

Confounding and Bias in Epidemiological Studies

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1. Introduction

- Bias and confounding are errors that distort the true relationship between exposure and outcome.
- Recognising and controlling them is essential for valid conclusions.

2. Bias

- **Selection bias:** error from how participants are chosen or retained in a study.
- **Information bias:** error from inaccurate measurement of exposure or outcome, including recall bias.
- Bias is a systematic error that cannot be reduced by increasing sample size.

3. Confounding

- **Confounder:** a third factor associated with both exposure and outcome that distorts the association.
- A confounder must not lie on the causal pathway between exposure and disease.
- Age and smoking are common confounders in many studies.

4. Controlling These Errors

- Design methods include randomisation, restriction, and matching.
- Analysis methods include stratification and multivariable regression.

5. Importance

- Uncontrolled bias and confounding can create false associations or mask real ones.
- Careful design and analysis improve internal validity.

6. Summary

- Bias and confounding threaten study validity, but they can be limited through sound design and appropriate statistical adjustment.