

MedicalBiostatistics.com

COMPARATIVE PERFORMANCE OF PROSPECTIVE, RETROSPECTIVE, AND CROSS-SECTIONAL STUDIES

For an updated version, see
Basic Methods of Medical Research, Third Edition
by A. Indrayan (<http://indrayan.weebly.com>)

Caution is the bottom line for results obtained from any observational study. Because of a large number of confounding factors in this setup, some of which may be obscure and beyond redemption, firm conclusion could be difficult. Results from such studies are many times considered suggestive and not conclusive. The confidence level increases when the same result is obtained in a variety of settings in different studies.

See Tables 1 and 2 for comparison of features and performance of prospective, retrospective, and cross-sectional studies.

Table 1: Comparative features of case-control, cohort and cross-sectional designs

Item	Cohort (or prospective)	Case-control (or retrospective)	Cross-sectional
Main antecedent	Mostly known at the time of recruitment but in cohort of general population may be assessed as a baseline after recruitment	Elicited	Elicited (The distinction between antecedent and outcome may be blurred)
Outcome	Elicited after the assessment of antecedents	Already present and known	Elicited
Recruitment of subjects	On the basis of the antecedent	On the basis of the outcome	Neither outcome nor antecedents is considered
Definition of a case	Subject with the specified antecedent	Subject with the specified outcome	Any subject in the defined population
Definition of a control	Subject without the specified antecedent	Subject with outcome other than specified	No control is required

Investigation	Forwards – into the outcome	Backwards – into the antecedent	Cross-sectional situation as it exists
---------------	-----------------------------	---------------------------------	--

Table 2: General performance comparison of case-control, cohort, and cross-sectional designs

Criteria	Cohort (or prospective)	Case-control (or retrospective)	Cross-sectional
Cost and time	High	Low	Low
Number of subjects required	Large	Small	Large
Suitability for rare exposures	Good	Poor	Poor
Suitability for rare outcomes	Poor	Good	Poor
Spectrum of aetiological factors that can be investigated	Small	Large	Large
Spectrum of outcome factors that can be investigated	Large	Small	Large
Recall lapse and other biases	Not likely	Very likely	Not likely
Completeness of information	High	Low	Full, but only cross-sectional
Dropouts	More	Less	None
Changes in the characteristics of the subjects over time	More likely	Less likely	None
Assessment of risk	Direct by relative risk	Indirect by odds ratio	Approximate by prevalence rate ratio
Assessment of cause-effect relationship	Good	Fair	Poor
Assessment of temporal relationship	Good	Difficult	Not possible
Suitability for assessment of sensitivity and specificity	No	Yes	Yes, if the sample is representative
Suitability for assessment of predictivities	Yes	No	Yes, if the sample is representative
Evaluation and control of confounders	Poor	Good	Fair