

# 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





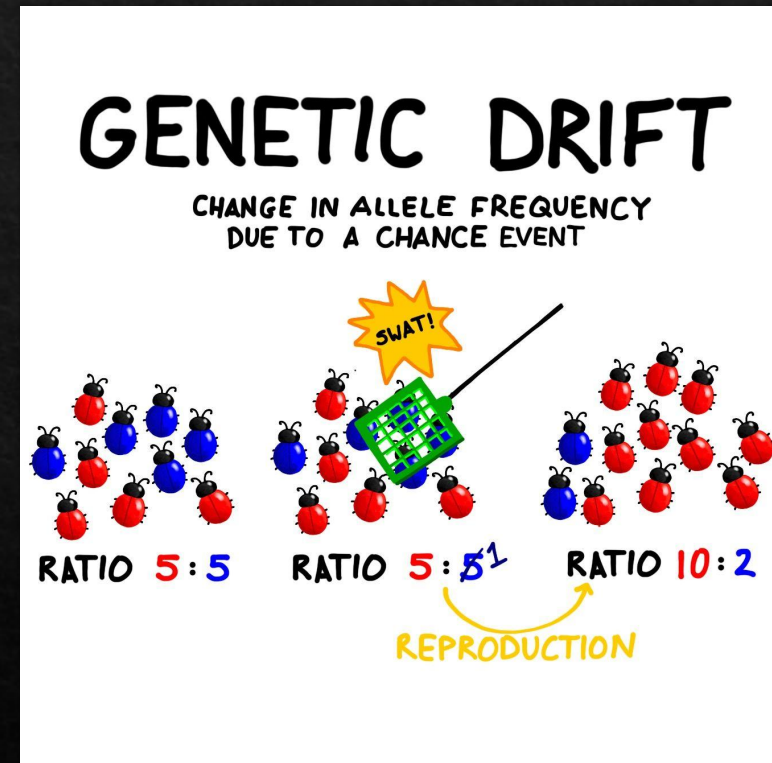
# GENETIC DRIFT

- ❖ 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

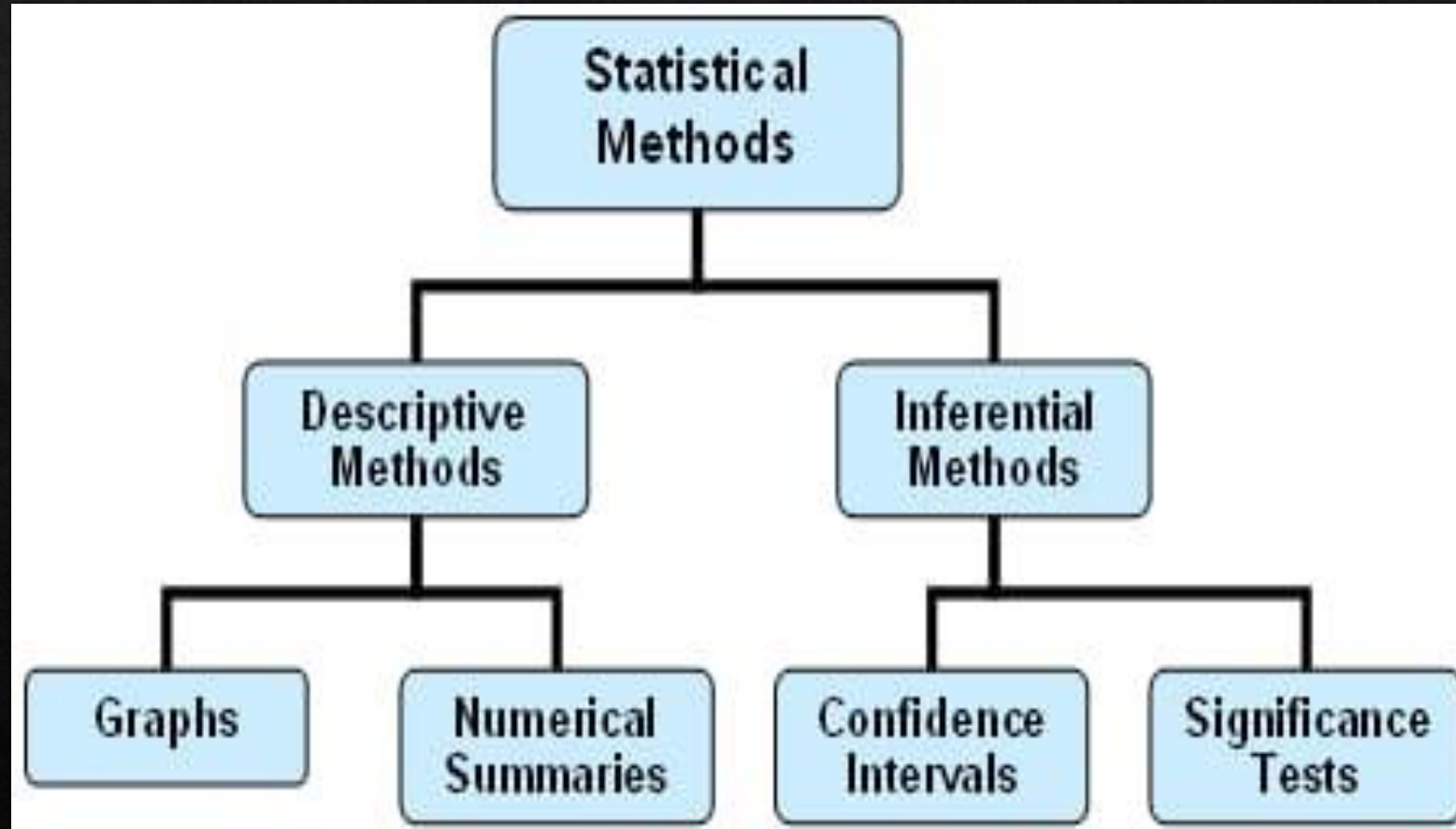


# SELECTION

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

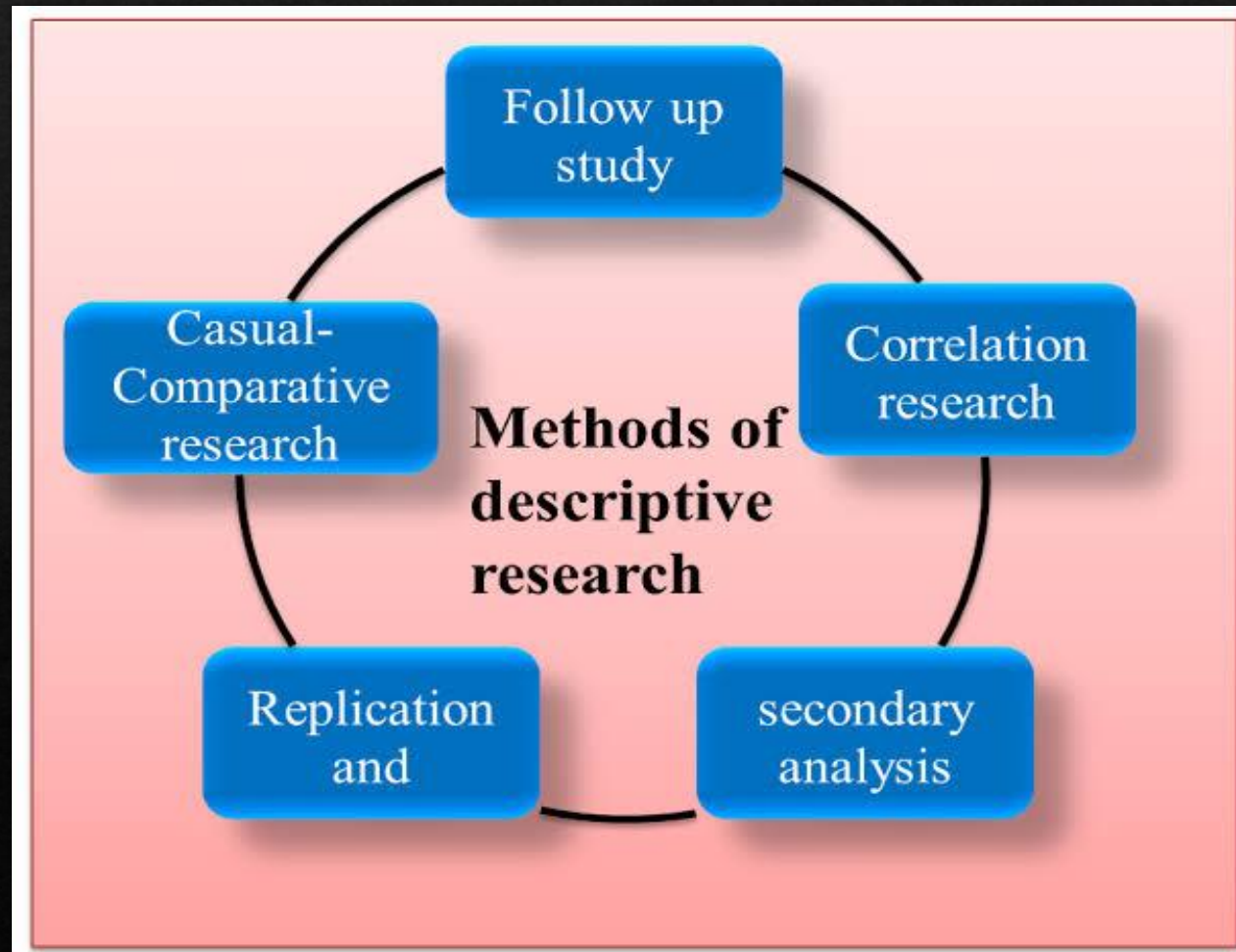


# TYPES OF POPULATION STATISTICAL METHODS

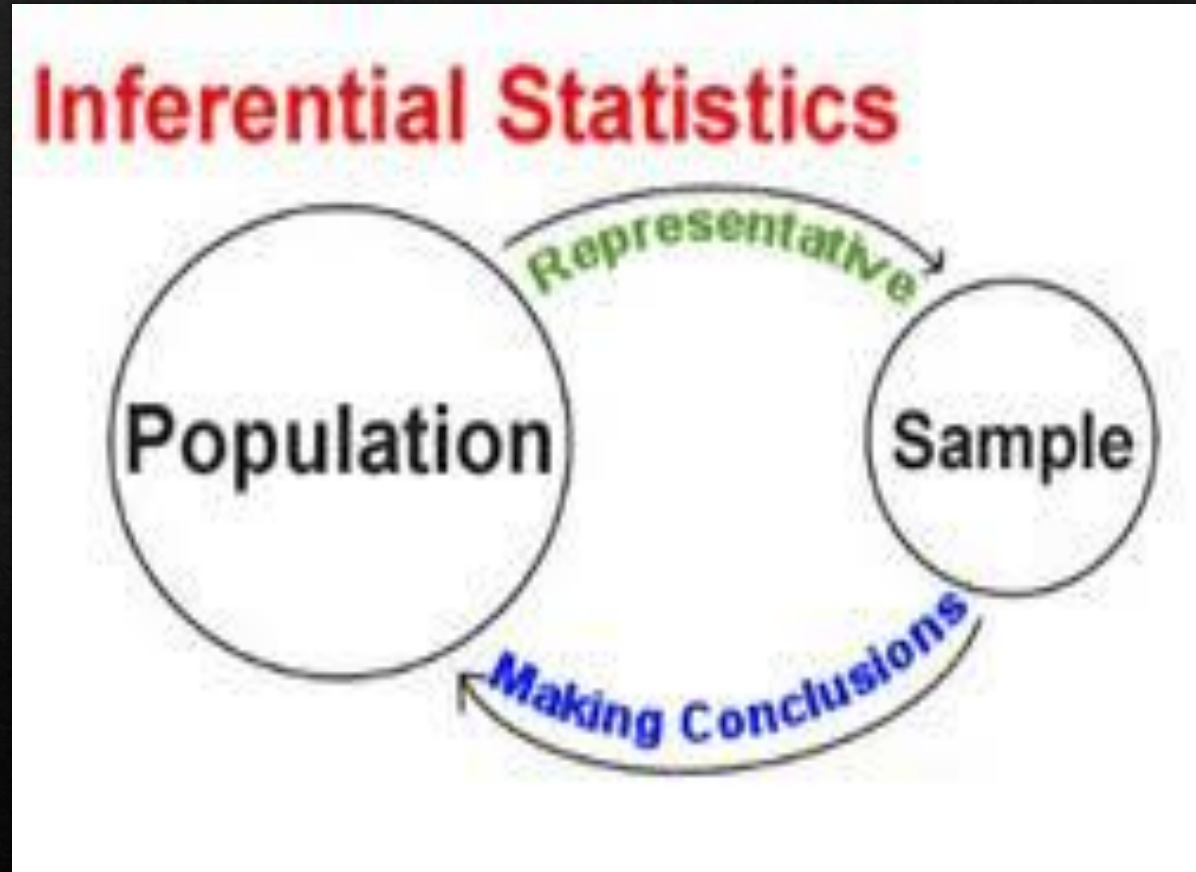




# DESCRIPTIVE METHODES



# INFERENCEAL METHODES





THANK YOU MAM