

BIOSTATISTICS

Definition and Basic Concepts

**An introduction to an expansive and
complex field**

BIO-STATISTICS

- (“Bio-) statistics” will mean analysis and interpretation with a view towards the reliability of the conclusions based on the biological experiments
- Is a *“science of figures which deals with collection, analysis and interpretation of facts and numbers connected with biology”*
- Also called **Biometry** refers to “Biological measurements”

Purpose and Scope

- **Collection of Data**
- **Methodologies to handle the data**
- **Analysis of data**
- **Development of valid inference**
- **Applications**

Some Important Terms

- **Statistics** – Summary data from a sample
- **Data** – A set of values recorded on one or more observations
 - **Primary** : collected by investigator
 - **Secondary** : Collected from another source
- **Sample** – A small representative fraction of a population drawn by using suitable method
- **Population** – A population is the group of individuals from which a sample is drawn
 - In research, it is not practical to include all members of a population
- **Parameters** – Numerical quantities from a population representing important characteristics
- **Observation** – Measurement of events

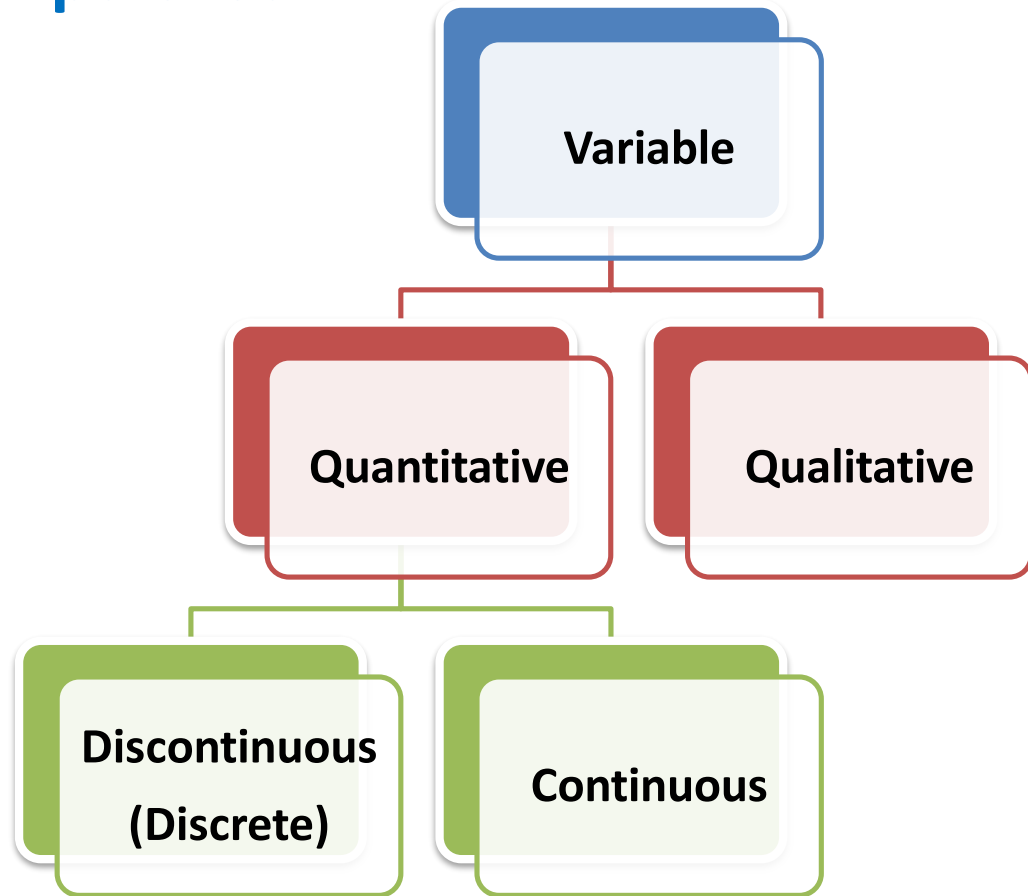
Variable – A characteristic that is observed or manipulated

– Independent variables

- The treatment or intervention that is used in a study
- Precede dependent variables in time
- Are often manipulated by the researcher

– Dependent variables

- What is measured as an outcome in a study
- Values depend on the independent variable



Statistical notations

- Summation - Σ
- Percent - %
- Mean - \bar{X}
- Equal to - =
- Greater than - >
- Lesser than - <
- Observed number - O
- Expected number - E
- Degree of freedom - df
- Number of groups/classes - K
- Probability - p
- Deviation - x
- Frequency - f
- Mean deviation - δ
- Standard deviation - σ
- Assumed mean - w
- Correction - c
- Length class interval - i

Types of biological data

- **A characteristic that varies from one biological entity to another is termed a *variable or variate***
 - ***Different types of variables may be encountered by biologists, and it is desirable to be able to distinguish among them***
1. **Data on a Nominal Scale: number, name, or letter**
 - **Examples**
 - **Gender (e.g., male, female)**
 - **Treatment (Positive/Negative)**

2. Data on an Ordinal Scale: ordered by rank

– Examples

- Pain level (e.g., mild, moderate, severe)
- Military rank (e.g., captain, major, colonel, general)

3. Data on an Interval Scale: a constant interval size but not a true zero

– Example

- Difference between 200°C and 300°C is the same as the difference between 50°C and 150°C

4. Data on a Ratio Scale: equal intervals size with true zero

– Example

- Difference in height between a 5cm and a 7cm plant is the same as the difference between 9cm and 11cm plant