## Base Rate Fallacy

In settings where the majority of people are vaccinated, it may be true that there is an equal number of people, or even a greater number of people, who are vaccinated and become infected. Thinking that this means vaccines are ineffective is an example of a *base rate fallacy* or *base rate bias*.

In the following hypothetical example, we have 100 individuals, 80% of whom are vaccinated and 20% of whom are unvaccinated. Four people get infected; two in the vaccinated group and two in the unvaccinated group (50% of cases vaccinated and 50% of cases unvaccinated).

Does this mean that the vaccine is not effective? No, because there are <u>more</u> people in the vaccinated group. The actual risk of infection is found by comparing the proportion of infected people in each group.

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80 Vaccinated People

2 Infected People

20 Unvaccinated People

2 Infected People

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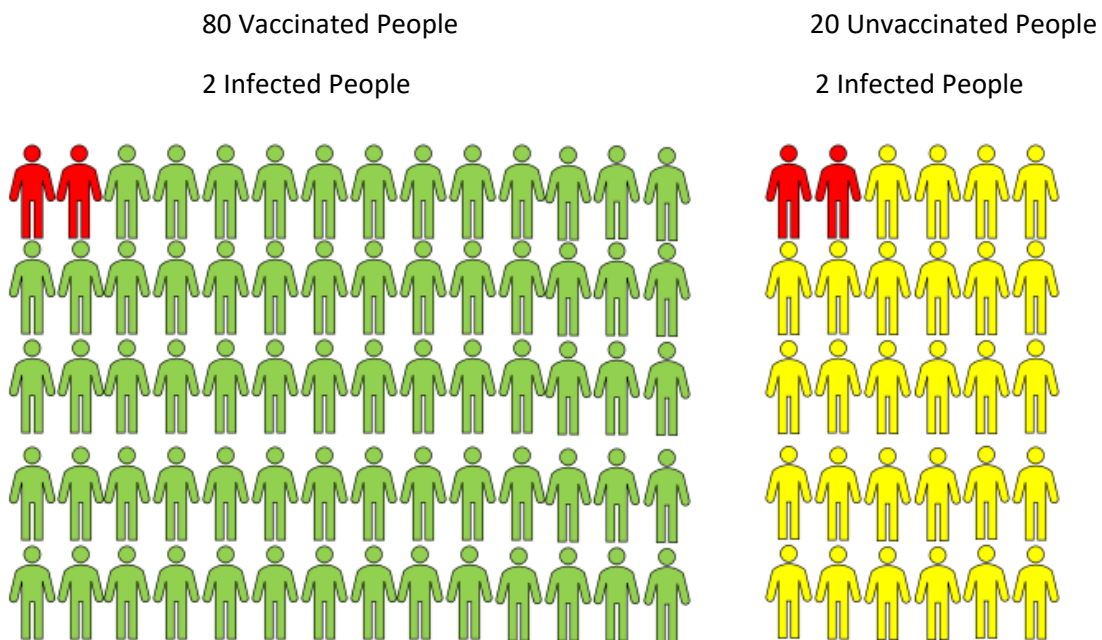
In the example above, the infection rate is 2.5% (2/80) in the vaccinated group and 10% (2/20) in the unvaccinated group. In other words, the unvaccinated have a <u>four times higher</u> risk of infection than the vaccinated, and the vaccine is <u>75% effective</u> at preventing disease.

Base rate fallacy can be applied to other situations, not just vaccines. As an example, let's say there is a hockey team with 20 players. During its first season, 10 players wear helmets on the ice and 10 do not. At the end of the season, two of the players with helmets and six of the players without helmets have had head injuries. The following season, the coach has all 20 players wear helmets, but four of them still get head injuries. Helmeted injuries went up from

two to four, but that does not mean that helmets don't work. The total number of head injuries decreased, even though the number of helmeted injuries went up. In the hockey helmet example, total injuries dropped to four compared to eight when half the team was not helmeted.