APPLIED STATISTICS IN PHYSICAL EDUCATION

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Unit-I Introduction Meaning and Definition of Statistics. Function, need and importance of Statistics. Types of Statistics. Meaning of the terms - Population, Sample and Data. Types of data (Nominal, Ordinal, Interval and Ratio) and collecting measures. Variables: Discrete, Continuous. Parametric and non-parametric statistics.

MEANING AND DEFINITION

•Statistics is a branch of mathematics dealing with the collection, analysis, interpretation, presentation, and organization of data. – **Croxton and Cowden.**

•Statistics are numerical statement of facts in any department of enquiry placed in relation to each other. – **Bowley**

FUNCTIONS, NEED AND IMPORTANCE OF STATISTICS

Functions:

☐ Simplifies complexity.

☐ One of the important functions of statistics is to present statements in a precise and definite form.

☐ Help to compare the data.

☐ Enlarges individual experiences.

☐ Formulates and test hypothesis.

☐ Tests the laws of sports sciences.

☐ The statistical technique for extrapolation is highly useful for forecasting future event.

☐ The extent of relationships between different data can be measured.

1. Statistics is essential for a country. It supplies essential information to run a government.

2. Statistics is an indispensable tool in all the aspects of economic study, in business to make maximum profits.

3. Statistics is necessary for the formulation of policies to start new courses, consideration of facilities and further research in education.

4. Statistical methods and statistical data are indispensable in research work.

5. In physical education and sports sciences, it helps to collect the data.

6. Helps to analyse the team performance in the tournament based on their previous win or loss.

7. In cricket, football and other sports statistics helps to give the various information to the players, coaches and opponents regarding each players performance and fitness level.

1. Descriptive Statistics

Descriptive statistics focuses on summarizing and presenting data in a way that makes it easier to understand and interpret. It involves organizing and analyzing data to describe its key features.

Methods:

•**Measures of Central Tendency**: Mean, median, and mode (summarize data by identifying the center of a data set).

•**Measures of Dispersion**: Range, variance, and standard deviation (indicate the spread or variability in the data).

•**Graphical Representation**: Charts, graphs, histograms, and pie charts for visual data interpretation.

Example:

•Calculating the average score of students in a class.

•Displaying sales trends over a month using a bar chart.

2. Inferential Statistics

Inferential statistics involves drawing conclusions, making predictions, or testing hypotheses about a population based on data collected from a sample.

Methods:

•**Estimation**: Determining population parameters (e.g., estimating the population mean based on a sample).

•**Hypothesis Testing**: Testing claims or assumptions about a population using tests like t-tests, chi-square tests, or ANOVA.

•**Regression Analysis**: Examining relationships between variables to make predictions.

•**Confidence Intervals**: Providing a range of values within which a population parameter is likely to fall.

Example:

•Estimating the percentage of voters favoring a candidate based on a survey.

•Testing whether a new drug is more effective than an existing one.

1. Population

A **population** refers to the entire set of individuals, objects, or events that a researcher is interested in studying. It represents the "whole" group about which conclusions are to be drawn.

Examples:

All citizens of a country.

All trees in a forest.

All manufactured cars of a specific model.

2. Sample

A **sample** is a subset of the population selected for analysis. It is used because studying the entire population may be impractical or impossible.

Examples:

A group of 500 students chosen from all students in a university.

A survey of 1,000 voters from a country's total voting population.

Testing 100 cars out of 10,000 produced in a factory.

3. Data

Data refers to the actual values or information collected from the population or sample. It is the raw material for statistical analysis.

Types of Data:

Quantitative Data: Numerical values (e.g., age, weight, income).

Qualitative Data: Categorical information (e.g., gender, favorite color, marital status).

Examples:

Heights of students in a sample (quantitative).

Responses to a survey question about preferred brands (qualitative).

Types of Data

1.Quantitative Data (Numerical Data)

Data that consists of numbers and represents measurable quantities.

- **Types**:
  - **Discrete**: Represents countable values (e.g., number of students, number of cars).
  - **Continuous**: Represents measurable values that can take any value within a range (e.g., height, temperature).

Examples:

- Discrete: Number of goals scored in a match.
- Continuous: Weight of a person.

2.Qualitative Data (Categorical Data)

Data that represents categories or qualities and cannot be measured numerically.

- **Types**:
  - **Nominal**: Categories with no inherent order (e.g., gender, eye color).
  - **Ordinal**: Categories with a meaningful order but no fixed interval (e.g., rankings, satisfaction levels).

Examples:

- Nominal: Types of fruits (apple, banana).
- Ordinal: Education level (high school, bachelor's, master's).

B. Based on Measurement Levels

1.Nominal Scale: Data with names or labels, without any order.

- Example: Types of vehicles (car, bike, truck).

2.Ordinal Scale: Data with a meaningful order, but intervals are not equal.

- Example: Ratings (poor, average, excellent).

3.Interval Scale: Numerical data with equal intervals but no true zero.

- Example: Temperature in Celsius.

4.Ratio Scale: Numerical data with equal intervals and a true zero.

- Example: Weight, height, age.

Variables

Variables are elements, features, or factors that are liable to change or vary. In the context of research and statistics, variables can be classified into different types:

Discrete Variables: These are countable variables that can take on a finite number of values. Examples include the number of students in a class or the number of goals scored in a match.

Continuous Variables: These can take on an infinite number of values within a given range. Examples include height, weight, and time.