

Observational Studies 101

Educational Briefing

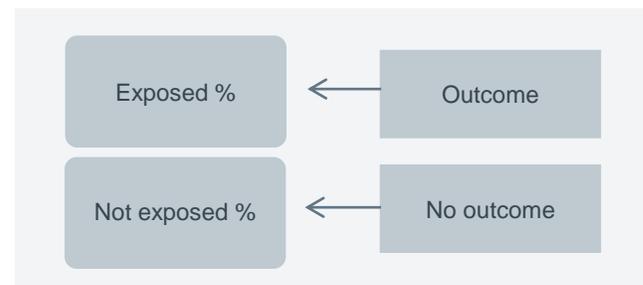
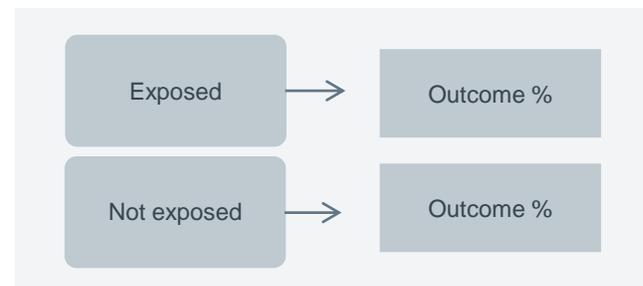
What is an observational study?

- In an observational study, researchers observe a population of individuals and measure their outcomes. Unlike in randomized control trials, researchers do not intervene to influence participants' outcomes.
- Many observational studies include a control group, which is a group of people who do not exhibit a particular behavior being studied. (For example, for a study evaluating the effects of smoking, the control group might consist of non-smokers.) Without a control group, studies cannot plausibly claim if a behavior had an impact on the observed outcomes.

What are the most common types of observational studies?

The most common observational studies with a control group are cohort and case-control studies:

- A **cohort** study looks at a similar groups of individuals (cohorts) who are alike in many ways but differ by a certain characteristic. Researchers compare these two groups on a particular outcome to see if this characteristic (or exposure) impacts that particular outcome.
 - For example, researchers might compare one cohort of female nurses who smoke to a cohort of female nurses who don't smoke and look at the overall rates of lung cancer between the two groups.
- A **case-control** study is retrospective (looks back in time). Researchers clearly define two groups at the start, one with a certain outcome and one without, and then look back to see what differences in risk factor exposure there might have been between the two groups. These studies can't determine definite causality (if one thing caused another), but they can suggest associations between a risk factor and an outcome (which is measured by an odds ratio).
 - For example, researchers might compare one group of people who got Salmonella against a group that didn't and look at which restaurants they ate at in order to find the source of the outbreak.



What type of causality can an observational study determine?

- Observational studies can show that an intervention is *associated with* a given outcome, but they cannot prove by themselves that an intervention *causes* an outcome.
 - For example, researchers might think that eating apples reduces your risk of a heart attack. To test this, they could compare a group of people who eat at least one apple a day to a group that never eats apples and see which group has more heart attacks. While they might find that those who eat more apples have fewer heart attacks, they cannot say for sure that eating apples *reduces* the risk of having a heart attack because that overlooks possible important differences in the apple group. For instance, those who eat more apples might also have a generally healthier diet, be more likely to follow health advice, and exercise. If this group has fewer heart attacks, it's not necessarily because of the apples they ate.

How are observational studies different than other study types?

- Observational studies differ from other study types where participants are divided randomly into different groups. Randomized control trials, for instance, divide participants randomly into different groups, which reduces the chance that (like the apple group above) there are important differences between the groups. Researchers are, therefore, more able to more accurately claim that a particular intervention led to an outcome.
- However, observational trials also tend to be cheaper and easier to conduct than randomized trials.