

XYZ Problem:

Imagine that XYZ viral syndrome is a serious condition that affects one person in 1,000. Imagine also that the test to diagnose the disease always indicates correctly that a person who has the XYZ virus actually has it. Finally, suppose that this test occasionally misidentifies a healthy individual as having XYZ. The test has a false-positive rate of 5 percent, meaning that the test wrongly indicates that the XYZ virus is present in 5 percent of the cases where the person does not have the virus.

Next we choose a person at random and administer the test, and the person tests positive for XYZ syndrome. Assuming we know nothing else about that individual's medical history, what is the probability (expressed as a percentage ranging from zero to 100) that the individual really has XYZ?

P = Probability

H = Hypothesis (1 in 1,000 chance of XYZ prior to test)

P(H) = 1 in 1,000

This is baserate of 1 in 1,000

not H = not have XYZ

D = Data (test is positive)

Correct positive rate = 100%

False positive rate = 5%

not D = test is negative

	People with and without XYZ			
	P(H) + P(not H)			
Number	1,000			
Yes/No	XYZ		Not XYZ	
	P(H)		P(not H)	
	1		999	
	Correct	False	False	Correct
	Positive	Negative	Positive	Negative
	P(D/H)	P(not D/H)	P(D/not H)	P(not D/not H)
	100%	0%	5%	95%
Positives	1.00	0.00	49.95	949.05
	Correct Positives		=	1.96%
	Correct Possitives +False Positives			
	<u>1.00</u>		=	0.0196 = 1.96%
	1 + 49.95			
	P(D/H) P(H)		=	P(H/D)
	P(D/H) P(H) + P(D/not H) P(not H)			