Lab09 - Logistic Regression

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```
# library impoart
library(HistData)
library(Matrix)
library(effects)
```

```
## Warning: package 'effects' was built under R version 4.3.3
```

```
## Loading required package: carData
```

```
## Warning: package 'carData' was built under R version 4.3.3
```

```
## Warning in check_dep_version(): ABI version mismatch:
## lme4 was built with Matrix ABI version 1
## Current Matrix ABI version is 0
## Please re-install lme4 from source or restore original 'Matrix' package
```

```
## lattice theme set by effectsTheme()
## See ?effectsTheme for details.
```

```
# load data
data("Arbuthnot", package = "HistData")
```

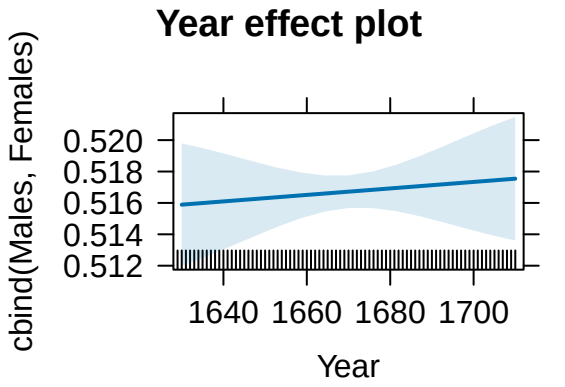
7.1

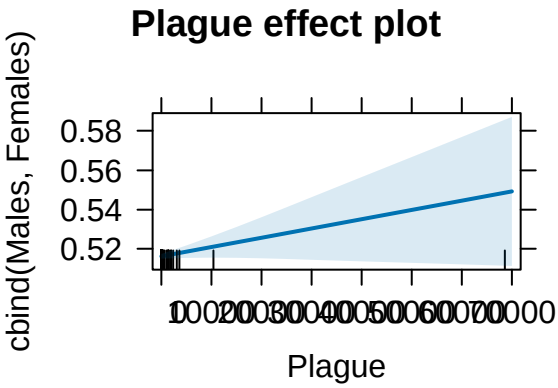
```
# define model
model <- glm(cbind(Males, Females) ~ Year + Plague + Mortality, family = binomial, data = Arbuthnot)

# display summary
summary(model)
```

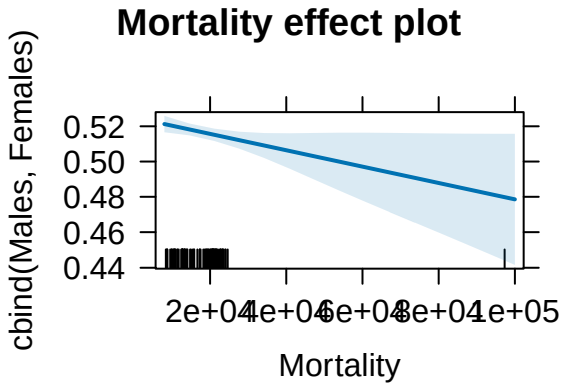
```
##
## Call:
## glm(formula = cbind(Males, Females) ~ Year + Plague + Mortality,
##     family = binomial, data = Arbuthnot)
##
## Coefficients:
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept) -4.067e-02  3.091e-01  -0.132   0.8953
```

```
## Year          8.282e-05  1.931e-04   0.429   0.6680
## Plague        1.907e-06  1.135e-06   1.681   0.0928 .
## Mortality    -1.858e-06  9.260e-07  -2.007   0.0448 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 169.74  on 81  degrees of freedom
## Residual deviance: 156.31  on 78  degrees of freedom
## AIC: 963.84
##
## Number of Fisher Scoring iterations: 3
```

```
# effect plot
plot(allEffects(model))
```







- The "Year" attribute does not show a significant impact on male births due to larger p-value.
- The "Plague" attribute shows a marginal effect on the proportion of male births. Although the a lower p-value implies potential influence but does not show a statistical significance.
- On the other hand, the "Mortality" attribute has a significant negative impact on the porportion of male births. This is the only explanatory variable