

## 7.1: Epidemiology definitions

### Introduction

This sub-chapter may lack for drama, but let's start by providing a list of key terms with definitions as you start our introduction to epidemiology.

### Definitions

**Absolute risk:** The probability that a specified event will occur in a specified population. See [Ch. 7.4 – Epidemiology: Relative risk and absolute risk, explained](#)

**Absolute risk reduction (ARR):** the decrease in risk of an event in an exposed (treatment) group compared to an unexposed (control) group. Also called the **risk difference**.  $CER - EER$ , see Contingency table. See [Ch. 7.4 – Epidemiology: Relative risk and absolute risk, explained](#)

**Contingency table**, also called cross tabulation or crosstab, is a display of counts of variables in a matrix format. In epidemiology, rows of contingency table represent treatment or exposure groups, and columns represent outcomes.

Table 7.1.1. A  $2 \times 2$  contingency table.

	Outcome	
	Yes	No
Treatment or exposed group	a	b
Control or nonexposed group	c	d

The  $2 \times 2$  contingency table is referred to frequently in this chapter and again in Chapter 9.

R code

```
a = 4; b = 46; c = 5; d = 45
```

```
Table1 <- matrix(c(a,b,c,d), 2, 2, byrow=TRUE, dimnames = list(c("Treatment", "Control"), c("Yes", "No")))
```

R output

```
      Yes No
Treatment  4 46
Control    5 45
```

**Control event rate (CER):** How often an event occurs in the control group.  $\frac{c}{c+d}$ , see Contingency table

**Diagnosis:** identification of the nature of a disease or condition.

**Event:** From probability theory, an event is a set of outcomes to which a probability is assigned.

**Experimental event rate (EER):** How often an event occurs in the treatment group.  $\frac{a}{a+b}$ , see Contingency table

**Hazard:** anything that can cause harm

**Incidence:** the number of newly diagnosed individuals in a population having a condition, disease or other characteristic. Compare to prevalence.

**Negative predictive value of a test (NPV),** defined as the probability that a negative test result identifies a person who truly does not have the disease. Calculated as the total number of individuals without the disease divided by the total that tested negative.

$$NPV = \frac{TN}{TN+FN}$$

**Number needed to treat (NNT):** the inverse of the absolute risk reduction.  $NNT = \frac{1}{ARR}$ . See [Ch. 7.4 – Epidemiology: Relative risk and absolute risk, explained](#)

**Odds**, the ratio (OR) of two probabilities: the probability of getting a one on throwing a dice is 1, and the probability of not getting a one is 5; therefore the odds of getting a one are 1 to 5.  $OR = \frac{a \cdot d}{b \cdot c}$ . See [Ch. 7.5 – Odds ratio](#)

**Per capita rate**, Latin phrase, for each head, meaning per person.

**Positive predictive value** of a test (**PPV**), defined as the probability that a positive test result identifies a person who truly has the disease. Calculated as the total number of individuals with the disease divided by the total that tested positive.  $PPV = \frac{TP}{TP+FP}$

**Posttest probability** refers to the probability that the patient has the disease after the results of the test are known.

**Pretest probability** is the prevalence of the disease, i.e., the chance that the a randomly selected person from the population has the disease.

**Prevalence:** The proportion of individuals in a population having a condition, disease, or characteristic. Compare to incidence.

**Prognosis:** how a disease plays out.

**Relative risk:** Ratio of the risk of an event among those exposed to the risk factor to the risk among those not exposed to the risk factor. See [Ch. 7.4 – Epidemiology: Relative risk and absolute risk, explained](#)

**Relative risk reduction (RRR):** is a measure calculated by dividing the absolute risk reduction by the control event rate. See [Ch. 7.4 – Epidemiology: Relative risk and absolute risk, explained](#)

**Risk:** Probability of an event. Risk is not restricted to just bad events, but refers to the uncertainty of a particular event (e.g., the risk that a child will be born male seems a melodramatic statement, but it is accurate as far as this definition goes).

**Therapy:** treatment intended to treat, relieve, or cure a disorder or condition.

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## Questions

1. Compare and contrast ARR and RRR.
2. What's the difference between event, hazard, and risk?
3. What's the difference between incidence and prevalence?
4. What's the difference between diagnosis and prognosis?
5. What's the implication of a NNT greater than 100 in terms of the utility of a proposed therapy or treatment?

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