

## Sudden infant death syndrome (SIDS)

Suppose the rate of SIDS is 1 in 8,500. Define

- $A$  to be ‘Sally Clark’s **first** born infant dies of SIDS’
- $B$  to be ‘Sally Clark’s **second** born infant dies of SIDS’

Then the probabilities for either infant dying of SIDS (given no additional information) are equal  $\mathbb{P}(A) = \mathbb{P}(B)$ .

1/8500

## [1] 0.001176471

Which is a probability of approximately 0.12%

When we know Sally’s first infant dies this changes the probability of the second infant. Since we believe SIDS has a genetic link,  $A$  and  $B$  are not independent. Therefore  $\mathbb{P}(A \wedge B) \neq \mathbb{P}(A) \cdot \mathbb{P}(B)$  and we must use Baye’s theorem to find the conditional probability.

$$\mathbb{P}(B|A) = \frac{\mathbb{P}(A|B) \cdot \mathbb{P}(B)}{\mathbb{P}(A)}$$

Let  $\mathbb{P}(\text{second case of SIDS} \mid \text{first case of SIDS})$