

Module 1: Basics of Studies

Questions when creating a study:

1. Outcome of interest?
2. Groups?
3. Population?
4. Type of Study?

Comparative studies are intended to show differences of an outcome between two or more groups.

Cross Sectional - Collected at one point in time

Longitudinal - multiple data sets collected at different points in time

Retrospective - Collecting "group data" on selected outcomes

Prospective - Collecting "outcome" on selected groups

Cohort studies gather data on groups of interest

| Study Design | Pros | Cons |
|----------------------|----------------------|------------------|
| Randomized trials | Strength of evidence | May be unethical |
| Cohort studies | Relative risk | Bias confounding |
| Case-Control studies | Easy and inexpensive | Bias confounding |
| Cross-sectional | Simplest | Weakest evidence |

Confounding occurs when a relationship between an exposure (risk factor) and a outcome (disease) is misrepresented because each of these variables is also related to a 3rd variable, the confounder. Ex. Ice cream sales and violent crimes both increase when it is hot outside.

Prevalence: The proportion of sampled individuals that possesses a condition of interest at a given time. Likelihood of being a case at a given point in time.

Incidence: The proportion of individuals that develop a condition of interest over a defined period of time. Risk of becoming a case over a period of time.

Interaction (Effect Modification) occurs when the magnitude of the effect of the primary exposure on an outcome (i.e., the association) differs depending on the level of a third variable.

Measures of Association

| | Cases (Have Disease) | Controls (No Disease) |
|--|----------------------|-----------------------|
|--|----------------------|-----------------------|

| | | |
|-----------|---|---|
| Exposed | a | b |
| Unexposed | c | d |

Odds Ratio (OR) = $(a/c) / (b/d) = a*d / b*c$ = Odds that a Case was Exposed / Odds that a Control was Exposed

Relative Risk (RR) = $(a / (a + b)) / (c / (c + d))$ = Risk of Disease of Exposed / Risk of Disease Unexposed

If the OR is greater than 1 than the risk factor is associated with disease, less than 1 suggests its a protective factor and =1 suggests no association.

This is often used when searching for food-borne illnesses. They are quick and cheap, and can be used for uncommon disease. It falls short when finding rare exposures, and it can be difficult to find a representative control selection who can accurately recall if they were exposed.

The main measurement used in cohort studies is called the Relative Risk (RR), which is the risk of disease for those exposed to a risk factor over the risk of disease in the unexposed group.

RR > 1 is increased risk, RR < 1 is lower risk, RR = 1 is same risk

Mantel-Haenszel Method (mOR) is used to compare the odds ratio between two strata defined by counfounders. Ex. the rate of lung cancer in shipbuilders and non-shipbuilders, stratified on those who smoked. We would call this the OR adjusted by smoking.

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