old</td>
<td>35</td>
<td>9.33%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>375</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**Interpretation of Data (Table 1)**

Table 2 reveals that almost 45.33 percent of the respondents are in the age bracket of 21- 30 years old compared to only 9.3 percent in ages 51 – 61 years old and above and 21.33 percent belonged to the 31- 40 age range.

This age profile is important as it also reflects the current age demographic for the Filipinos according to Philippine Statistics Authority (PSA). There is a much younger age cohort of teachers entering the workforce.

There is a much younger cohort who has the capacity to purchase product and services.

### Table 2
**Distribution of Respondents by Sex**

<table>
<thead>
<tr>
<th>Sex</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>230</td>
<td>61.33%</td>
</tr>
<tr>
<td>Female</td>
<td>145</td>
<td>38.67%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>375</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Interpretation of Data (Table 2)

Table 2 shows that 61.33 percent of the respondents are female compared to 38.67 percent males. This is representative of the current gender distribution of the population in the Philippines.

According to Philippine Statistics Authority (PSA) in 2015 of the total population in the Philippines, 50.40% are males and the rest are females.

This gender distribution is common among most countries where male becomes more in population than female (Skelton, 2012).

STOP! Now it’s your turn to answer the following questions below □

Supposes a study is conducted to one of the stores in your barangay to determine the factors affecting customer preferences among the residences ages 22 to 60 years old. The following data were given.

Table 3
Distribution of Respondents by Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 – 30 yrs. old</td>
<td>38</td>
<td>42.22</td>
</tr>
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<td>21</td>
<td>23.33</td>
</tr>
<tr>
<td>41 – 50 yrs. old</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>51 – 60 yrs. old</td>
<td>13</td>
<td>14.44</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>90</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Kindly give your interpretation on the given data in table 3.

Suppose you want to determine the factors affecting customer preferences among the residence of one of the barangays of El Salvador City ages 22 to 60 years old. What particular data analysis method will you use?
Multiple Choice: Encircle the letter of the best answer

1. What does quantitative data refers to?
   e. graphs and tables.
   f. numerical data that could usefully be quantified to help you answer your search question(s) and to meet your objectives.
   g. any data you present in your report.
   h. Statistical analysis

2. Which measure of central tendency is obtained using the middle score when all scores are organized in numerical order?
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A survey was conducted to know the audience feedback on a dance presentation. It asked this question:

“In your opinion, the dance presentation was entertaining, boring or neither?”

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<td></td>
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<tr>
<td>C</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td></td>
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</tr>
<tr>
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<td></td>
<td>1</td>
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<td><strong>3</strong></td>
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7. What percentage of the respondents said that the dance presentation is entertaining?
   a. 50%    c. 70%
   b. 60%    d. 20%

8. What percentage of the respondents said that the dance presentation is boring?
   a. 50%    c. 70%
   b. 60%    d. 20%

9. What percentage of the respondents said that the dance presentation is neither entertaining or boring?
   a. 50%    c. 70%
   b. 60%    d. 20%

10. The total marks obtained by few students in mathematics exam are 100, 160, 154, 95 and 82. What is the mean?
    a. 117.2    c. 119.2
    b. 118.2    d. 120.2

11. The following are the methods use in quantitative data analysis **except**
    a. Data Validation  c. Data Coding
    b. Data Editing  Data Coding  d. Data Correction

12. What are the two commonly used tool in quantitative data analysis
    a. Descriptive Statistics  c. Measures of Central Tendency
    b. Inferential Statistics  d. both a and b
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<td>16</td>
</tr>
<tr>
<td>17</td>
</tr>
<tr>
<td>18</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Mean 16.07

<table>
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<tr>
<th>Gender</th>
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<tbody>
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</tr>
<tr>
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<tr>
<td>Total</td>
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</tbody>
</table>

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   a. Most of the Grade 10 students were at their correct age level which is grade 10
   b. Only 3.6% of the respondent is 18 years old
   c. Most of the grade 10 students age is 16 years old
   d. All of the above

14. Based on the respondent’s gender, what can be inferred?
   a. Most of the Grade 10 students are female
   b. Most of the Grade 10 students are male
   c. Both a and b
   d. None of the above

15. The following are descriptive statistics use in quantitative research except one.
   a. Mean
   b. Mod
   c. Feasibility Study
   d. Percentage
ADDITIONAL ACTIVITIES

Activity 1

Suppose you want to sell your product to one of the school canteen of El Salvador city thus you conducted study to one of the schools in El Salvador city Misamis Oriental to determine the factors affecting consumer preferences of the students ages 16 to 19 years old. The following data were given.

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
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<td>24.39</td>
</tr>
<tr>
<td>18 yrs. old</td>
<td>150</td>
<td>18.29</td>
</tr>
<tr>
<td>19 yrs. old</td>
<td>100</td>
<td>12.20</td>
</tr>
<tr>
<td>Total</td>
<td>820</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 1
Distribution of Respondents by Age

Kindly write your interpretation, based on the data given in table 1. Remember to write first the comparison and contrast of the data given, its implication to the study and connect it with your review of related literature.
Activity 2

The same research study given in activity 1 was conducted. The following data were given below

<table>
<thead>
<tr>
<th>Sex</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>430</td>
<td>52.43</td>
</tr>
<tr>
<td>Female</td>
<td>390</td>
<td>47.56</td>
</tr>
<tr>
<td>Total</td>
<td>820</td>
<td>100</td>
</tr>
</tbody>
</table>

Kindly write your interpretation, based on the data given in table 2. Remember to write first the comparison and contrast of the data given, its implication to the study and connect it with your review of related literature.
Activity 3

The same research study given in activity 1 was conducted. The following data were given below:

Table 3
Distribution of Respondents by Daily Allowance

<table>
<thead>
<tr>
<th>Daily Allowance</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Php20</td>
<td>120</td>
<td>14.63</td>
</tr>
<tr>
<td>Php20 – below Php30</td>
<td>200</td>
<td>24.39</td>
</tr>
<tr>
<td>Php30 – below Php40</td>
<td>150</td>
<td>18.29</td>
</tr>
<tr>
<td>Php40 – below Php50</td>
<td>100</td>
<td>12.20</td>
</tr>
<tr>
<td>Above Php50</td>
<td>250</td>
<td>30.49</td>
</tr>
<tr>
<td>Total</td>
<td>820</td>
<td>100</td>
</tr>
</tbody>
</table>

Kindly write your interpretation, based on the data given in table 3. Remember to write first the comparison and contrast of the data given, its implication to the study and connect it with your review of related literature.

Suppose you want to determine the factors affecting customer preferences among the residence of barangay Poblacion, El Salvador City ages 22 to 60 years old. What particular data analysis method will you use?
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. b</td>
<td>6. a</td>
<td>11. d</td>
</tr>
<tr>
<td>2. b</td>
<td>7. b</td>
<td>12. d</td>
</tr>
<tr>
<td>3. a</td>
<td>8. b</td>
<td>13. d</td>
</tr>
<tr>
<td>4. c</td>
<td>9. c</td>
<td>14. a</td>
</tr>
<tr>
<td>5. b</td>
<td>10. b</td>
<td>15. c</td>
</tr>
</tbody>
</table>
REFERENCES

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Bhat, A. 2019. Five Methods Used for Quantitative Data Collection. shorturl.at/abmqZ


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