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**Q 1. How will you conduct case control study explain it with Example.**

**Ans.**

**Case Control Study**

**Definition**

A study that compares patients who have a disease or outcome of interest (cases) with patients who do not have the disease or outcome (controls), and looks back retrospectively to compare how frequently the exposure to a risk factor is present in each group to determine the relationship between the risk factor and the disease.

Case control studies are observational because no intervention is attempted and no attempt is made to alter the course of the disease. The goal is to retrospectively determine the exposure to the risk factor of interest from each of the two groups of individuals: cases and controls. These studies are designed to estimate odds.

Case control studies are also known as "retrospective studies" and "case-referent studies."

A **case**-**control study** is a retrospective **study** that looks back in time to find the relative risk between a specific exposure (**e.g.** second hand tobacco smoke) and an outcome (**e.g.** cancer). A **control** group of people who do not have the disease or who did not experience the event is used for comparison.

## **Five steps in conducting a case-control study**

#### 1. Define a study population (source of cases and controls)

Controls must have as similar a background as possible to the cases, except that they do not have the outcome in question. They should come from the same population as the cases. Their selection should be independent of the exposures of interest. Objective measures of the presence of risk factors are best, ideally carried out in a 'blind' assessment or before the cases and controls are identified (i.e. they do not know who is a control or not).

#### 2. Define and select cases

Identification of cases can be made from the general population using health register and data or from a particular medical setting. The criteria for diagnosis of a case should be defined as well as the eligibility criteria used for selection. The diagnostic criteria should be sensitive and specific (i.e. strict!). Information on diseases can be got from death certificates, disease registers, medical records or population survey. For rare diseases, cases may have to sought from large areas or over many years.

#### 3. Define and select controls

This is a very important step. Get this wrong and you introduce bias into the study. Controls should represent the population that the cases come from (i.e. they should be at risk of becoming new cases). Ratio to cases is usually 1:1. If cases are limited, you can have up to 4 controls: 1 case. Some time will be needed in considering the way in which the cases and controls, which make up the study will be chosen. More heterogeneity in the cases, less likelihood of being able to link a specific risk factor to the disease causation. But, narrower the category of disease for inclusion as 'cases', less general applicability the findings will have.

#### 4. Measure exposure

The measurement of the exposure(s) must be collected in a comparable way for cases and controls. It is worth 'blinding' the data gatherers to case or control status of participants or at least blind them to the main hypothesis of the study. This should help prevent measurement or researcher bias. Exposure information can come from records (though, obvious disadvantage is that records can be inaccurate, incomplete and were not originially collected for the study purposes) or can be via an interview or questionnaire (this can introduce recall bias, where cases have more vested interest in recalling the exposures than controls, and sometimes rely on 'proxy' respondents, e.g. carers, or parents of children).

#### 5. Estimate disease risk associated with exposure

Traditionally, data from case control studies are set in a 2 by 2 or fourfold table. It is unlike cohort studies (where study population is denominator adn incidence rate can be calculated for the disease as people are affected adn relative risk can be calculated). Because there is no population based data in case-control studies, results are best expressed as odds ratio (the ratio of exposed to non-exposed in the case group divided by the same ratio in the control group). When the number with disease is small compared with the number unaffected, the odds ratio is closer in value to the relative risk, which is a population-based estimate derived from cohort studies.

**Example**

The Salmonella outbreak above occurred in a small, well-defined cohort, and the overall [attack rate](http://sphweb.bumc.bu.edu/otlt/mph-modules/ph/outbreak/Outbreak8.html) was 58%. A cohort study design works well in these circumstances. However, in most outbreaks the population is not well defined, and cohort studies are not feasible. A good example of this is an actual outbreak of hepatitis A that occurred in Marshfield, MA in 2004.

Within a short period of time 20 cases of hepatitis A were identified in the Marshfield area. The epidemic curve suggested a point source epidemic, and the spot map showed the cases to be spread across the entire South Shore of Massachusetts, although the pattern suggested a focus near Marshfield. Hypothesis-generating interviews resulted in five food establishments that were candidate sources. Moreover, the disease was rare, so that even if they interviewed a sample of patrons at each of the restaurants, it is most likely that few, if any would have had recent hepatitis, even from the responsible restaurant.

**Q 2. How will you conduct Cohort study Explain it with Example.**

# Cohort study

A **cohort study** is a particular form of [longitudinal study](https://en.wikipedia.org/wiki/Longitudinal_study) that samples a [cohort](https://en.wikipedia.org/wiki/Cohort_%28statistics%29) (a group of people who share a defining characteristic, typically those who experienced a common event in a selected period, such as birth or graduation), performing a [cross-section](https://en.wikipedia.org/wiki/Cross-sectional_data) at intervals through time. It is a type of [panel study](https://en.wikipedia.org/wiki/Panel_study) where the individuals in the panel share a common characteristic.

Cohort studies represent one of the fundamental designs of [epidemiology](https://en.wikipedia.org/wiki/Epidemiology) which are used in research in the fields of [medicine](https://en.wikipedia.org/wiki/Medicine), [nursing](https://en.wikipedia.org/wiki/Nursing), [psychology](https://en.wikipedia.org/wiki/Psychological_research), [social science](https://en.wikipedia.org/wiki/Social_science), and in any field reliant on 'difficult to reach' answers that are based on evidence ([statistics](https://en.wikipedia.org/wiki/Statistics)). In medicine for instance, while clinical trials are used primarily for assessing the safety of newly developed pharmaceuticals before they are approved for sale, epidemiological analysis on how risk factors affect the incidence of diseases is often used to identify the causes of diseases in the first place, and to help provide pre-clinical justification for the plausibility of protective factors (treatments).

**How do you conduct a cohort study?**

A “cohort” is any group of people with a shared characteristic. For example, in a birth cohort, what’s common to all individuals is their birth year.

In a cohort study, the study participants are followed over time—from weeks to years, depending on the time frame. The goal is to understand the relationship between some attribute related to the cohort at the beginning of the study and the eventual outcome.

There arefive steps in a cohort study:

1. Identify the study subjects; i.e. the cohort population.
2. Obtain baseline data on the exposure; measure the exposure at the start. (The exposure may be a particular event, a permanent state or a reversible state.)
3. Select a sub-classification of the cohort—the unexposed control cohort—to be the comparison group.
4. Follow up; measure the outcomes using records, interviews or examinations. (Note: Outcomes must be defined in advance and should be specific and measurable.)
5. Do the data analysis where the outcomes are assessed and compared.

**Example**

An example of an epidemiological question that can be answered using a cohort study is whether exposure to X (say, smoking) associates with outcome Y (say, lung cancer). In 1951, commenced the [British Doctors Study](https://en.wikipedia.org/wiki/British_Doctors_Study), a cohort that included both smokers (the exposed group) and non-smokers (the unexposed group). The study continued through 2001. By 1956, the study provided convincing proof of the association of smoking with the incidence of lung cancer. In a cohort study, the groups are *matched* in terms of many other variables such as economic status and other health status so that the variable being assessed, the [independent variable](https://en.wikipedia.org/wiki/Independent_variable) (in this case, smoking) can be isolated as the cause of the [dependent variable](https://en.wikipedia.org/wiki/Dependent_variable) (in this case, lung cancer). In this example, a [statistically significant](https://en.wikipedia.org/wiki/Statistical_significance) increase in the incidence of lung cancer in the smoking group as compared to the non-smoking group is evidence in favor of the hypothesis. However, rare outcomes, such as lung cancer, are generally not studied with the use of a cohort study, but are rather studied with the use of a [case-control](https://en.wikipedia.org/wiki/Case-control) study.