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 \( p_1 \) 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 $P_1$

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 $P_2$ equal to 0.8.
5. Read the result in the $P_1$ box. The result is 0.5.

Example 2 – Solving for $P_2$

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 $P_1$ equal to 0.4.
4. Set Odds Ratio equal to 1.5.
5. Read the result in the $P_2$ 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 $P_1$ equal to 0.4.
4. Set $P_2$ 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.