

Study Design Summary and MCQs

Summary of Study Designs

1. Descriptive Studies

Descriptive studies aim to outline patterns of diseases or health-related phenomena within populations.

Key Types:

- Case Reports: Detailed descriptions of a single patient's condition.

Example: A report on pulmonary embolism after using oral contraceptives.

- Case Series: Characteristics of multiple patients with a specific condition.

Example: Study of 5 cases of *Pneumocystis carinii* pneumonia in Los Angeles.

- Ecological Studies: Analyze data at the population level.

Example: Correlation between low meat consumption and colorectal cancer.

Strengths: Generate hypotheses; provide baseline data.

Limitations: Cannot establish causation; no control group.

2. Cross-Sectional Studies

These assess disease or exposure prevalence in a population at a single point in time.

Strengths: Quick and cost-effective; useful for public health planning.

Limitations: Not suitable for rare or short-duration diseases; cannot establish causation.

3. Analytical Studies

3.1 Case-Control Studies:

- Retrospective comparison of individuals with a disease (cases) and without (controls).

- Example: Investigating aspirin use during pregnancy and congenital heart defects.

Strengths: Ideal for rare diseases; quick; explores multiple risk factors.

Limitations: Prone to recall/selection bias; cannot calculate incidence.

3.2 Cohort Studies:

- Observational follow-up of exposed vs. unexposed groups over time.

- Example: Hypertension as a risk factor for intracerebral hemorrhage.

Strengths: Establishes cause-effect relationships; measures incidence.

Limitations: Time-consuming; inefficient for rare diseases.

4. Experimental Studies

Involve investigator-controlled interventions to test treatments or preventive measures.

Key Types:

- Clinical Trials: Test treatment efficacy and safety.

Example: Comparing aspirin users vs. non-users for colorectal cancer risk.

- Preventive Trials: Interventions in healthy populations.

Example: Vaccination to prevent hepatitis B.

Strengths: Rigorous testing; reduces bias through randomization.

Limitations: Ethical/logistical challenges; rare adverse events require long-term follow-up.

Key Comparisons:

Feature	Descriptive	Cross-Sectional	Case-Control	Cohort	Experimental
Purpose	Describe patterns.	Measure prevalence.	Study risk factors.	Explore causation.	Test interventions.
Best For	Hypothesis generation.	Chronic diseases.	Rare diseases.	Rare exposures.	Treatment evaluation.
Strengths	Quick insights.	Cost-effective.	Explores many risks.	Measures incidence.	Reduces bias.
Limitations	No causation.	No temporal link.	Prone to bias.	Time-consuming.	Ethical/logistical.

Multiple Choice Questions (MCQs)

1. What is the main purpose of descriptive studies?

- A. Establishing cause-effect relationships
- B. Testing new treatments
- C. Describing patterns of disease in a population
- D. Investigating rare diseases

Answer: C

2. Which of the following is an example of a case report?

- A. A study comparing smokers and non-smokers over 20 years
- B. A detailed report of a single patient with pulmonary embolism after using oral contraceptives
- C. A study investigating the prevalence of diabetes in a population
- D. A community-wide trial to test water fluoridation

Answer: B

3. What is a limitation of ecological studies?

- A. They are expensive to conduct.
- B. They focus on individuals rather than populations.
- C. They are prone to ecological fallacy and cannot establish causation.
- D. They require randomization and blinding.

Answer: C

4. Cross-sectional studies are most suitable for which type of diseases?

- A. Rare diseases
- B. Chronic diseases like diabetes

C. Diseases with short durations like flu

D. Rare exposures

Answer: B

5. What is a major limitation of case-control studies?

A. They are time-consuming and expensive.

B. They are inefficient for studying rare diseases.

C. They are highly prone to recall and selection bias.

D. They cannot identify multiple risk factors.

Answer: C

6. What is a key strength of cohort studies?

A. Efficient for rare diseases

B. Can establish temporal relationships between exposure and outcome

C. Ideal for rare exposures

D. Both B and C

Answer: D

7. Which of the following best describes a preventive trial?

A. Testing a new drug on a group of patients

B. Observing individuals exposed to a potential risk factor

C. Administering a preventive measure to healthy individuals or communities

D. Comparing cases and controls to identify risk factors

Answer: C

8. Randomization in clinical trials is used to:

A. Reduce costs

- B. Ensure comparability of groups
- C. Identify rare diseases
- D. Analyze confounding factors

Answer: B

9. What type of study is most suitable for studying rare diseases?

- A. Descriptive studies
- B. Cross-sectional studies
- C. Case-control studies
- D. Cohort studies

Answer: C

10. In a double-blind study:

- A. Only the participant knows the treatment being administered.
- B. Both the participant and the investigator are unaware of the treatment.
- C. The participant, investigator, and biostatisticians are unaware of the treatment.
- D. No blinding is used.

Answer: B

11. Which of the following is NOT a limitation of cohort studies?

- A. Time-consuming and expensive
- B. Susceptible to ecological fallacy
- C. Inefficient for rare diseases
- D. Requires large sample sizes

Answer: B

12. An example of an experimental study is:

- A. Observing the natural history of a disease
- B. Testing the effect of a new drug compared to a placebo
- C. Comparing exposure levels in ecological units
- D. Determining the prevalence of a disease in a population

Answer: B

13. What is the purpose of control groups in experimental studies?

- A. To eliminate confounding factors
- B. To identify rare exposures
- C. To allow fair comparison of outcomes
- D. To reduce costs

Answer: C

14. What type of study was conducted when a group of mothers who used aspirin during pregnancy were compared to those who did not?

- A. Cross-sectional study
- B. Case-control study
- C. Cohort study
- D. Experimental study

Answer: B

15. What is the term for factors that distort the relationship between exposure and outcome?

- A. Bias
- B. Randomization
- C. Confounding
- D. Blinding

Answer: C

