Chapter 134

Odds Ratio and Proportions Calculator

Introduction

The Odds Ratio tab of this procedure calculates any one of three parameters, odds ratio, p_1, or p_2, from the other two parameters. Note that p_1 and p_2 are the proportions in groups one and two, respectively. This provides you with a tool to study the relationship between these three parameters. The procedure may be loaded by selecting *Odds Ratio and Proportions Calculator* from the *Calculators* sub-menu of the *Tools* menu.

As an expanded version of the Odds Ratio tab, the Proportions tab calculates p_1, p_2, the difference, ratio, odds ratio, or Ln(OR) from various combinations of these parameters.

When planning studies involving two proportions, two parameters, p_1 and p_2, need to be specified. At times, it may be difficult to propose a value for p_2. In these cases, it might be easier to propose a value for the *odds ratio* (*OR*).

The odds of obtaining the response of interest in group 1 are $p_1 / (1 - p_1)$ and the odds of obtaining the response in group 2 are $p_2 / (1 - p_2)$. The ratio of these odds, called the odds ratio, is defined as

$$OR = \frac{p_2 / (1 - p_2)}{p_1 / (1 - p_1)} = \frac{p_2(1 - p_1)}{p_1(1 - p_2)}$$

To understand better how to interpret an odds ratio, consider the following example. Suppose the proportion dying from a particular disease during the first five years is 80%. The odds of dying are thus 0.8 / 0. 2 = 4.0 Suppose a treatment reduces the death rate from 80% to 60%. The odds of dying are now 0.6 / 0.4 = 1.5. The odds ratio is 4.0 / 1.5 = 2.7. That is, the odds of dying have been reduced by a factor of 2.67.

The odds ratio is reversible. In this example, suppose we talk in terms of surviving instead of dying. The odds of the two groups are now 0.2 / 0.8 = 0.25 and 0.4 / 0.6 = 0.67. The odds ratio is 0.67 / 0.25 = 2.67. The odds of surviving have increased by a factor of 2.67.

In some situations, it may be easier to define a meaning treatment effect in terms of the odds ratio. That is, it might be meaningful to say that a certain treatment increases the odds of survival by 50% (*OR* = 1.5) or by 200% (*OR* = 2.0). If this is the case, a value for p_2 can be calculated from p1 and *OR* by solving the above equation for p_2 to find that

$$p_2 = \frac{p_1(OR)}{1 - p_1 + p_1(OR)}$$

Hence, given a value for p_1 and *OR*, you can calculate an appropriate value for p_2.

Odds Ratio Tab

This window lets you calculate p_1, p_2, or the odds ratio (OR) from the other two parameters.

Example 1 – Solving for P1

Suppose you know that $p_2 = 0.8$ and that *OR* = 4 and you want to find the corresponding value of p_1.

1. Load the **Odds Ratio and Proportions Calculator** procedure by selecting it from the *Tools* menu.
2. Select the **Odds Ratio tab**.
3. Set **P2** equal to **0.8**.
4. Set **Odds Ratio** equal to **4**.
5. Read the result in the P1 box. The result is **0.5**.

Example 2 – Solving for P2

Suppose you know that $p_1 = 0.4$ and that *OR* = 1.5 and you want to find the corresponding value of p_2.

1. Load the **Odds Ratio and Proportions Calculator** procedure by selecting it from the *Tools* menu.
2. Select the **Odds Ratio tab**.
3. Set **P1** equal to **0.4**.
4. Set **Odds Ratio** equal to **1.5**.
5. Read the result in the P2 box. The result is **0.5**.

Example 3 – Solving for Odds Ratio

Suppose you know that $p_1 = 0.4$ and that $p_2 = 0.8$ and you want to find the corresponding value of the odds ratio.

1. Load the **Odds Ratio and Proportions Calculator** procedure by selecting it from the *Tools* menu.
2. Select the **Odds Ratio tab**.
3. Set **P1** equal to **0.4**.
4. Set **P2** equal to **0.8**.
5. Read the result in the Odds Ratio box. The result is **6**.

Proportions Tab

This window lets you calculate p_1, p_2, the difference, ratio, odds ratio, or Ln(OR) from various combinations of these parameters.

Example 1 – Calculating Ln(OR)

Suppose you know that $p_1 = 0.4$ and that $p_2 = 0.8$ and you want to find the corresponding value of Ln(OR).

1. Load the **Odds Ratio and Proportions Calculator** procedure by selecting it from the *Tools* menu.
2. Select the **Proportions tab**.
3. Set **P1** equal to **0.4**.
4. Set **P2** equal to **0.8**.
5. Read the result in the Ln(O.R.) box. The result is **1.79176**.