

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?

5. 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?

More on the Concepts of Risk, Odds, the Relative Risk Ratio, and the Odds Ratio

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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?

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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?

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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.