

Dependent Variable

low - low birth weight

(yes = 1 , no = 0) \Rightarrow

Mother's age

socio demographic status

(1 = low, 2 = medium
3 = high).

alcohol consumption during pregnancy

(yes = 1 , no = 0)

history of hypertension (yes = 1 , no = 0)

$$P = \beta_0 + \beta_1 (\text{Age}) + \beta_2 (\text{socio})$$

$$\Rightarrow + \beta_3 (\text{alcohol}) + \beta_4 (\text{hyp})$$

$$P = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k)}}$$

this constrains probability to be b/w 0 and 1

$$\text{logit}(P) = \ln \left(\frac{P_i}{1 - P_i} \right) \rightarrow \text{Odds.}$$

$$\Rightarrow = \beta_0 + \underline{\beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k}$$

$$P_i = P_{\text{outcome}} =$$

$$1 - P_i = P_{\text{no outcome}}$$

$$\log(\text{odds}) = \log\left(\frac{P_i}{1-P_i}\right)$$

$$\ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k$$

β_1 = A unit change in
 x_1 changes your log
odds by β_1

$$\ln \left(\frac{P_{\text{low}}}{P_{\text{not low}}} \right) =$$

But

$$-0.75 + 0.20(\text{Age})$$

$$+ 0.3 (\text{alcohol Consumption})$$

If mom consumed alcohol
alcohol consumption = 1

$$\text{logit}(P) = -0.75 + 0.20(20) \\ + 0.3(1) = 3.55$$

If mom did not consume
alcohol

$$\text{logit}(P) = -0.75 + 0.20(20) + 0.3(0) = 3.25$$

Odds ratio (alcohol VS no
alcohol)

$$= \frac{e^{3.55}}{e^{3.25}}$$

$$= \underline{\underline{1.35}}$$

Babies are more likely to ^{be} born
underweight if the mom
consumed alcohol.

$$\ln \left(\frac{P(\text{Admit})}{P(\text{no admit})} \right) = -3.98 + 0.0022 (\text{gre}) + \underline{\underline{0.804}} (\text{gpa}) - 0.675 (\text{rank 2}) - 1.34 (\text{rank 3}) - 1.55 (\text{rank 4})$$

↓
Odds.

For unit change in gre Score,
 log odds of getting admitted
 ↑ by 0.0022

Likelihood Ratio (LR)

LR $\chi^2 = 41.46$ with 5 df

$$P = 0.0000$$

H_0 : Independent variables do not have an effect on dependent variable.

$P < 0.05$ reject H_0 .

\Rightarrow model fits better.