

Chapter 7 Cross-Sectional Study

Definition

An evaluation of the current status of the population at one point of the time. It is a study that describes the prevalence of a disease or a specific condition in the population at one point in time in the defined population.

Importance

A cross-sectional study is an important design to:

- Investigate the current prevalence of a condition or a disease in the population at one point of the time. For example, the prevalence of HCV in Egypt or the prevalence of depression among medical students.
- Test for possible relationships (i.e., associations) between variables in the population at one point of the time. For example, a cross-sectional study about Egyptian population habits and common diseases might reveal that lung cancer is prevalent in the population as well as a smoking habit. Such study can suggest a possible association between smoking and lung cancer, however, owing to the nature of the cross-sectional study, it is not possible to conclude whether smoking was a risk factor for lung cancer or lung cancer was a risk factor for smoking. Although this example is a hypothetical scenario, it is important that the validity of a research design be critically appraised independently from the common knowledge or current practice since they might be incorrect and might bias the interpretation of your research findings.

Types

- Descriptive cross-sectional study
- Analytical cross-sectional study
- Cross-sectional case-control study

Advantages

→ Short time

Cross-sectional studies can be done in short time once the proper sample from the population has been identified and reached; this study design does not include follow up, and therefore, it is relatively inexpensive in time.

→ Low cost

Unlike clinical trials and cohort studies, cross-sectional studies do not cost so much; the study costs might be limited to the costs of the screening tools and the incentives to the study participants. While clinical trials are expensive since they might include the costs of the treatment, patient assessment, the patient follows up, screening tools, incentives, or financial compensations to the study participants.

Disadvantages

→ Lack of information about the timing of exposure and outcome relationships

As we mentioned in the previous example "A cross-sectional study of population habits and common diseases," it was difficult to determine whether smoking was a risk factor for lung cancer or lung cancer was a risk factor for smoking. Such a relationship between the timing of exposure (to a certain risk factor) and developing a disease (developing an outcome) is called a temporal relationship. Cross-sectional studies lack information about the temporal relationships between variables. Therefore, it can only indicate a possible association between variables while the researchers can not emphasize which variable affects the other.

→ Include only prevalent cases

For example, if we design a study to evaluate depression among men with prostate cancer, our study will likely to include only diagnosed prostate cancer cases while neglecting the undiagnosed cases.

Examples

A cross-sectional study that is evaluating the prevalence of HTN in Egyptian medical students.

Sample size calculation for a prevalence study

$$n = \frac{(z^2)P(1 - P)}{d^2}$$

Where n=sample size, z= z statistic for the level of confidence, P=expected prevalence, and d=allowable error. This formula assumes that "P" and "d" are decimal values.