Need and Importance of Statistics in Physical Education
• **Collection of data**- collection of data helps to produce large data base to generate new information.
• This data base can be developed on sports trends, preference of sports persons, participation, health, fitness and sports.
• The data can be collected by primary and secondary sources.

• **Presentation of data**- In statistics, the data are presented in a **tabular, graphic and diagrammatic form**.

The *age* of the students, *weight* of the players and *motivation* scores etc. could be explained with the use of tabular and graphic method.

The **social factors such culture, values and rebellion variables** can also be described by graphic representation.

Classify data according to **different strata, demography such as gender, age, performance level** that is represented in tabular form.
• **Description of data** — there are various methods to describe the data and help to draw valid conclusions. Following are some of the methods which are used in researches in physical education.

  • *Use of measures of central tendency in physical education*— measures of central tendency, which are popularly known for average, play a vital role in the analysis in physical education studies. There are various types of average, the most common are mean, median and mode. Each has its own uniqueness and importance in physical education studies.
• **Use of measures of dispersion**- central tendency throws light on the central position of variable but never reflect other issues.
• It is possible that the average of two different phenomena may be the same but they may differ widely as to their concentration.
• The measures of dispersion are used to know the movement of individual score away from central tendency.
• Standard deviation, skewness and kurtosis are most commonly used in the studies of physical education.
• **Inferences** - The researcher attempts to reach conclusions and make inferences about the population by using following statistical techniques:

• **Use of comparison** – the comparison between two groups or more than two group in dependent group or independents groups can be analysed by comparison statistics.

For example - In physical education, the effect of training program can be compare between experimental and control group with the help of comparative statistics.

**T-test, anova, ancova and repeated measure anova** are the some examples of comparative statistics.
Use of correlation and regression - the relationship between two or more variables can be analysed by correlation technique in statistics.

If there is negative correlation between two variables, it indicates that the increase in one variable is related with the decrease in another variable.
– **Use of sampling** – when a researcher is unable to collect data of population, the sampling method is used in which data is collected from few subjects known as sample.

– There are various methods of sampling. Each sampling method has its own importance in physical education research.
BASIC STATISTICAL CONCEPTS

DESCRIPTIVE STATISTICS

- Describing the data gathered on a group and reaching to the conclusion about the same data, the statistics are called descriptive statistics.
- For example, if a researcher wants to assess the problems faced by athletes during practice for enhancing performance, he may produce statistics to summarize the problems occur with athletes and uses those statistics to reach conclusions about that problem of athletes, the statistics are descriptive.
- The researcher can use these statistics to discuss average of problems, a range of problems, minimum, maximum and any other data measurements for describing the athletes problems.
• **Inferential Statistics**

• Gathering a data from a sample and using the statistics generated to reach conclusions about the population from which the sample was selected randomly, the statistics are inferential statistics.

• The data collected is used to infer something about a larger group.

• For example, a researcher wants to compare the problems faced by athletes in different sports. Collecting a data from all the athletes is difficult and therefore the collection of data must be limited to small randomly selected sample.

• The researcher then attempts to reach conclusions and make inferences about the population.
Data Measurement level

- **Nominal Data**: Which is the lowest level of measurement, is used to classify or categorise, for example: we may like to know which fruit a person like or which is liked by some particular group, or which area, place a particular group or player or person belong to.

- The data which we receive through nominal is not in metric, it is non-metric, it is more of information rather than score.

- It helps us in doing the classification and categorisation of data on the basis of predefined categories.
• **Ordinal Data:**

• The level higher than the nominal is ordinal where we rank the objects, like in the previous example we asked about the favourite fruit, favourite sport or the area, place of a particular group belonging to.

• The same information can be collected on ordinal scale if we ask them to rate their favourite fruit, sport, place in preferential order from high to lowest.

• In the nominal level data, wherein the information of a particular fruit, sport or place hide lot of information, ordinal data provides more scope for interpretation. In fact, saying orange is an favourite fruit or football as a favourite sport or Delhi as best place to visit, does not mean that the person does not like any other fruit or sport or place.
• When in ordinal scale, where we asked subject to rate for the option available, we are able to exploit more information from subjects which is important at various point of time for various studies.

• Knowing apart from football as a choice for favourite sport or apart from selection of orange as a favourite sport, it give very good information about the preferential order related to second, third, fourth best choices available from the pool of options available.

• With this advantage, placing ordinal data on a level higher on order to nominal data, the ordinal data is again non-parametric data, because the difference between the consecutive numbers or consecutive answers is not equal, rather it doesn’t give much meaning to it.

• The difference between an orange, apple, mango and banana may not be equal. The different between football, hockey, cricket may not be equal and does not give much meaning to it.
• **Interval Data:**

• When the distance, difference between consecutive numbers have meaning, the interval is equal and the data is metric, it become of a higher order than the ordinal level which is called as interval measurement level data.

• The interval measurement level data, the data is in numerical instead of statement. The distance between the consecutive numbers is equal and it has meaning to it wherein zero is just another score. For example, temperature which is zero degrees centigrade does not mean it is the coldest or zero phenomenon, it is another temperature or a score in the scale.
• **Ratio Data:**
  • The highest level of measurement is ratio data measurement scale.

  • It has all the qualities and properties of interval scale. The only difference is that, the zero is fixed, that means zero represent “No Phenomenon”. For example, zero kg of weight or zero meter of height lead to interpret that the object does not exist, no phenomenon.

  • If object exist, there will be some score other than zero. Within all the levels of nominal, ordinal, interval and ratio measurement scale, former two ie: nominal and ordinal level data are non-metric data for which non-parametric statistic is used, whereas in interval and ratio level parametric statistics can be used.

  • With an exception, interval and ratio level being the highest level of the order, non parametric statistics can be used.