بسم الله الرحمن الرحيم

کارگاه روش تحقیق

جلسه چهارم

اهداف

- **درپایان جلسه انتظارمیرود فراگیران بتوانند:**
- انواع متغیرها نام ببرند
- تقسیم بندی مطالعات در علوم پزشکی را بیان کنند
- انواع مطالعات توصیفی را نام ببرند و هرکدام را توضیح دهند
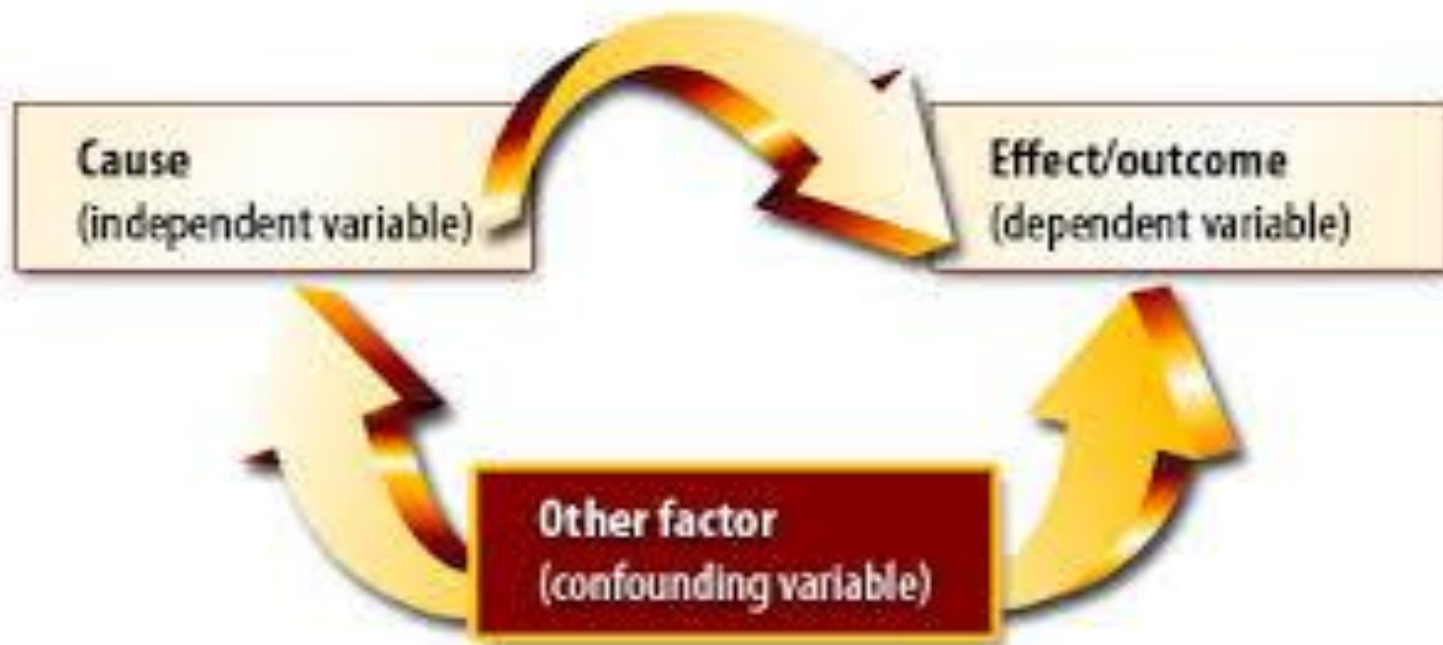- متغیر مستقل،وابسته ومتغیر مخدوشگر را توضیح دهند

variables

variables

- There should be three categories of variables in every experiment: <u>dependent</u>, <u>independent</u>, <u>confounding</u>

- Dependent -- is what will be measured; it's what the investigator thinks will be affected during the experiment

- Independent -- is what is varied during the experiment; it is what the investigator thinks will affect the dependent variable
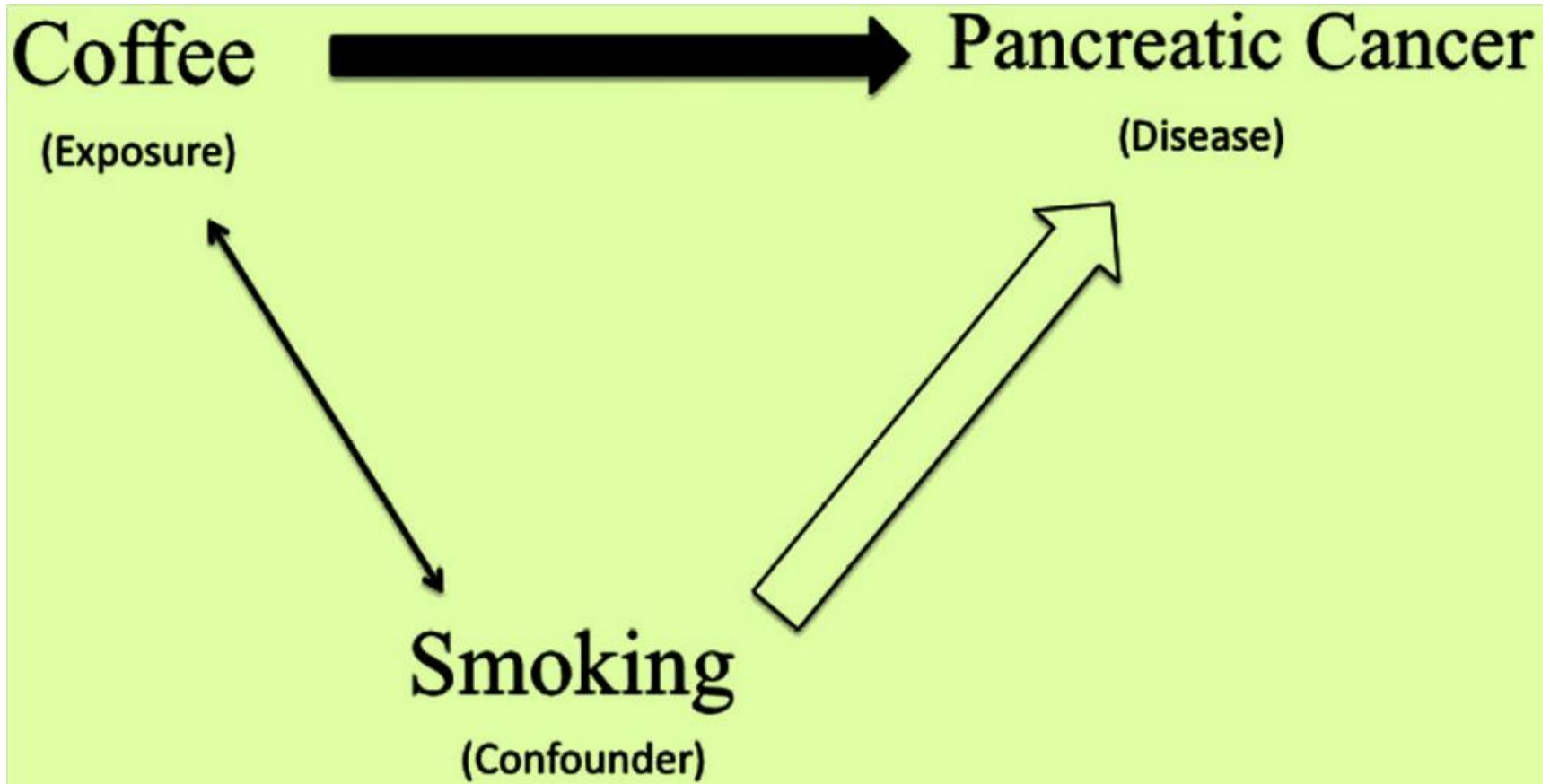
variables

- In statistics, a confounding variable (also confounding factor, a confound, or confounder) is an extraneous variable in a statistical model that correlates (directly or inversely) with both the dependent variable and the independent variable

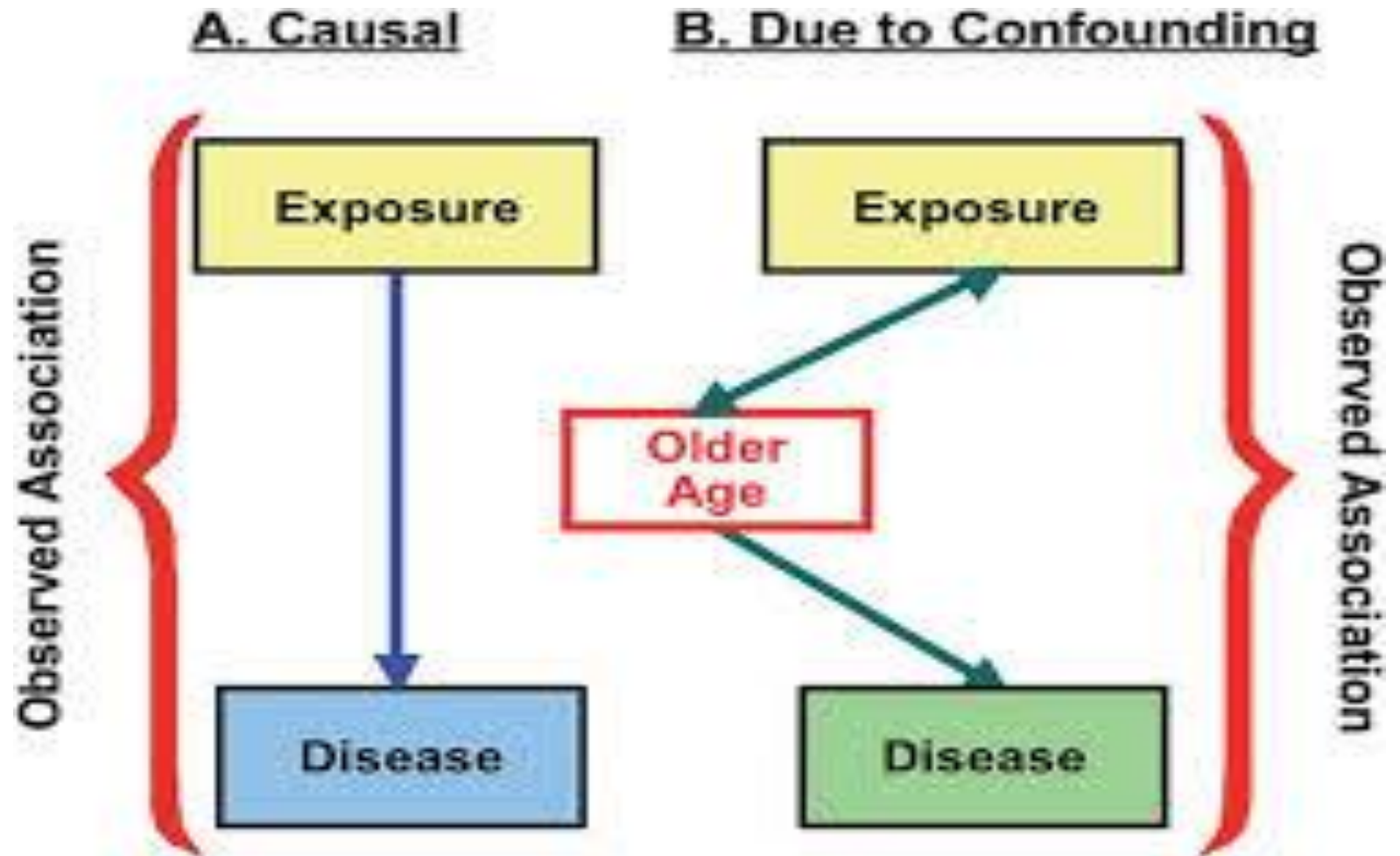# *confounding variable*

Example

Coffee (Exposure) → Pancreatic Cancer (Disease)

Smoking (Confounder)

Example

A. Causal
B. Due to Confounding

Exposure → Disease

Exposure ↔ Older Age → Disease

Observed Association

9

رویکردهای مقابله با مخدوش شدگی:

- طراحی واجرای مطالعه(جورسازی فردی،گروهی)
- تحلیل داده ها(لایه بندی)

1 confounder

Crude Analysis
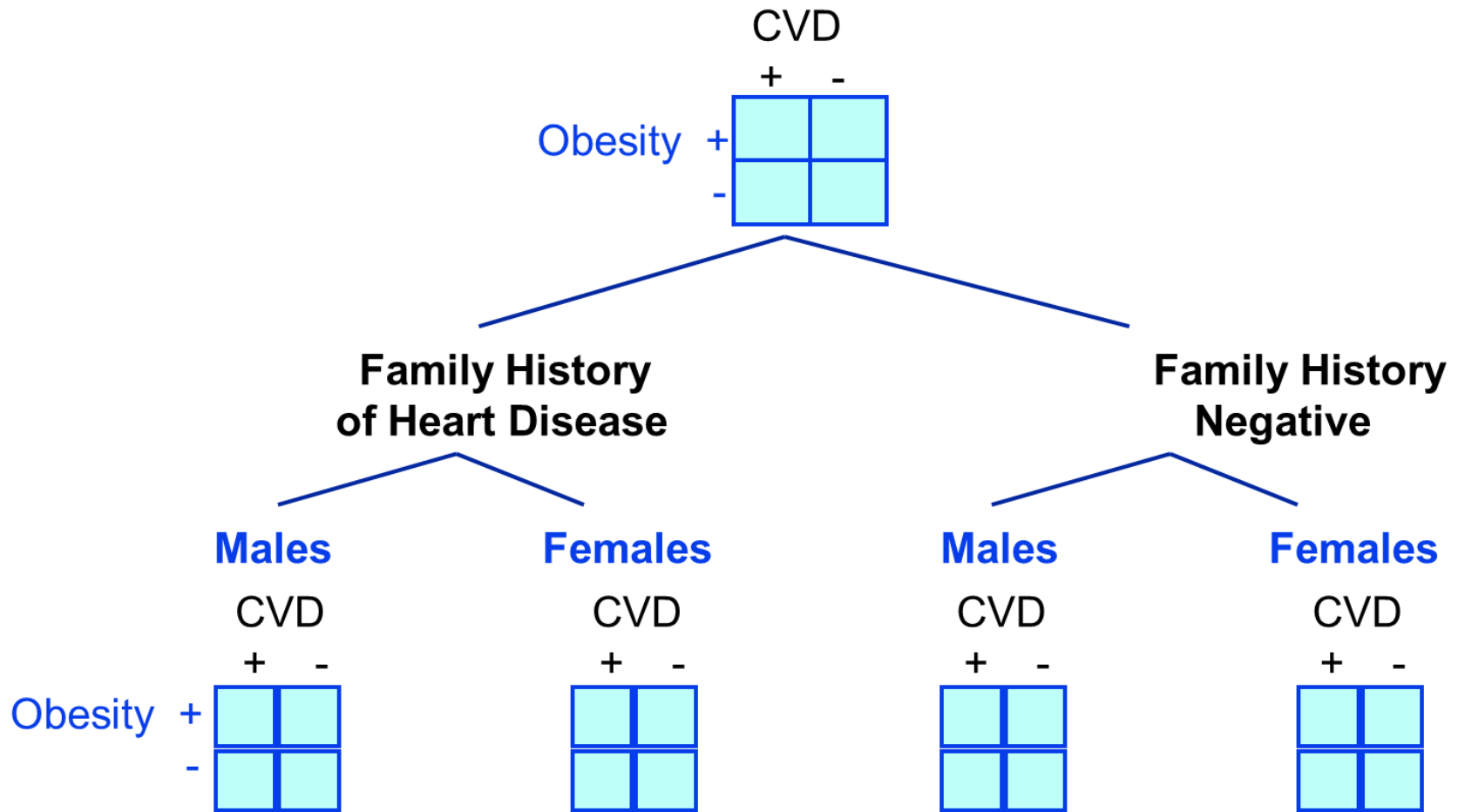
CVD

	+	-
Obesity +		
-		

Stratified Analysis

Age Groups:

35-39	40-44	45-49	50-54	55-59	60-64

CVD   CVD   CVD   CVD   CVD   CVD

Obesity +
-

2confounder

CVD

	+	−
Obesity +		
−		

Family History of Heart Disease

Family History Negative

Males

CVD

	+	−
Obesity +		
−		

Females

CVD

	+	−
+		
−		

Males

CVD

	+	−
+		
−		

Females

CVD

	+	−
+		
−		
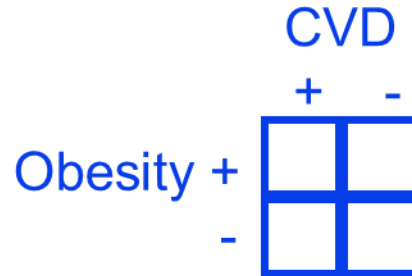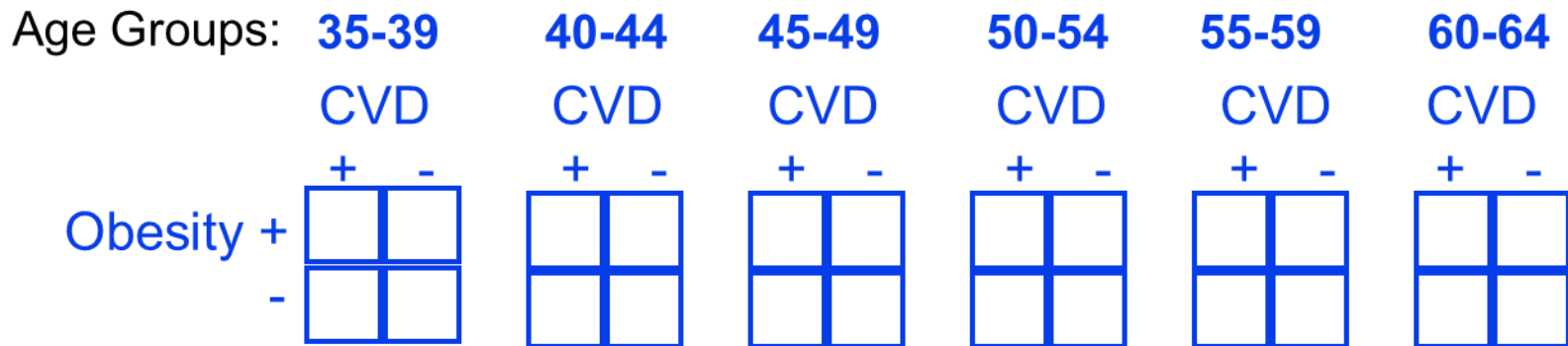
3confounder

Stratify by:
- gender
- age (5 categories)
- smoking status (never, former, current)

males   females

5 ages   5 ages

3 levels of smoking for each age & gender group
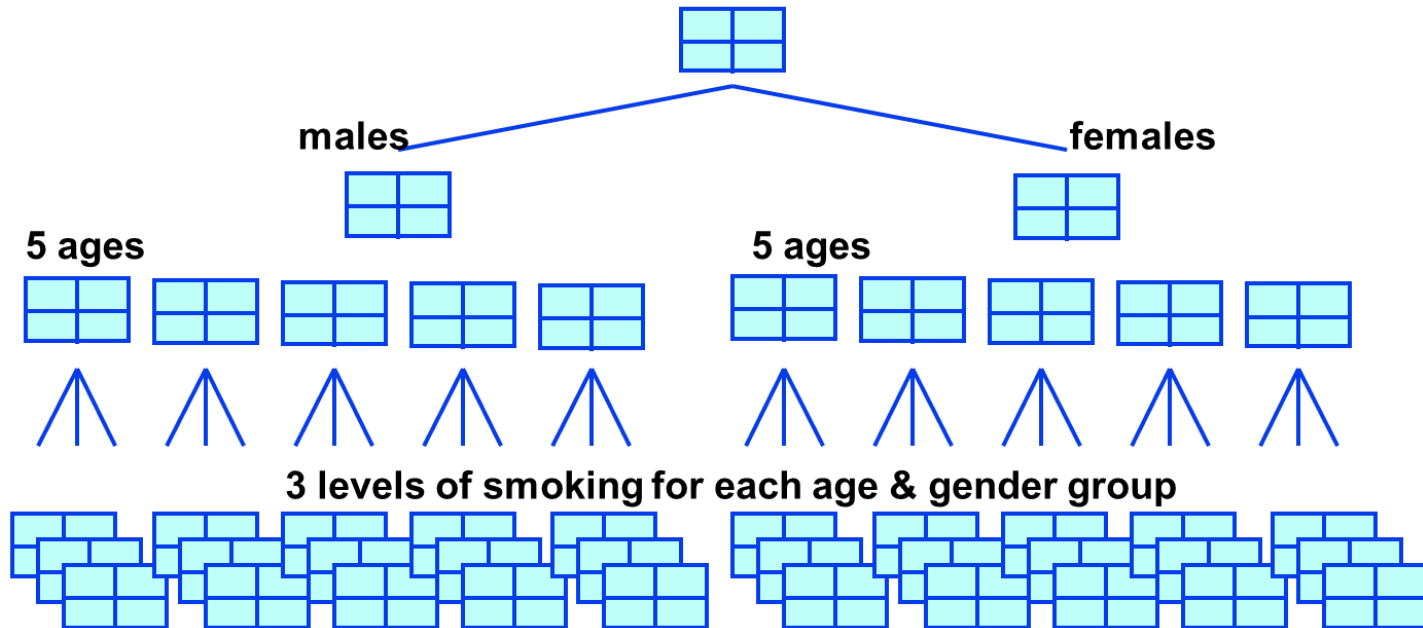
30 different sub-strata!!!

تمرین

- Helicobacter pylori infection and the risk of gastric carcinoma

- Relationship between Helicobacter pylori eradication and reduced duodenal and gastric ulcer recurrence: a review

- Nucleotide polymerase inhibitor sofosbuvir plus ribavirin for hepatitis C

- Impact of psychiatric conditions on health-related quality of life in persons with HIV infection

تقسیم بندی تحقیق

✔ تحقیق بنیادی یا Basic Research

✔ تحقیق کاربردی یا Applied Research

تقسیم بندی تحقیق

تحقیق بنیادی یا Basic Research

" تحقیقی است که برای گسترش و بسط دانش یا علوم پایه در یک نظام و بخاطر فهم آن طرح ریزی می شود. ممکن است همه یا بخشی از این دانش در آینده کاربرد داشته باشد ولی معمولا خود محقق در کاربرد آن نقشی ندارد".

تقسیم بندی تحقیق

تحقیق کاربردی یا Applied Research

" این نوع تحقیق برروی یافتن راه حل مسائل فوری با ماهیت عملی متمرکز می شود و بنابراین این تحقیقات جنبه عملی داشته و معمولاخود محققین درکاربرد نتایج دخیل می باشند".

Descriptive studies

Case report

- a case report is a <u>detailed report </u>of the symptoms, signs, diagnosis, treatment, and follow-up of an individual patient

- Case reports may contain a demographic profile of the patient, but usually describe an <u>unusual or novel occurrence</u>.

Types of case reports

- An unexpected association between diseases or symptoms.

- An unexpected event in the course of observing or treating a patient.

- Unique or rare features of a disease.

- Unique therapeutic approaches.

- A positional or quantitative variation of the anatomical structures

Roles in research and education

- A case report is generally considered a type of <u>anecdotal evidence</u>.

- case reports are placed at the foot of the hierarchy of clinical evidence.

Hierarchy of evidence

- Systematic Reviews
- Randomized Controlled Trials
- Cohort Studies
- Case-Control Studies
- Case Series, Case Reports
- Editorials, Expert Opinion

Reporting guidelines

- This 13-item checklist includes indications regarding the *title, key words, abstrac*t, *introduction, patient information, clinical findings, timeline, diagnostic assessment, therapeutic interventions, follow-up and outcomes, discussion, patient perspective, and informed consent*

example

Borrelia miyamotoi Infection Presenting as Human Granulocytic Anaplasmosis

A Case Report

Hanumara Ram Chowdri, MD; Joseph L. Gugliotta, MD; Victor P. Berardi; Heidi K. Goethert, ScD; Philip J. Molloy, MD;
Sherri L. Sterling, MBA, MLS; and Sam R. Telford III, ScD

Background: The diverse tickborne infections of the northeastern United States can present as undifferentiated flu-like illnesses. In areas endemic for Lyme and other tickborne diseases, patients presenting with acute febrile illness with myalgia, headache, neutropenia, thrombocytopenia, and elevated hepatic aminotransferase levels are presumptively diagnosed as having human granulocytic anaplasmosis (HGA).

Objective: To assign a cause for illness experienced by 2 case patients who were initially diagnosed with HGA but did not rapidly defervesce with doxycycline treatment and had no laboratory evidence of *Anaplasma phagocytophilum* infection.

Design: Case report.

Setting: 2 primary care medical centers in Massachusetts and New Jersey.

Patients: 2 case patients acutely presenting with fever.

Measurements: Identification of the causative agent by polymerase chain reaction and DNA sequencing.

Results: Molecular diagnostic assays detected *Borrelia miyamotoi* in the peripheral blood of both patients. There was no evidence of infection with other tickborne pathogens commonly diagnosed in the referral areas.

Limitation: One of the case patients may have had concurrent Lyme disease.

Conclusion: The presence of *B. miyamotoi* DNA in the peripheral blood and the patients' eventual therapeutic response to doxycycline are consistent with the hypothesis that their illness was due to this newly recognized spirochete. Samples from tick-exposed patients acutely presenting with signs of HGA but who have a delayed response to doxycycline therapy or negative confirmatory test results for HGA should be analyzed carefully for evidence of *B. miyamotoi* infection.

Primary Funding Source: National Institutes of Health and the Evelyn Lilly Lutz Foundation.

Study design
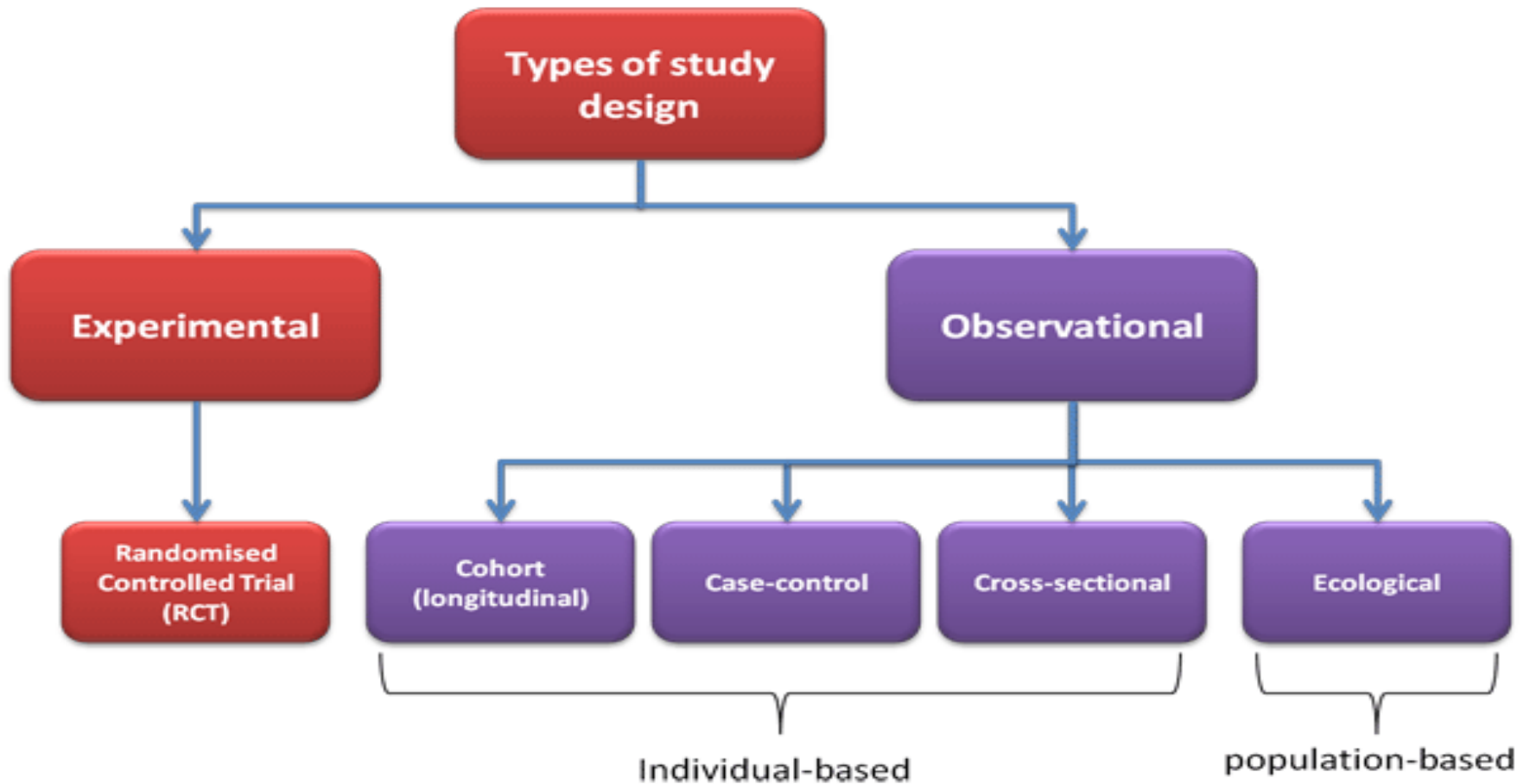
Ecologic Studies

- "A study in which units of analysis are populations or groups of people than individuals." – Dictionary [Porta 2008]

- "An ecologic or aggregate study focuses on the comparison of groups rather than individuals" – Morgenstern, Modern Epi, 2008

Ecologic Studies

- Explores correlations between aggregate (group level) exposure and outcomes

- Unit of analysis: usually not individual, but clusters (e.g. countries, counties, schools)

- Useful for generating hypothesis

- Prone to "ecological fallacy

Ecological fallacy

- if countries with more fat in the diet have higher rates of breast cancer, then women who eat fatty foods must be more likely to get breast cancer.

- Such inferences made using group-level data may not always be correct at the individual level.

Why do ecologic studies?

- Low cost and convenience
- Some measurements cannot be made on individuals
- Ecologic effects are the main interest (at the population level)
- Simplicity of analyses and presentation
- Often helpful for generating new hypotheses for further research

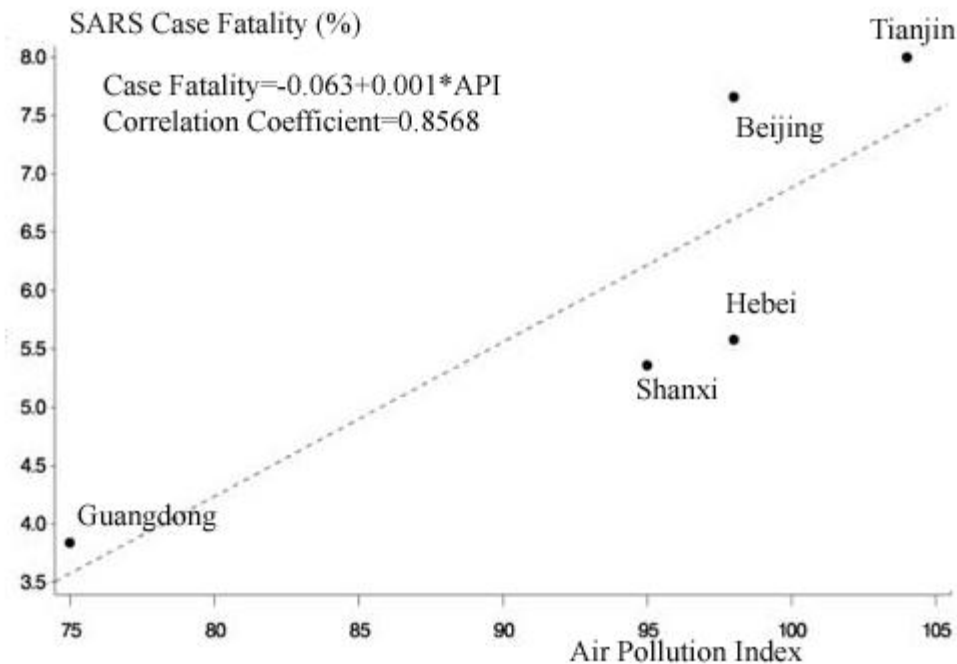# Example: Correlation between TB and AIDS
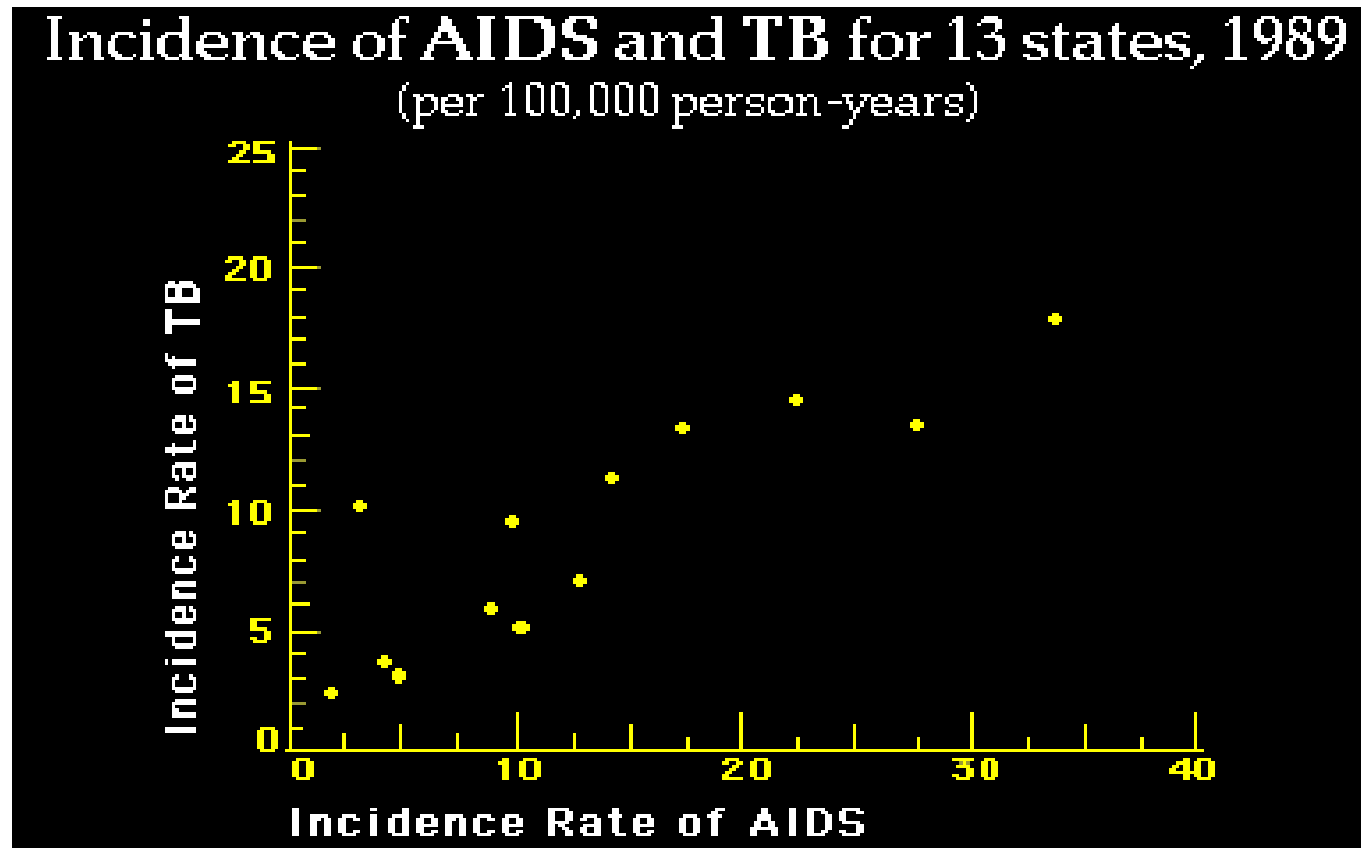
Wider income gaps, wider waistbands? An ecological study of obesity and income inequality
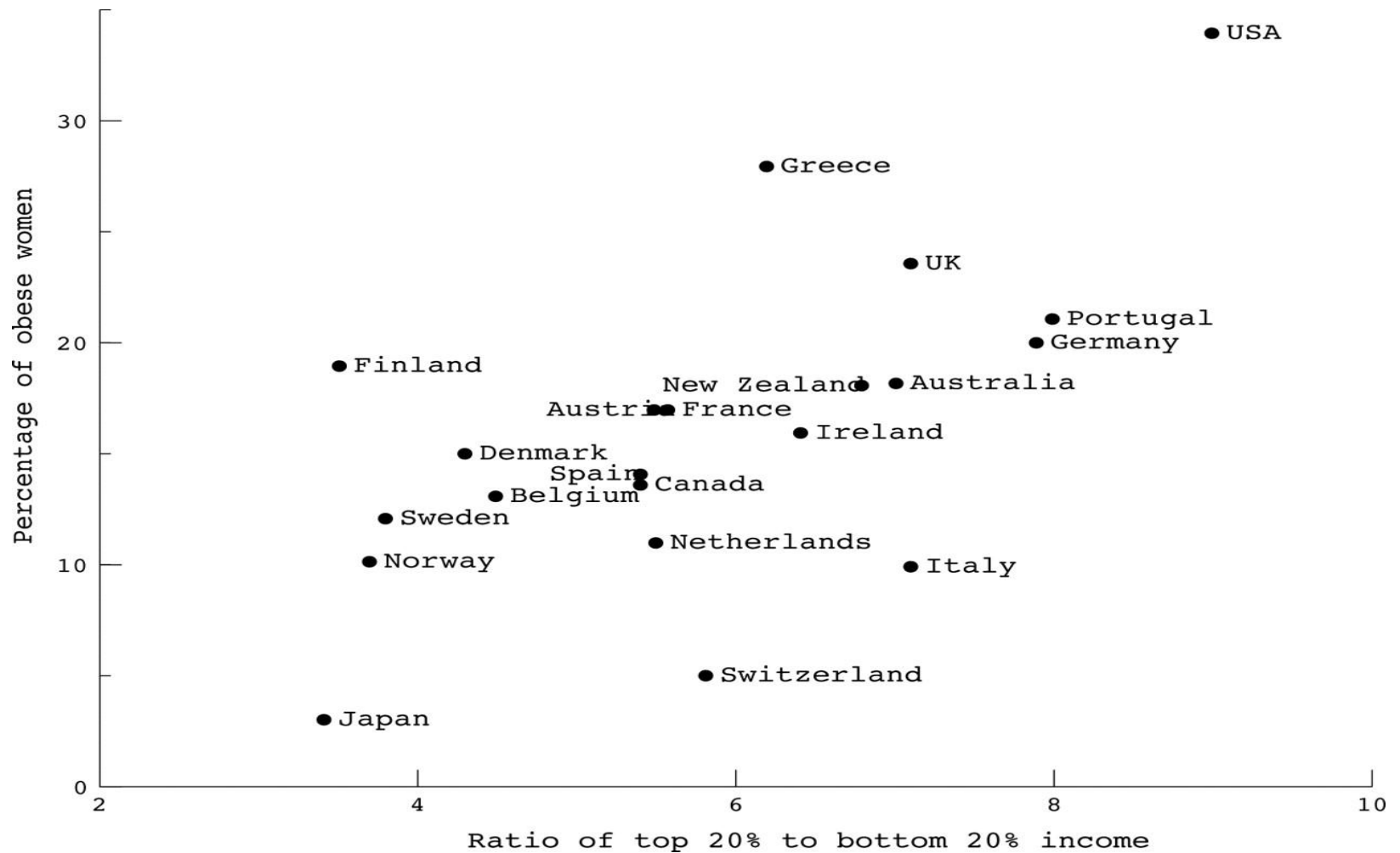
Air pollution and case fatality of SARS in the People's Republic of China: an ecologic study

Yan Cui[1], Zuo-Feng Zhang*[1], John Froines[2], Jinkou Zhao[3], Hua Wang[3], Shun-Zhang Yu[4] and Roger Detels[1]

The Correlation and Association between Short-term Exposure to Ambient Air Pollution and Case Fatality of SARS in People's Republic of China.

Cross-sectional study

Cross-sectional study

- is a type of observational study that involves the analysis of data collected from a population, or a representative subset, at one specific point in time—that is, cross-sectional data.

- Cross-sectional studies are descriptive studies (neither longitudinal nor experimental)

Cross-sectional study

- They may be used to describe some feature of the population, such as prevalence of an illness, or they may support inferences of cause and effect

Types of cross-sectional study

Descriptive

- A cross-sectional survey may be purely descriptive and used to assess the burden of a particular disease in a defined population. *For example a random sample of schools across London may be used to assess the prevalence of asthma among 12-14 year olds.*

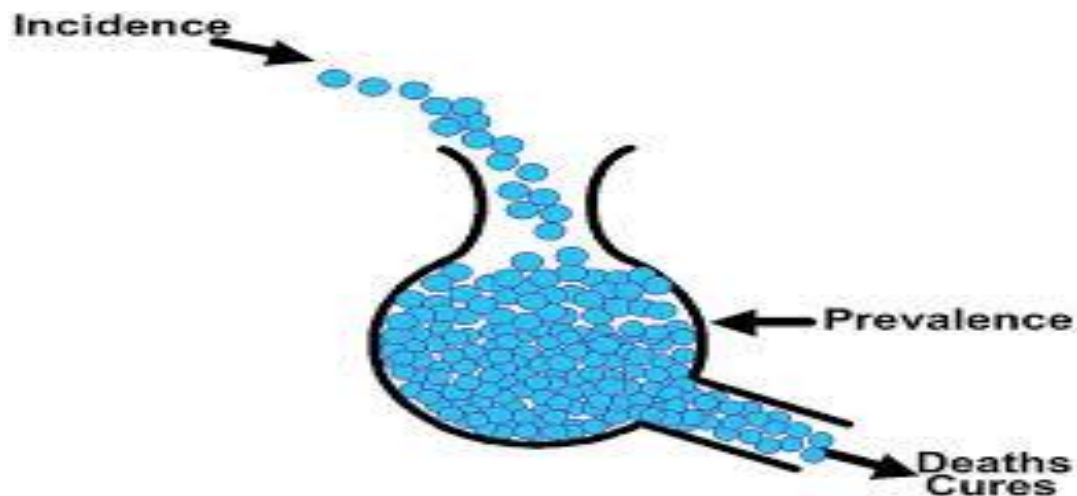# Types of cross-sectional study

Analytical

- Analytical cross-sectional surveys may also be used to investigate the association between a putative risk factor and a health outcome.
- However this type of study is limited in its ability to draw valid conclusions as to the association between a risk factor and health outcome.
- In a cross-sectional survey the risk factors and outcome are measured simultaneously, and therefore it may be difficult to determine whether the exposure proceeded or followed the disease.

Cross-sectional study

- In a cross-sectional study all factors (exposure, outcome, and confounders) are measured simultaneously. The main outcome measure obtained from a cross-sectional study is prevalence, that is:

$$\text{Prevalence} = \frac{\text{Number of cases in a defined population at one point in time}}{\text{Number of persons in a defined population at the same point in time}}$$

Prevalence	Measures **existing** cases of disease and is expressed as a proportion
Incidence	Measures **new** cases of disease and is expressed in person-time units

Incidence

Prevalence

Deaths
Cures

example

Cases of cold infections in class 4J : Class size = 20

January	February	March
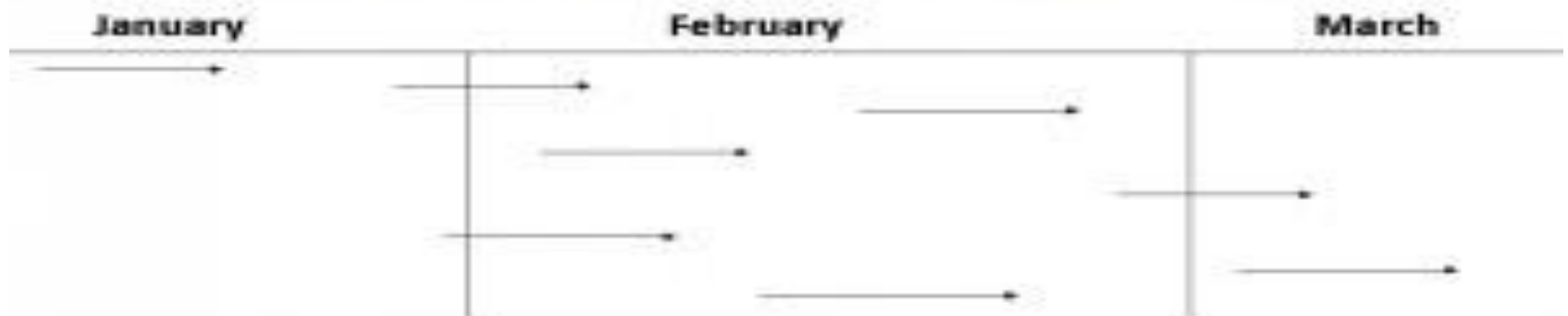
What is the period prevalence during February?   6/20=30.0%

What is the point prevalence on the 28ᵗʰ February?   1/20=5.0%

What is the incidence in February?   4/18=22.2%

Cross-sectional study

- Note that for continuous variables such as blood pressure or weight, prevalence may only be calculated when the variable is divided into those which fall below or above a particular pre-determined level.

- In analytical cross-sectional studies, the odds ratio can be used to assess the strength of an association between a risk factor and health outcome of interest

Advantages

- •Relatively quick and easy to conduct (no long periods of follow-up).

- •Data on all variables is only collected once.

- •Able to measure prevalence for all factors under investigation.

- •Multiple outcomes and exposures can be studied.

- • The prevalence of disease or other health related characteristics are important in public health for assessing the burden of disease in a specified population and in planning and allocating health resources.

- •Good for descriptive analyses and for generating hypotheses

disadvantages

- • Difficult to determine whether the outcome followed exposure in time or exposure resulted from the outcome.

- • Not suitable for studying rare diseases or diseases with a short duration.

- •As cross-sectional studies measure prevalent rather than incident cases, the data will always reflect determinants of survival as well as aetiology1.

- •Unable to measure incidence.

- • Associations identified may be difficult to interpret.

Odds ratio
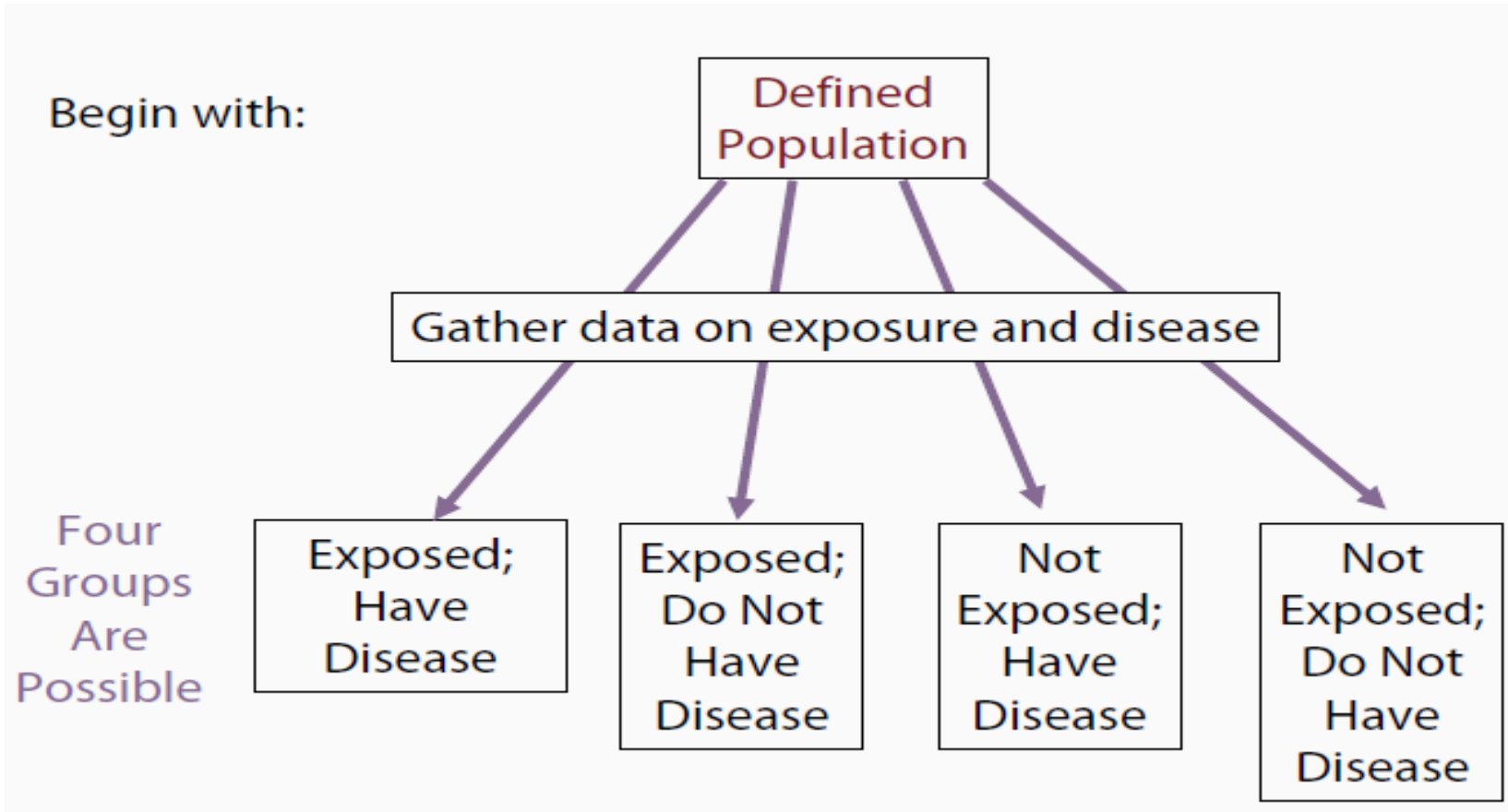
Odds ratio

	Disease	No Disease
Exposed	a	b
Not Exposed	c	d

	Disease	No Disease
Exposed	a	b
Not Exposed	c	d

	Disease	No Disease
Exposed	a	b
Not Exposed	c	d

Odds ratio

$$\text{Odds} = \frac{\text{probability of the event}}{1 - \text{probability of event}} = \frac{P}{1 - P}$$

OR

$$P = \frac{\text{Odds}}{1 + \text{Odds}}$$

Odds ratio

Odds Ratio (OR)

Contingency (or 2 x 2) Table

	Cases	Controls	Total
Exposed	a	b	a+b
Unexposed	c	d	c+d
Total	a+c	b+d	a+b+c+d

$$OR = (a/c) / (b/d)$$
$$= (a*d) / (b*c)$$

تمرین

❖از جمعیت صد نفره ۲۰نفربیمار وبقیه سالم هستند.ده درصد سالم ها و بیست درصد بیماران سابقه مواجهه با ریسک فاکتوررابیان میکنند.نسبت شانس را محاسبه کنید.

thanks