

## Probability to Log Odds:

For categorical

- $p$  = event rate for that level
- $\text{odds} = p/(1-p)$
- $\text{odds ratio} = \text{odds}_{\text{level}}/\text{odds}_{\text{reference level}}$
- $\text{log odds ratio} = \ln(\text{odds ratio})$

Log odds ratio against reference level = 1.2

Odds ratio against reference level =  $e^{1.2} = 3.32$

Probability/event rate in training data =  $3.32/(1 + 3.32) = 0.76$

“Holding all other variables constant, a person being male change the odds of the event occurring by a factor of 3.32 over the reference level on average.”

$$\hat{y} = \text{“log odds”} = \log(p/(1 - p)) = 1.7 - 0.54 * age + 1.2 * male$$

For interval:

- $p$  = change in event rate for one unit increase; this is **not** constant
- $\text{odds} = \text{odds}_{\text{level}} - \text{odds}_{\text{level} + 1}$ , this **is** constant
- $\text{Log odds} = \ln(\text{odds})$

Log odds = -0.54

Odds =  $e^{-0.54} = 0.58$

“Holding all other variables constant, for a one unit increase in age, the odds of the event occurring change by a factor of 0.58 on average.”