



COMMUNITY MEDICINE *Notes*

Done by:

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Good Morning

Have a joyful and productive day!



Learning Objectives

First two objectives are the important ones



- 1) Define epidemiology, goals and objectives.
- 2) Recognize different types of epidemiological studies & their main advantage and disadvantages.
- 3) Design an epidemiological study according to a selected health problem or situation.
- 4) Define risk assessment and demonstrate methods of risk assessment.
- 5) Define the evidence-based medicine and demonstrate its main steps.
- 6) Demonstrate different sampling methods and their purposes.
- 7) Recognize the meaning and the aim of screening and demonstrate types of screening programs and requirements for a screening test.

You have to know the type of data you are going to collect, so you would be able to choose the most suitable research method

The science dealing with the methods applied to collect data for a scientific research.

When the research is done among a group of population, we call it an epidemiologic research.

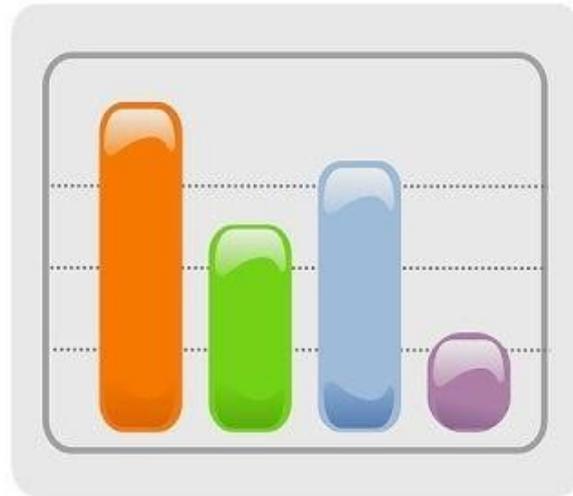
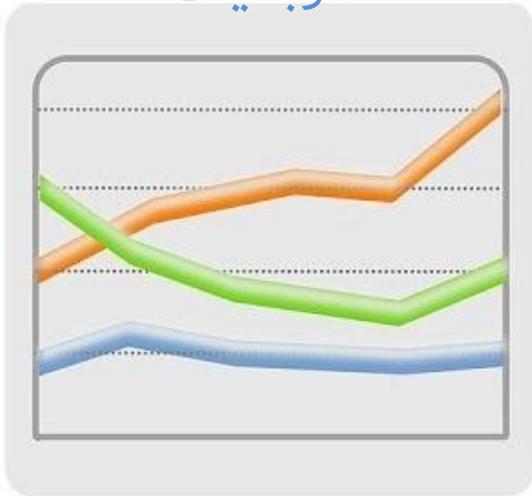
The process used to collect information and data for the purpose of making business decisions.

Research Methodology

KEY TO PUBLIC HEALTH: **EPIDEMIOLOGY**



is a branch of community medicine and means علم
الوبائيات



- **Epidemiology** is derived from the Greek,

“upon”
epidemiology
“study”
“people”

**Epidemiology is the basic science
of Public Health**



Goals of epidemiology

Promotion of
health of
population.



Control of
diseases.

Prevention of
diseases.

These goals can be achieved through these objectives:

Describe the health status of the population in certain community and subsequently diagnose its major health problems.

Discover the causes of diseases and determinants of ill or good health.

Discover the risk factors that predispose to diseases of unknown aetiology .

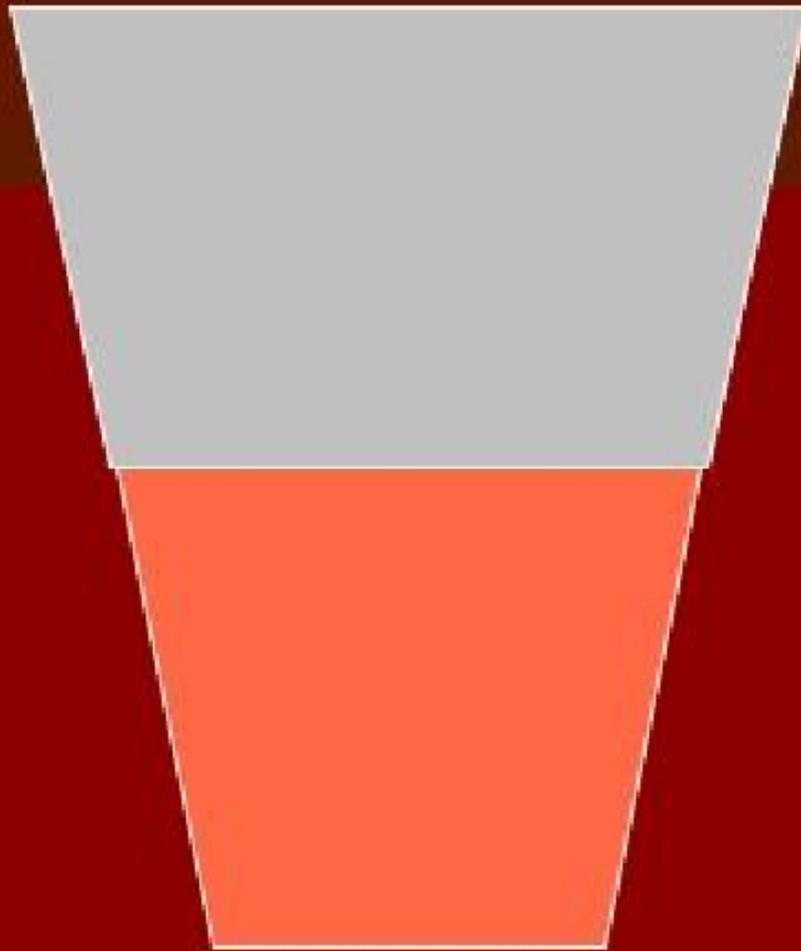
Complete the clinical picture of diseases from beginning of pathologic changes till cure or occurrence of complications .

Evaluate effectiveness of health services.

Predict the future health needs of a population



How we view the world.....



- *Pessimist:* The glass is half empty.
- *Optimist:* The glass is half full.
- *Epidemiologist:* As compared to what?

Epidemiological methods (How to choose an epidemiological study?)



Quantitative and Qualitative Research



QUANTITATIVE



QUALITATIVE

Research methods

Quantitative

Observational

Descriptive

Experimental

Analytical

Qualitative

Descriptive

- Observational studies can be analytical if there is a comparison group. What it will be if there is no comparison group??? It will be descriptive
- Qualitative is always descriptive

Simple picture to show you the difference between quantitative and qualitative

Quantitative Methods

Deals with numbers

Only one in 30 take the free ice cream. Interesting...



Qualitative Methods

What did you feel when you saw the free ice cream?

Excited. A little scared.

And why was that?

Deals with causes and feelings



سلايده مهمه جدااا

Quantitative epidemiological studies

Observational

No intervention

Experimental

Do intervention

Descriptive

No comparison group

Yes comparison group

Analytical

Clinical Trials

Community Trials

Surveillance

Case Reports & Series

Cross-sectional

Case control

Cohort

An experiment on group of people

An experiment on the community as a whole

Epidemiological methods

- 1) **Non –Experimental (observational):** no intervention by the researcher.
- 2) **Experimental:** Interventional studies

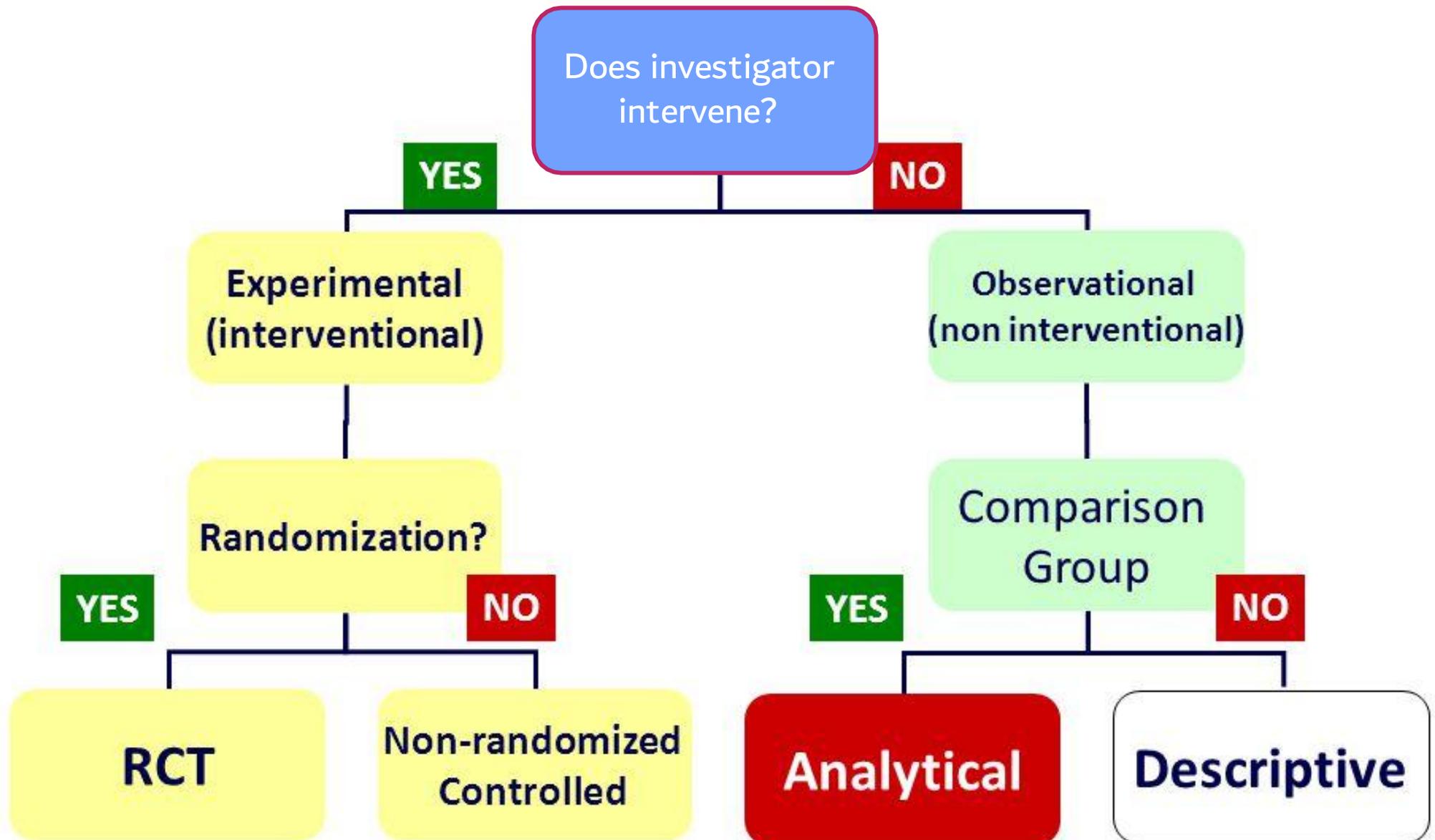
Observational Study



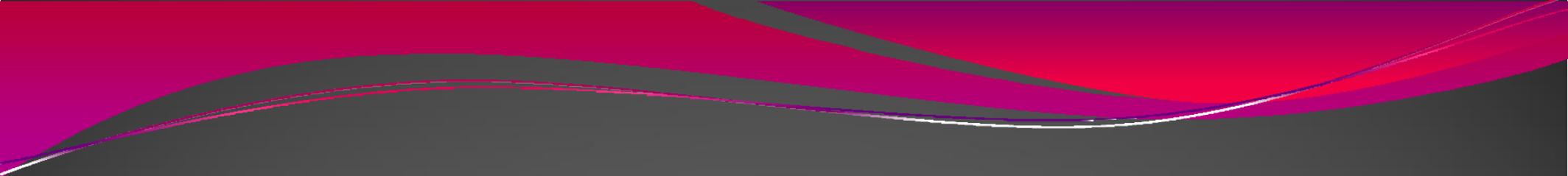
Experimental Study

برضو سلايده حلوه
و مهمه

Study Designs



RCT=randomized controlled trial



DESCRIPTIVE EPIDEMIOLOGY

Descriptive=describe the situation
remember.. descriptive can be surveillance, case report and series or cross
sectional

Descriptive Epidemiological studies

● To Know the situation: (what is the problem? What are its manifestations?)

Or

● To Describe the general characteristics of a disease /or health problem in relation to PPT (Person– Place –Time).

Who?

Person:



Where?

Place:



When?

Time:



- Person:** *Who* is getting sick?
- Place:** *Where* is the sickness occurring?
- Time:** *When* is the sickness occurring?

“PPT = Person, Place, Time”

Quantitative epidemiological studies

Observational

Descriptive

Surveillance

Case Reports & Series

Cross-sectional

Analytical

Case control

Cohort

Experimental

Clinical Trials

Community Trials

متابعة للحالة
الصحية للفرد او
المجتمع

DISEASE SURVEILLANCE

So surveillance is one of the descriptive studies that is a part of observational quantitative epidemiological methods/studies 3عاداتها الدكتوراة
مرات

= نظام مراقبة المرض
disease surveillance

Disease surveillance

Disease surveillance: that involves the **systematic collection, analysis, and dissemination** of health data on an **ongoing basis to monitor** the health of the community, set priorities and plan programs for prevention and control of health problems



Characteristics of efficient surveillance system as recommended by CDC

CDC=center for
dz control and
prevention



1

- Sensitivity to detect all cases of certain disease in target population.

2

- Timelines: how rapidly reports about disease are received, evaluated, analyzed and reached the higher authority to take action.

3

- Reporting the disease must be the same in all population or in different groups in the same community.

4

- High positive predictive value of reported cases i.e. the percentage of reported cases that were truly positive.

5

- Simple, flexible system which is easy to operate, to be acceptable by the community to be ready to co-operate and the system can be adapted to changing conditions as the need for more personnel and costs.

Objectives of surveillance system:

Identification of disease ecology (agent, host, environment).

Early detection of any change in disease occurrence and /or distribution.

مثلا منحنى كورونا بخليتنا نعرف متى الحالات بتزيد و متى بتقل و كله عن طريق نظام المراقبة

Used as a tool for evaluating health care practice in prevention and control.

Generating hypothesis and new epidemiologic researches.

To describe the risky groups who are susceptible to infection & give protective measures for contact to prevent more spread of infection.

Major sources of data relevant to disease surveillance:

Mortality & morbidity reports.

Epidemic reports.

Special surveys.

Demographic data.

Laboratory reports for certain diseases.

Hospital records for infection.

Zoonotic infection=when the reservoir is an animal like swine influenza

Environmental data including data on an animal's diseases or new vector reservoirs.

Adverse reaction for vaccination.



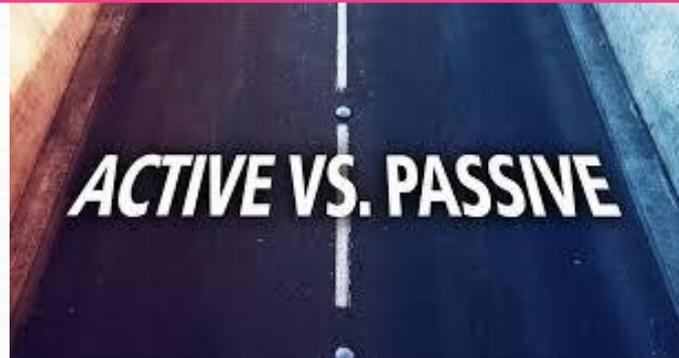
Types of surveillance

انت اللي
جمعت الدا
بنفسك، بتنزل
ع الميدان و

Active surveillance

Primary source of data

- to collect data for specific disease in limited period by regular research.
- This is done in case of :
 - Appearance of **new disease** not known at that area before.
 - Discovery of **new mode of transmission**.
 - In **risky seasons** as influenza in winter.
 - For certain diseases that will be **eradicated** as polio and measles.



اما هون،
بتجمع
الدا من
مصادر
اخرى زي

Passive surveillance

- Secondary sources of data
- to get data from routine records as in hospitals, private clinics, death certificates.



Diseases that are included in surveillance are **changeable** from time to time and from place to another. In general, diseases under surveillance are arranged in **priority** according to:

المعايير اللي بتخلينا نختار
المرض اللي لازم ينعمله
Surveillance
و هالاشي بختلف حسب
اهمية المرض مثلا و برضو
بختلف من دولة لدوله



Fatality rate.

Morbidity
rate.

Risk of
epidemic.

Availability of
treatment &
preventive
measures.

Diseases to
be
nationally
eradicated.

Like Polio and
Hepatitis C

Case Report

Case Report & Case Series



Features of the Case Report:

Case report is a report of a case with rare disease that we know nothing about it

Consists of a careful & detailed report by one or more clinicians of unusual medical condition.

Represents the 1st clue in the identification of a new disease.

This is the importance of the descriptive study in general. you can not make it as an analytical study: however, it ends up by forming hypothesis. So, based on it, you can make an analytical research afterwards using the resulted hypothesis

Leads to formulation of a new hypothesis.

Case Series:

هون بدل ما اشتغل ع حالة بشتغل ع مجموعة حالات
و بعمل عنهم تقرير مفصل

Example of the case series study:

- During 1950, **8 cases of cancer lung** were admitted to different hospitals during the same period of time. Taking history from these patients showed that they were **miners**. This unusual circumstance suggested that the miners may been exposed to something. Investigating this circumstance showed high concentration of **radon gas**. A hypothesis was formulated that lung cancer is related to exposure to radon.

المثال بحكي انه سنة 1950 مجموعة مرضى دخلوا مستشفيات مختلفة بنفس المرض (سرطان الرئة) فعملوا دراسة طلوعوا كلهم عمال المناجم و فيها توصلوا لنظرية انه السبب تعرضهم لغاز الرادون و بعدين بناء ع هاي النظرية عملوا

Analytical research (cohort or case control) in order to prove that hypothesis

Case Report



One case of unusual findings

Case Series



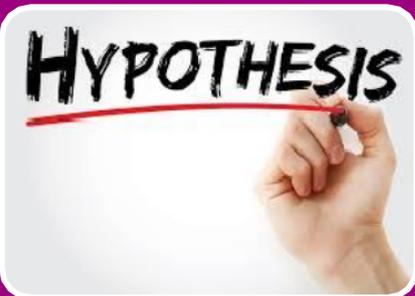
Multiple cases of findings

Example of case series: 10 cases showed up With the same symptoms, so you want to search in order to find the causes

The benefits of case report & case series



Describe rare clinical conditions



HYPOTHESIS

Formulate a new hypothesis for disease occurrence



Trigger “stimulate start of analytic studies to be conducted to identify risk factors of disease”.

Disadvantages of the case reports & series:



The association present at **individual level** is not necessarily present at the population level.



We cannot evaluate whether the **risk** is different among individuals exposed or non-exposed because the event is rare or cannot be repeated as Chernobyl explosion

Cross-Sectional Studies



Cross-sectional studies



Cross sectional study searches for the dz and the exposure at the same time
Cross sectional gives info about prevalence not incidence

- An “observational” design that surveys exposures and disease status at a single point in time (simultaneously) in a defined population)

-example: we use cross-sectional study to know the prevalence of HTN patient in first year medical student at Hashemite university and to determine the risk factor.so, at a specific day of the study, you go to the uni and measure **all** first year students BP as well as ask them about the risk factors



Sometimes called a prevalence study



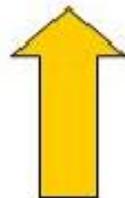
A snapshot of what is going on

One point in time

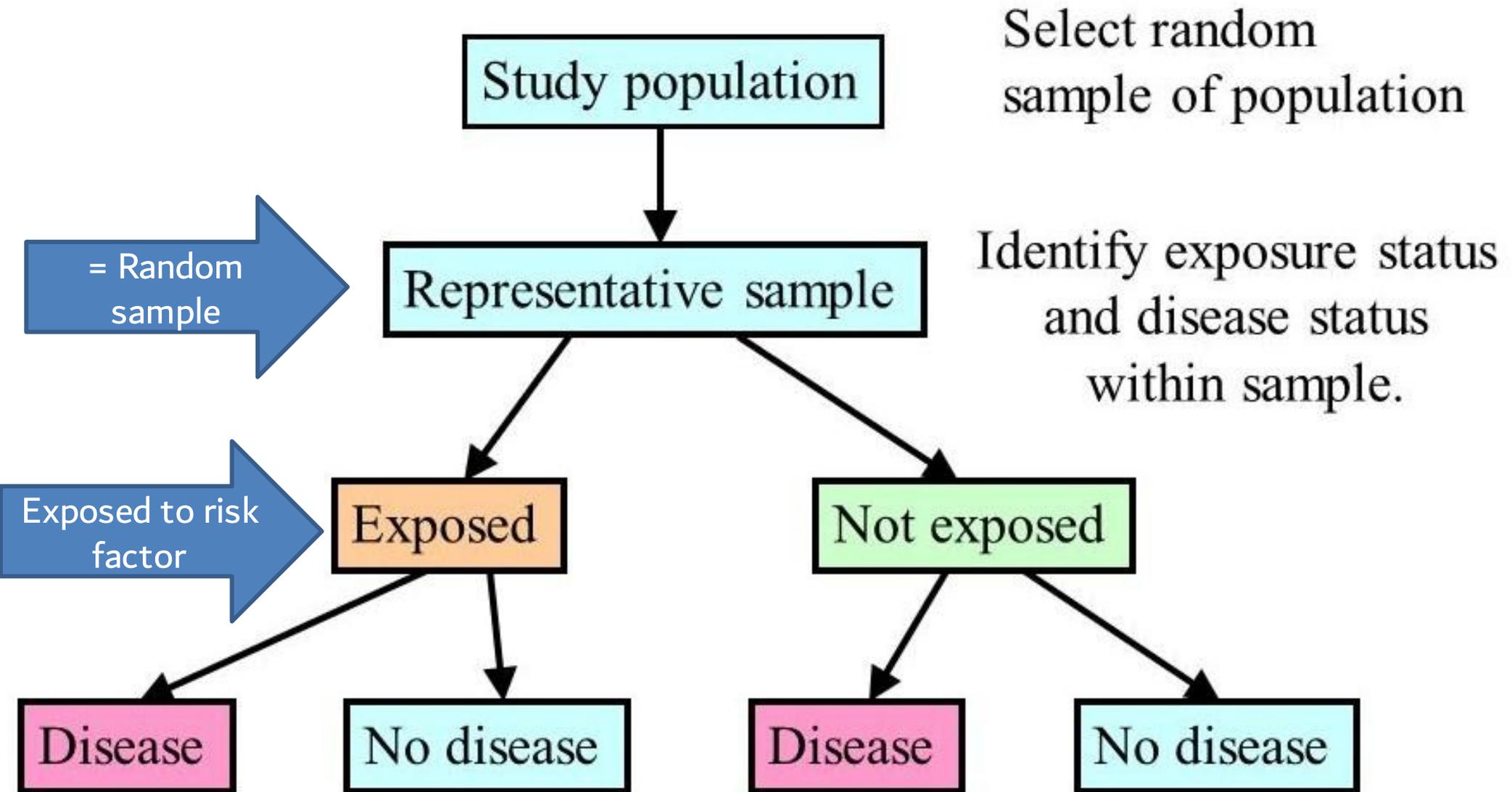
An observational study

time

Study only exists at this point in time



Cross-sectional studies
Other name = prevalence study



Cross sectional study (Prevalence study):

In this type researchers took a sample from the population then search for exposed and unexposed groups. After that, they find who has the dz and who has not from each groups(exposed and unexposed).

With Exposure & with disease

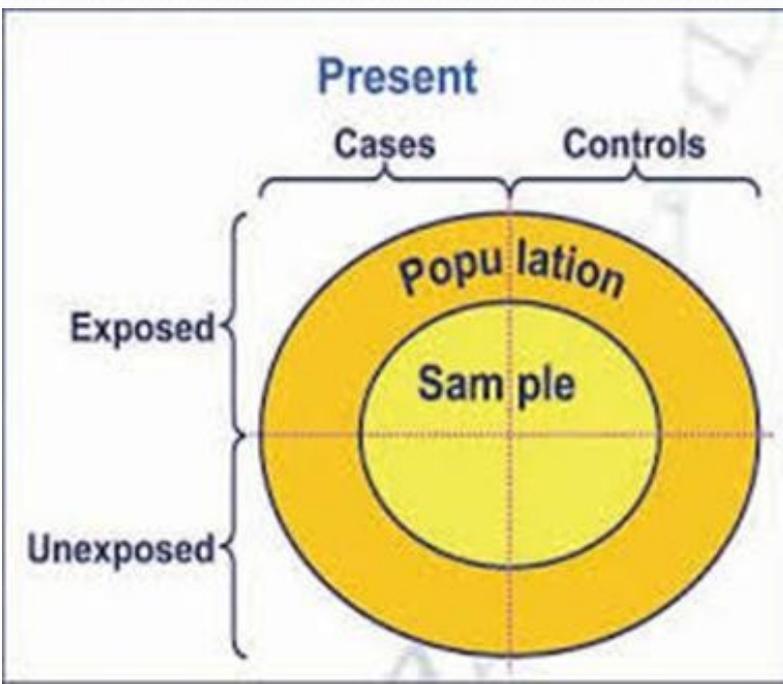
With Exposure & without disease

Without Exposure & with disease

Without Exposure & without disease

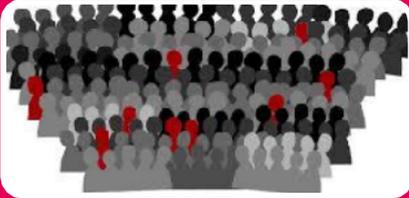
Population

Sample



و هيكون شكل الداتا الطالعه معي من ال
Cross-sectional study

Advantages of cross-sectional study:



Why large ??? because it is easy and no need to follow up with the sample. You collect the data once only can use large sample of the population.



Assess health status & health problems & indicate priorities for health care planning.



Provide the baseline data for further studies if the problem is not studied before.



Cheap, rapid, easy and yield immediate results. The



most convenient 1st step in the investigation of the cause of the outbreak or epidemic.

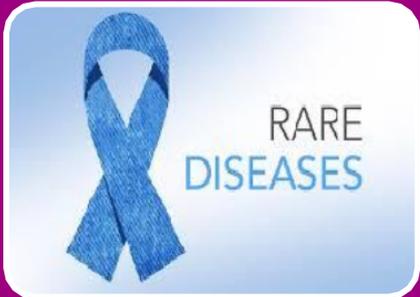
Disadvantages of the cross-sectional study:



Cannot identify **time sequence** necessary to establish cause-effect relationship “the exposure & outcome are preceded”.



Not suitable for factors or diseases of **short period of time** because some cases will be reported as negative at time of examination.



Not practical in studying **rare diseases** since we are going to need a very large sample.

ANALYTIC EPIDEMIOLOGY

Remember there is comparable group here

Quantitative epidemiological studies

Observational

Descriptive

Surveillance

Case Reports & Series

Cross-sectional

Analytical

Case control

Cohort

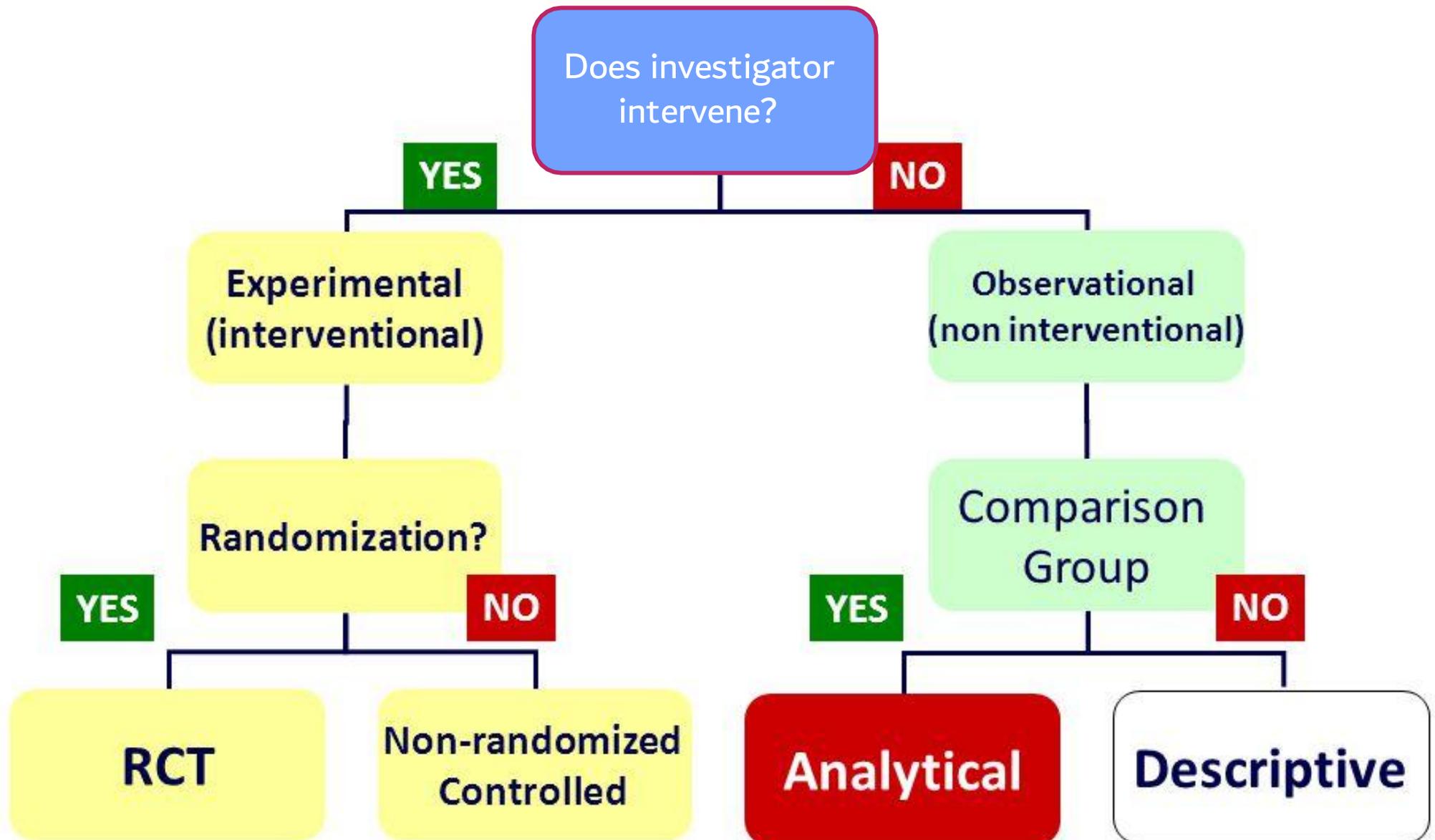
Experimental

Clinical Trials

Community Trials

مهم جدا

Study Designs



Analytical epidemiology

(Finding the cause-effect)

- Try to identify causal relationships between some risk factors & occurrence of disease. (cause and effect relationship)
- Try to answer why the disease occurs.

Testing A
Hypothesis

ANALYTICAL

● It is formed of 2 comparative groups.

● Their types are:

1 Case-control

2 Cohort: -Prospective

-Retrospective

Data collected by yourself
then follow up till find results

Data from past records
then follow up till find
results



Study Designs

exposure

COHORT

outcome

exposure

Case-control

outcome

In case control, researcher will go to patients and ask them if they were exposed to X factor in order to know the cause

Cross sectional

In cohort, researcher follow up with healthy people till the outcome appears

In cross sectional, researcher look for the cause and the result at the same time, so he do not know for sure which one is the cause of the other one

Exposure



Outcome

CASE-CONTROL STUDY



The features of case control Study

The subjects are selected on the basis of whether they have:

- The condition (cases) or
- Free from the condition (controls)

I asked cases and controls about their past exposure, I have not follow up by myself.

Example: lung Ca pts (cases) and non pt (controls), when test for previous tobacco exposures in order to find the link between lung Ca and smoking

بالتالي اجاباتهم معتمده على ذاكرتهم و مصداقيتهم

Both are then compared with respect to the having the history of exposure or certain characteristic.

It is used to **test the hypothesis** i.e. the **causal association** between the exposure and the events (disease).

So at the end of the study, you can say there is an association between smoking and lung Ca, but you can not say definitely smoking is the cause of lung Ca. because your data not based on your follow up instead it was based on what did they have told you (about their past)

Case-Control Study

WERE
EXPOSED

WERE NOT
EXPOSED

WERE
EXPOSED

WERE NOT
EXPOSED

HAVE THE
DISEASE

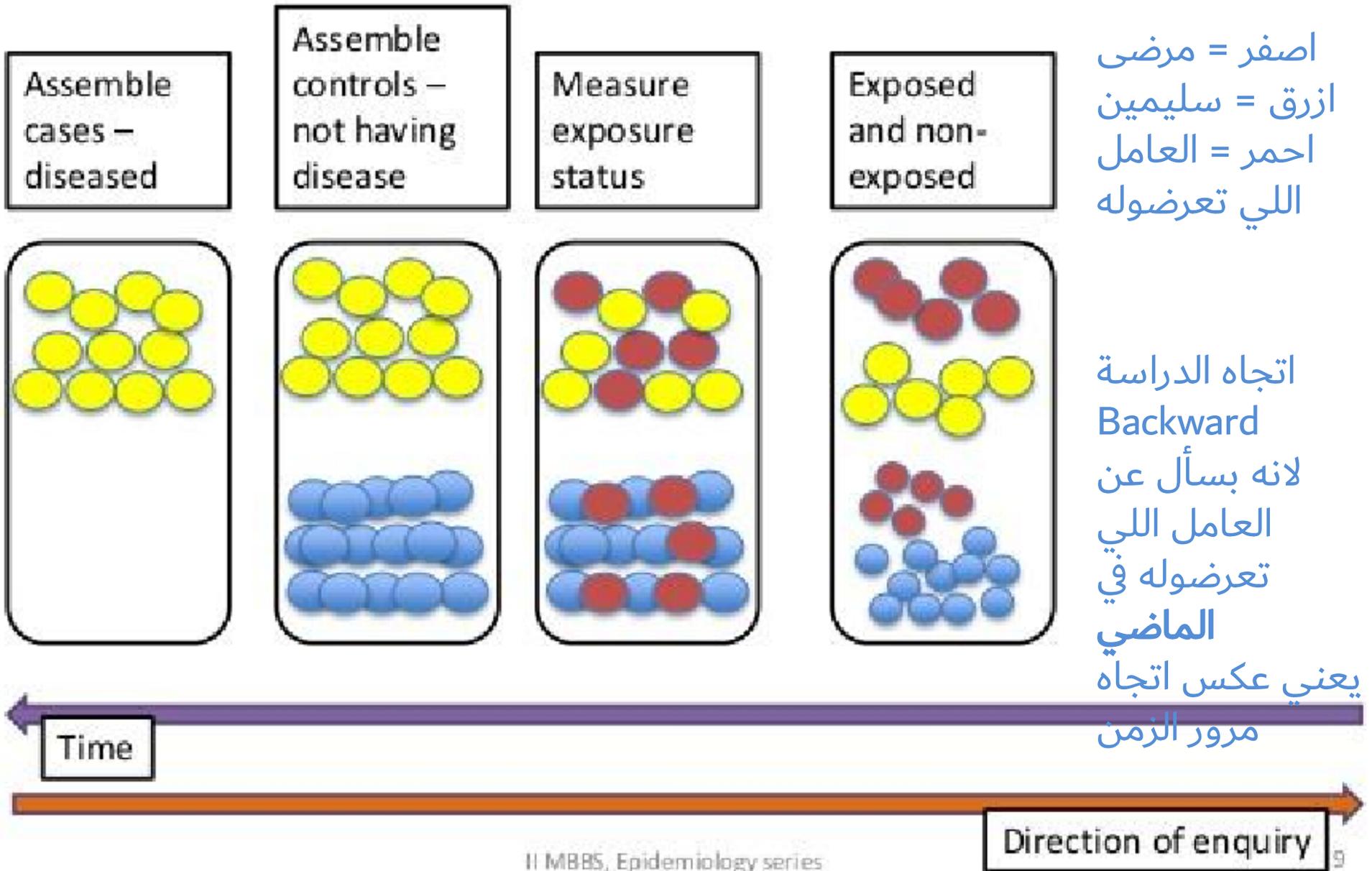
DO NOT HAVE THE
DISEASE

“CASES”

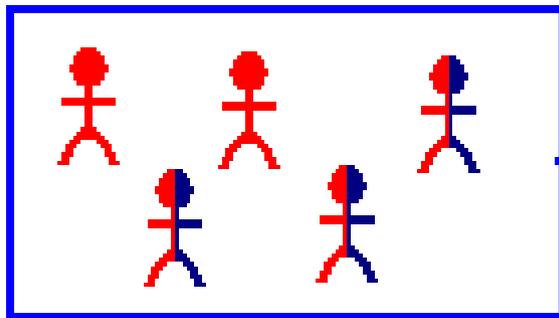
“CONTROLS”



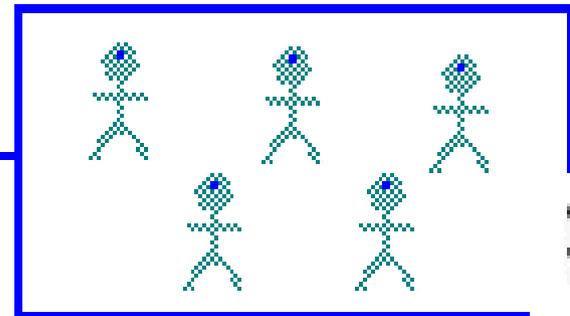
Dogma of case control study



**Group of interest
(e.g. cancer patients)**

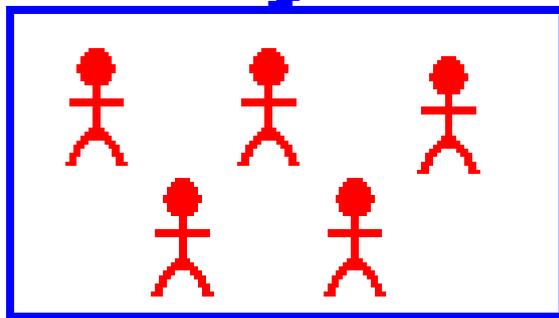


Take histories



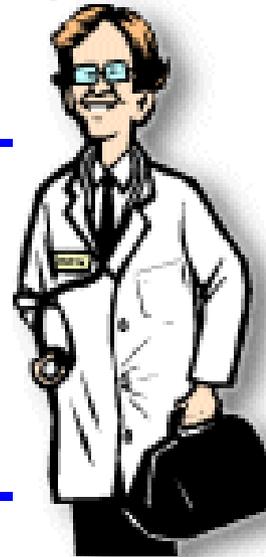
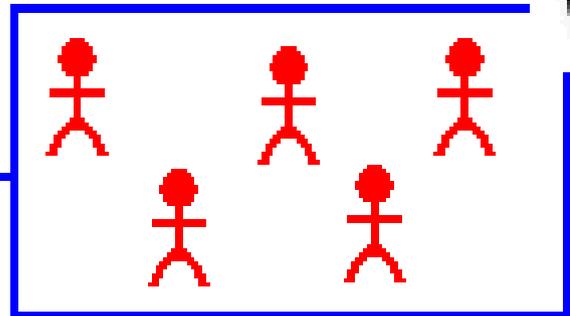
**Compare
histories**

**Draw
conclusions**



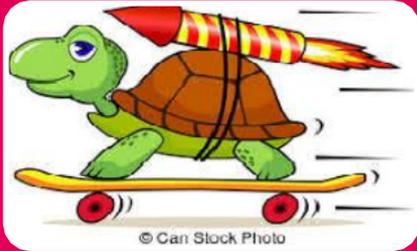
Take histories

**Comparison group
(e.g. non-patients)**



CASE CONTROL STUDIES

Advantages of case-control study:



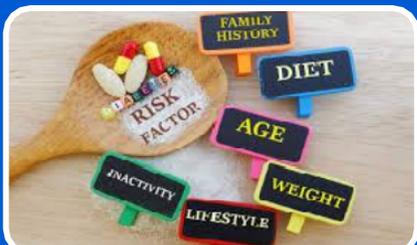
It is quick & inexpensive. Cuz it does not need follow up



It is suitable for evaluation of diseases with long latent periods, since we start with cases already having the diseases.

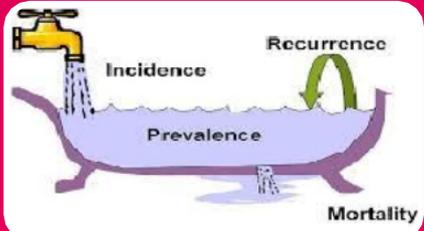


It is suitable for rare diseases. Cuz if you use cohort for rare dz, you will wait for a long time to see it once



Can examine multiple etiologic factors for a single disease at the same time e.g. cancer lung in relation to smoking, inhalation of silica, asthmatic bronchitis

Disadvantages of case-control study:



Incidence & Prevalence rates cannot be calculated. Cuz you are dealing with patients who are already having the dz



Relationship between exposure & disease difficult to establish. Cuz you are always not sure about what exposures happened in the past



Not suitable for studying rare exposures



. Bias “selection or recall”

Known by a variety of names

اي دراسة
بتشوف فيها
المريض اكثر
من مرة بتكون
longitudinal

Prospective study

Follow up study

Longitudinal study

Incidence study

Quick question
The study used
to measure
prevalence is ---

Answer in next
slid

اما اللي
بتشوف فيها
المريض مرة
وحدة عشان
توخد الداتا
بتكون
Vertical
study like in
cross-
sectional
study

Cohort study has 2 types

Answer is cross sectional study



the researcher follow up with the group sample for 1 year instead of 20 years and collect the rest of the data from past record. Example of type 2 :

ليش عمل هيك؟ عشان يختصر وقت

- **Prospective cohort study:** All data will be collected in the future
- **Retrospective prospective study:** where part is carried out retrospectively by collecting existing data then the cohort is followed till the outcome under study is developed.

Concept of a cohort

In epidemiology the word cohort is defined as a group of people who share a common characteristic or experience within a defined period of time (e.g. age, occupation, exposure to drug, vaccine, pregnancy, birth or marriage cohorts).



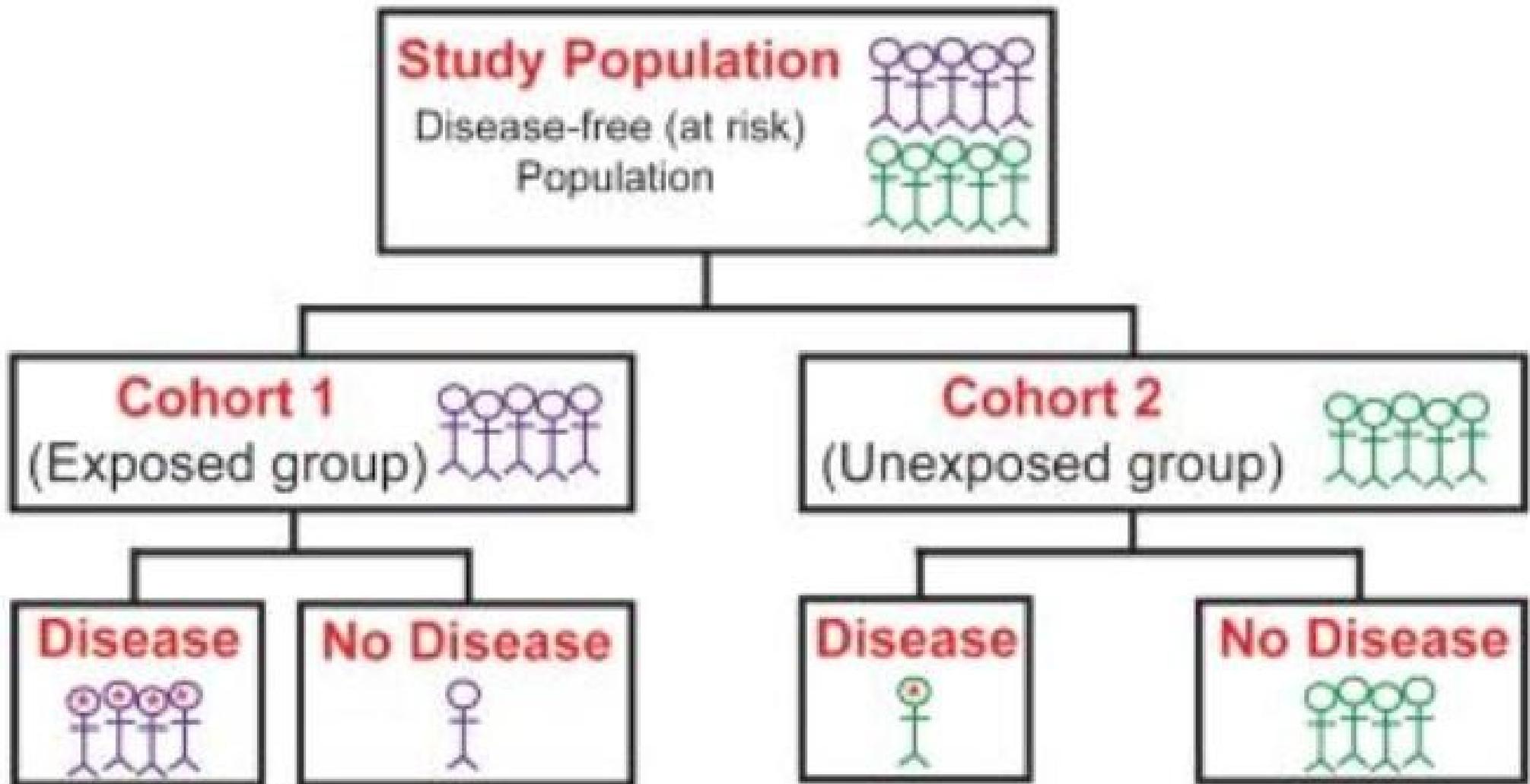


Cohort study Starts with cohorts (sample group) then follow up till the dz show up

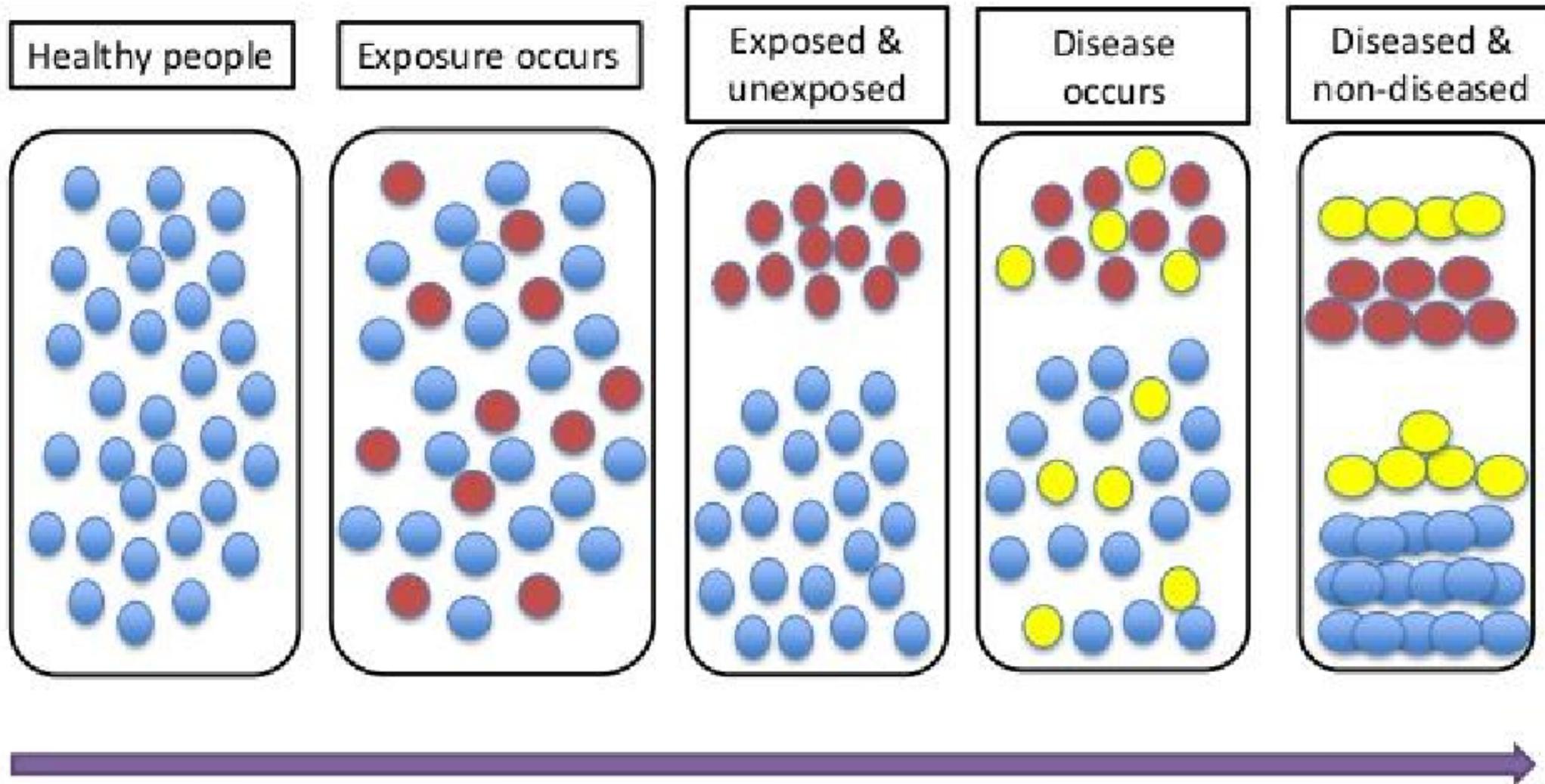


Case control study Starts with the dz then go backward to know the exposure

COHORT STUDY



Dogma of cohort study

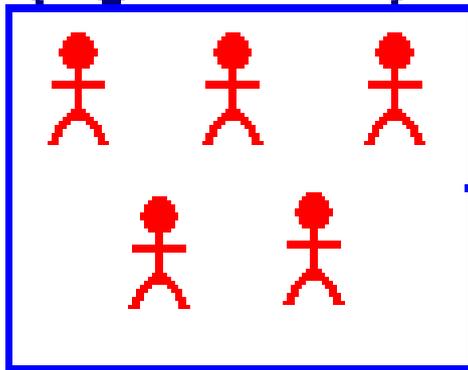


Red = exposed group

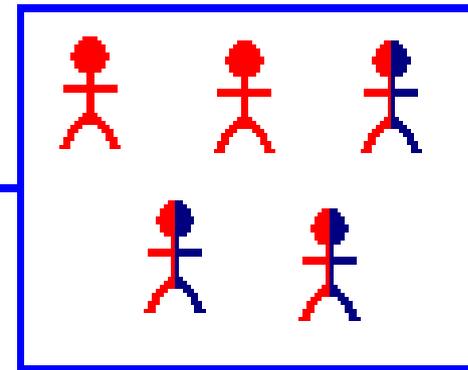
Yellow = group of people who got the dz

Blue = group who did not get the dz

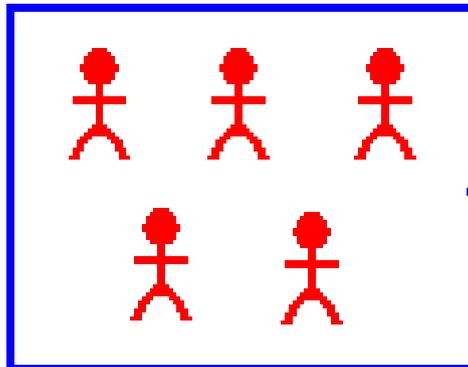
Group of interest
(e.g. smokers)



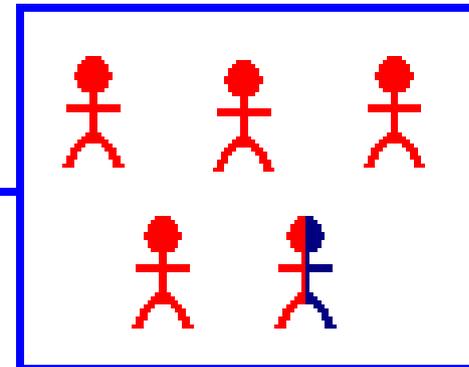
Follow
over time



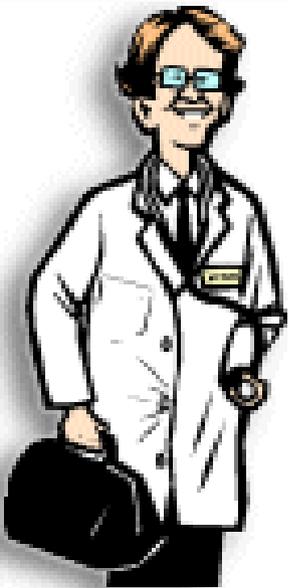
Comparison group
(e.g. non-smokers)



Follow
over time



Compare
outcomes



Cohort Studies

Prospective cohort

The features of prospective cohort of the study:

- ❑ A group of individuals are defined on the basis of the presence or absence of exposure to a suspected factor for a disease.
- ❑ At the time when the exposure status is defined, all individuals must be free from the disease under investigation.
- ❑ They will be followed over a period of time to assess the occurrence of that outcome.

Advantages of cohort study:



It identifies the cause as time sequence of event is observed i.e. they were healthy group then exposed to the risk so the disease occurs thus we can calculate relative risk.



We can calculate the incidence rate since the sample is drawn from the normal population.

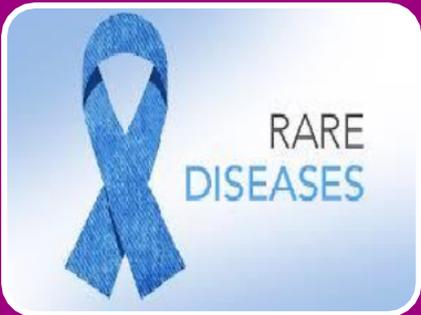


Suitable for studying rare exposure to risk since we start by exposed and non-exposed groups.

Disadvantages of the cohort study:



It is expensive and need longer time than case control studies.



Not feasible for rare disease, since we will need a large size cohort to get sufficient number of cases at the end of the study.



Some members of the cohort may be lost during follow up.

CANCER LUNG & SMOKING

Case-control

- One group already have ca. lung “cases”
- 2nd healthy group “controls”
- Comparing smoking status “smoker or not & duration of smoking in past history of both groups”

Cohort

- Start by a cohort selected from population living in a locality.
- Individuals in this cohort divided into exposed “smoker” & non-exposed “non-smoker”
- Then these 2 groups followed for some period of time to find out who among both groups will develop ca.lung.

Case-Control Versus Cohort Studies

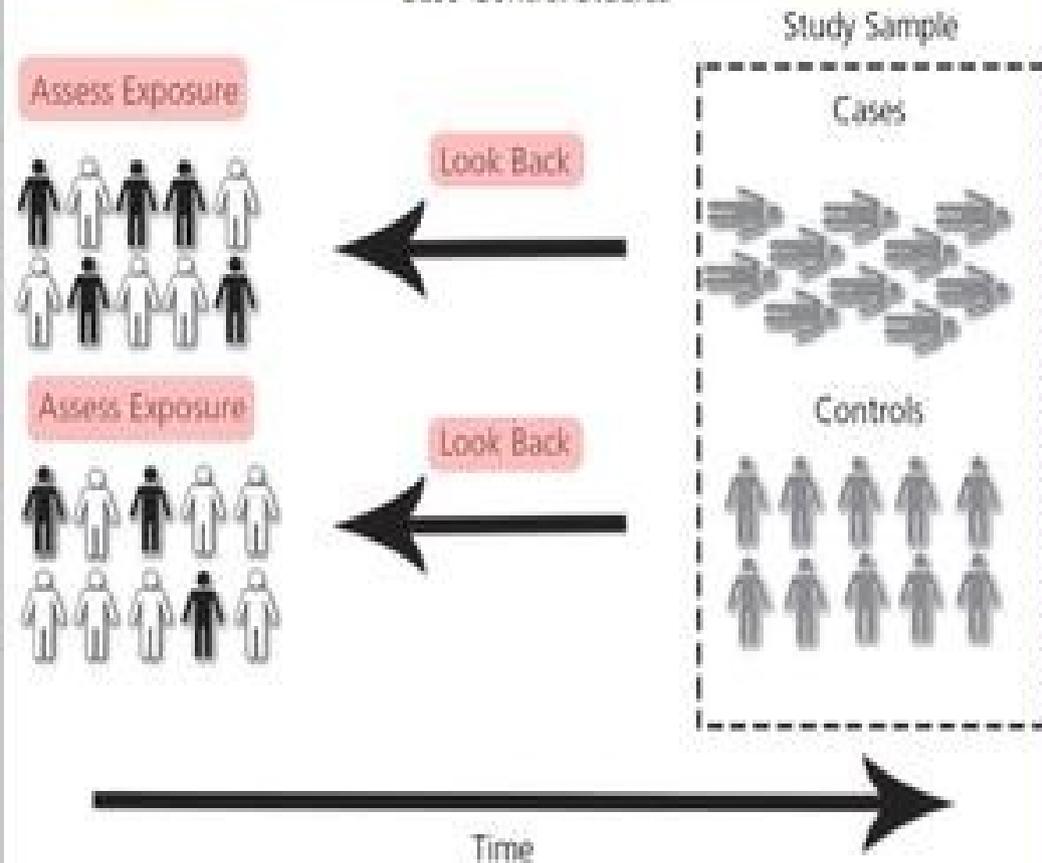
Similarities

- Both Are Analytical
- Both Can Examine Associations

Case-Control Study (Differences)

- Track *Backward* From Outcome To Exposure
- Are Inherently Retrospective (Past)

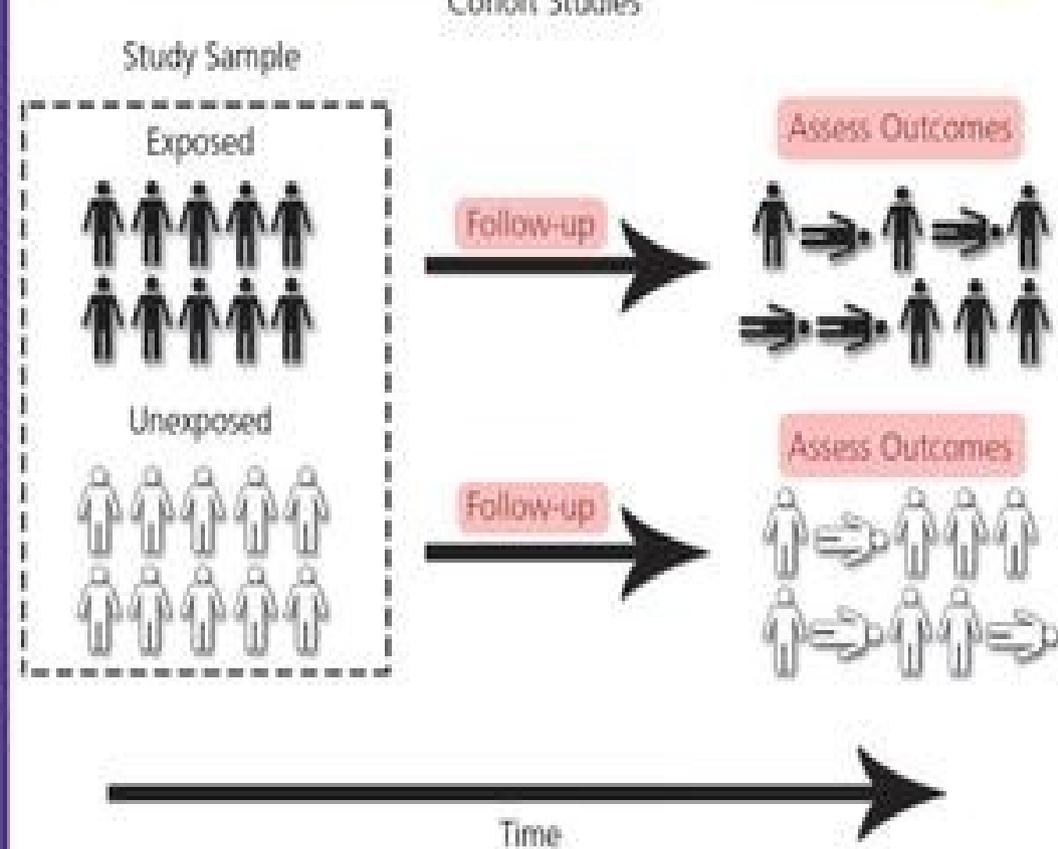
Case-Control Studies



Cohort Study (Differences)

- Track *Forward* From Exposure To Outcome
- Can Be Retrospective (Past) Or Prospective (Future)

Cohort Studies



Case-control Or Cohort. How to choose?



✓ **When the outcome is rare** ☒ start with it.

So ☒ case-control study.

Search for possible incriminated exposures retrospectively

✓ **When the exposure is rare** ☒ start with it. So ☒ cohort study.

Follow them up compared with those unexposed

✓ **When the exposure is new** ☒ follow it up. So ☒ cohort study.

Summary slide

Analytical studies used for hypothesis testing, and a comparable group must be present

Analytical studies are two types: cohort and case control

Case study	Cohort
Study sample group already has the dz	Study sample group are healthy then exposed to X factor then follow them up
Not suitable for studying rare exposure	Suitable for studying rare exposure
Weaker study than cohort	Stronger study in evidence- based medicine
Does not show cause-effect relationship	Show cause-effect relationship
Can not calculate incidence rate	Can calculate incidence rate
Suitable for rare dz	Not suitable for rare dz
Not expensive	Expensive

Thank You!

