

POPULATION
STATISTICAL
METHODS

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POPULATION

GENETICS

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INTRODUCTION

- ◆ Population genetics is the study of change in the frequencies of allele and genotype within a population.
- ◆ Population geneticists study the genetic structure of populations, and how they change geographically and over time.

- ❖ Gene – a discrete unit of hereditary information consisting of a specific sequence of DNA
 - Alleles – alternative forms of a gene

- ❖ Genotype – the genetic makeup of an organism
- ❖ Phenotype – the physical traits of an organism

HARDY WEINBERG PRINCIPAL

$$p^2_{(AA)} + 2pq_{(Aa)} + q^2_{(aa)} = 1$$

Under certain condition, allelic frequencies remain constant from generation to generation.

If any one condition is not made, genetic equilibrium will be disturbed and the population may evolve.

WHY ALLELE FREQUENCIES CHANGE

Five evolutionary forces can significantly alter the allele frequencies of a population

- i. Mutation
- ii. Migration
- iii. Genetic drift
- iv. Non-random mating
- v. Selection

MUTATION

- ◆ Errors in DNA replication result in mutation.
- ◆ Mutation can also be caused by mutagens.
- ◆ It is the ultimate source of new variation in a population.



MIGRATION

- ◆ Movement of individuals from one place to another.
- ◆ There are 2 types of migration :
 - a. Immigration : movement into a population
 - b. Emigration : movement out of a population



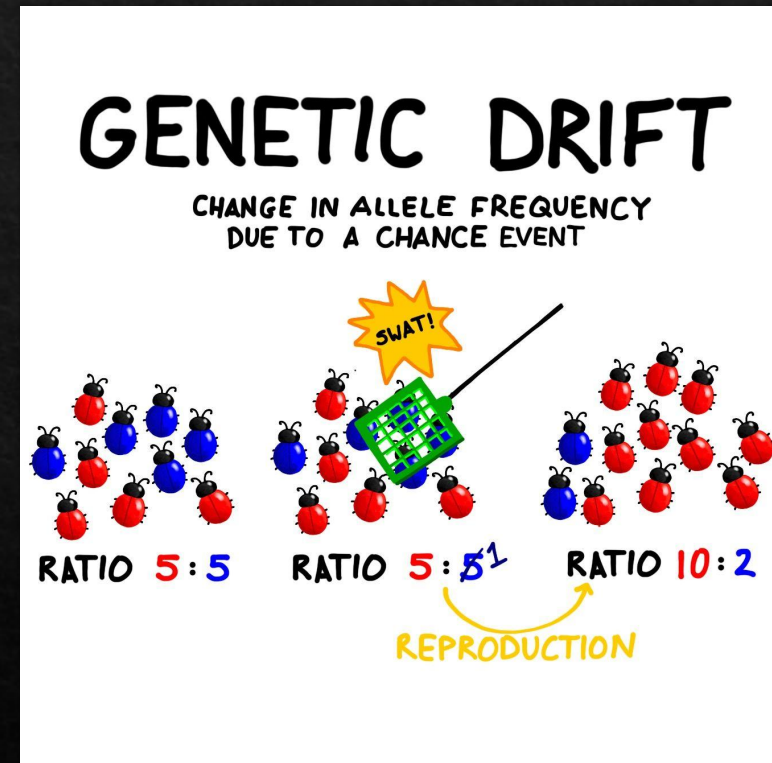
GENETIC DRIFT

- ❖ Founder effect

Small group of individuals establishes a population in a new location.

- ❖ Bottleneck effect

A sudden decrease in population size due to natural forces



NON-RANDOM MATING

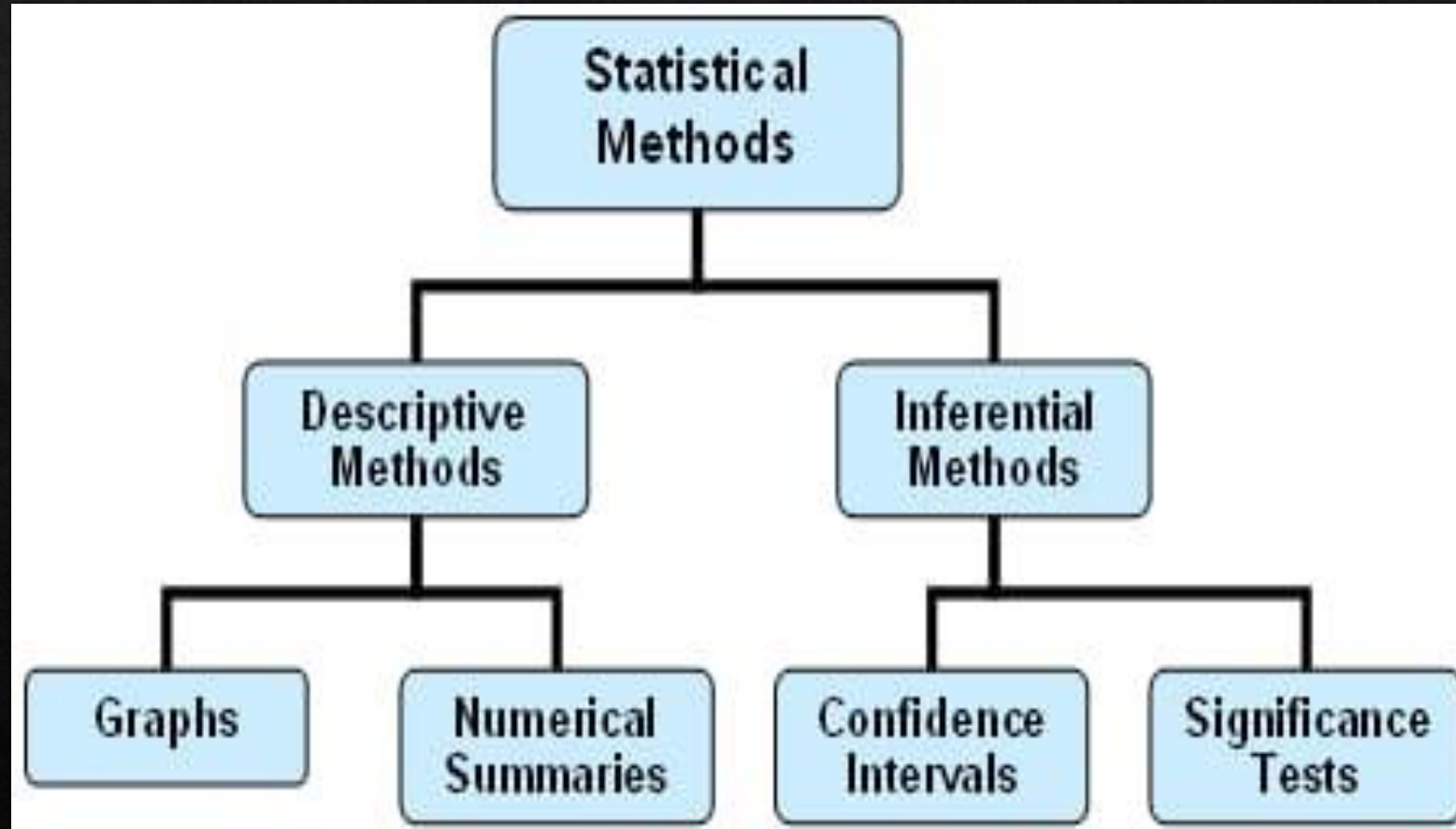
- ❖ Mating that occurs more or less frequently than expected
- ❖ Inbreeding
 - Mating with relatives
 - Increases homozygosity
- ❖ Outbreeding
 - Mating with non-relatives
 - Increases heterozygosity

SELECTION

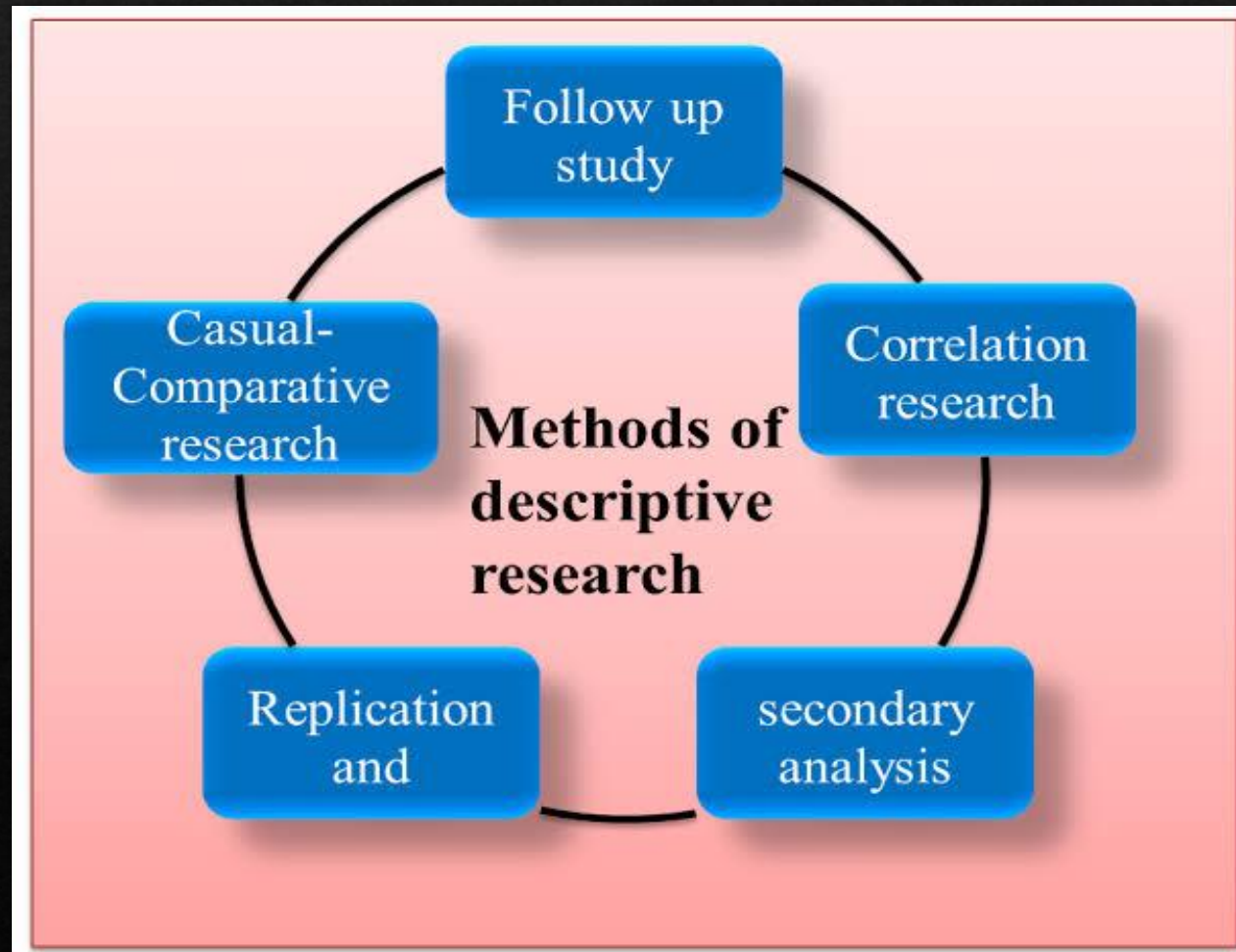
- ◇ Natural selection
 - Environment selects for adapted characteristics
- ◇ Artificial selection
 - Breeder selects for desired characters



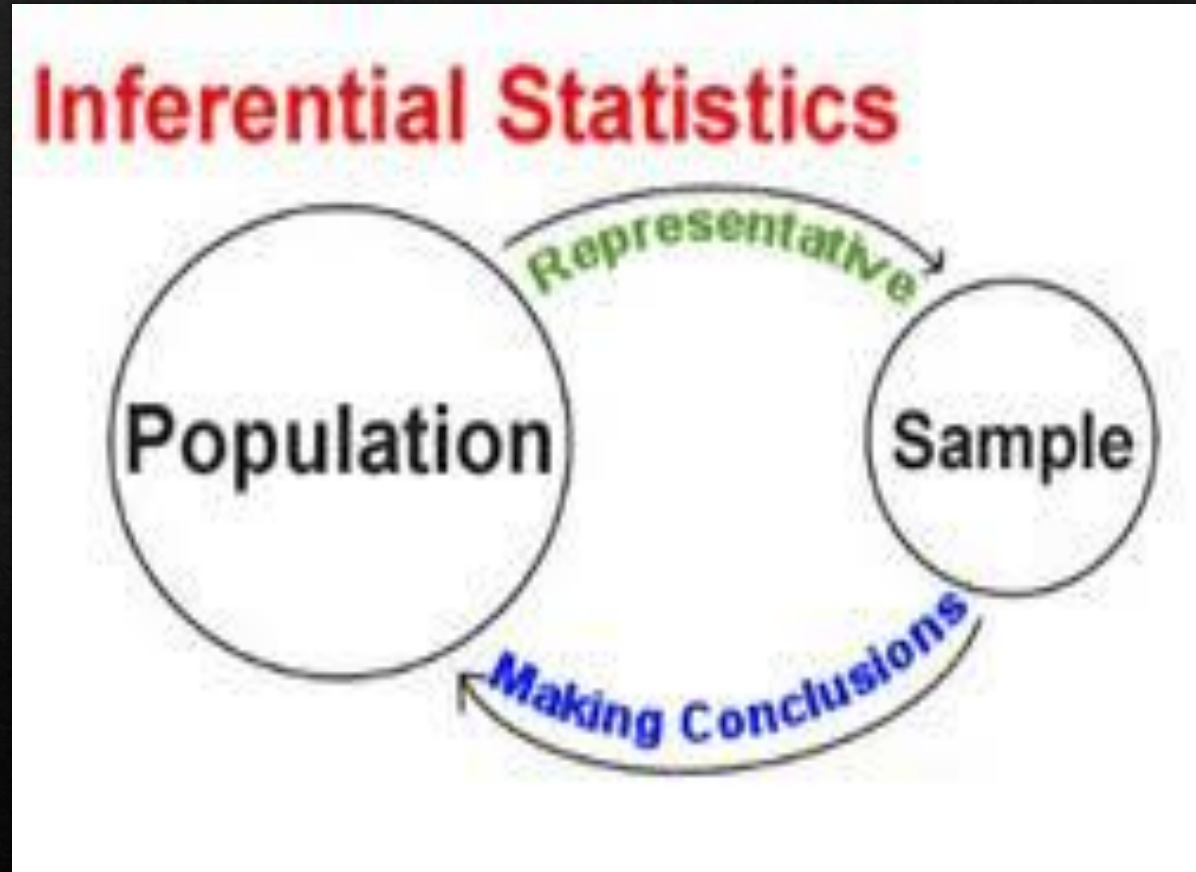
TYPES OF POPULATION STATISTICAL METHODS



DESCRIPTIVE METHODES



INFERENCEAL METHODES



THANK YOU MAM