06

CROSS-SECTIONAL STUDY DESIGN

KSU COLLEGE OF MEDICINE
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ACKNOWLEDGMENTS

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LECTURE **OBJECTIVES**

By the end of this lecture, I am able to:

- Describe types of cross-sectional studies
- Identify steps for conducting cross-sectional studies
- Identify issues in the design of cross-sectional studies
- Describe the strengths and weaknesses of cross-sectional studies

Overview

What is Cross-Sectional Studies/ surveys?

A cross-sectional study is a study that either quantifies an outcome of interest **AND/OR** examines the relationship between disease (or other health related state) and other variables of interest as they exist in a defined population at a single point in time or over a short period of time.

- If I want to compare between two prevalence at different area or different point of time > it become analytical
- whether they have the outcome of interest.
- If the study made at multiple points in time it will be called cohort design neither than cross sectional design.
- Associated factors are not a primary objective when using cross sectional design specially if we study a rare disease, better to use case control design.

Types of Cross-Sectional Studies

Descriptive cross-sectional studies	Analytical cross-sectional studies
Related events at a point in time/snapshot (Diseases, risk factors, coverage of interventions, health service utilization, knowledge, attitude and practice)	Assess **association** between exposure and outcome. Exposure and disease status are assessed **simultaneously** among individuals at the same point in time **Compare prevalence** of disease in persons with and without the exposure of interest Ask at the same time to assess the association between the exposure and the outcome **there is no follow up**

- In practice, cross-sectional studies will include an element of both types of design.

Overview

When to Conduct a Cross- Sectional Study

- To estimate **prevalence** of a **health condition** or **prevalence** of a behavior or **risk factor**
- To learn about **characteristics** such as knowledge,
- attitude and practices of individuals in a population
- To **monitor trends over time** with serial cross-sectional studies (National example of cross-sectional studies of great importance is the National Health and Nutrition Surveys **(NHANES)**).

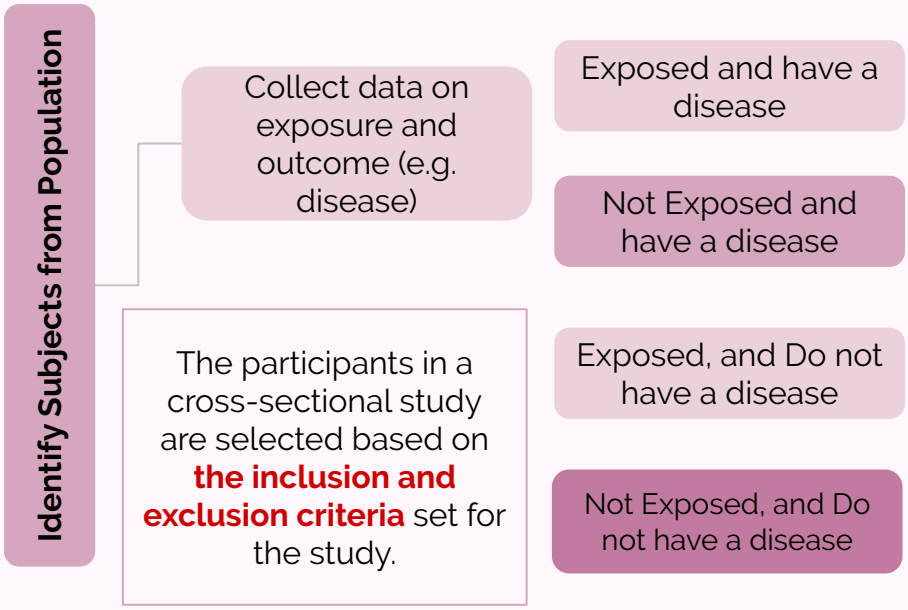
Steps in conducting a cross-sectional study

01 Define a **population** of interest (reference or source population) You don't look for existing exposure; general

02 Recruit a representative **sample** (adequate size, random selection)

03 Measure the **variables** of interest (exposure/outcome) at the same point in time

04 Analyze the **data**



- You don't categorize the subjects in your sample to people with the disease and health people like in case control design, in cross sectional design you will take a random sample and may all of them fall in one category of above figure. For example " No disease, risk factors " or may the sample will distributed

" Measure disease and exposure status simultaneously among individuals in a well-defined population at a point time (Snapshot of the health status of populations at certain point in time)

Measurements & Analysis

Types of Cross-sectional Studies:

Descriptive	Analytical
Prevalence on an outcome	Compare prevalence of an outcome between exposed and unexposed
Simply **characterize** the prevalence of a health outcome in a specified population.	They **compare the proportion** of exposed persons who are diseased with the proportion of non-exposed persons who are diseased
Prevalence=Cases / Total Population X 100	Prevalence Odd Ratio (POR)

Vaping & Advertisement (Example)

You identify a random sample of young adults aged 18 – 25 at city of Riyadh.

Exposure: Ads about vaping. **Outcome:** Vaping

	Vaping	Not Vaping	Total
Ads	50 A	200 B	250
No Ads	50 C	700 D	750
Total	100	900	1000

Descriptive Cross-Sectional:

What is the prevalence of vaping?

Prevalence of Vaping = Number of people who vape/ Total population X 100

= 100 /1000 X 100

= 10%

Analytical Cross-Sectional:

Does the prevalence of vaping vary by the status of exposure to advertisement?

I.e. What are the odds of vaping given exposure to advertisement versus not exposed to advertisement?

OR = odds an exposed person develop the outcome (a/b) odds an unexposed person develop the outcome (c/d)

= ad / bc

= (50X700) / (200X50) = 3.5 **(The odds of vaping is 3.5 times higher after seeing a vaping advertisement as opposed to not seeing one.)**

Issues in the Design

1- Choosing a representative sample:

- A cross-sectional study should be representative of the population if generalizations from the findings are to have any validity.
- For example, a study of the prevalence of diabetes among women aged 40-60 years in Town A should comprise a random sample of all women aged 40-60 years in that town.

2-Sample Size:

- The sample size should be sufficiently large enough to estimate the prevalence of the conditions of interest with adequate precision.
- Sample size calculations can be carried out using sample size tables or statistical packages such as Epi Info.

3-Biases:

1. Selection Bias:

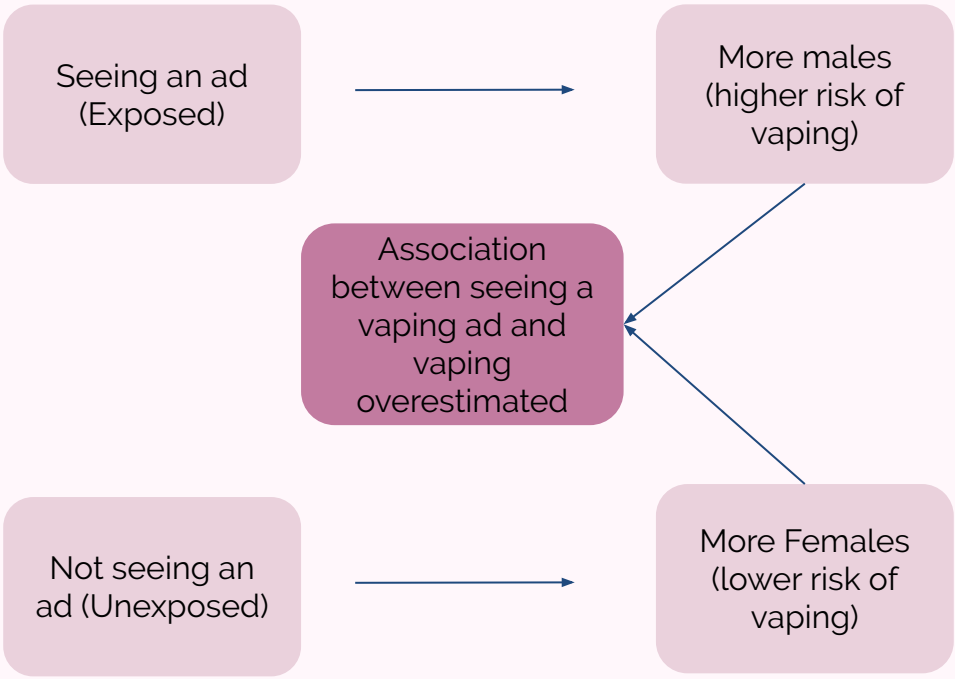
When the study participants are systematically different in their characteristics compared with eligible participants who were not selected for the study. **Common type:** Nonresponse bias.

2. Recall bias (very common)

3. Confounding (Disortets the assoscian)

Issues in the Design

Confounding (Example):



Cross-sectional strengths and weakness:

Weakness	Strengths
• Difficult to determine whether the outcome followed exposure in time or exposure resulted from the outcome. • Difficult to determine whether the outcome followed exposure in time or exposure resulted from the outcome. Relationships between the inactivity and developing diabetes; we don't know whether those patient are inactive because they are obese or they are obese because they are inactive (Lack of temporality) • Associations identified may be difficult to interpret. • Susceptible to bias due to low response and misclassification due to recall bias.	• Relatively quick and easy to conduct • Data on all variables is only collected once. • Able to measure prevalence for all factors under investigation. • Multiple outcomes and exposures can be studied. • Good for descriptive analyses and for generating hypotheses.