

Exam P

22

H = heavy smoker ; L = light smoker

N = Non-smoker ; D = Death

$$\Pr(H) = 20\% \quad \Pr(L) = 30\% \quad \Pr(N) = 50\%$$

$$\Pr(D|L) = 2\Pr(D|N) = \frac{1}{2}\Pr(D|H)$$

$$\Pr(H|D) = ?$$

Bayes Theorem

$$\Pr(H|D) = \frac{\Pr(D|H) \cdot \Pr(H)}{\Pr(D|H) \cdot \Pr(H) + \Pr(D|L) \cdot \Pr(L) + \Pr(D|N) \cdot \Pr(N)}$$

Let $\Pr(D|L) = a$, then $\Pr(D|N) = \frac{1}{2}a$, $\Pr(D|H) = 2a$

$$\Pr(H|D) = \frac{2a \cdot 20\%}{2a \cdot 20\% + a \cdot 30\% + \frac{1}{2}a \cdot 50\%}$$

$$= 0.42$$

(D)