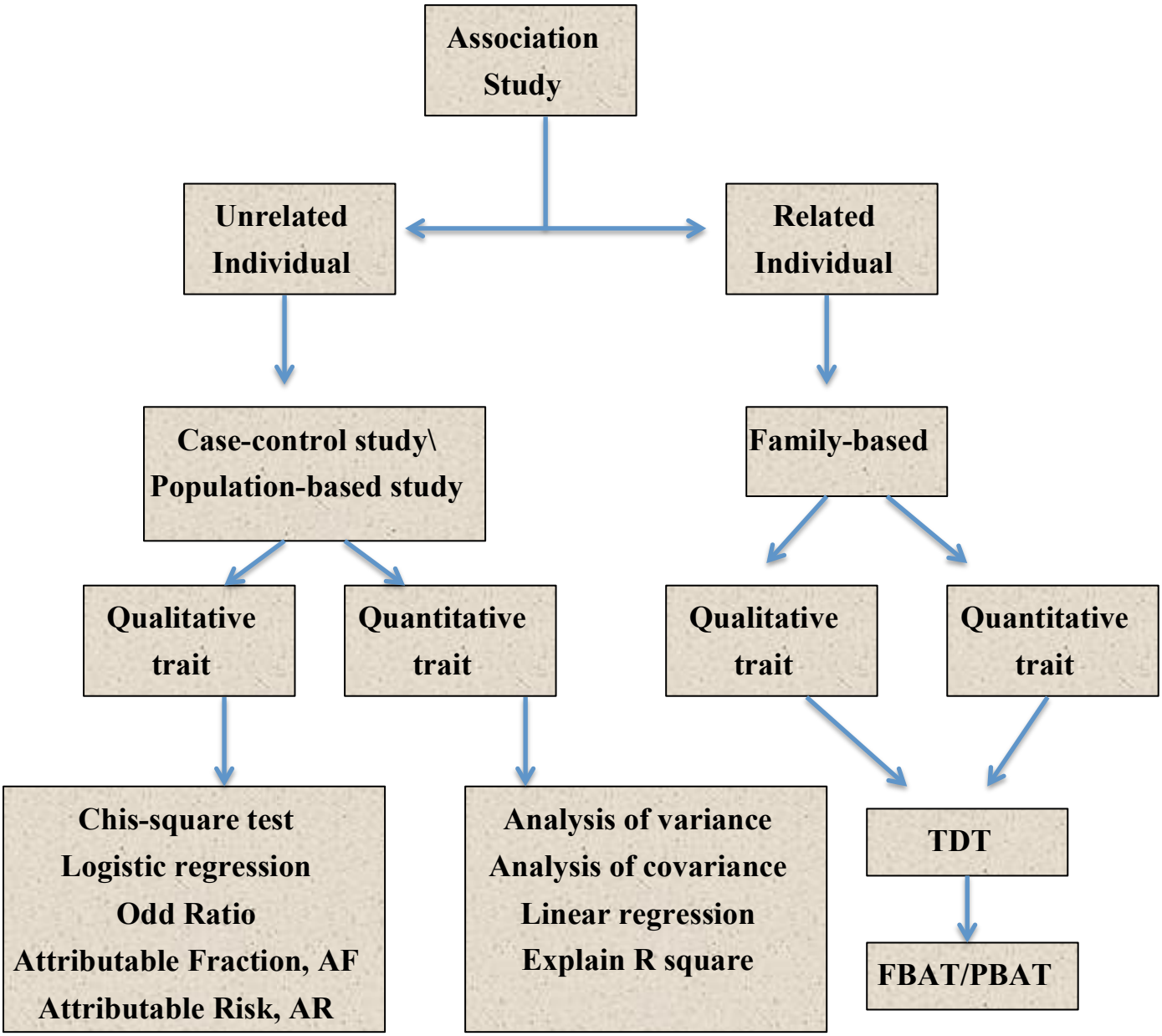
GWAS Statistical Principle

1 **Associated Studies of Unrelated Individuals.**

The design of this associated studies mainly have two analysis: Case-control analysis and Population-based association analysis. The former is basically used to detect the difference and characteristic distribution of genotypes between the group with disease and the control group. Normally, we can use "**chi-square test of four-fold table**"to compare the difference of gene frequency between two groups. If there exist a obvious significant, it means the association of the SNPs and the disease. And the Case-control analysis is always used in predisposing genes human disease and focus on qualitative character whereas the Population-based association analysis is mainly used for animals and plants and concentrates on quantitative characters.

2 **Associated Studies of Family-based association.**

Generally speaking, the reliability of analysis based on unrelated individuals is easily influenced by sample population stratification or other factors while the Family-based association studies can effectively increase the reliability.(What you should notice is that if the samples are composed by multiple families, it can still cause population stratification.) When we have a completed information of pedigree of samples, we can make use of **Transmission Disequilibrium Test (TDT)** to analysis the association effects between SNPs and the quantitative characters we focused on.


Association Study
Unrelated Individual
Related Individual
Case-control study\ Population-based study
Family-based
Qualitative trait
Quantitative trait
Qualitative trait
Quantitative trait
Chis-square test
Logistic regression
Odd Ratio
Attributable Fraction, AF
Attributable Risk, AR
Analysis of variance
Analysis of covariance
Linear regression
Explain R square
TDT
FBAT/PBAT