

### 4.3: Taking up Arms Against the Base Rate Fallacy

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You don't have to be performing advanced cancer research or early cancer screenings to run into the base rate fallacy. What if you're doing social research? You'd like to survey Americans to find out how often they use guns in self-defense. Gun control arguments, after all, center on the right to self-defense, so it's important to determine whether guns are commonly used for defense and whether that use outweighs the downsides, such as homicides.

One way to gather this data would be through a survey. You could ask a representative sample of Americans whether they own guns and, if so, whether they've used the guns to defend their homes in burglaries or defend themselves from being mugged. You could compare these numbers to law enforcement statistics of gun use in homicides and make an informed decision about whether the benefits outweigh the downsides.

Such surveys have been done, with interesting results. One 1992 telephone survey estimated that American civilians use guns in self-defense up to 2.5 million times every year – that is, about 1% of American adults have defended themselves with firearms. Now, 34% of these cases were in burglaries, giving us 845,000 burglaries stymied by gun owners. But in 1992, there were only 1.3 million burglaries committed while someone was at home. Two thirds of these occurred while the homeowners were asleep and were discovered only after the burglar had left. That leaves 430,000 burglaries involving homeowners who were at home and awake to confront the burglar – 845,000 of which, we are led to believe, were stymied by gun-toting residents.<sup>28</sup>

Whoops.

What happened? Why did the survey overestimate the use of guns in self-defense? Well, for the same reason that mammograms overestimate the incidence of breast cancer: there are far more opportunities for false positives than false negatives. If 99.9% of people have never used a gun in self-defense, but 1% of those people will answer “yes” to any question for fun, and 1% want to look manlier, and 1% misunderstand the question, then you'll end up *vastly* overestimating the use of guns in self-defense.

What about false negatives? Could this effect be balanced by people who say “no” even though they gunned down a mugger last week? No. If very few people genuinely use a gun in self-defense, then there are very few opportunities for false negatives. They're overwhelmed by the false positives.

This is exactly analogous to the cancer drug example earlier. Here,  $p$  is the probability that someone will falsely claim they've used a gun in self-defense. Even if  $p$  is small, your final answer will be wildly wrong.

To lower  $p$ , criminologists make use of more detailed surveys. The National Crime Victimization surveys, for instance, use detailed sit-down interviews with researchers where respondents are asked for details about crimes and their use of guns in self-defense. With far greater detail in the survey, researchers can better judge whether the incident meets their criteria for self-defense. The results are far smaller – something like 65,000 incidents per year, not millions. There's a chance that survey respondents underreport such incidents, but a much smaller chance of massive overestimation.

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