**Example: When is the Relative Risk Close to the Odds Ratio?**

Consider the following hypothetical example comparing survival rates between two groups.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Survived | Died | Total |
| Group A | 98 | 2 | 100 |
| Group B | 99 | 1 | 100 |

Questions:

1. Compute the relative risk of death for comparing Group A to Group B.
2. Compute the odds ratio for death for comparing Group A to Group B.
3. What do you notice about the overall probability of death? In this case, how close are the relative risk and the odds ratios?

Now, suppose the results were as shown below, instead.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Survived | Died | Total |
| Group A | 25 | 75 | 100 |
| Group B | 75 | 25 | 100 |

Questions:

1. Compute the relative risk of death for comparing Group A to Group B.
2. Compute the odds ratio for death for comparing Group A to Group B.
3. What do you notice about the overall probability of death? In this case, how close are the relative risk and the odds ratios?

Next, we will discuss the use (and sometimes abuse) of such statistics in the real world.

**Example: Mammography Screening and Breast Cancer Mortality**Suppose the following data were the result of a study to investigate the impact of mammography screening on breast cancer mortality. Use the data to answer the following questions.

|  |  |  |  |
| --- | --- | --- | --- |
| **Mammogram?** | **Died of Breast Cancer** | **Did Not Die of Breast Cancer** | **Total** |
| Yes | 4 | 996 | **1,000** |
|  No | 5 | 995 | **1,000** |
| **Total** | **9** | **1,991** | **2,000** |

Questions:

1. Find the risk of dying of breast cancer for those that underwent mammography screening.
2. Find the risk of dying of breast cancer for those that did not undergo mammography screening.
3. Find and interpret the risk ratio calculated using the risk for those who did have a mammogram in the numerator.
4. If these data were actually obtained from a study, would it be accurate for pamphlets, websites, etc., to advertise that mammograms were associated with a 20% reduction in breast cancer mortality? Why or why not?

1. Find and interpret the risk ratio calculated using the risk for those who did not have a mammogram in the numerator. Based on these results, how else could one advertise the association between mammograms and breast cancer mortality?

 **Example: The Risk Profile of Vioxx**

Vioxx is a prescription medication used to treat arthritis pain. In 2000, the results of a study which compared the effect of Vioxx on gastrointestinal toxicity to that of a competing drug, naproxen, was published. The researchers found that Vioxx greatly reduced the risk of GI problems; however, there was another discovery. The study also reported the incidence of heart attack in patients, noting that “the incidence of myocardial infarction was lower among patients in the naproxen group than among those in the [Vioxx] group (relative risk, 0.2).”

Questions:

1. Interpret the relative risk (i.e., risk ratio) as reported above.
2. How would the risk ratio have been reported had the risk for the Vioxx group been used in the numerator of the risk ratio? Would this have changed your opinion of whether or not the increased risk of heart attack was justifiable given the benefit of decreased gastrointestinal events? Why or why not?

**Example: Blindness and Diabetes**
Suppose the following data were the result of a study carried out over five years to investigate the impact of a new drug on the risk of blindness in diabetics. Use the data to answer the following questions.

|  |  |  |  |
| --- | --- | --- | --- |
| **Treatment** | **Blind** | **Not Blind** | **Total** |
| Conventional Treatment | 2 | 98 | **100** |
| New Drug | 1 | 99 | **100** |
| **Total** | **3** | **197** | **200** |

Questions:

1. Find the risk of blindness for those diabetics getting the conventional treatment.
2. Find the risk of blindness for those diabetics getting the new drug.
3. Find and interpret the risk ratio.
4. Find and interpret the risk difference.
5. If you were a marketing manager for the new drug, which would you probably use to compare the new drug to the conventional treatment: the risk difference or the risk ratio? Why?
6. If you were a journalist whose job was to inform your readers, what information should you report from this study?

Finally, suppose the data from the study investigating risk of blindness in diabetics were as shown below. Use these data to answer the following questions.

|  |  |  |  |
| --- | --- | --- | --- |
| **Treatment** | **Blind** | **Not Blind** | **Total** |
| Conventional Treatment | 20 | 80 | **100** |
| New Drug | 10 | 90 | **100** |
| **Total** | **30** | **170** | **200** |

Questions:

1. Find the risk of blindness for those diabetics getting the conventional treatment.
2. Find the risk of blindness for those diabetics getting the new drug.
3. Find and interpret the risk ratio.
4. Find and interpret the risk difference.
5. If you were a marketing manager for the new drug, which would you probably use to compare the new drug to the conventional treatment: the risk difference or the risk ratio? Why?
6. Once again, if you were a journalist whose job was to inform your readers, what information should you report from this study?

**Don’t Forget Absolute Risk!**
As the previous examples have illustrated, too often the absolute risks for each group involved in a study are ignored, and only the risk ratio (i.e., the relative risk) is reported. To learn more about this, read the following article:

<http://www.huffingtonpost.com/h-gilbert-welch/health-risk_b_1613912.html>.

Then, read two different accounts of the results of a recent study released in November of 2013:

* WebMD: <http://www.webmd.com/sex/birth-control/news/20131118/the-pill-tied-to-raised-risk-of-glaucoma>
* NPR: <http://www.npr.org/blogs/health/2013/11/18/245959355/using-birth-control-pills-may-increase-womens-glaucoma-risk>

Which article do you think does a better job of presenting these results to the public? Explain your reasoning.