

# Glossary of Statistical Terms

## **Alternative Hypothesis ( $H_1$ )**

A formal statement which can take three different forms depending on the likely direction of the impact of an intervention.

## **Critical value(s)**

The location point(s) on a probability distribution which lead to rejection of the null hypothesis.

## **Critical region**

The region(s) or tail(s) of the probability distribution that lead to rejection of  $H_0$ .

## **Empirical probability**

The relative frequency of occurrence of an outcome of interest. The relative frequency converges to the true probability as more sample results are accumulated.

## **Hypothesis testing**

Tests a statistical hypothesis by specifying both null and alternative propositions concerning the value of a parameter. The type 1 error ( $\alpha$ ) is decided prior to experimental data being collected allowing for type 2 errors to be determined.

## **Null Hypothesis ( $H_0$ )**

A formal statement to the effect that an intervention has had no impact and that the status quo remains.

## **One-tailed tests**

Tests for which the critical region is located on the right or left hand tail of a probability distribution.

## **Operating characteristic (OC) curve**

A plot of the type 2 ( $\beta$ ) error for a range of assumed values of the true parameter.

### **p-value**

The probability of obtaining a result at or more extreme than the result obtained given that the null hypothesis is true. Used in significance testing.

### **Population parameter**

The true value of a statistic which is generally unknown. Collecting large amounts of data tends to give a good approximation.

### **Power of the test**

A plot of  $(1-\beta)$  for a range of assumed values of the true parameter. The power curve illustrates the probability of correctly rejecting  $H_0$  based on a decision rule.

### **Probability distribution**

Can be considered as the possible outcomes of the experiment (plotted say on an x-axis) with the corresponding likelihood of occurrence (plotted on the y-axis). Examples include normal or t distributions.

### **Significance testing**

Statistical reasoning based on specifying the null hypothesis and determining the likelihood (expressed using p-values) of obtaining at least the sample data assuming the null hypothesis is true.

### **Test statistic**

Calculated using a formula which includes the sample result, the hypothesised parameter and an estimate of the standard deviation e.g. z or t statistic. The strength of the case against the null hypothesis is determined by the location of the test statistic on the probability distribution.

### **Two-tailed tests**

Tests for which the critical region is located on both sides of a probability distribution.

### **Type 1 error ( $\alpha$ )**

The risk of falsely rejecting  $H_0$ . It is also known as a false positive error.

### **Type 2 error ( $\beta$ )**

The risk of falsely 'accepting'  $H_0$ . It is also known as a false negative error.