Call**:**

glm**(**formula **=** obese **~** flipper\_length\_c **+** bill\_length\_c **+** sex **+**

species **+** island, family **=** binomial**(**link **=** "logit"**)**, data **=** train\_data**)**

Coefficients**:**

Estimate Std. Error z value

**(**Intercept**)** **-**4.065e+01 1.311e+04 **-**0.003

flipper\_length\_c 3.601e-02 1.245e-01 0.289

bill\_length\_c 3.255e-01 2.861e-01 1.138

sexmale 2.068e+01 5.375e+03 0.004

speciesChinstrap **-**3.415e+00 1.408e+04 0.000

speciesGentoo 3.882e+01 1.311e+04 0.003

islandDream **-**4.058e-01 1.493e+04 0.000

islandTorgersen **-**6.304e-01 1.580e+04 0.000

Pr**(>|**z**|)**

**(**Intercept**)** 0.998

flipper\_length\_c 0.772

bill\_length\_c 0.255

sexmale 0.997

speciesChinstrap 1.000

speciesGentoo 0.998

islandDream 1.000

islandTorgersen 1.000

**(**Dispersion parameter **for** binomial family taken to be 1**)**

Null deviance**:** 116.652 on 99 degrees of freedom

Residual deviance**:** 20.405 on 92 degrees of freedom

AIC**:** 36.405

Number of Fisher Scoring iterations**:** 21

**Flipper Length C:**

* A 1 mm increase in centered flipper length increases log-odds of obesity by 0.036.
* Odds ratio: (3.7% increase in odds).

**Std. Error:** 0.1245 (compared to P-Value of 0.772), therefore flipper length correlates with the confusion matrix output, in that flipper length alone doesn’t reliably predict obesity (ceteris paribus).

**Bill Length C:**

* A 1mm increase in bill length increases log-odds by 0.326.
* Odds ratio: (38.5% increase in odds).

**Std. Error:** 0.2861 (compared to P-Value of 0.255), therefore although there’s a moderately positive effect, it isn’t enough to be statistically significant. Meaning that bill length COULD influence obesity, but the evidence of it actually being able to do so is weak.

Do the same for the rest of the coefficients.

**Model Fit Stats:**

**Akaike Information Criterion: 36.405**

* A very low value, indicating a very good fit relative to its degrees of freedom.

**Fisher Scoring Iterations: 21**

* A high number of iterations could suggest convergence issues, possibly due to separation or ill-conditioned data.

**Notes:**

**Perfect Separation:** In logistic regression, if a predictor (e.g., sexmale) perfectly separates the outcome (e.g., all males obese, all females non-obese), the maximum likelihood estimates explode (large Estimates, huge Std. Errors). Your data might have this issue with sex, species, or a combination.

**Small Sample**: With only 100 observations, and multiple fixed effects (7 parameters), the model may overfit or lack enough variation per group to estimate effects reliably.

**Data Sparsity:** If obese = 1 is rare in some groups (e.g., Chinstrap, Dream), the model struggles to estimate group-specific effects.

**Numerical Issues**: 21 iterations suggest convergence problems, possibly due to ill-conditioned data (e.g., correlated predictors).

Reference

Prediction 0 1

0 73 4

1 0 23

Accuracy**:** 0.96

Correctly predicted 96% of the penguins in whether or not they are obese, which aligns quite well with the data sparsity point.

Good fit (low AIC, deviance drop), however unreliable coefficients due to abnormally large Std. Errors.

Likely perfect separation in this case. However it’s important to make mention of the sample size and data distribution.