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Reg. no: COM/0501/21

**Primary Sources/data and Secondary Sources of data.**

Primary sources of data and secondary sources of data are two fundamental categories used to classify the origin and nature of data in research and information gathering. Here's an overview of each:

1. Primary Sources of Data:

Primary sources of data are original, firsthand pieces of information or data that are directly collected or created for a specific research purpose. These sources provide raw and unmediated information, offering a unique perspective on a particular topic. Common examples of primary sources include:

a. *Surveys and Questionnaires:* Researchers create surveys or questionnaires to collect data directly from individuals, asking questions related to their experiences, opinions, or behaviors.

b. *Observations*: Researchers directly observe and record events, behaviors, or phenomena as they occur. This method is often used in ethnographic studies or scientific observations.

c. *Interview*: Conducting interviews with individuals or groups to gather firsthand information, insights, or personal narratives.

d. *Experiments:* In experimental research, researchers manipulate variables and collect data to understand cause-and-effect relationships.

e. *Diaries and Journals:* Personal accounts, diaries, or journals can serve as primary sources when studying historical events or individuals' experiences.

2. Secondary Sources of Data:

Secondary sources of data, on the other hand, involve using existing information or data that has been collected, analyzed, and published by others for various purposes. These sources provide a synthesized or interpreted view of the original data.

a. *Books and Research Papers:* Published works that summarize, analyze, or interpret data and research findings. They often provide a broader context or synthesis of existing knowledge.

b. *Magazine and Newspaper Articles*: Articles written by journalists or authors that report on research findings or events, often providing a condensed and accessible overview.

c. *Databases and Online Resources*: Online databases, such as academic journals, government databases, or statistical repositories, that compile and organize data from various primary sources.

d. *Literature Reviews:* Academic papers or reports that review and summarize existing research on a particular topic, providing a synthesis of primary research findings.

e. *Encyclopedias:* Reference sources that provide concise summaries of information on various topics, drawing from primary and secondary sources.

**Descriptive statistics and inferential Statistics**

Descriptive statistics and inferential statistics are two branches of statistics used to analyze and interpret data in research and data analysis. They serve different purposes and provide distinct insights into data sets.

1. Descriptive Statistics:

Descriptive statistics involve methods and techniques used to summarize and describe the main features or characteristics of a data set. These statistics help researchers and analysts organize and present data in a meaningful way to gain a better understanding of the data's basic properties.

a. Measures of Central Tendency: These statistics describe the central or typical value in a data set. The most common measures of central tendency are the mean (average), median (middle value), and mode (most frequently occurring value).

b. *Measures of Dispersion:* These statistics quantify the spread or variability within a data set. Common measures of dispersion include the range, variance, and standard deviation.

c. Frequency Distributions: These show how often each value or category occurs in a data set. Histograms and bar charts are visual representations of frequency distributions.

d. *Measures of Position:* These statistics provide information about the relative position of a data point within a data set, such as percentiles and quartiles.

e. *Summary Tables and Graphs:* Tables and graphical representations like box plots, scatterplots, and pie charts are used to summarize and visualize data.

Descriptive statistics are primarily used to provide a concise summary of the data, identify patterns and trends, and gain insights into the data's basic characteristics.

2. *Inferential Statistics:* Inferential statistics involve techniques and methods used to make predictions, draw conclusions, and make inferences about populations or larger data sets based on a sample of data. These methods allow researchers to make generalizations and test hypotheses.

a. *Hypothesis Testing:* Inferential statistics are used to test hypotheses about population parameters. Researchers collect a sample from the population and use statistical tests to determine whether observed differences or relationships are statistically significant.

b. *Confidence Intervals:* These provide a range of values within which a population parameter is likely to fall. Confidence intervals help quantify the uncertainty associated with sample estimates.

c. *Regression Analysis:* This technique is used to model and analyze the relationship between variables and make predictions based on that relationship.

d. *Analysis of Variance (ANOVA):* ANOVA is used to compare means among multiple groups or treatments to determine if there are statistically significant differences.

e. *Probability Distributions:* Probability distributions, such as the normal distribution, are used to make probabilistic statements about population parameters.

**Qualitative Variables and Quantitative Variables**

Qualitative variables and quantitative variables are two fundamental types of variables used in statistics and data analysis.

1. *Qualitative Variables (Categorical Variables):*

- Qualitative variables, also known as categorical variables, represent data that can be categorized into distinct groups or categories based on specific characteristics or attributes.

- These variables do not have a natural numerical order or magnitude. Instead, they represent differences in kind or quality.

- Examples of qualitative variables include gender (categories: male, female, non-binary), marital status (categories: married, single, divorced), and colors (categories: red, blue, green).

- Statistical analysis of qualitative variables involves techniques like frequency counts, percentages, and bar charts to describe the distribution of categories within the data.

2. *Quantitative Variables (Numerical Variables):*

- Quantitative variables, also known as numerical variables, represent data that can be measured on a numerical scale. These variables have both magnitude and order.

- There are two types of quantitative variables: discrete and continuous. Discrete variables represent countable values, while continuous variables represent values that can be measured with infinite precision.

- Examples of discrete quantitative variables include the number of children in a family or the number of students in a class. Examples of continuous quantitative variables include age, height, weight, and temperature.

- Statistical analysis of quantitative variables involves a wide range of techniques, including measures of central tendency (e.g., mean, median), measures of dispersion (e.g., variance, standard deviation), and various types of graphical representations (e.g., histograms, scatterplots).