**Model forms and estimation for linear, log and logit risk GLM models.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Model Type** | **Linear** | **Log Risk** | **Logit risk** |
| Model Form | Risk = β0 + β1X1…+β­­­kXk  ­­­ | ln(Risk) = β0 + β1X1…+βkXk | logit(Risk)= β0 + β1X1…+βkXk |
| Outcome distribution | binomial | binomial | binomial |
| Link function | identity | ln() | logit() |
| Simple model | Risk(outcome | X1) = β0 + β1X1 | ln[Risk(outcome | X1)] = β0 + β1X1 | logit[Risk(outcome | X1)] = β0 + β1X1 |
| Risk(outcome | X1 =0) | R0 = β0 + 0\*β1 = β0 | ln(R0) = β0 + ­0\*β1 = β0  so R0 = exp[β0] | ln(Odds0) = β0 + 0\*β1 = β0  so Odds0 = exp[β0] |
| Risk(outcome | X1 =1) | R1 = β0 + 1\*β1 = β0 + β1 | ln(R1) = β0 + 1\*β1 = β0 + β1  so R1 = exp[β0 + β1] | ln(Odds1) = β0 + 1\*β1 = β0 + β1  so Odds1 = exp[β0 + β1] |
| Risk comparison | **Risk Difference** | **Risk Ratio** | **Odds Ratio** |
|  | RD = R1 - R0  = [β0 + 1\*β1] - [β0 + 0\*β1]  = [β0 + β1] - [β0]  = β1  95% CI = β1 +/- (1.96\*SE(β1)) | ln(RR) = ln(R1 / R0) = ln(R1) - ln(R0)  = [β0 + 1\*β1] - [β0 + 0\*β1]  = [β0 + β1] - [β0]  = β1  so RR = exp(β1)  and 95% CI = exp(β1 +/- (1.96\*SE(β1))) | ln(OR) = ln(O1 / O0) = ln(O1) - ln(O0)  = [β0 + 1\*β1] - [β0 + 0\*β1]  = [β0 + β1] - [β0]  = β1  so OR = exp(β1)  and 95% CI = exp(β1 +/- (1.96\*SE(β1))) |
| R Commands | glm(death ~ bord5, family = “binomial”(link = “identity”), data = dat) | glm(death ~ bord5, family = “binomial”(link = “log”), data = dat) | glm(death ~ bord5, family = “binomial”(link = “logit”), data = dat) |