

## Biostatistics

Biostats is the science of collection, analysis & interpretation of facts & numbers connected with Biology.

Biostats is the application of statistics to a wide range of topics in Biology. The science of Biostats encompasses the design of Biological exp., collection of data, summarization & analysis of the data obtained from these experiments, interpretation of results & inference from the results.

Sir Francis Galton :- Father of Biostats.

### Scope of Biostats :-

- 1.) To help design the exp.
- 2.) " present the facts in a definite order.
- 3.) " simplify the mass of figures
- 4.) Helps in easy comparisons.
- 5.) For formulating & testing hypothesis
- 6.) Prediction of correlation b/w cause & effect.

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Page \_\_\_\_\_
7. Formulation of suitable biological indices
  8. Developing new policies.

Population :- Group of individuals or study elements or observations.

Sample :- A sample is a representative fraction of the population.

Applications of Biostats :-

1. Public Health including health services research, nutrition & environmental health.
2. Design & analysis of clinical trials in medicine.
3. Genomics, population genetics & various genetic studies in a population in order to link the variation in the genotype to variation in the phenotype.
4. Used in agriculture to improve crops & farm animals.
5. In Biomedical research to find genes which can cause or influence a disease in an organism.

6. In ecology & ecological forecasting.
7. Used in Biological sequence analysis.

### Data Collection & Tabulation :-

There are 4 specific aspects of statistical data.

- 1.) Collection of data.
- 2.) Presentation " "
- 3.) Analysis " "
- 4.) Interpretation " "

#### 1.) Collection of Data :-

The 1<sup>st</sup> step in a statistical investigation is the collection of data. The study of techniques of " " & its presentation helps us to draw conclusions from the collected data & also helps in analysis & interpretation.

Data can be primary or secondary data.

- 1.) Primary Data :- A data collected in its original form by an investigator for the first time is known as " " Data, Raw data or ungrouped data.

It is regarded as the 1<sup>st</sup> Hand informant. It can be obtained by personal investigation from the original source or by performing experiments.

2.) Secondary Data :- If the data is collected by some other person & have been processed at least once then the data is called as 2<sup>o</sup> data.

In scientific research 1<sup>o</sup> data is used w<sup>h</sup> is obtained from experimental results.

2.) Presentation of Data :-

Collected data are presented in an orderly manner to make the statistical analysis easy. There are different methods of presentation of data like tables, graphs, diagrams etc.

3.) Analysis of Data :-

The data represented in tables, diagrams or graphs are analysed carefully by various methods like measures of central tendencies, measures of dispersion, Regression, correlation, test of significance etc.

20/8/19.

#### 4.) Interpretation of Data.

Drawing conclusion from analysis of data is called as interpretation.

**Statistical Units :-** Units in which measurements are made in a statistical investigation are known as statistical units.

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**Types Data :-** The values recorded in an exp. or collected from an observation is called Data.

#### Types of Data :-

**Primary****Secondary**

- |                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Collected By the investigator</p> <p>First Hand information</p> <p>Original, accurate, reliable, requires more labour &amp; consumes more time &amp; money.</p> <p>also called as raw data.</p> | <p>1.) If the data is collected from any other source or by some other person &amp; is being processed at least once, it is called as secondary data.</p> <p>2.) It is easy to collect, requires less labours, time &amp; money.</p> <p>3.) Method of collection of data is not known.</p> <p>4.) Not so reliable &amp; accurate as compared to 1<sup>st</sup> data.</p> |
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Attributes :- Non measurable characteristics are called as attributes.

Variables :- All measurable characteristics.

- 2 types :-  
i) Discrete  
&  
ii) Continuous.

Discrete variables are those in which the complete data is in the form of whole numbers.

Continuous Variables :- the variable which can be represented in decimal form are " " " "

### Tabulation of Data :-

Tabulation is a process of orderly arrangement of data into series of rows & columns where they can be read in 2 dimensions.

Arranging data values into columns & rows is called Tabulation.

Tabulation is a form of presenting quantitative data in a condensed & concised form so that the numerical values are easy & quick to observe.

The logical & systematic presentation of numerical data into rows & columns designed to

simplify the presentation & facilitate comparisons is called tabulation.

### Significance of Tabulation :-

1. Simplest way to summarise data.
2. Tabulated data can be easily understood as compared to non tabulated data.
3. It simplifies the complex raw data.
4. " helps in comparison b/n different values of a parameter.
5. It gives identity to the data.
6. " shows diff patterns within the table.
7. " is most easy, simple & Best way to summarize data.
8. It helps in detection of errors & omissions.
9. Repetition of explanatory terms & phrases is avoided.

### Table & Parts of Table :-

Table :- It is a systematic arrangement of statistical data into rows & columns.

Table no. 1

Title

Table no 1: showing food Habits of students.

Head Note

|     | Food Habits | No of students |        |
|-----|-------------|----------------|--------|
|     |             | Boys           | Girls. |
| 1.  | Veg         |                |        |
| 2.  | Non veg.    |                |        |
| 3.  | Eggetarian  |                |        |
| 4.) | Vegan       |                |        |

caption

Body of the table.

Foot note & Source.

## Types of Table:-

- 1.) Simple & Complex Table:-
- 2.) General & Summary Table:-

### 1.) Simple & Complex :-

| Height of Plant. | 5-10 | 10-15 | 15-20 | Height of Plants (in cm) | No of Plants |              |          |              |
|------------------|------|-------|-------|--------------------------|--------------|--------------|----------|--------------|
|                  |      |       |       |                          | wheat        |              | Rice     |              |
| No. of Plants    | 5    | 10    | 7     |                          | Infected     | Non Infected | Infected | Non Infected |
|                  |      |       |       |                          |              |              |          |              |

Simple Table.

In a simple Table, only 1 characteristic is shown & it is also called as 1 way table.

Complex Table.

In a complex table 2 or more characteristics are shown. If the table includes 2 factors it is called as Double table & if 3 factors are included, it is called as a Treble Table.

## 2- General & Summary Table:-

These table contain detailed information & are not constructed for specific discussion. Such tables are not used for Biological research.

| Species of Fish. | No of Fishes Caught. |             |        |
|------------------|----------------------|-------------|--------|
|                  | Private Ponds.       | Govt. Ponds | Total. |
| 1. Labeo.        | 10                   | 12          |        |
| 2. Catla         | 5                    | 10          |        |
| 3.) Wallago.     | 6                    | 7           |        |
| Total.           |                      |             |        |