Article title: **Individual tree damage dominates mortality risk factors across six tropical forests**

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Notes S1. GLMMs summary statistics and analysis of residuals

Site-specific mortality model for condition: Size
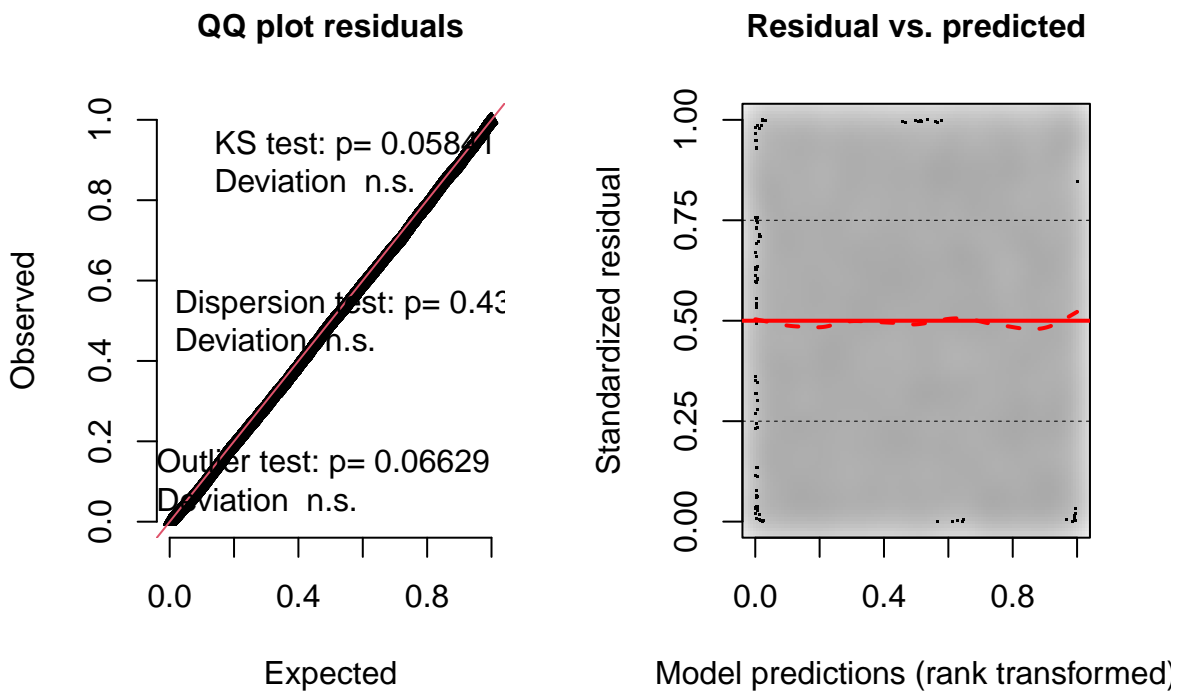
Model estimates and residuals for amacayacu
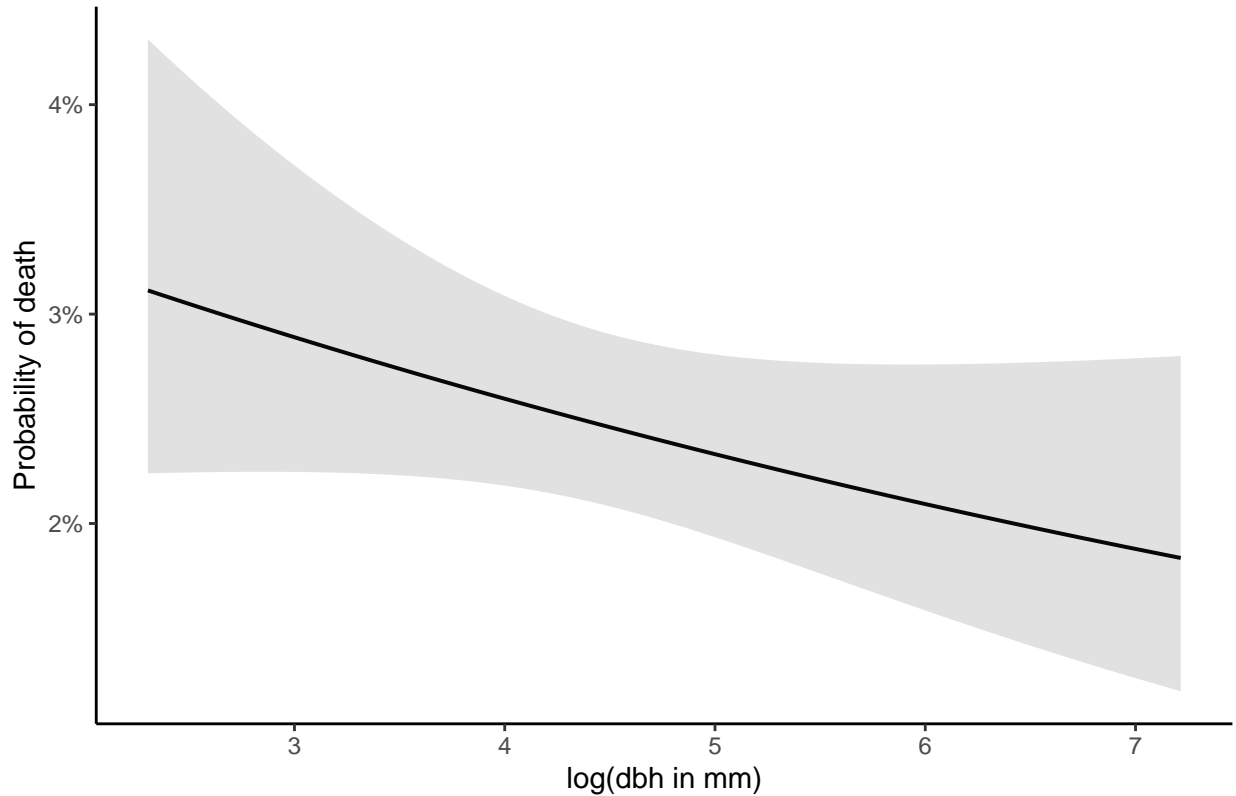

```
## MODEL INFO:
## Observations: 12847
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 3234.52, BIC = 3271.83
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.11
##
## FIXED EFFECTS:
## -----------------------------------------------
##                     Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)         -3.18    0.33    -9.77    0.00
## var.x1              -0.11    0.07    -1.54    0.12
## -----------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##       Group           Parameter    Std. Dev.
```

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```
## ------------------- ------------- -----------
##  species.grouping   (Intercept)     1.08
##  species.grouping      var.x1       0.28
## -----------------------------------------------
##
## Grouping variables:
## -----------------------------------
##       Group         # groups   ICC
## ----------------- ---------- ------
##  species.grouping     697      0.26
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.0584
Deviation n.s.

Dispersion test: p= 0.43
Deviation n.s.

Outlier test: p= 0.06629
Deviation n.s.

Residual vs. predicted
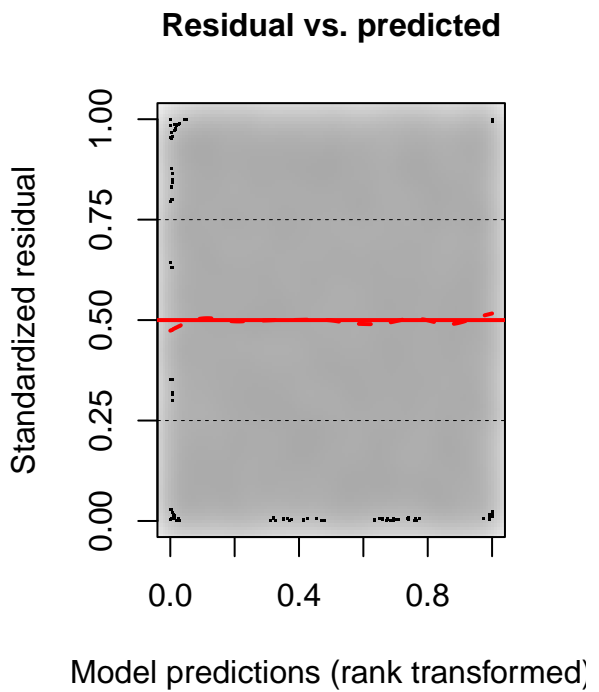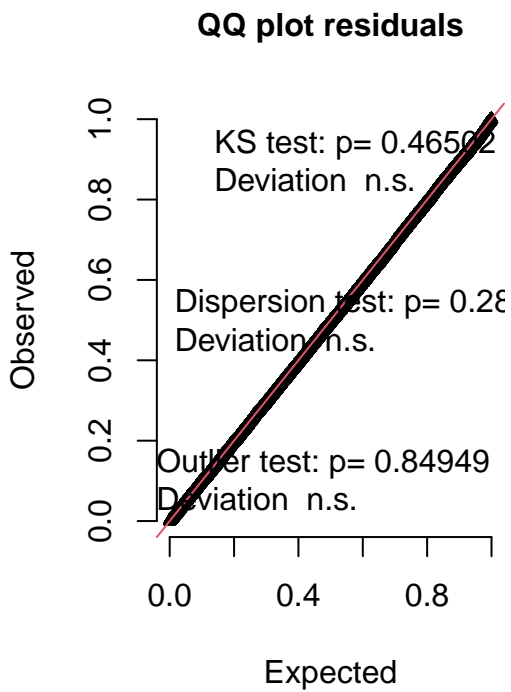
Model estimates and residuals for bci
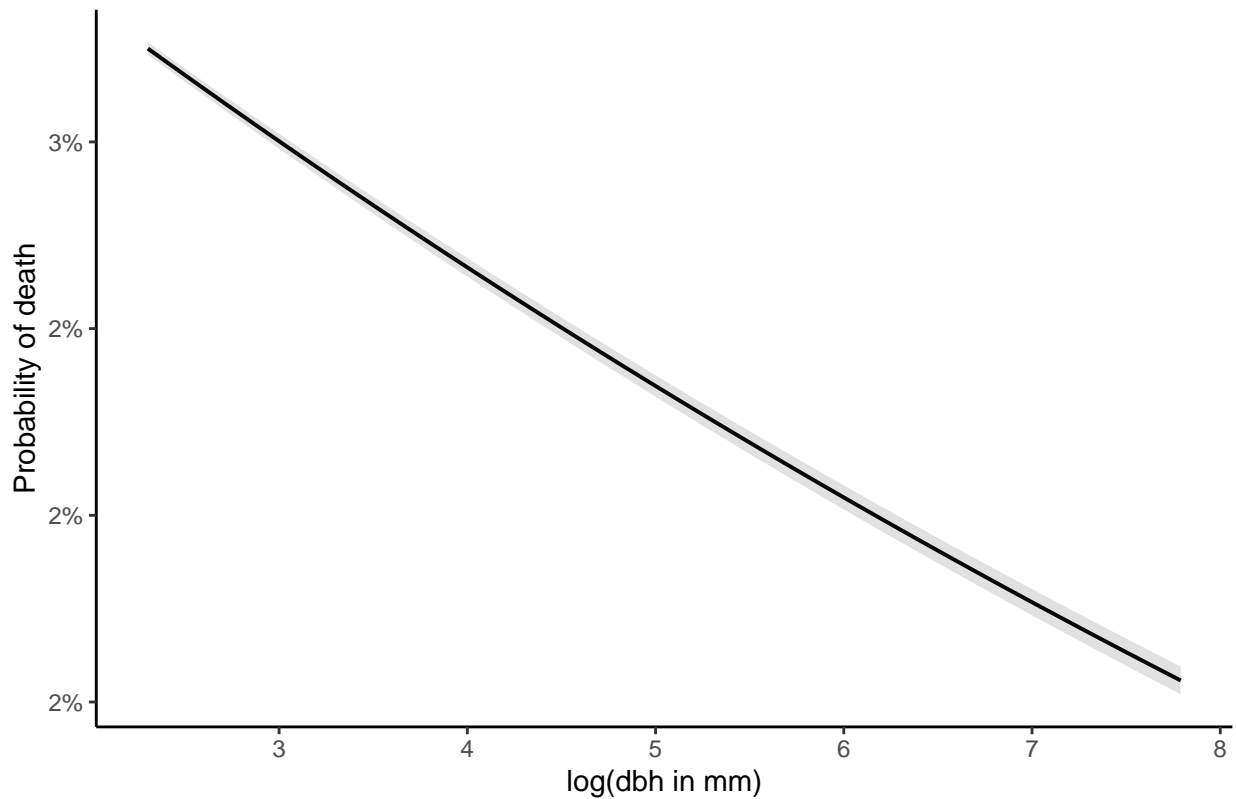
```
## MODEL INFO:
## Observations: 21952
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 5384.07, BIC = 5424.05
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.15
##
## FIXED EFFECTS:
## ----------------------------------------------------
##                     Est.    S.E.     z val.       p
## ---------------- ------- ------ ---------- ------
## (Intercept)         -3.37   0.00   -5558.07    0.00
## var.x1              -0.07   0.00    -107.13    0.00
## ----------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter     Std. Dev.
## ------------------ ------------- ----------
##  species.grouping   (Intercept)      1.08
##  species.grouping     var.x1         0.14
```

4

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group         # groups   ICC
## ----------------- ---------- ------
##  species.grouping     220      0.26
## -----------------------------------
```

DHARMa residual diagnostics
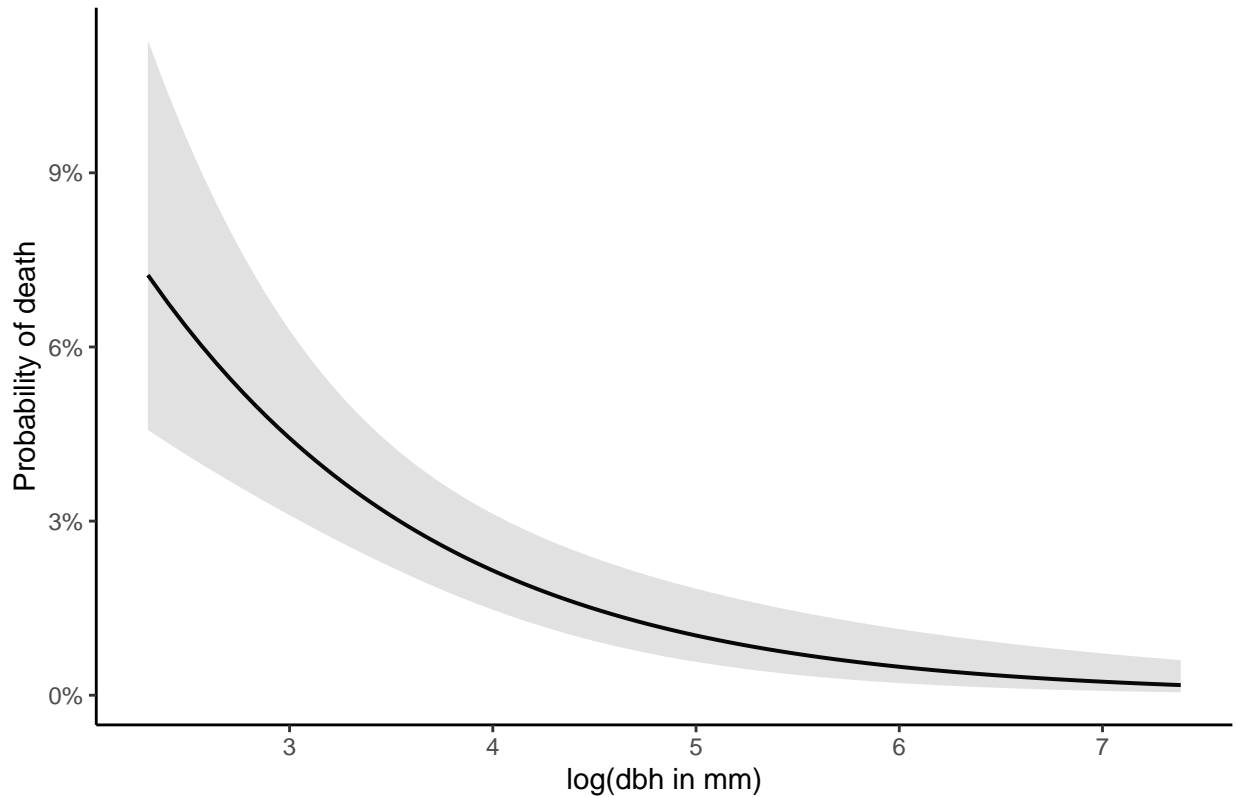
QQ plot residuals

KS test: p= 0.46502
Deviation n.s.

Dispersion test: p= 0.28
Deviation n.s.

Outlier test: p= 0.84949
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Model estimates and residuals for fushan


```
## MODEL INFO:
## Observations: 10963
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2631.86, BIC = 2668.37
## Pseudo-R² (fixed effects) = 0.15
## Pseudo-R² (total) = 0.47
##
## FIXED EFFECTS:
## -------------------------------------------------
##                     Est.    S.E.   z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -0.83   0.56    -1.48   0.14
## var.x1             -0.75   0.16    -4.82   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##      Group          Parameter     Std. Dev.
## ---------------- ------------- ----------
##  species.grouping   (Intercept)     1.59
##  species.grouping     var.x1        0.51
```
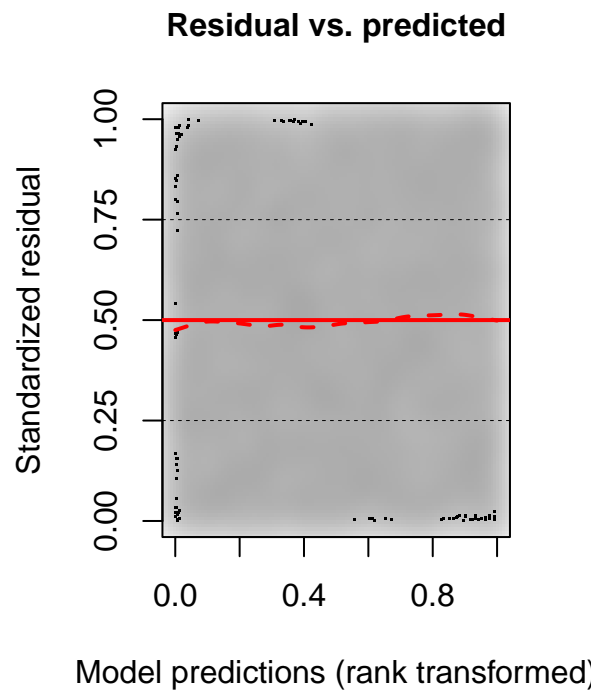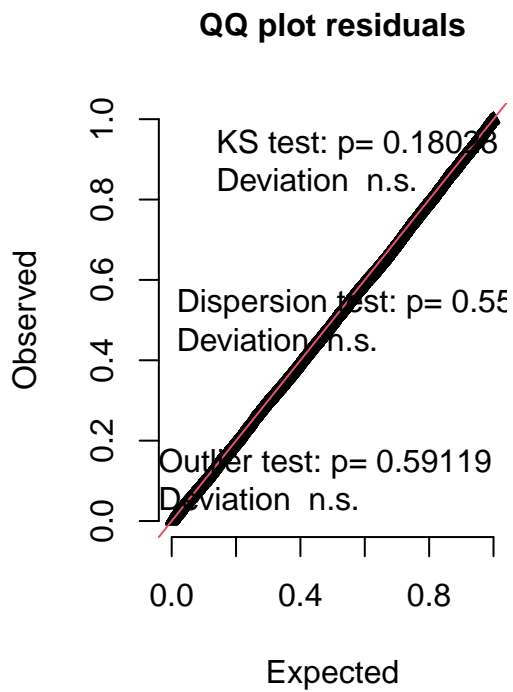
```
## ----------------------------------------
##
## Grouping variables:
## ---------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     64      0.43
## ---------------------------------
```

DHARMa residual diagnostics
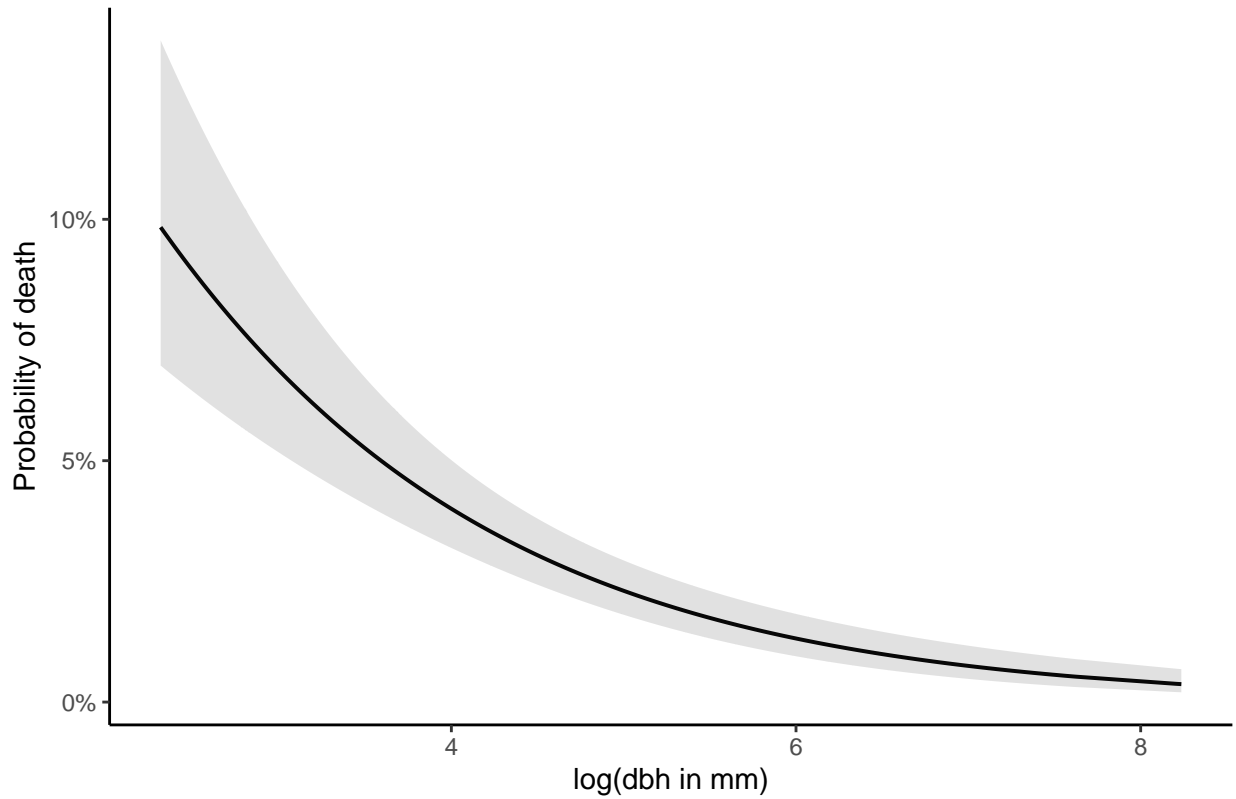
QQ plot residuals

KS test: p= 0.18028
Deviation n.s.

Dispersion test: p= 0.55
Deviation n.s.

Outlier test: p= 0.59119
Deviation n.s.

Observed / Expected

Residual vs. predicted

Standardized residual / Model predictions (rank transformed)

Model estimates and residuals for hkk


```
## MODEL INFO:
## Observations: 9463
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2419.89, BIC = 2455.66
## Pseudo-R² (fixed effects) = 0.12
## Pseudo-R² (total) = 0.26
##
## FIXED EFFECTS:
## -------------------------------------------------
##                     Est.    S.E.    z val.      p
## ----------------- ------- ------ -------- ------
## (Intercept)        -0.90    0.34    -2.61   0.01
## var.x1             -0.57    0.07    -7.67   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group           Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping   (Intercept)      1.22
##  species.grouping      var.x1        0.26
```
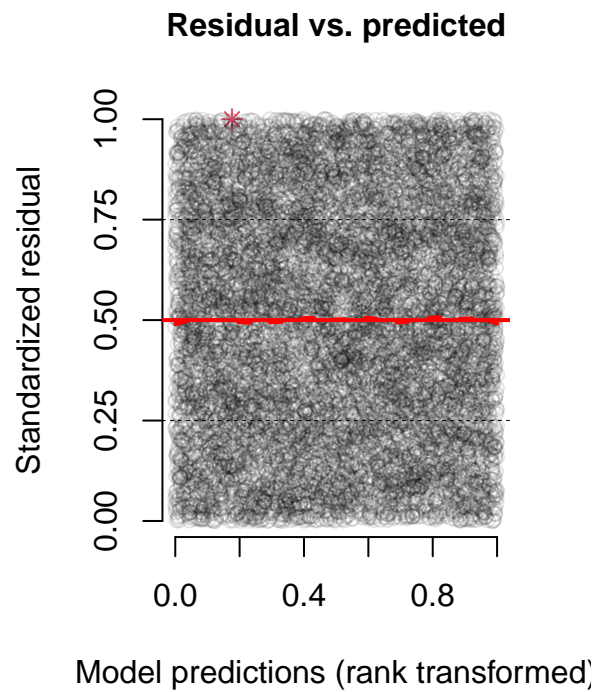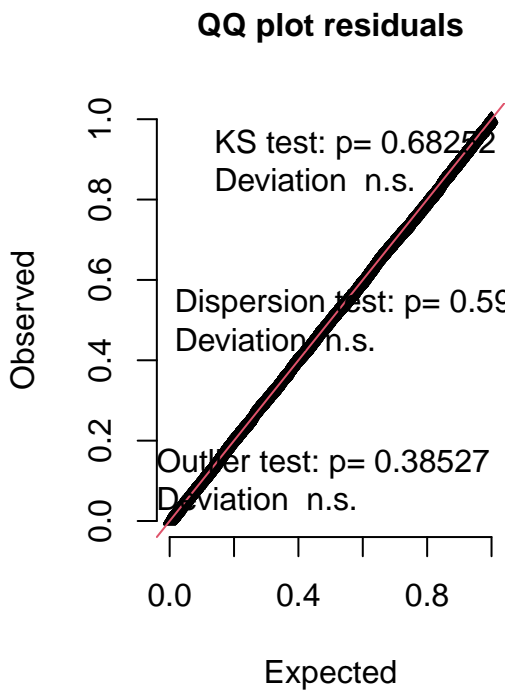
```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group        # groups   ICC
## ------------------  ----------  ------
##  species.grouping     202       0.31
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.68252
Deviation n.s.

Dispersion test: p= 0.59
Deviation n.s.

Outlier test: p= 0.38527
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
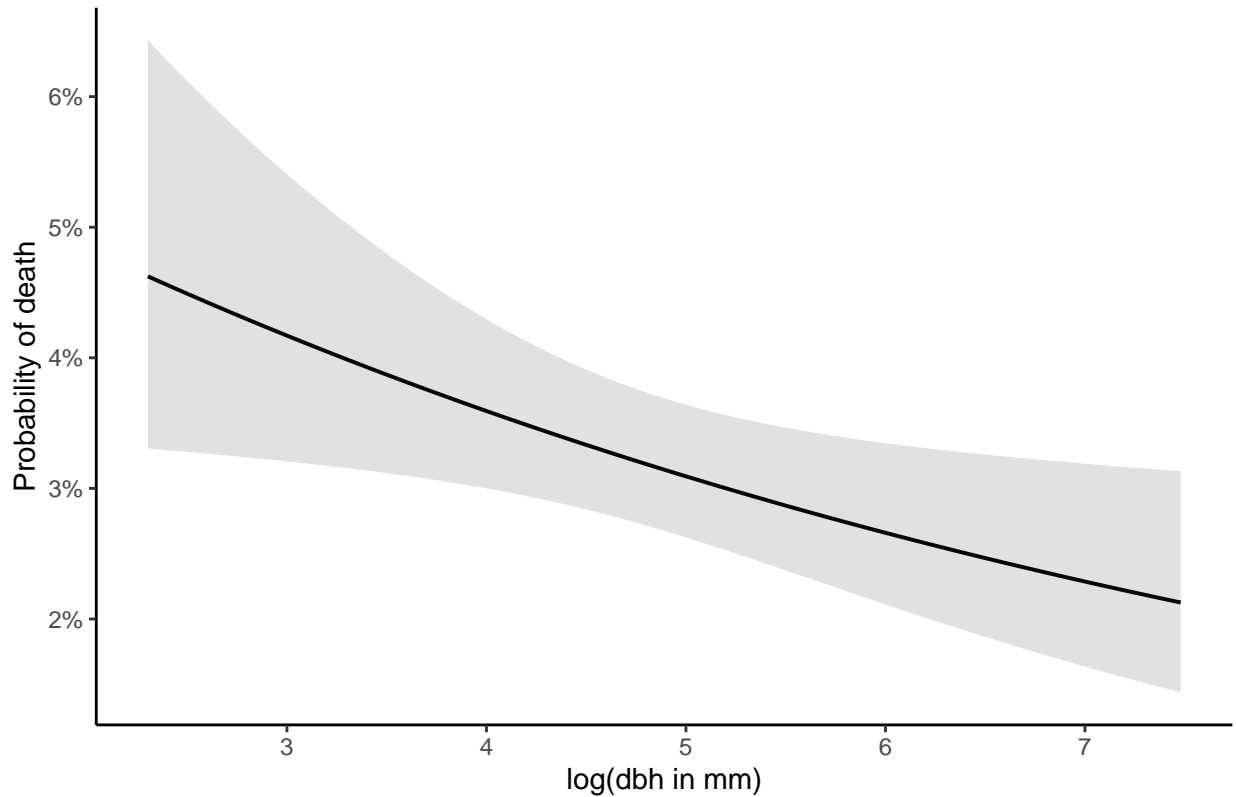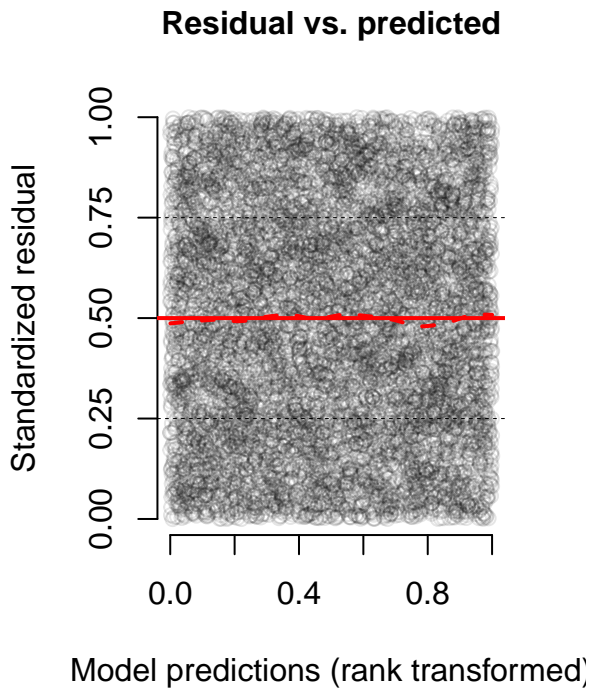
Model estimates and residuals for kc

```
## MODEL INFO:
## Observations: 8323
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2517.55, BIC = 2552.68
## Pseudo-R² (fixed effects) = 0.01
## Pseudo-R² (total) = 0.12
##
## FIXED EFFECTS:
## -------------------------------------------------
##                      Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)         -2.67    0.32    -8.33   0.00
## var.x1              -0.16    0.07    -2.35   0.02
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##     Group           Parameter      Std. Dev.
## ----------------- ------------- ----------
##  species.grouping   (Intercept)      1.92
##  species.grouping     var.x1         0.36
```

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping    379      0.53
## -----------------------------------
```

DHARMa residual diagnostics
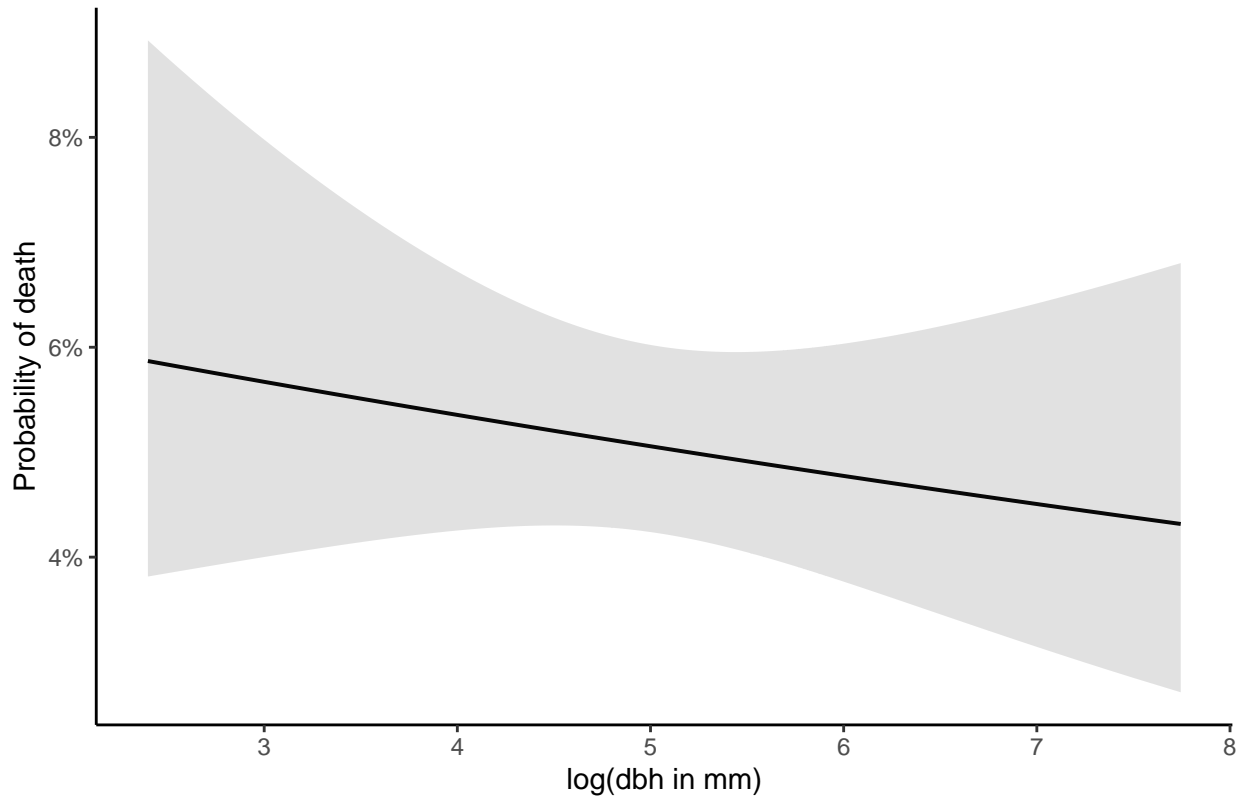
QQ plot residuals

KS test: p= 0.34281
Deviation n.s.

Dispersion test: p= 0.21
Deviation n.s.

Outlier test: p= 0.66576
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
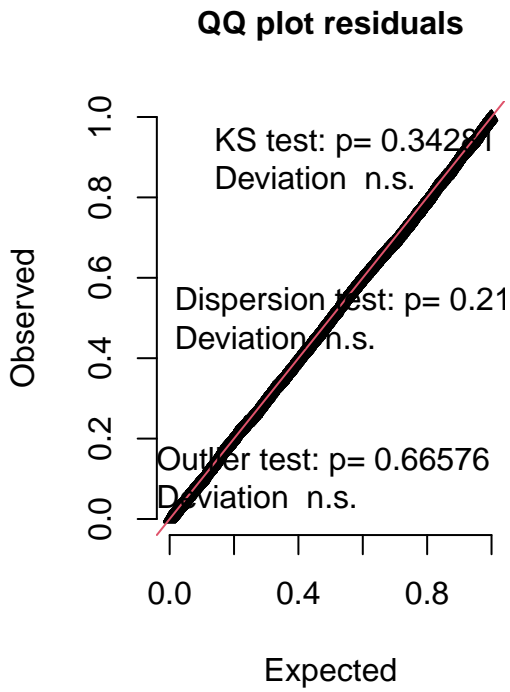
Model estimates and residuals for pasoh


```
## MODEL INFO:
## Observations: 5045
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2203.63, BIC = 2236.26
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## ------------------------------------------------
##                      Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)         -2.63    0.42    -6.30   0.00
## var.x1              -0.06    0.08    -0.74   0.46
## ------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##       Group          Parameter    Std. Dev.
## ---------------- ------------ ----------
##  species.grouping   (Intercept)      1.40
##  species.grouping      var.x1        0.34
```

```
## ----------------------------------------------
##
## Grouping variables:
## ----------------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     477     0.37
## ----------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.15889
Deviation n.s.

Dispersion test: p= 0.43
Deviation n.s.

Outlier test: p= 0.87399
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Site-specific mortality model for condition: Elevation
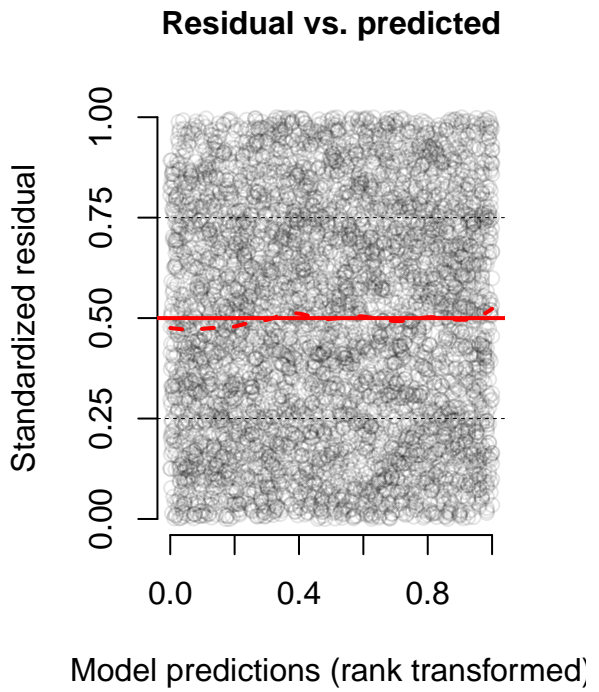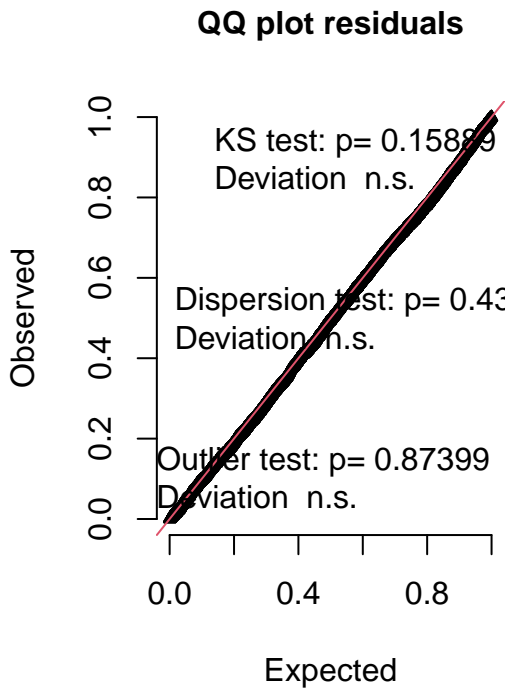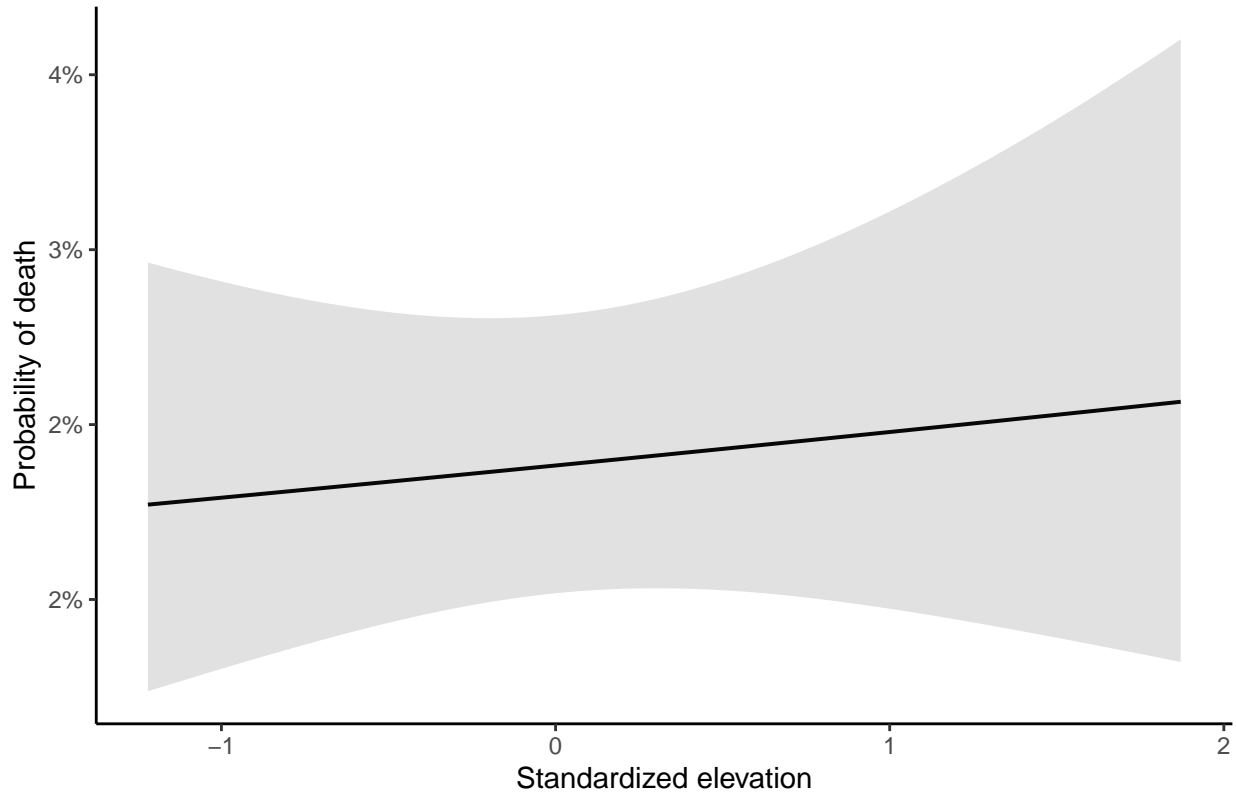
Model estimates and residuals for amacayacu


```
## MODEL INFO:
## Observations: 12850
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 3232.91, BIC = 3270.21
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## --------------------------------------------------
##                      Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)          -3.71    0.09   -42.76   0.00
## var.x1                0.04    0.09     0.47   0.64
## --------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter      Std. Dev.
```

```
## ------------------ ------------- -----------
##  species.grouping   (Intercept)     0.50
##  species.grouping      var.x1       0.47
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##      Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping    697      0.07
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

Observed / Expected

KS test: p= 0.12525
Deviation n.s.

Dispersion test: p= 0.38
Deviation n.s.

Outlier test: p= 0.18004
Deviation n.s.

Residual vs. predicted

Standardized residual / Model predictions (rank transformed)

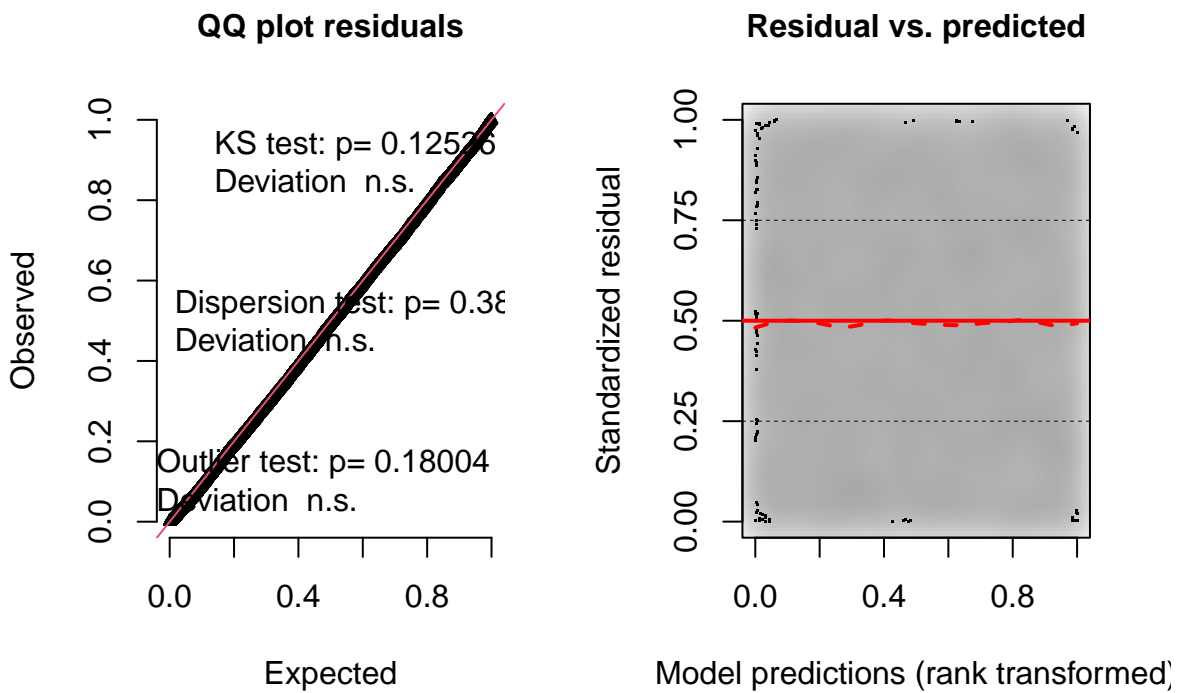## Model estimates and residuals for bci
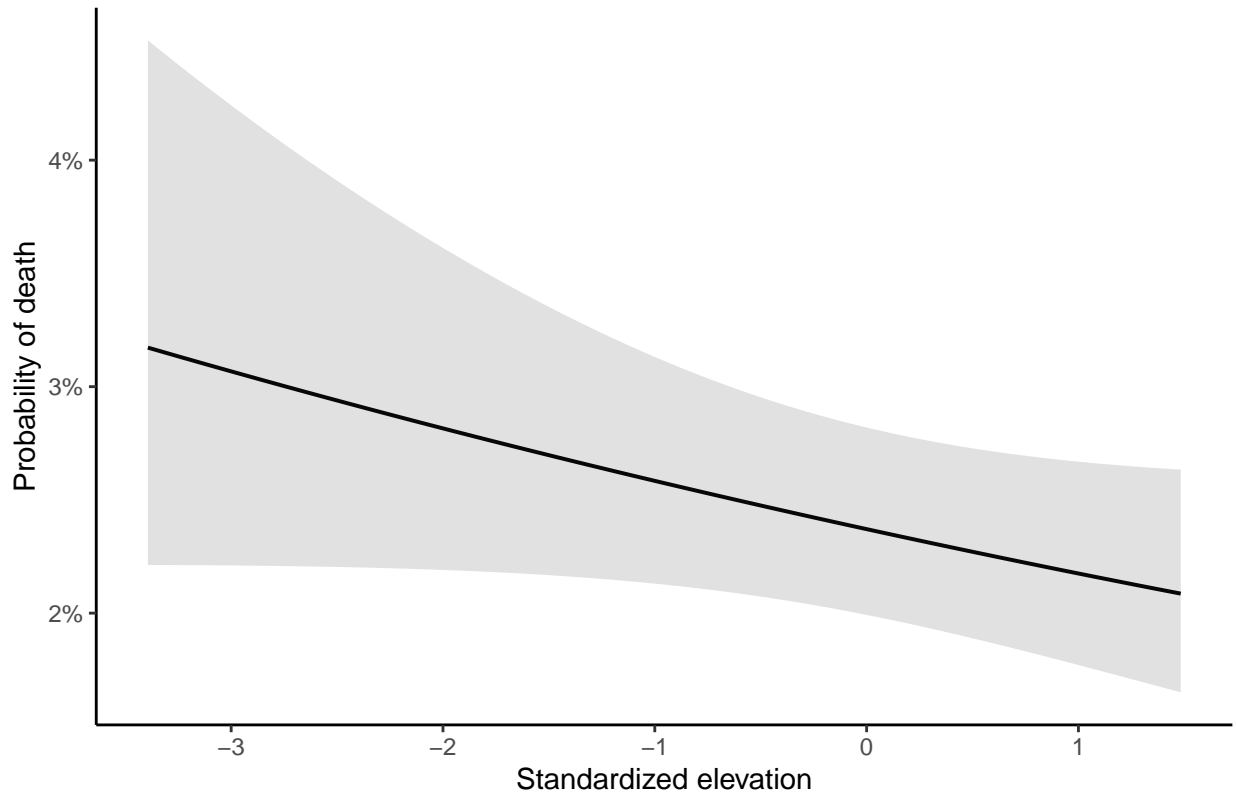

```
## MODEL INFO:
## Observations: 21909
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 5357.64, BIC = 5397.62
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.16
##
## FIXED EFFECTS:
## -------------------------------------------------
##                      Est.   S.E.   z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -3.72   0.09   -40.95   0.00
## var.x1             -0.09   0.05    -1.74   0.08
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter    Std. Dev.
## ------------------ ------------- -----------
##  species.grouping  (Intercept)      0.78
##  species.grouping     var.x1        0.08
```

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group        # groups   ICC
## ------------------ ---------- ------
##  species.grouping     220      0.15
## -----------------------------------
```

DHARMa residual diagnostics
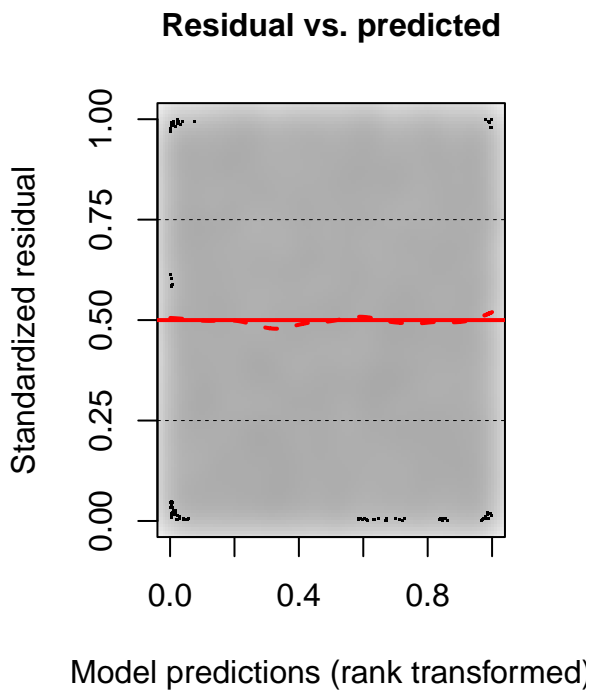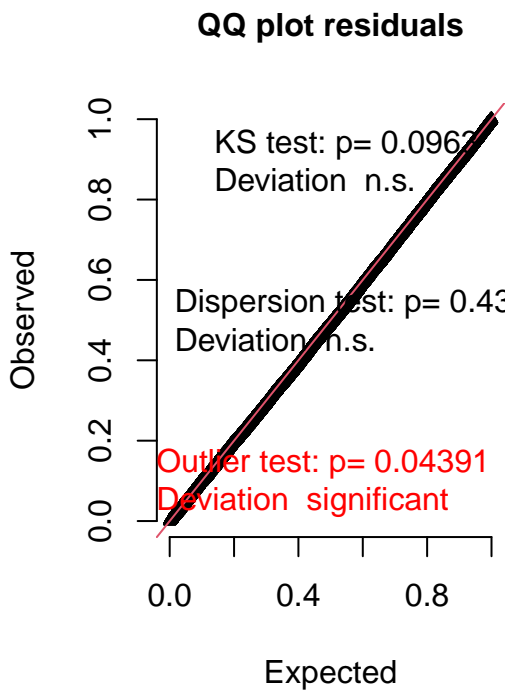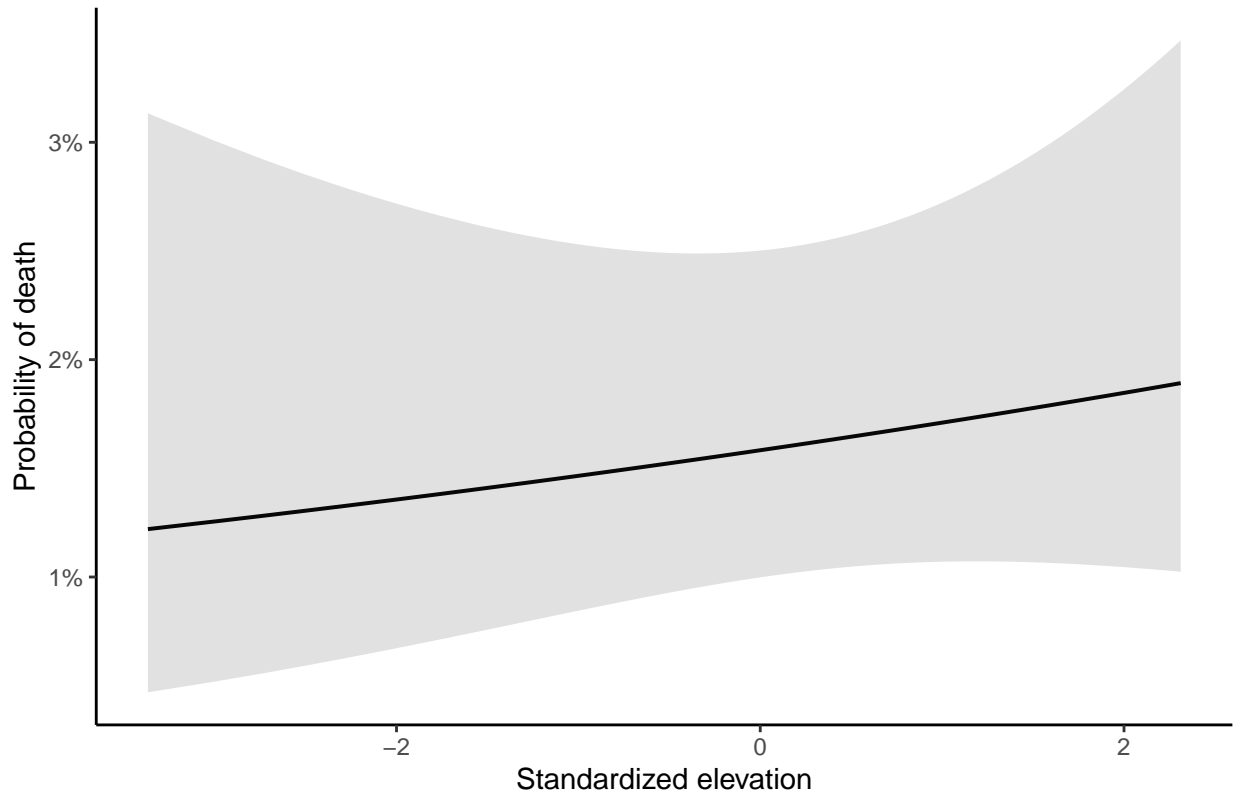
QQ plot residuals

KS test: p= 0.0962
Deviation n.s.

Dispersion test: p= 0.43
Deviation n.s.

Outlier test: p= 0.04391
Deviation significant

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Model estimates and residuals for fushan


```
## MODEL INFO:
## Observations: 10963
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2677.87, BIC = 2714.38
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.32
##
## FIXED EFFECTS:
## -------------------------------------------------
##                       Est.   S.E.   z val.     p
## ----------------- ------- ------ -------- ------
## (Intercept)          -4.13   0.24   -17.33   0.00
## var.x1                0.08   0.11     0.69   0.49
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group         Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping   (Intercept)      1.24
##  species.grouping     var.x1         0.13
```

```
## ----------------------------------------------
##
## Grouping variables:
## ----------------------------------------
##        Group          # groups   ICC
## ----------------------- ---------- ------
##  species.grouping          64     0.32
## ----------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.0845
Deviation n.s.

Dispersion test: p= 0.9
Deviation n.s.

Outlier test: p= 0.30696
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
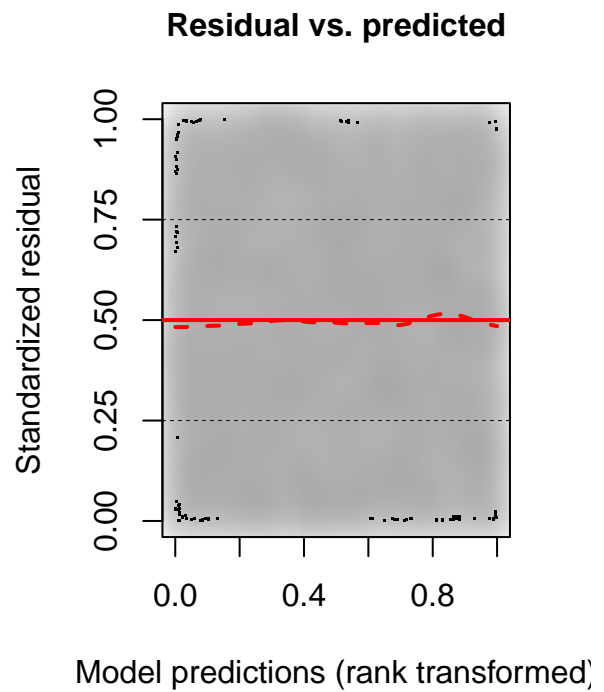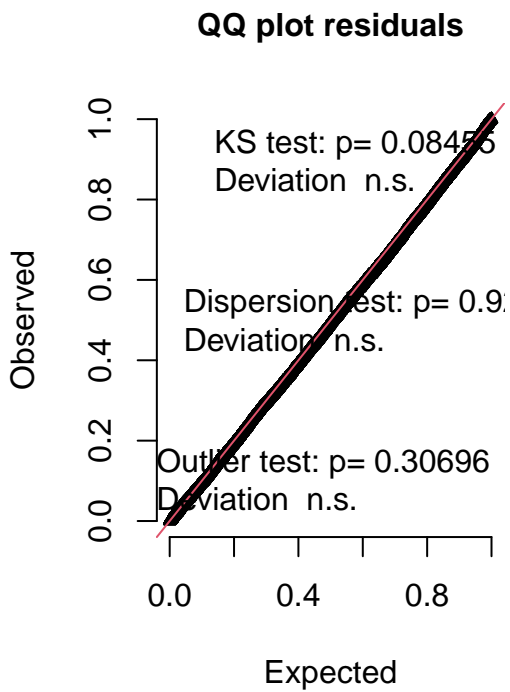
Model estimates and residuals for hkk
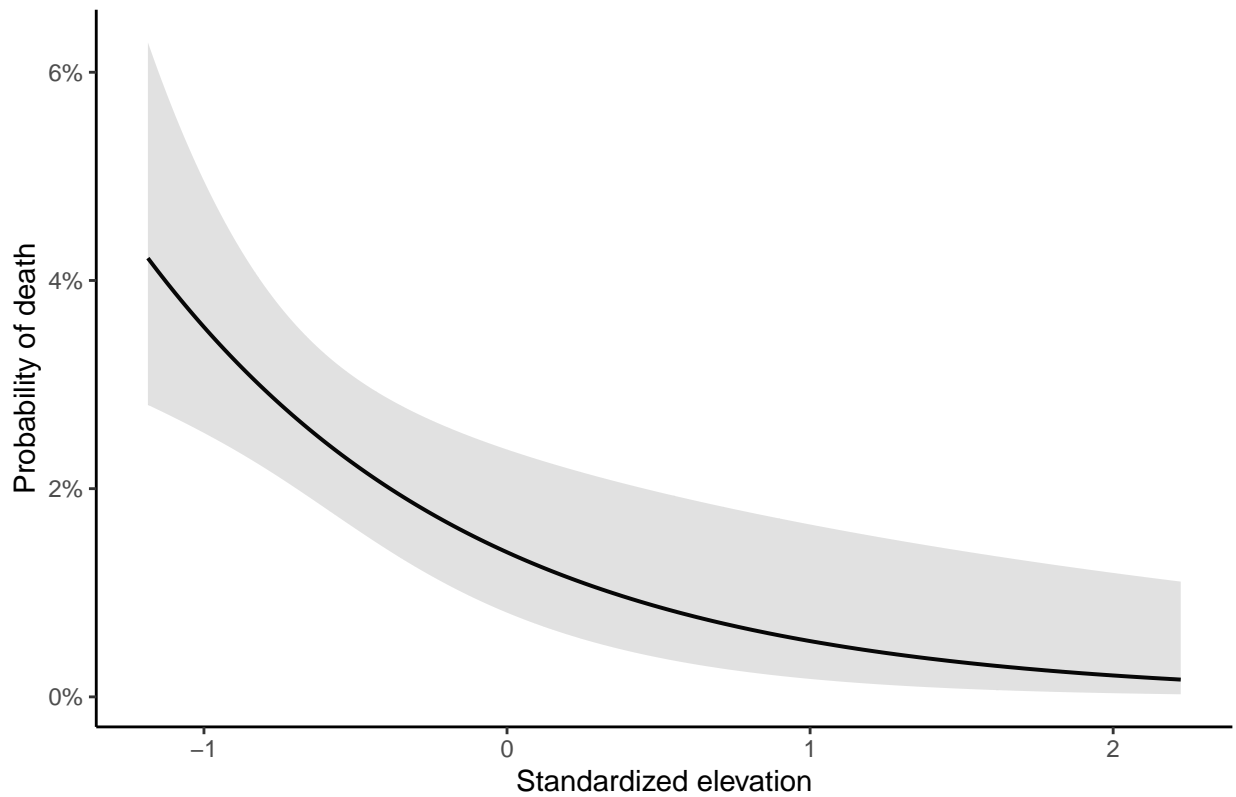

```
## MODEL INFO:
## Observations: 9463
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2474.63, BIC = 2510.41
## Pseudo-R² (fixed effects) = 0.13
## Pseudo-R² (total) = 0.50
##
## FIXED EFFECTS:
## -------------------------------------------------
##                      Est.    S.E.    z val.    p
## ---------------- ------- ------ -------- ------
## (Intercept)        -4.26    0.28   -15.28   0.00
## var.x1             -0.96    0.33    -2.94   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##       Group         Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping   (Intercept)      1.24
##  species.grouping     var.x1         1.03
```

```
## ---------------------------------------------
##
## Grouping variables:
## ----------------------------------------
##      Group        # groups   ICC
## ---------------- ---------- ------
## species.grouping    202      0.32
## ----------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.24719
Deviation n.s.

Dispersion test: p= 0.61
Deviation n.s.

Outlier test: p= 0.27143
Deviation n.s.

Observed

Expected

Residual vs. predicted

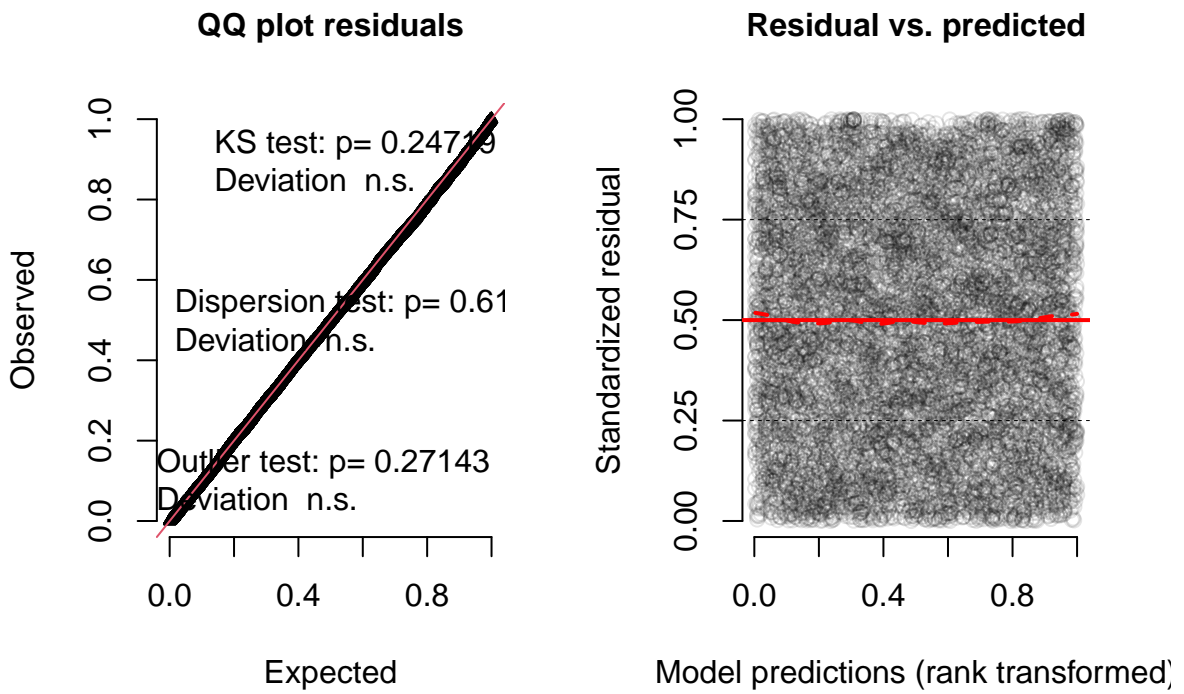Standardized residual

Model predictions (rank transformed)
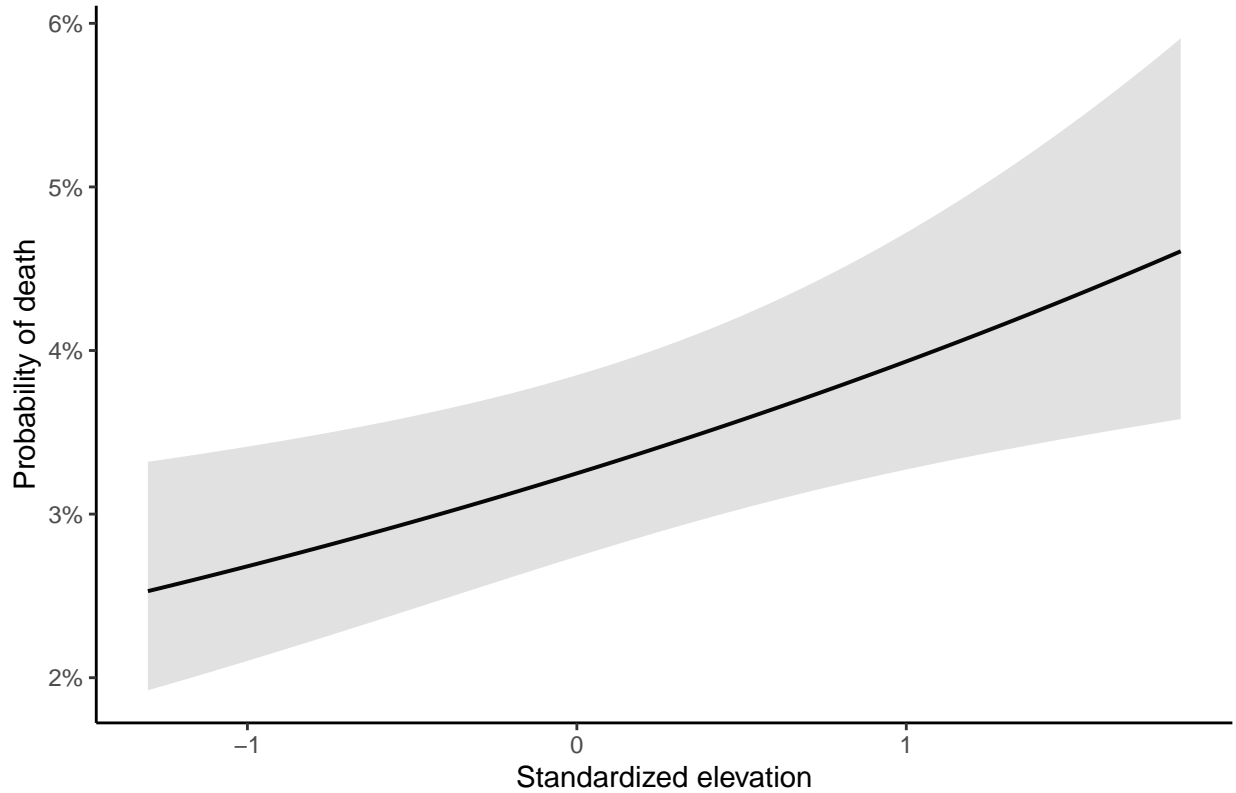
Model estimates and residuals for kc


```
## MODEL INFO:
## Observations: 8323
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2530.81, BIC = 2565.94
## Pseudo-R² (fixed effects) = 0.01
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## -------------------------------------------------
##                    Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)       -3.39    0.09   -37.86   0.00
## var.x1             0.20    0.07     2.87   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     0.65
##  species.grouping    var.x1        0.11
```

```
## --------------------------------------------
##
## Grouping variables:
## -----------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     379     0.11
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.3300*
Deviation n.s.

Dispersion test: p= 0.2(
Deviation n.s.

Outlier test: p= 0.9508
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

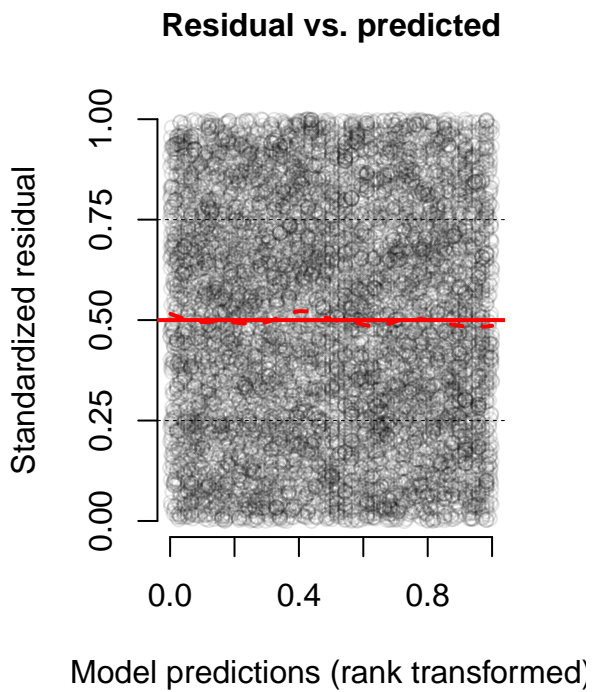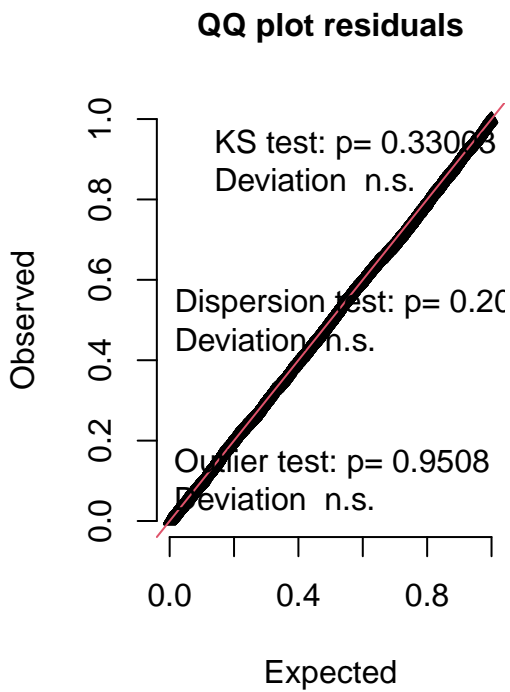## Model estimates and residuals for pasoh
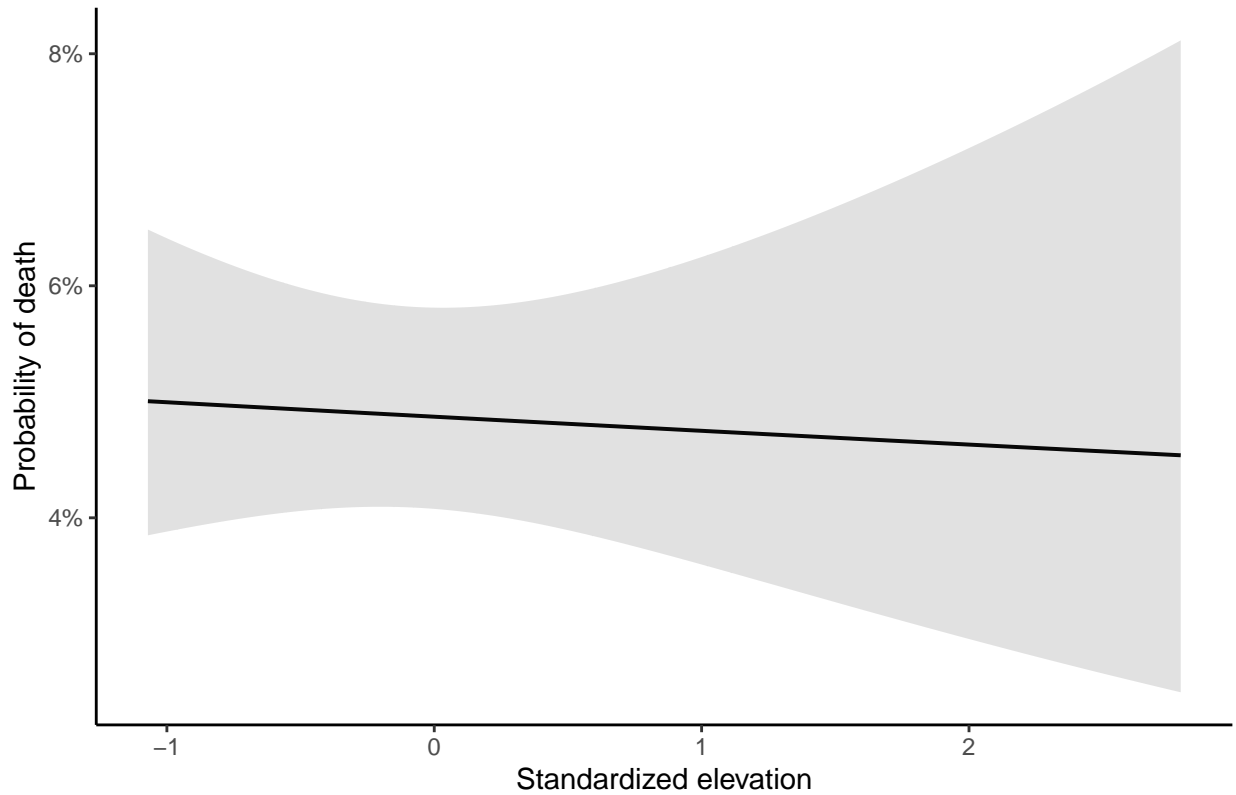

```
## MODEL INFO:
## Observations: 5045
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2201.61, BIC = 2234.24
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## ------------------------------------------------
##                      Est.    S.E.   z val.      p
## ----------------- ------- ------ -------- ------
## (Intercept)         -2.97    0.10   -31.25   0.00
## var.x1              -0.03    0.10    -0.25   0.80
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     0.56
##  species.grouping    var.x1        0.40
```

```
## --------------------------------------------
##
## Grouping variables:
## ------------------------------------
##      Group          # groups   ICC
## ----------------- ---------- ------
## species.grouping     477      0.09
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.21506
Deviation n.s.

Dispersion test: p= 0.79
Deviation n.s.

Outlier test: p= 0.87399
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
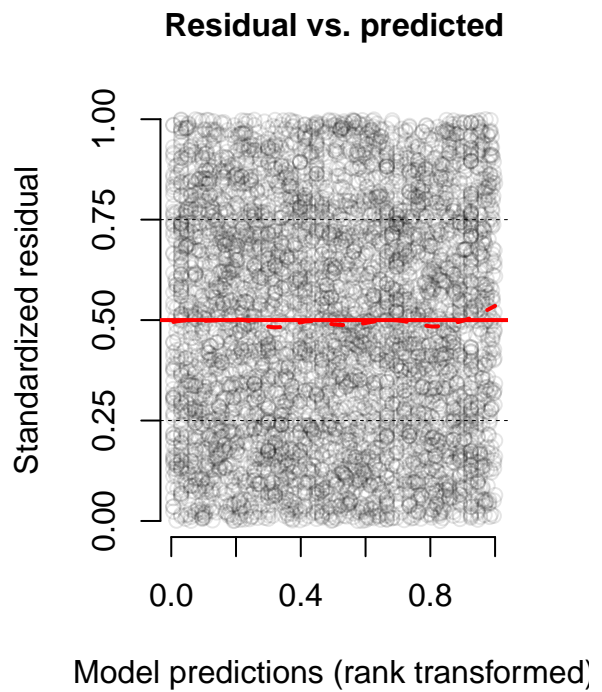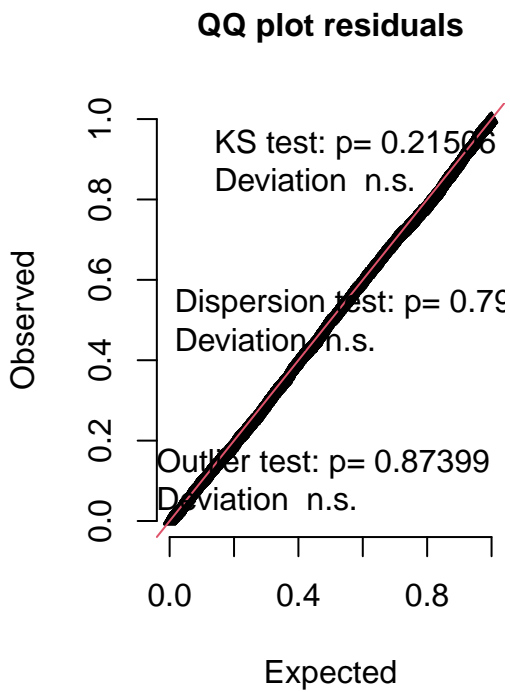
Site-specific mortality model for condition: Illumination index

Model estimates and residuals for amacayacu
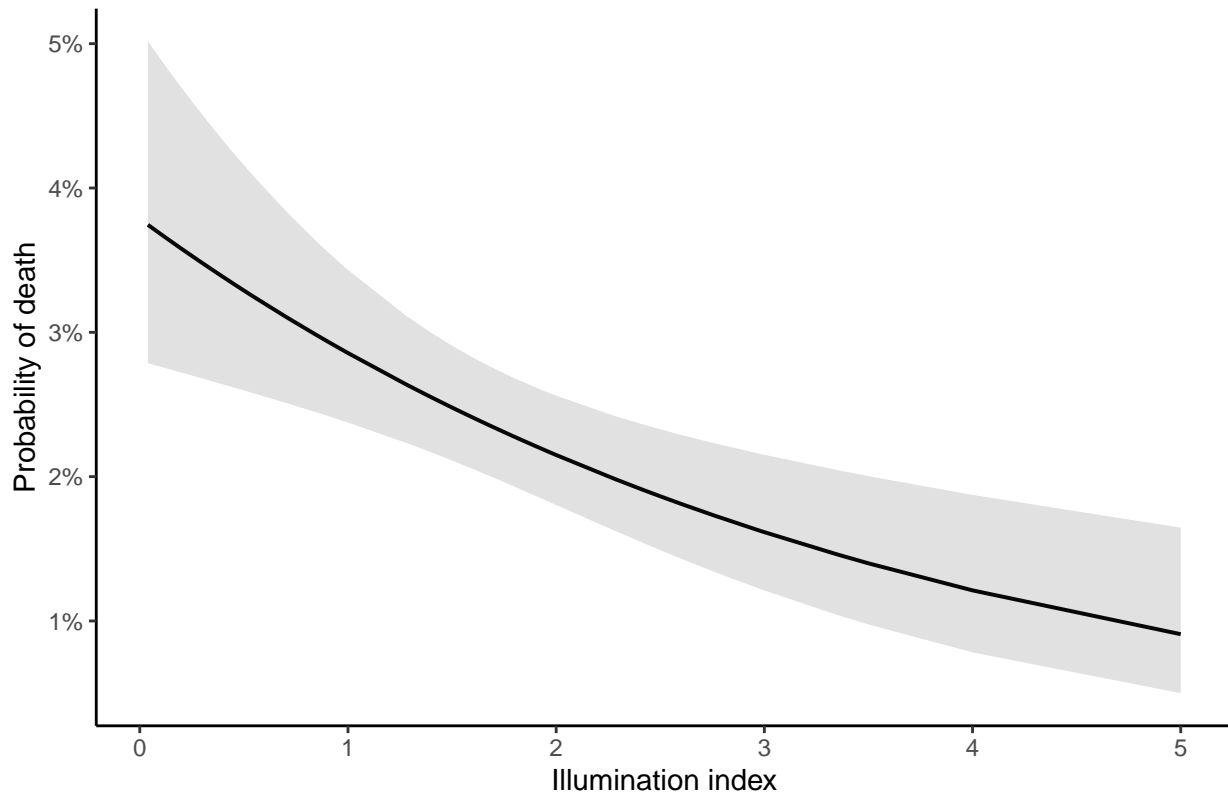
```
## MODEL INFO:
## Observations: 12625
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2834.07, BIC = 2871.28
## Pseudo-R² (fixed effects) = 0.04
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## -------------------------------------------------
##                      Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)          -3.24    0.16   -20.37   0.00
## var.x1               -0.29    0.09    -3.38   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group          Parameter    Std. Dev.
```

```
## ------------------- ------------- -----------
##  species.grouping   (Intercept)      0.46
##  species.grouping     var.x1         0.24
## -----------------------------------------------
##
## Grouping variables:
## -----------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     695     0.06
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.47775
Deviation n.s.

Dispersion test: p= 0.49
Deviation n.s.

Outlier test: p= 0.39453
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
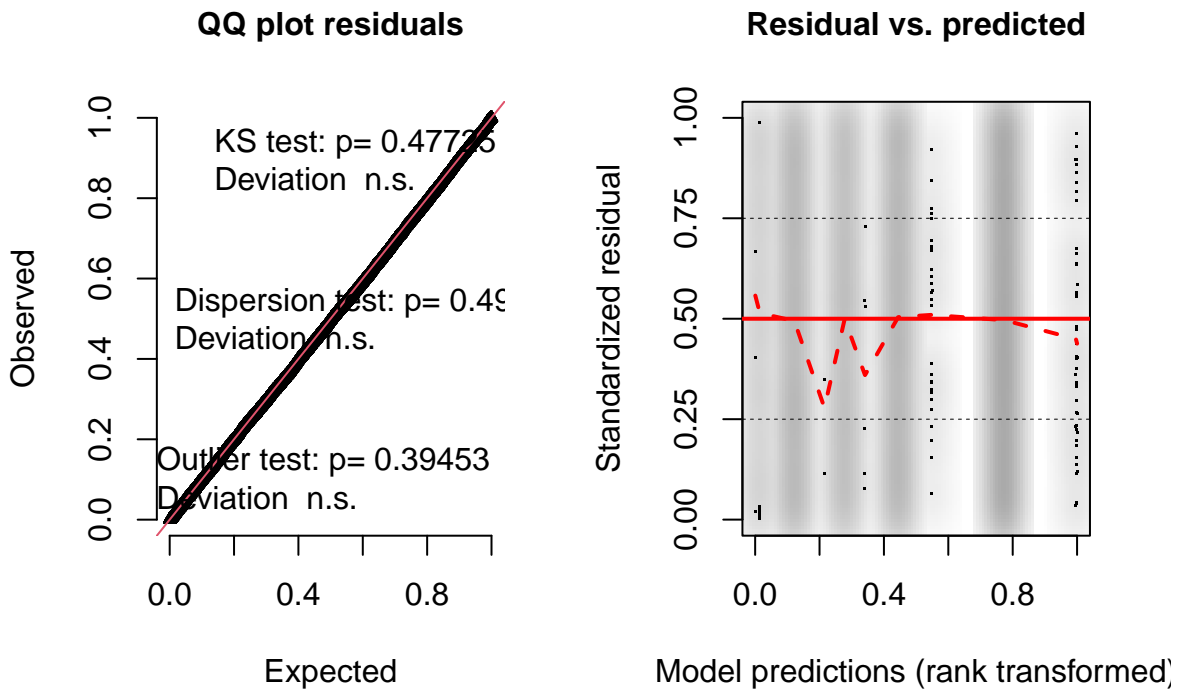
Model estimates and residuals for bci
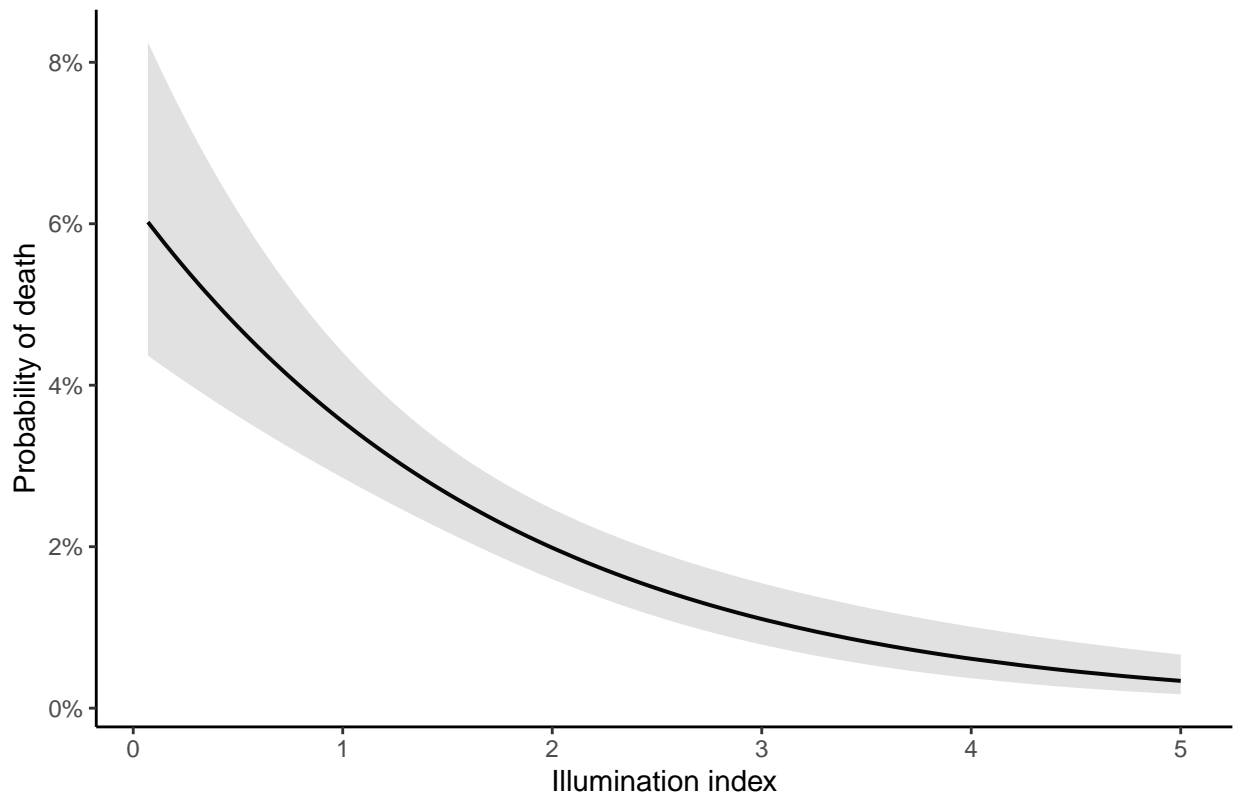

```
## MODEL INFO:
## Observations: 21717
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 4718.50, BIC = 4758.43
## Pseudo-R² (fixed effects) = 0.10
## Pseudo-R² (total) = 0.34
##
## FIXED EFFECTS:
## ------------------------------------------------
##                    Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)       -2.71    0.18   -15.19   0.00
## var.x1            -0.60    0.10    -6.27   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ------------------------------------------------
##      Group          Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     1.04
##  species.grouping    var.x1        0.46
```

```
## ----------------------------------------------
##
## Grouping variables:
## -------------------------------------
##       Group        # groups  ICC
## ----------------- ---------- ------
## species.grouping    220      0.25
## -------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.2029
Deviation n.s.

Dispersion test: p= 0.09
Deviation n.s.

Outlier test: p= 0.67466
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
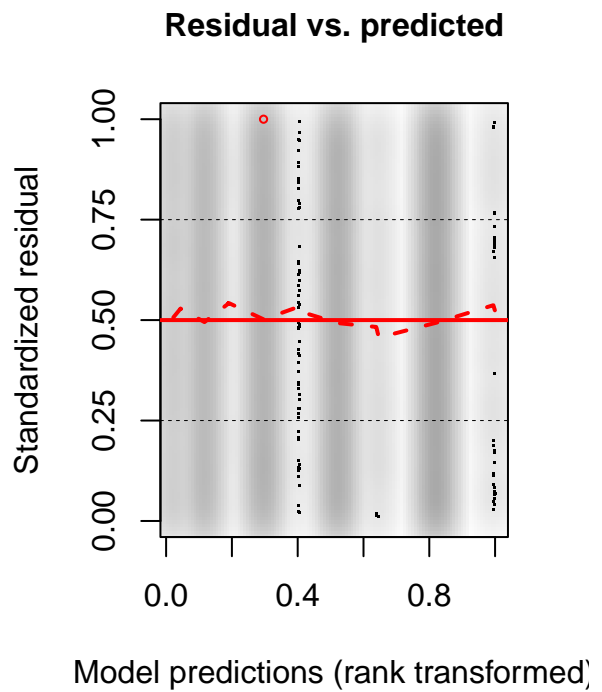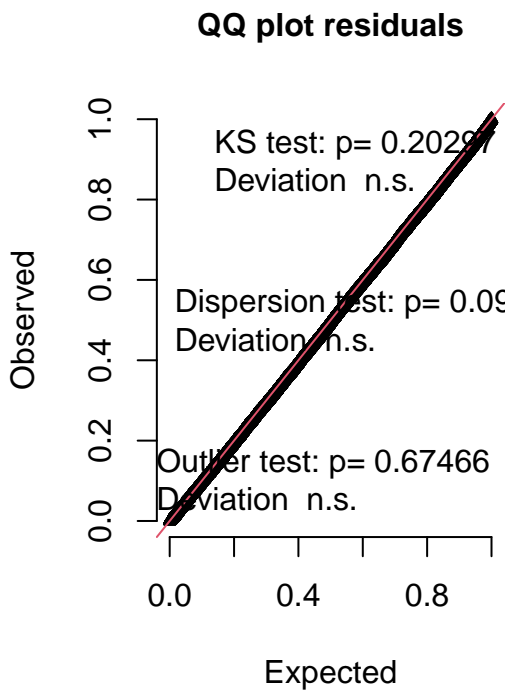
Model estimates and residuals for fushan
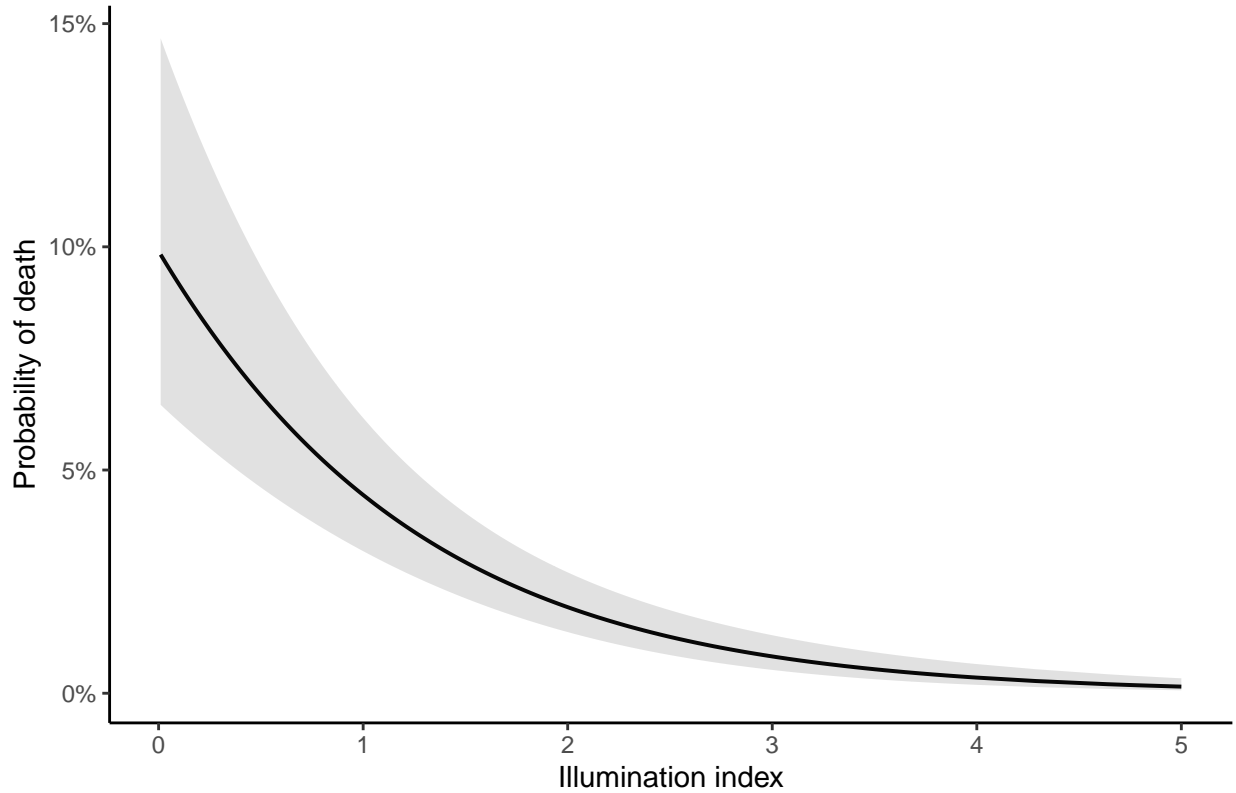

```
## MODEL INFO:
## Observations: 10755
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2095.06, BIC = 2131.47
## Pseudo-R² (fixed effects) = 0.21
## Pseudo-R² (total) = 0.38
##
## FIXED EFFECTS:
## ------------------------------------------------
##                    Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)       -2.21    0.23    -9.46   0.00
## var.x1            -0.86    0.11    -7.95   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##       Group         Parameter    Std. Dev.
## ------------------ ------------- -----------
##  species.grouping   (Intercept)      0.49
##  species.grouping     var.x1         0.15
```

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group        # groups   ICC
## ------------------ ---------- ------
##  species.grouping      64      0.07
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.03781
Deviation significant

Dispersion test: p= 0.51
Deviation n.s.

Outlier test: p= 0.23232
Deviation n.s.

Observed

Expected

Residual vs. predicted

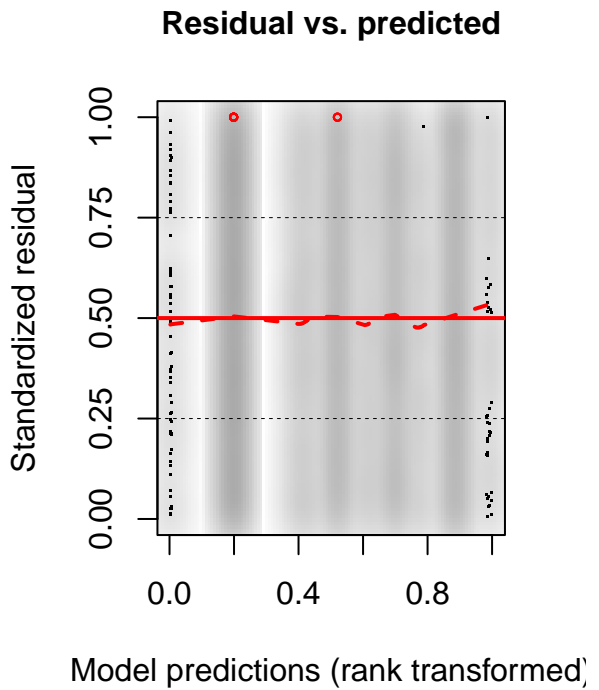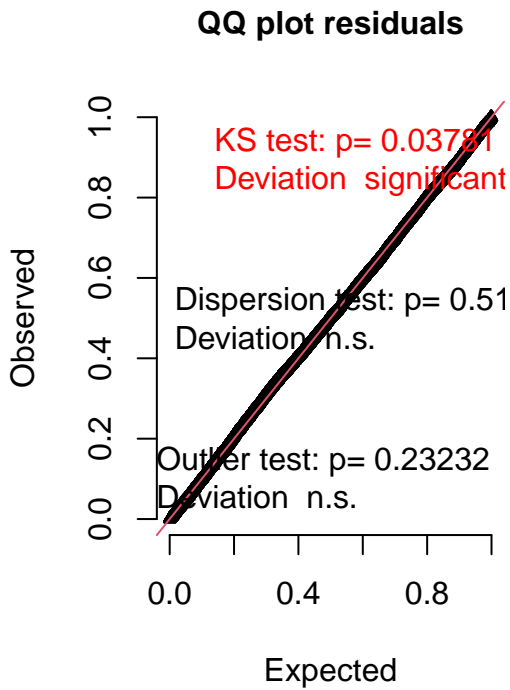Standardized residual

Model predictions (rank transformed)
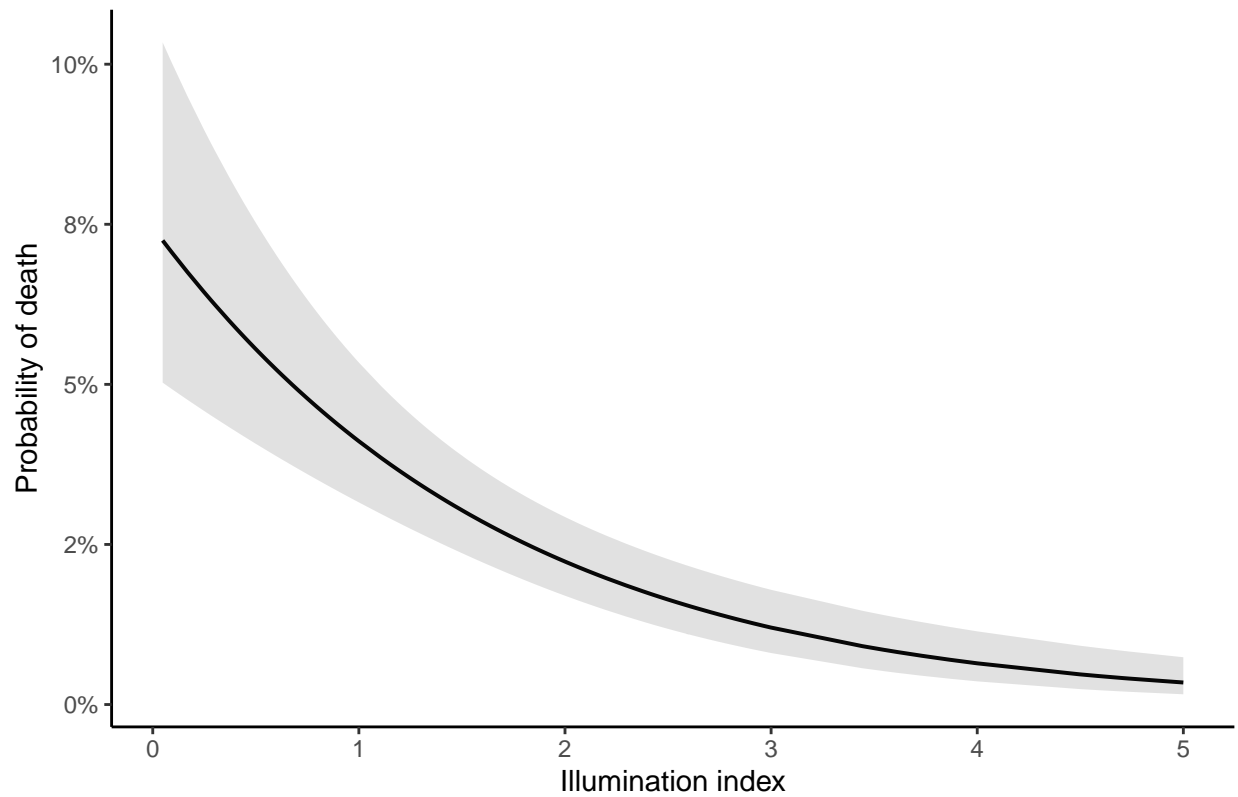
Model estimates and residuals for hkk


```
## MODEL INFO:
## Observations: 9290
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2074.45, BIC = 2110.14
## Pseudo-R² (fixed effects) = 0.15
## Pseudo-R² (total) = 0.36
##
## FIXED EFFECTS:
## ------------------------------------------------
##                     Est.   S.E.   z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -2.52   0.20   -12.44   0.00
## var.x1             -0.63   0.10    -6.01   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group        Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     0.54
##  species.grouping    var.x1        0.29
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group        # groups  ICC
## ----------------- ---------- ------
## species.grouping     201     0.08
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.44461
Deviation n.s.

Dispersion test: p= 0.56
Deviation n.s.

Outlier test: p= 0.32094
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
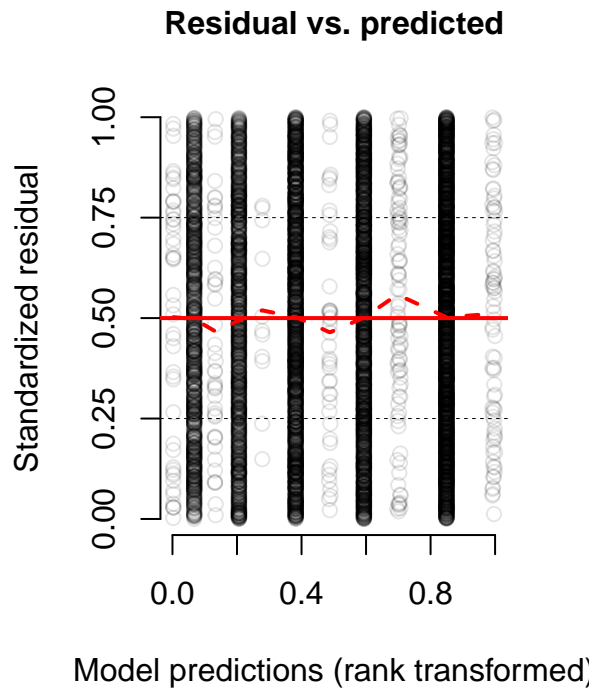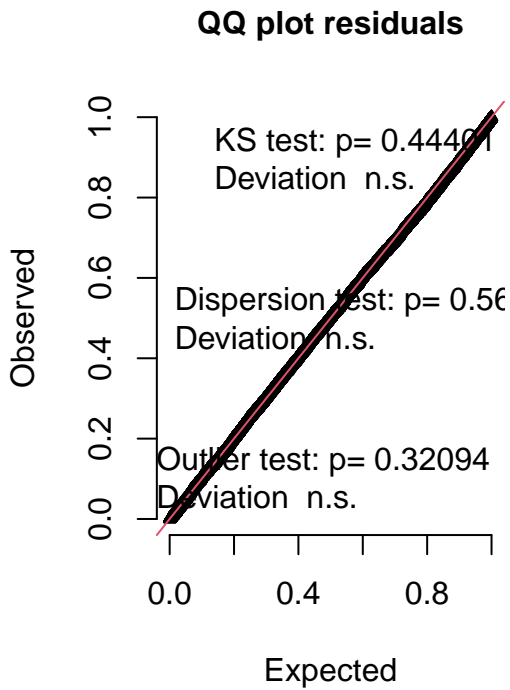
Model estimates and residuals for kc
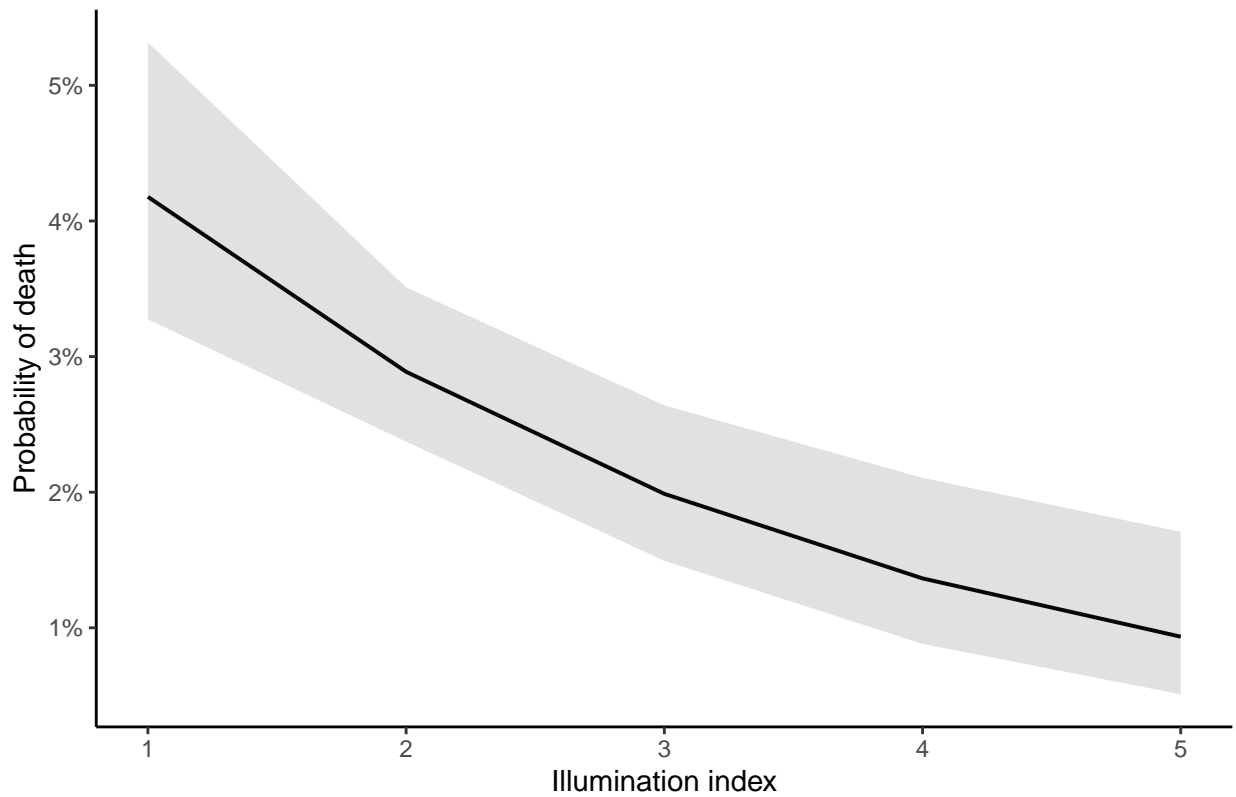

```
## MODEL INFO:
## Observations: 8183
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2259.61, BIC = 2294.65
## Pseudo-R² (fixed effects) = 0.06
## Pseudo-R² (total) = 0.22
##
## FIXED EFFECTS:
## -------------------------------------------------
##                     Est.    S.E.   z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -2.75    0.20   -13.72   0.00
## var.x1             -0.38    0.09    -4.10   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##       Group        Parameter    Std. Dev.
## ------------------ ------------ ----------
##  species.grouping  (Intercept)     1.32
##  species.grouping    var.x1        0.45
```

```
## -----------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group          # groups   ICC
## ------------------ ---------- ------
##  species.grouping     377       0.35
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.51618
Deviation n.s.

Dispersion test: p= 0.12
Deviation n.s.

Outlier test: p= 0.41846
Deviation n.s.

Observed

Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance n

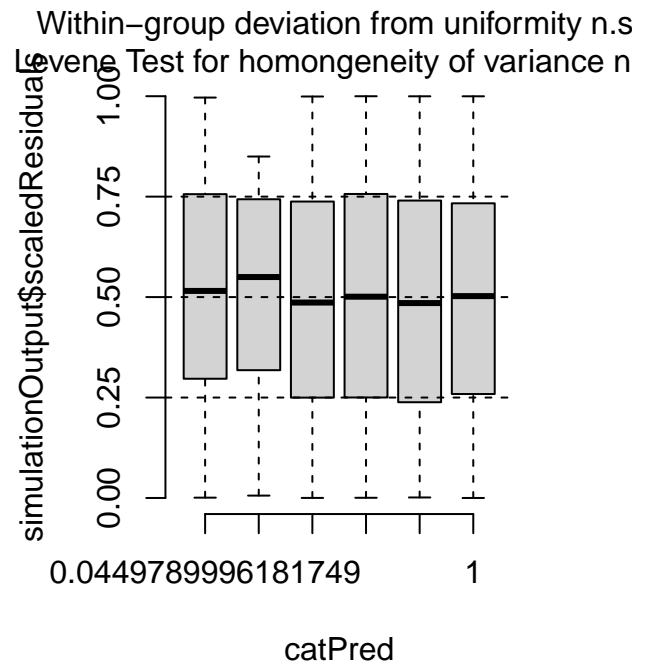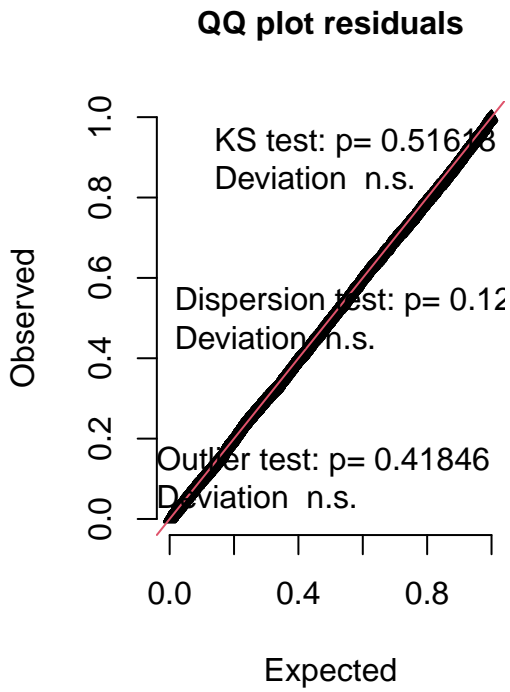simulationOutput$scaledResiduals

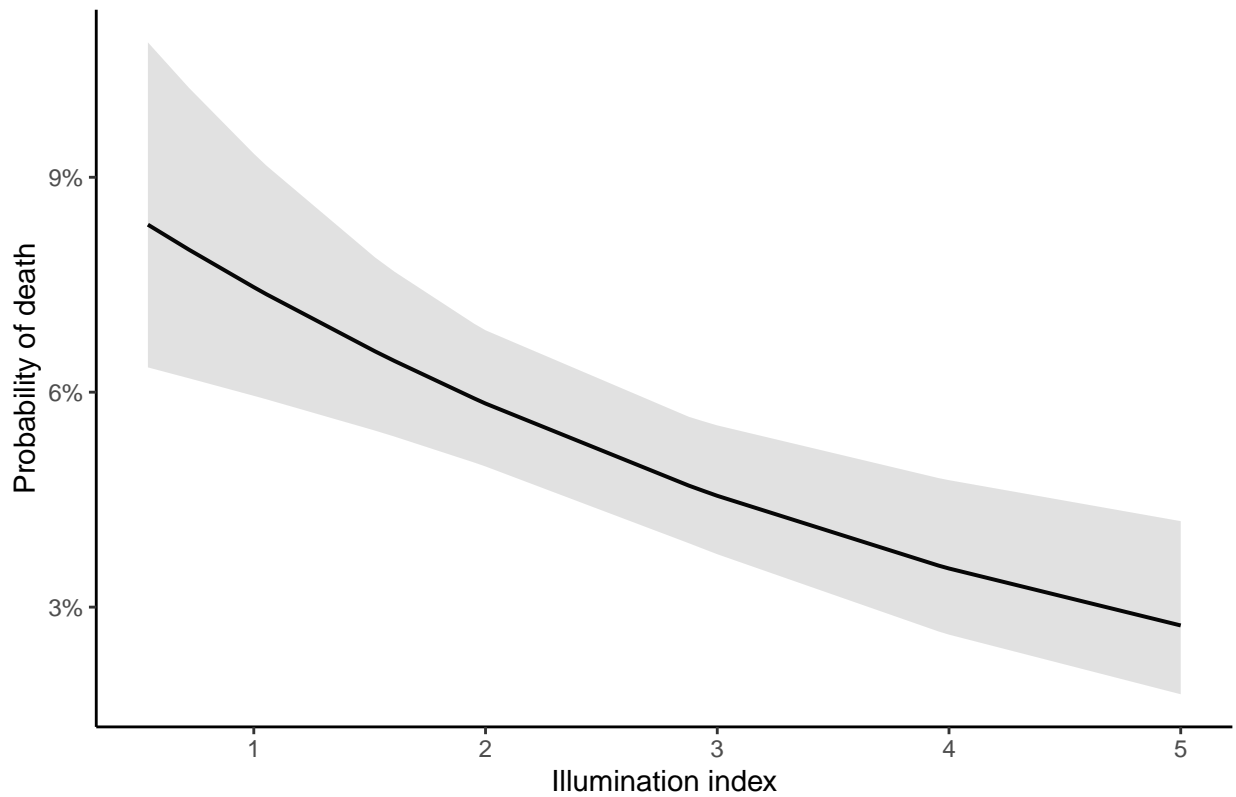catPred

Model estimates and residuals for pasoh


```
## MODEL INFO:
## Observations: 4993
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2136.58, BIC = 2169.16
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## -------------------------------------------------
##                     Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)        -2.25    0.18   -12.21   0.00
## var.x1             -0.26    0.07    -3.54   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group        Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)      0.01
##  species.grouping    var.x1         0.21
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group          # groups   ICC
## -----------------  ----------  ------
##  species.grouping      473      0.00
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.86247
Deviation n.s.

Dispersion test: p= 0.73
Deviation n.s.

Outlier test: p= 0.26399
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Site-specific mortality model for condition: physical state (mode)
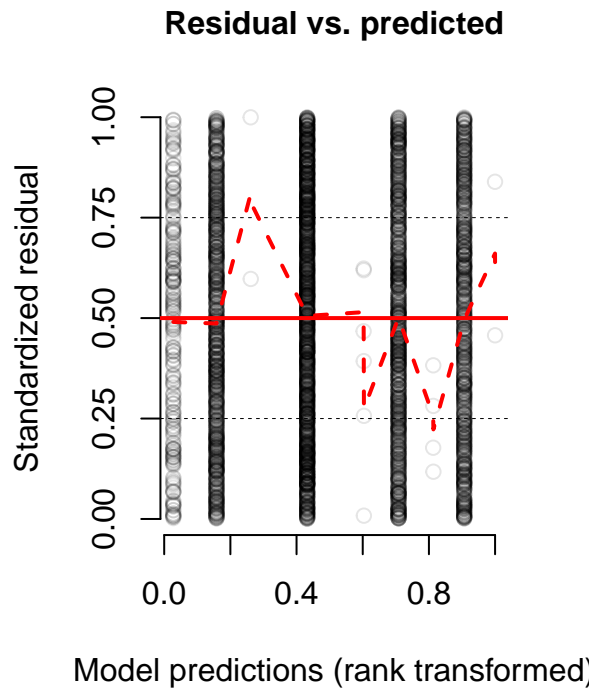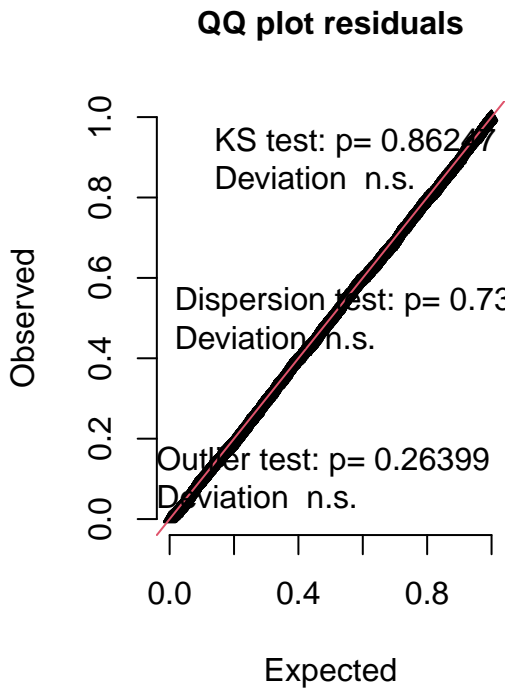

amacayacu

```
## MODEL INFO:
## Observations: 4993
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2136.58, BIC = 2169.16
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## ---------------------------------------------------
##                     Est.    S.E.    z val.     p
## ----------------- ------- ------ -------- ------
## (Intercept)        -2.25    0.18   -12.21   0.00
## var.x1             -0.26    0.07    -3.54   0.00
## ---------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group          Parameter     Std. Dev.
```

```
## ------------------- ------------- -----------
##  species.grouping   (Intercept)      0.01
##  species.grouping      var.x1        0.21
## -----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group       # groups   ICC
## ----------------- ---------- ------
##  species.grouping    473      0.00
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

Residual vs. predicted

KS test: p= 0.86247
Deviation n.s.

Dispersion test: p= 0.73
Deviation n.s.

Outlier test: p= 0.26399
Deviation n.s.

Observed

Expected

Standardized residual

Model predictions (rank transformed)

```
## MODEL INFO:
## Observations: 4993
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2136.58, BIC = 2169.16
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## ------------------------------------------------
##                      Est.   S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)         -2.25   0.18   -12.21   0.00
## var.x1              -0.26   0.07    -3.54   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group          Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping   (Intercept)      0.01
##  species.grouping      var.x1        0.21
```

```
## ----------------------------------------------
##
## Grouping variables:
## ----------------------------------------
##       Group         # groups   ICC
## ----------------- ---------- ------
##  species.grouping     473     0.00
## ----------------------------------
```
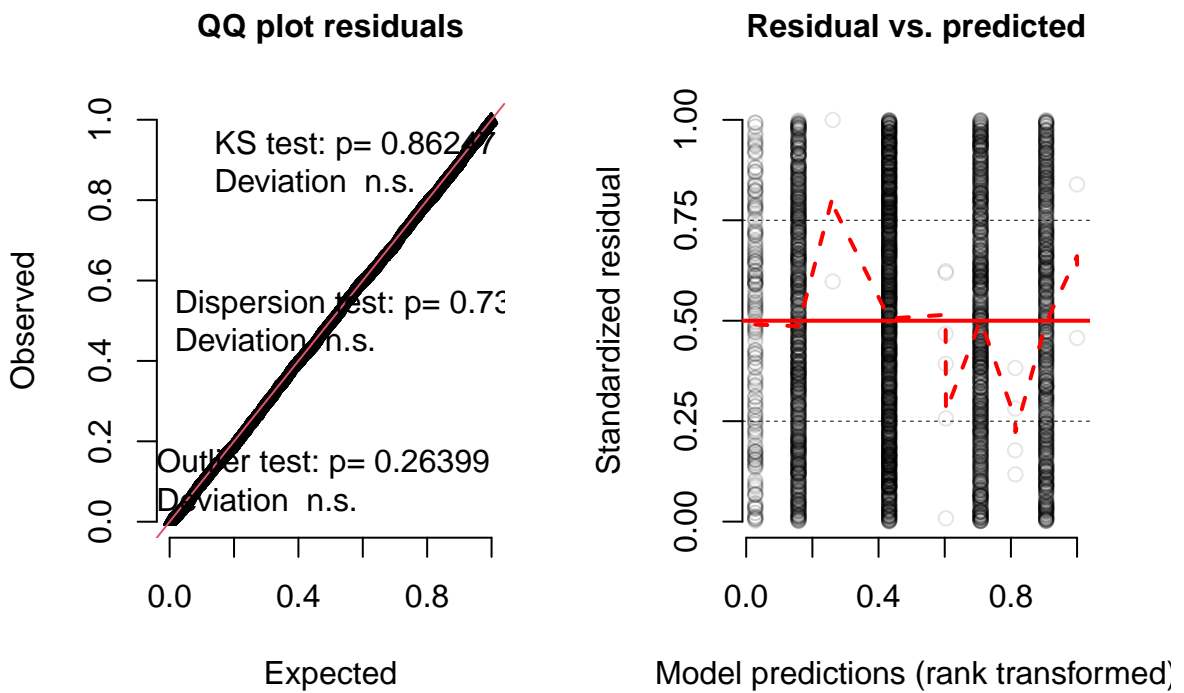
DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.8624?
Deviation n.s.

Dispersion test: p= 0.73
Deviation n.s.

Outlier test: p= 0.26399
Deviation n.s.

Observed / Expected

Residual vs. predicted

Standardized residual / Model predictions (rank transformed)

fushan

Probability of death — Physical state of living trees (modes)

```
## MODEL INFO:
## Observations: 4993
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2136.58, BIC = 2169.16
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## --------------------------------------------------
##                    Est.    S.E.    z val.     p
## ---------------- -------  ------  --------  ------
## (Intercept)       -2.25    0.18    -12.21    0.00
## var.x1            -0.26    0.07     -3.54    0.00
## --------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group        Parameter     Std. Dev.
## ----------------- ------------- -----------
##  species.grouping  (Intercept)      0.01
##  species.grouping    var.x1         0.21
```

```
## ----------------------------------------------
## 
## Grouping variables:
## ------------------------------------
##        Group         # groups   ICC
## ----------------- ---------- ------
##  species.grouping      473      0.00
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.86247
Deviation n.s.

Dispersion test: p= 0.73
Deviation n.s.

Outlier test: p= 0.26399
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

hkk

Probability of death vs Physical state of living trees (modes)

```
## MODEL INFO:
## Observations: 4993
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2136.58, BIC = 2169.16
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## -------------------------------------------------
##                    Est.    S.E.    z val.     p
## ---------------- -------  ------  --------  ------
## (Intercept)       -2.25    0.18    -12.21    0.00
## var.x1            -0.26    0.07     -3.54    0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##       Group         Parameter    Std. Dev.
## ---------------- ------------- ----------
##  species.grouping  (Intercept)     0.01
##  species.grouping    var.x1        0.21
```

```
## ------------------------------------------------
##
## Grouping variables:
## ------------------------------------------
##        Group         # groups   ICC
## -----------------  ----------  ------
##  species.grouping      473      0.00
## ------------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.862
Deviation n.s.

Dispersion test: p= 0.73
Deviation n.s.

Outlier test: p= 0.26399
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

kc

Probability of death vs Physical state of living trees (modes): aStanding, breakage, uprooting

```
## MODEL INFO:
## Observations: 4993
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2136.58, BIC = 2169.16
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## -----------------------------------------------
##                     Est.    S.E.   z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -2.25   0.18   -12.21   0.00
## var.x1             -0.26   0.07    -3.54   0.00
## -----------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     0.01
##  species.grouping    var.x1        0.21
```

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group         # groups   ICC
## ----------------- ---------- ------
##  species.grouping     473      0.00
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.8624?
Deviation n.s.

Dispersion test: p= 0.73
Deviation n.s.

Outlier test: p= 0.26399
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

pasoh

Probability of death vs Physical state of living trees (modes)

```
## MODEL INFO:
## Observations: 4993
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2136.58, BIC = 2169.16
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## ------------------------------------------------
##                   Est.    S.E.   z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)      -2.25    0.18   -12.21   0.00
## var.x1           -0.26    0.07    -3.54   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     0.01
##  species.grouping    var.x1        0.21
```

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group        # groups   ICC
## ----------------   ----------  ------
##  species.grouping     473       0.00
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.862
Deviation n.s.

Dispersion test: p= 0.73
Deviation n.s.

Outlier test: p= 0.26399
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Site-specific mortality model for condition: Trunk loss

Model estimates and residuals for amacayacu
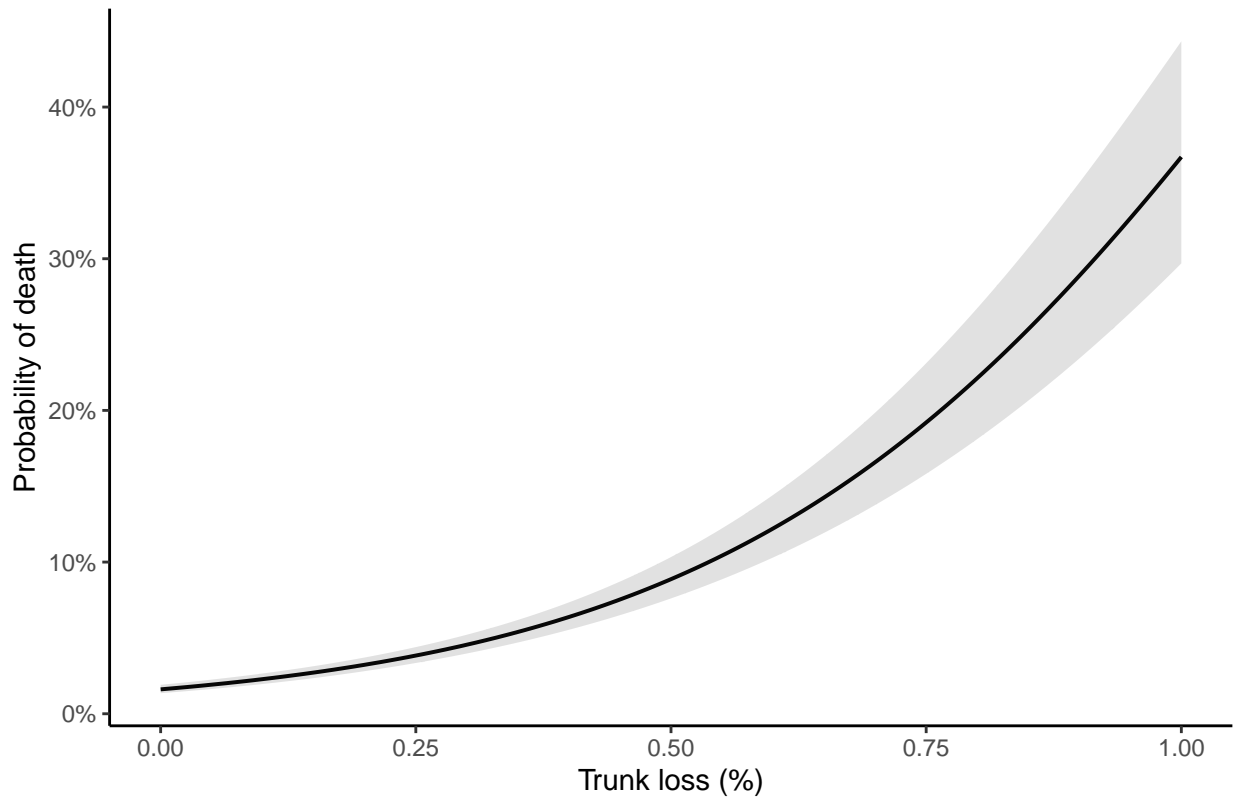

```
## MODEL INFO:
## Observations: 12758
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2774.96, BIC = 2812.23
## Pseudo-R² (fixed effects) = 0.09
## Pseudo-R² (total) = 0.14
##
## FIXED EFFECTS:
## ------------------------------------------------
##                    Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)       -4.11    0.09   -46.14   0.00
## var.x1             3.57    0.20    18.12   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##      Group         Parameter    Std. Dev.
```

```
## ------------------- ------------- -----------
##  species.grouping    (Intercept)     0.47
##  species.grouping      var.x1        0.05
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping    695      0.06
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.81103
Deviation n.s.

Dispersion test: p= 0.69
Deviation n.s.

Outlier test: p= 0.17885
Deviation n.s.

Observed / Expected

Residual vs. predicted

Standardized residual / Model predictions (rank transformed)

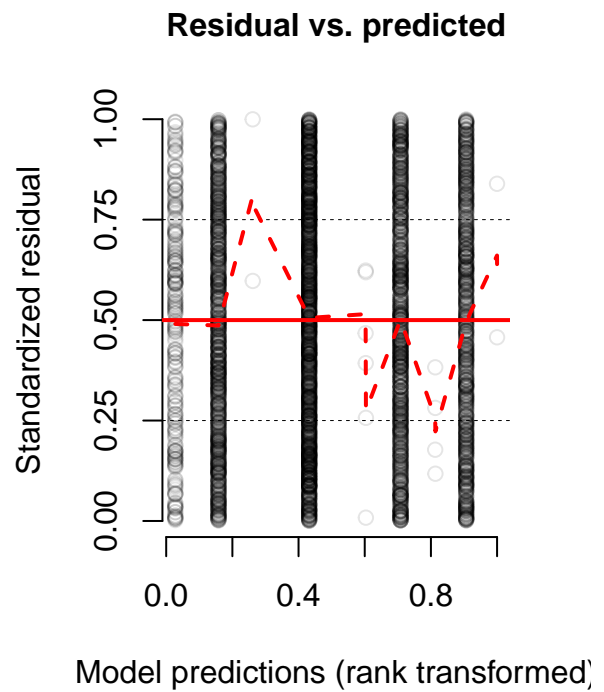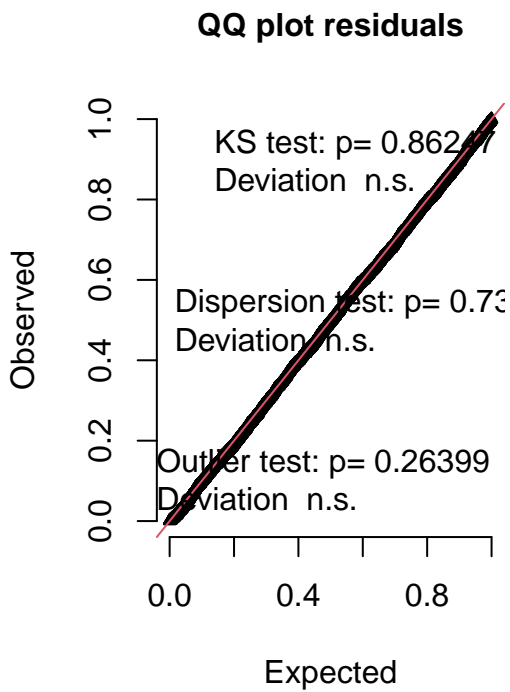Model estimates and residuals for bci
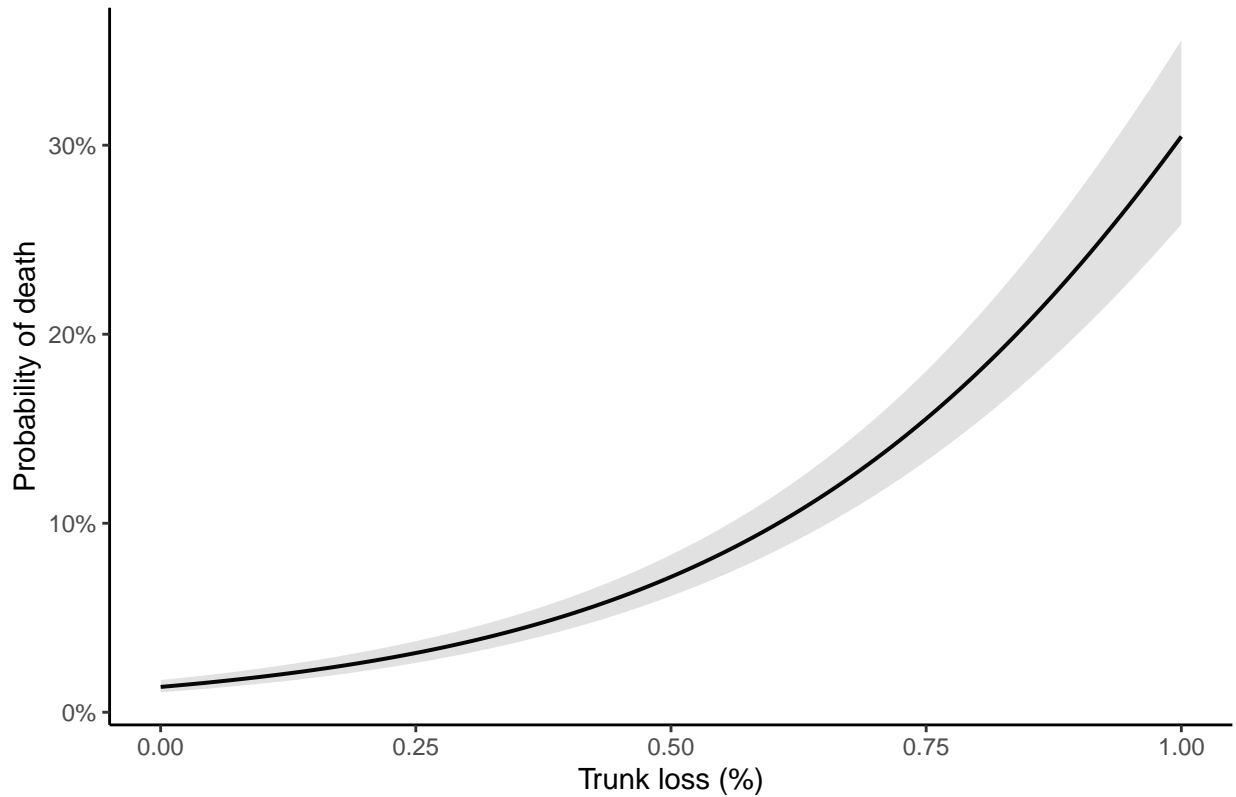
```
## MODEL INFO:
## Observations: 21796
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 4730.76, BIC = 4770.71
## Pseudo-R² (fixed effects) = 0.08
## Pseudo-R² (total) = 0.28
##
## FIXED EFFECTS:
## ------------------------------------------------
##                     Est.    S.E.    z val.     p
## ---------------- -------  ------  --------  ------
## (Intercept)       -4.30    0.12    -34.84    0.00
## var.x1             3.47    0.17     20.03    0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##       Group          Parameter     Std. Dev.
## ----------------- ------------- -----------
##  species.grouping   (Intercept)      0.99
##  species.grouping     var.x1         0.80
```

```
## -----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group        # groups  ICC
## ----------------- ---------- ------
##  species.grouping    220     0.23
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.20956
Deviation n.s.

Dispersion test: p= 0.45
Deviation n.s.

Outlier test: p= 0.59373
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
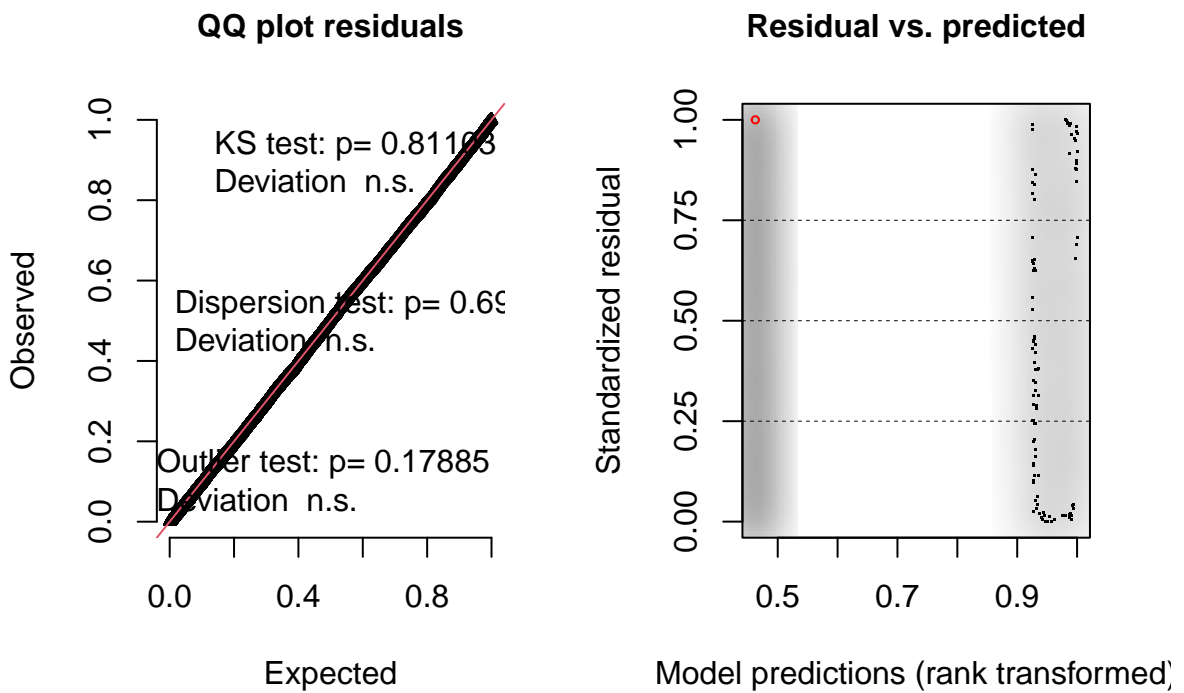
Model estimates and residuals for fushan

```
## MODEL INFO:
## Observations: 10880
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2213.72, BIC = 2250.20
## Pseudo-R² (fixed effects) = 0.15
## Pseudo-R² (total) = 0.42
##
## FIXED EFFECTS:
## ------------------------------------------------
##                    Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)       -4.83    0.26   -18.46   0.00
## var.x1             3.76    0.27    14.15   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##      Group          Parameter      Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)      1.28
##  species.grouping     var.x1        0.37
```

```
## ------------------------------------------------
##
## Grouping variables:
## ----------------------------------------
##        Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping      64      0.33
## ----------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.5301
Deviation n.s.

Dispersion test: p= 0.6
Deviation n.s.

Outlier test: p= 0.70568
Deviation n.s.

Observed

Expected

Residual vs. predicted

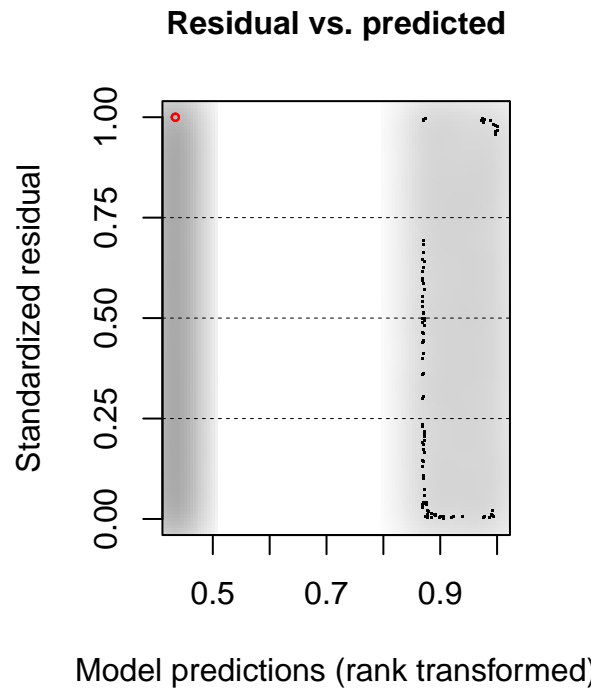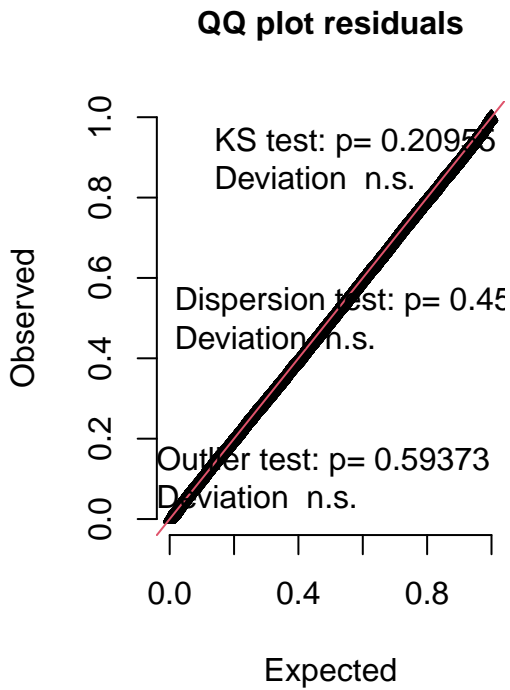Standardized residual

Model predictions (rank transformed)
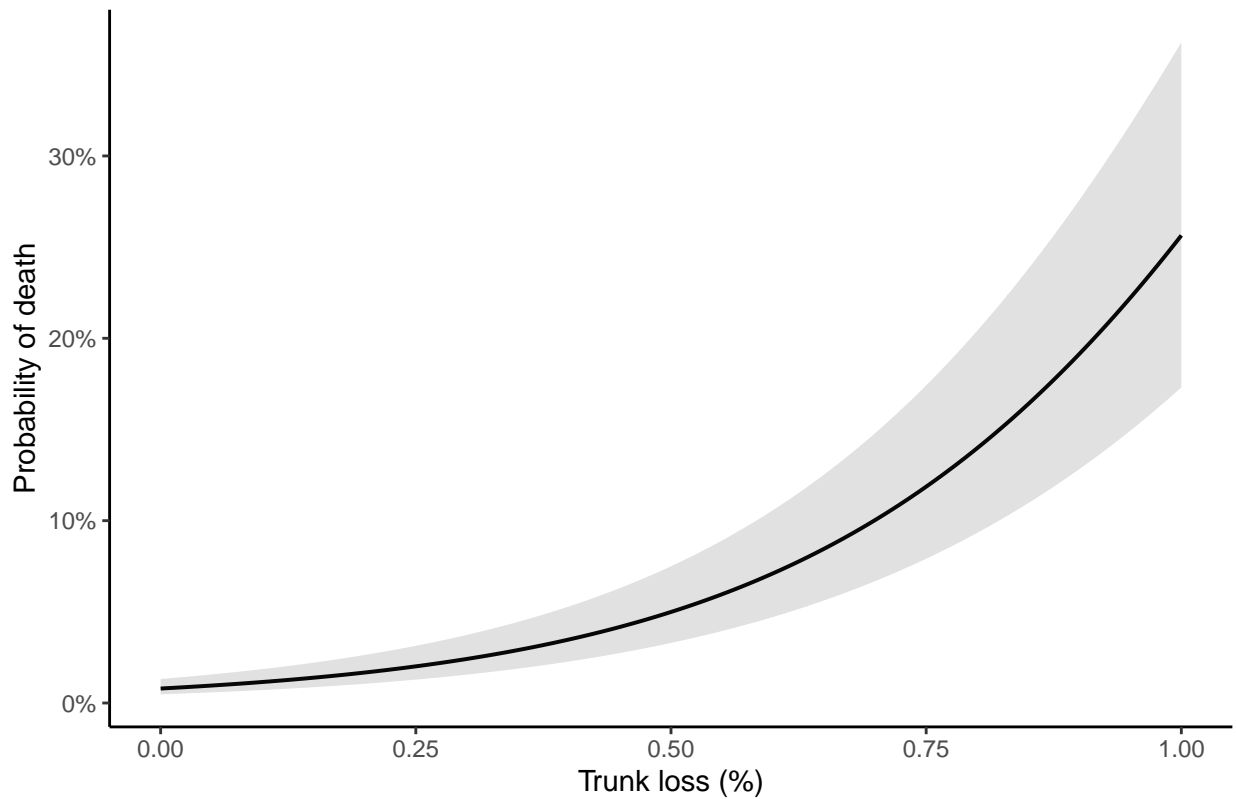
Model estimates and residuals for hkk


```
## MODEL INFO:
## Observations: 9413
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2265.23, BIC = 2300.98
## Pseudo-R² (fixed effects) = 0.07
## Pseudo-R² (total) = 0.31
##
## FIXED EFFECTS:
## ------------------------------------------------
##                    Est.    S.E.    z val.     p
## ---------------- ------- ------- -------- ------
## (Intercept)       -4.24    0.18   -23.87   0.00
## var.x1             3.51    0.27    13.03   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##       Group         Parameter     Std. Dev.
## ----------------- ------------- -----------
##  species.grouping  (Intercept)      1.11
##  species.grouping     var.x1        0.79
```

```
## ----------------------------------------
##
## Grouping variables:
## ----------------------------------
##      Group          # groups   ICC
## ----------------  ----------  ------
##  species.grouping     201      0.27
## ----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.1897
Deviation n.s.

Dispersion test: p= 0.65
Deviation n.s.

Outlier test: p= 0.60196
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

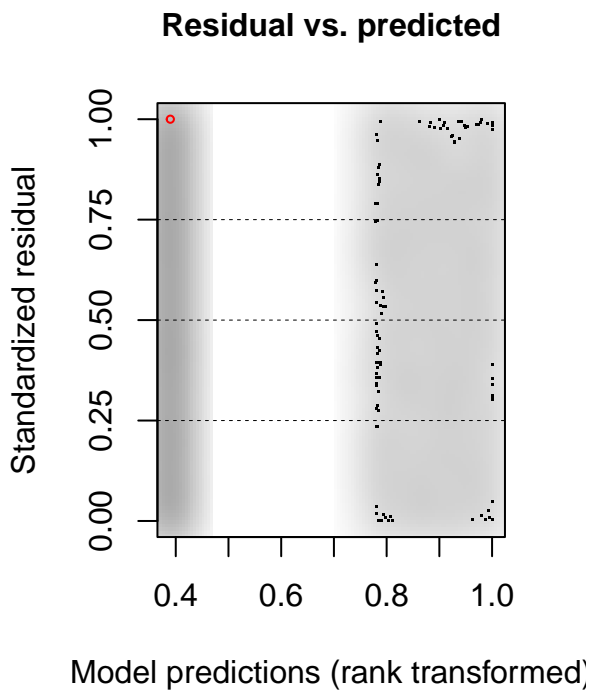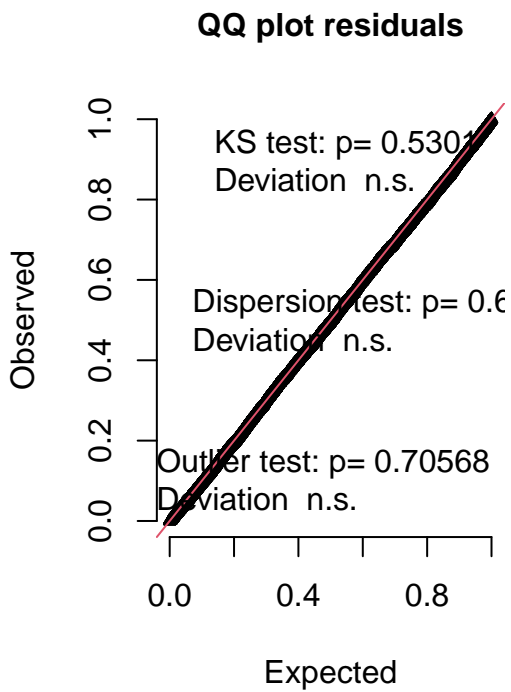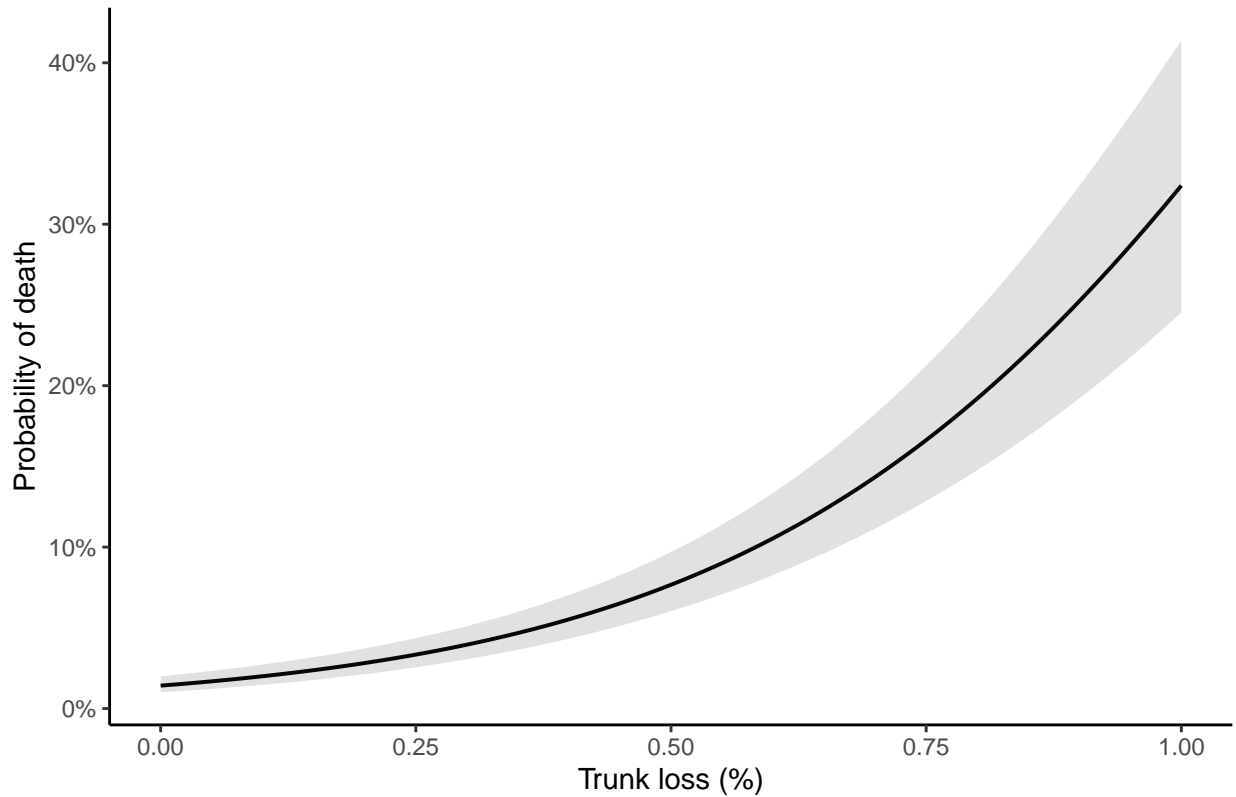## Model estimates and residuals for kc
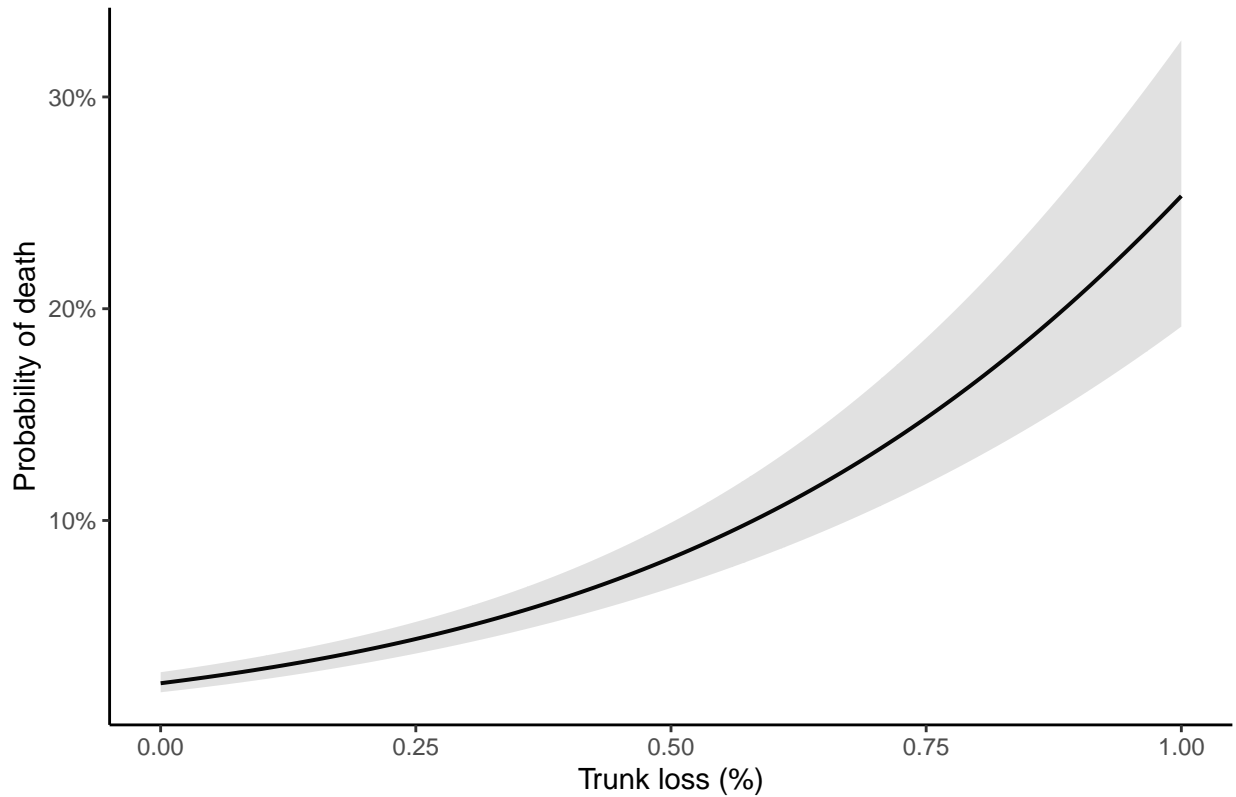

```
## MODEL INFO:
## Observations: 8289
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2334.96, BIC = 2370.07
## Pseudo-R² (fixed effects) = 0.06
## Pseudo-R² (total) = 0.18
##
## FIXED EFFECTS:
## -------------------------------------------------
##                     Est.    S.E.    z val.    p
## ---------------- ------- ------ -------- ------
## (Intercept)        -3.74    0.11   -35.17   0.00
## var.x1              2.66    0.22    12.34   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##      Group          Parameter     Std. Dev.
## ------------------ ------------- ----------
##  species.grouping  (Intercept)      0.72
##  species.grouping    var.x1         0.25
```

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##       Group        # groups   ICC
## -----------------  ----------  ------
## species.grouping      379      0.13
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.6322̵9
Deviation n.s.

Dispersion test: p= 0.18
Deviation n.s.

Outlier test: p= 0.04777
Deviation significant

Observed (y-axis)
Expected (x-axis)

Residual vs. predicted

Standardized residual (y-axis)
Model predictions (rank transformed) (x-axis)
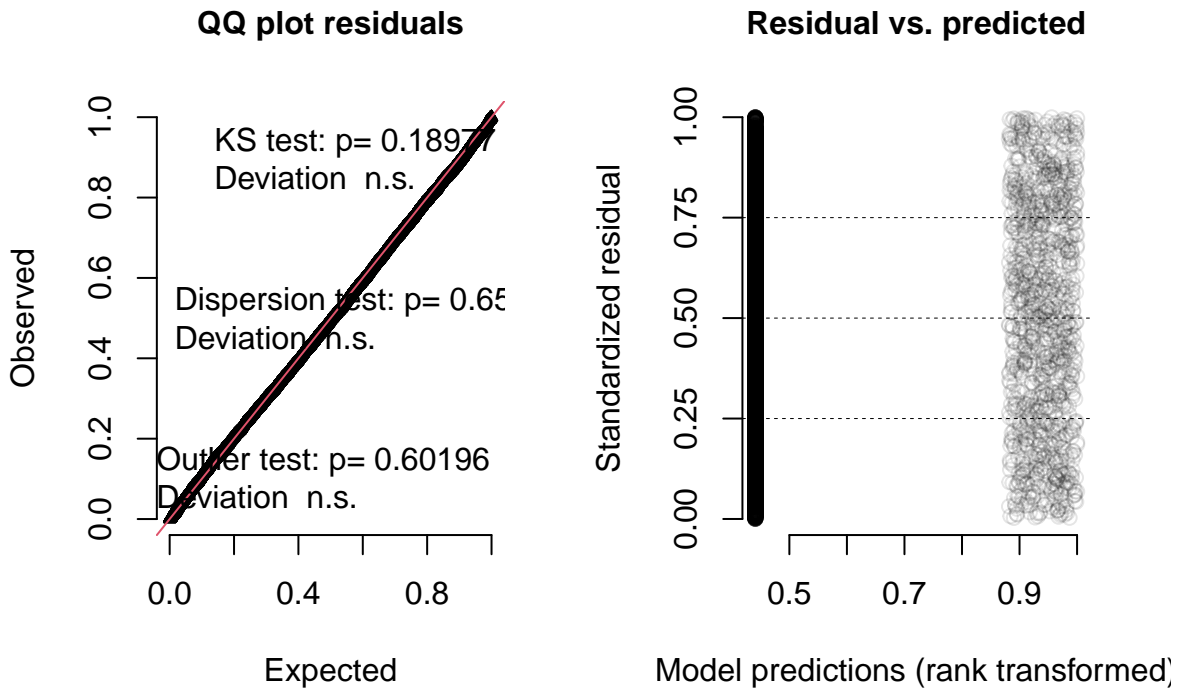
Model estimates and residuals for pasoh
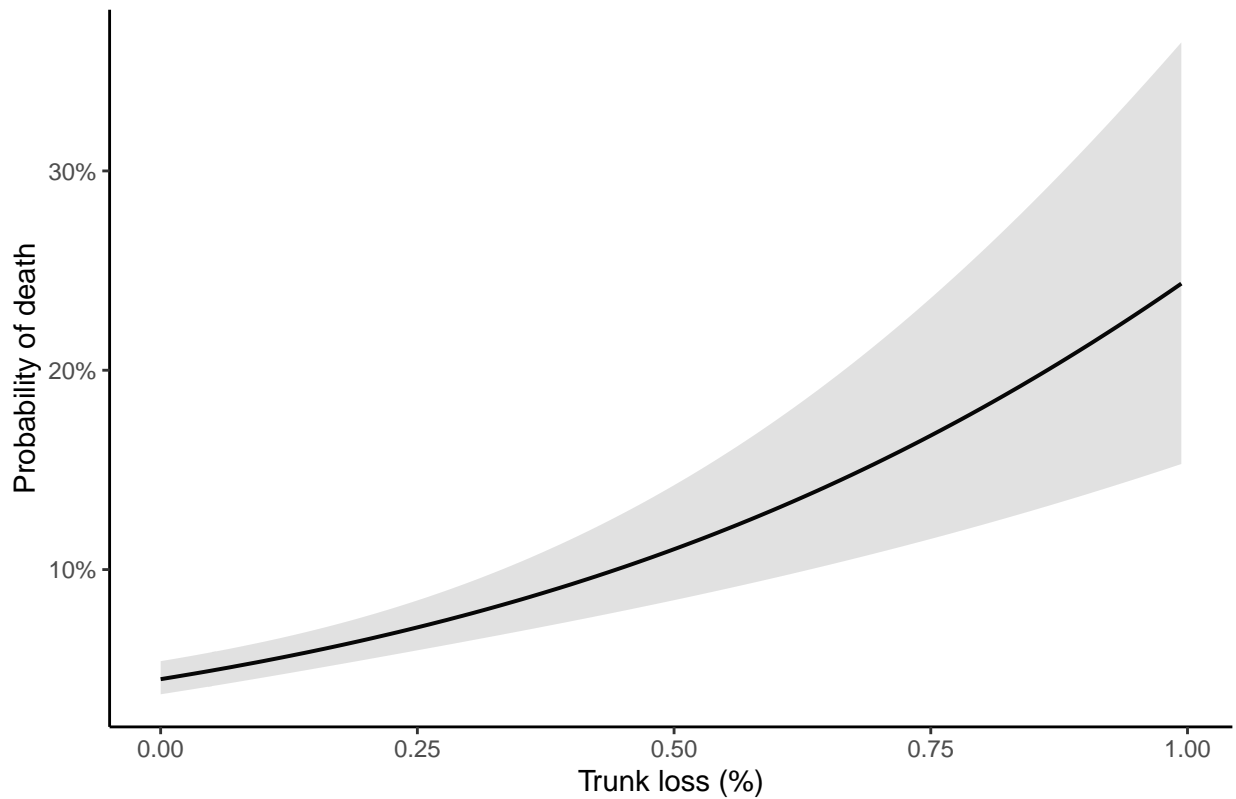
```
## MODEL INFO:
## Observations: 5023
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2144.82, BIC = 2177.43
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.12
##
## FIXED EFFECTS:
## ------------------------------------------------
##                     Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)        -3.05    0.10   -31.08   0.00
## var.x1              1.93    0.33     5.93   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter    Std. Dev.
## ---------------- ------------- ----------
##  species.grouping  (Intercept)     0.64
##  species.grouping    var.x1        0.99
```

```
## ----------------------------------------------
##
## Grouping variables:
## ----------------------------------------
##       Group        # groups   ICC
## ----------------   ----------  ------
##  species.grouping     475      0.11
## ----------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.4212̃
Deviation n.s.

Dispersion test: p= 0.96
Deviation n.s.

Outlier test: p= 0.57862
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
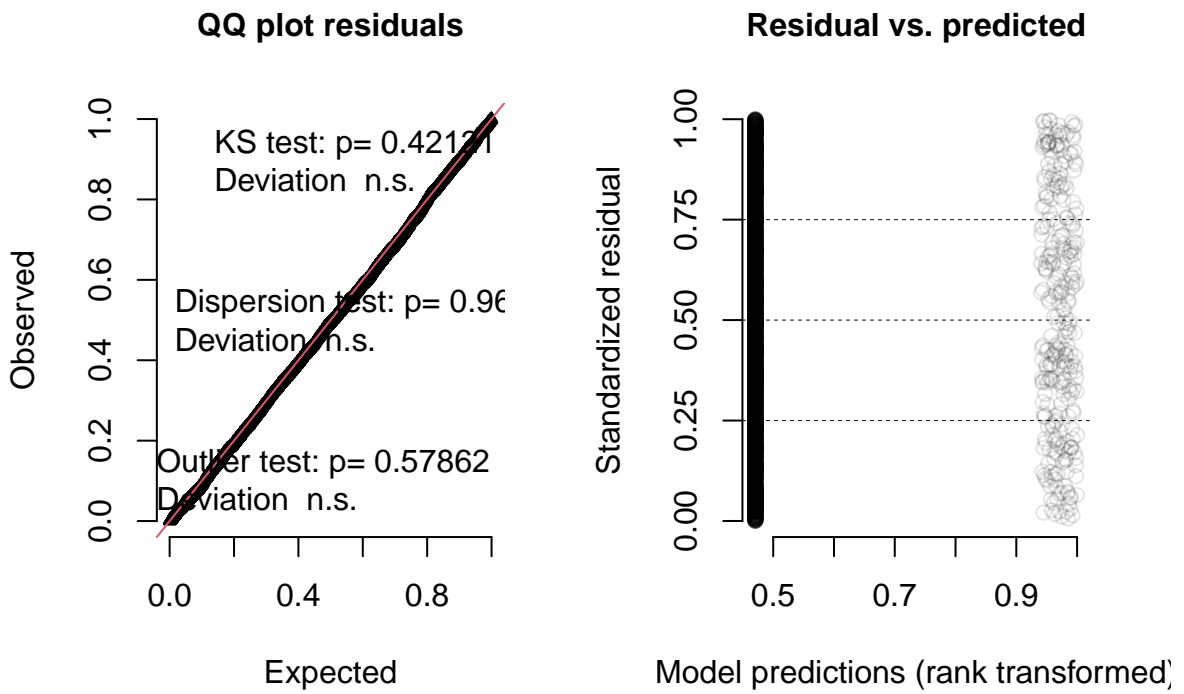
Site-specific mortality model for condition: Crown loss

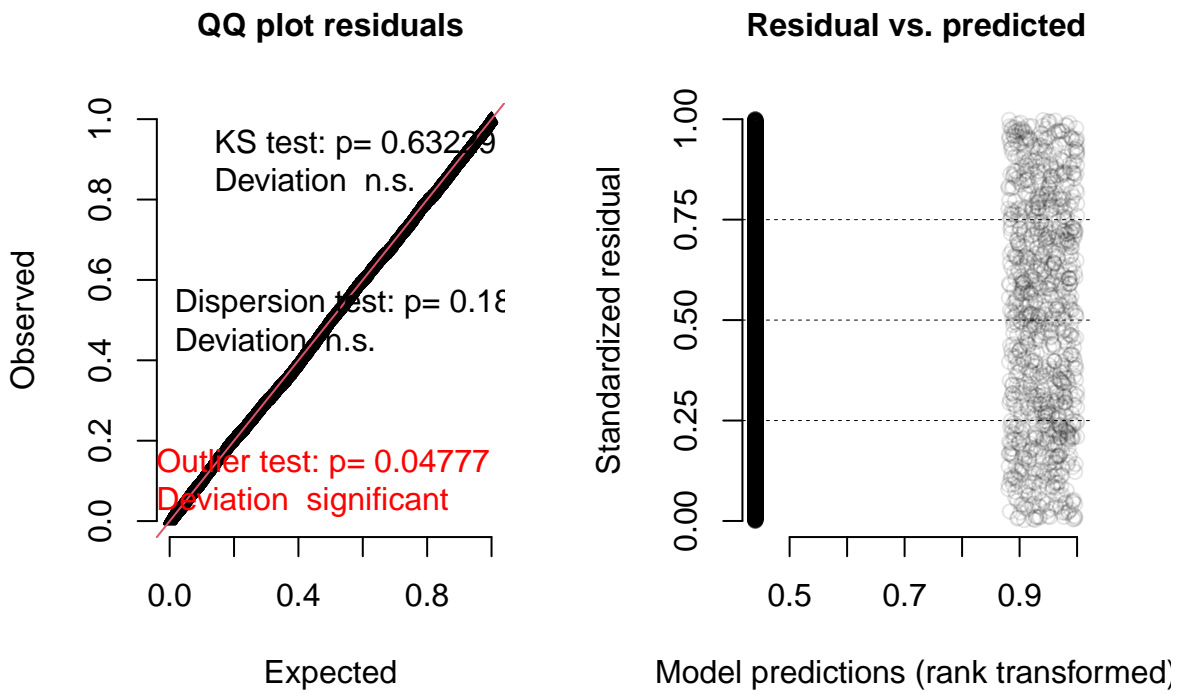## Model estimates and residuals for amacayacu
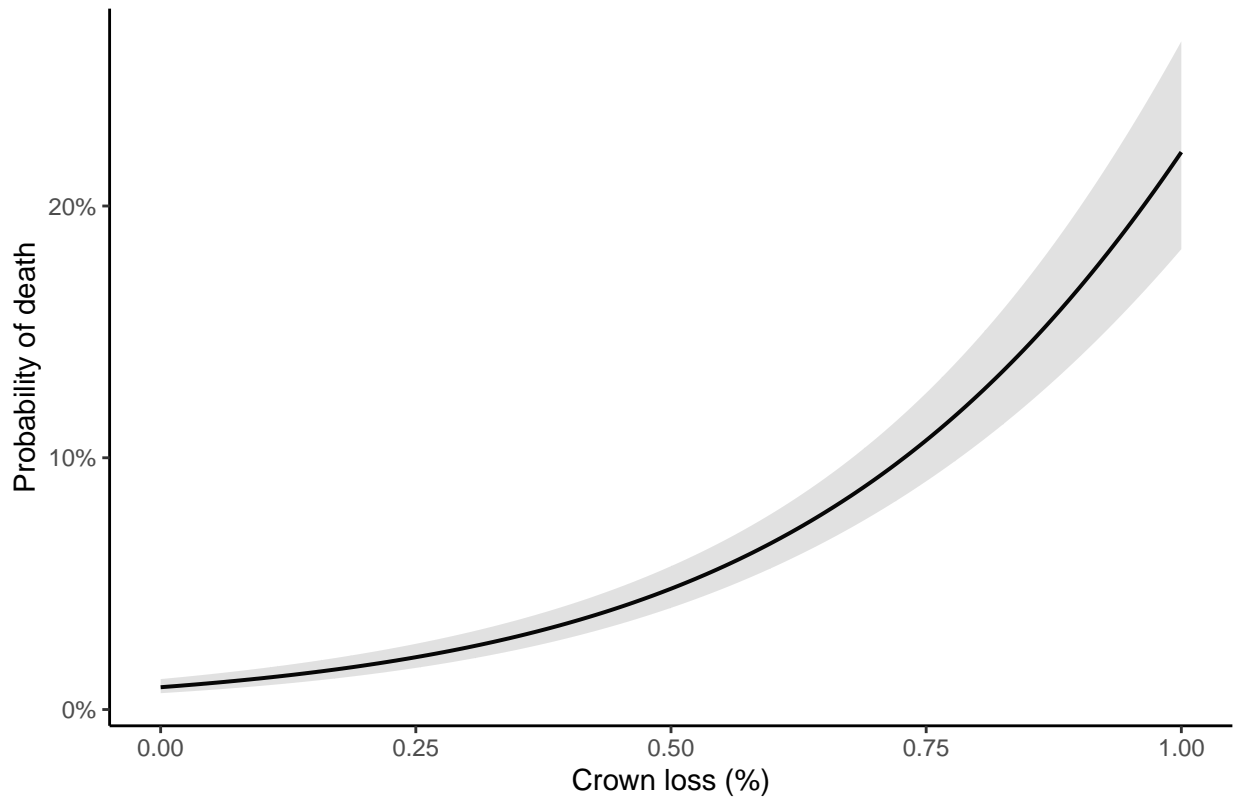

```
## MODEL INFO:
## Observations: 11601
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2278.20, BIC = 2314.99
## Pseudo-R² (fixed effects) = 0.15
## Pseudo-R² (total) = 0.27
##
## FIXED EFFECTS:
## ---------------------------------------------------
##                    Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)        -4.72    0.16   -29.33    0.00
## var.x1              3.46    0.22    15.85    0.00
## ---------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##      Group          Parameter      Std. Dev.
```

```
## ------------------- ------------- -----------
##   species.grouping   (Intercept)     0.81
##   species.grouping     var.x1        0.89
## -----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##        Group       # groups   ICC
## ----------------- ---------- ------
##  species.grouping    666      0.16
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.58164
Deviation n.s.

Dispersion test: p= 0.51
Deviation n.s.

Outlier test: p= 0.43307
Deviation n.s.

Observed / Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Model estimates and residuals for bci
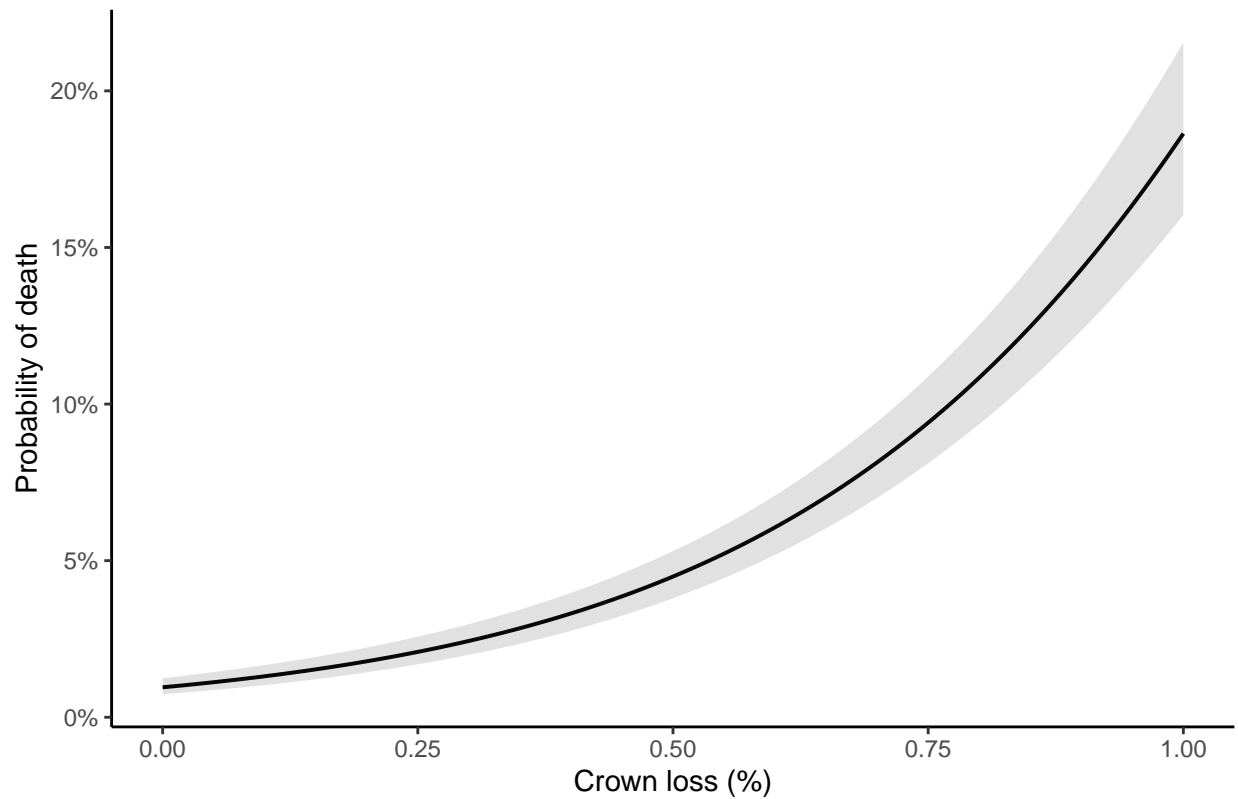

```
## MODEL INFO:
## Observations: 20914
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 4322.04, BIC = 4361.78
## Pseudo-R² (fixed effects) = 0.12
## Pseudo-R² (total) = 0.30
##
## FIXED EFFECTS:
## -------------------------------------------------
##                     Est.    S.E.    z val.      p
## ----------------- -------  ------  --------  ------
## (Intercept)        -4.64    0.14    -33.82    0.00
## var.x1              3.17    0.15     20.89    0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter     Std. Dev.
## ----------------- ------------- ------------
##  species.grouping  (Intercept)      0.98
##  species.grouping     var.x1        0.62
```

64

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     211      0.23
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.1908?
Deviation n.s.

Dispersion test: p= 0.66?
Deviation n.s.

Outlier test: p= 0.90709
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
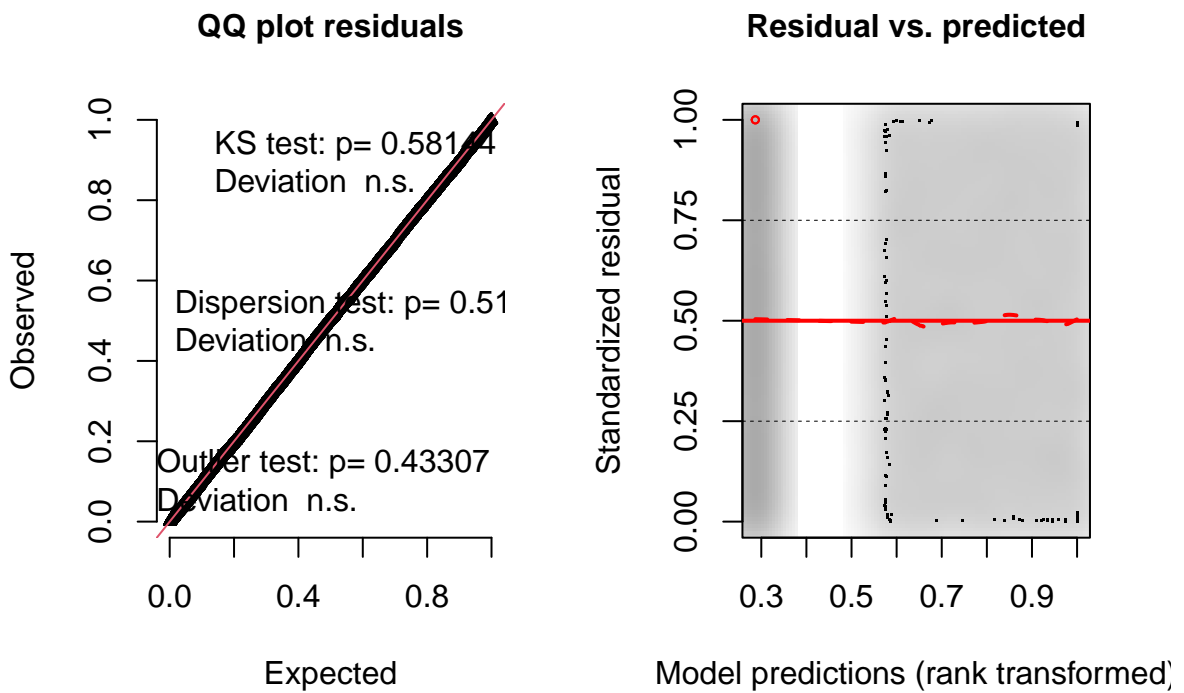
Model estimates and residuals for fushan


```
## MODEL INFO:
## Observations: 10206
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 1691.49, BIC = 1727.64
## Pseudo-R² (fixed effects) = 0.21
## Pseudo-R² (total) = 0.41
##
## FIXED EFFECTS:
## ------------------------------------------------
##                   Est.    S.E.   z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)       -5.52   0.27   -20.09   0.00
## var.x1             3.88   0.27    14.44   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ------------------------------------------------
##      Group          Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     1.12
##  species.grouping    var.x1        0.24
```
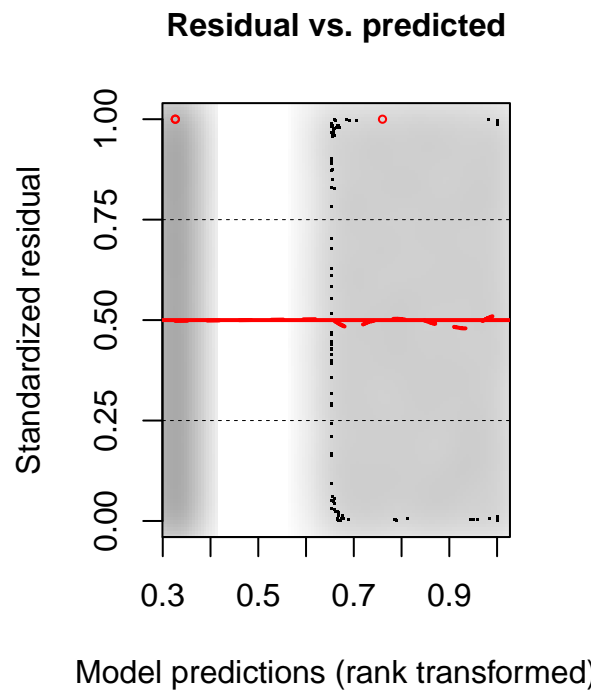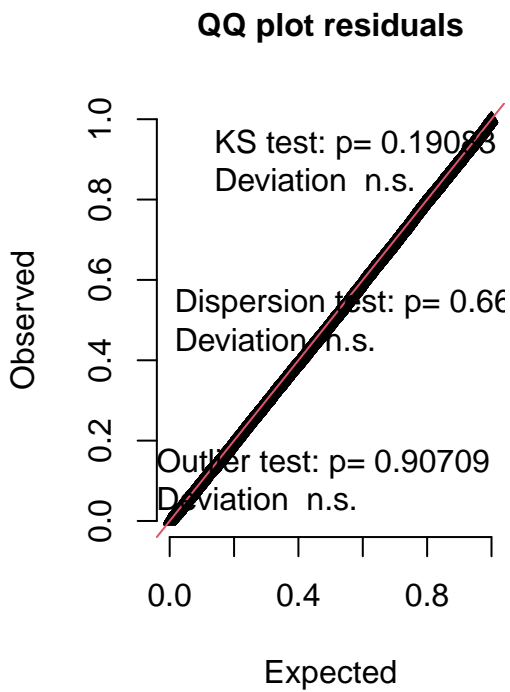
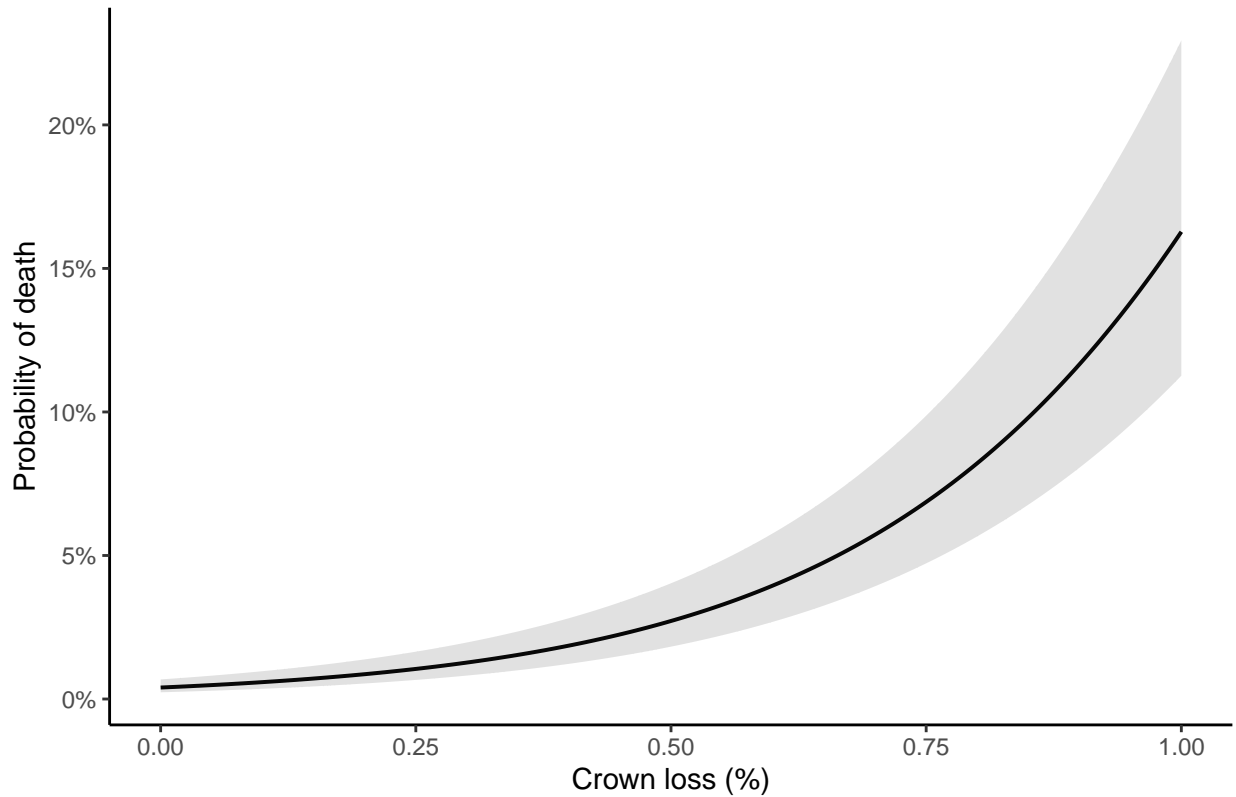## Model estimates and residuals for fushan


```
## MODEL INFO:
## Observations: 10206
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 1691.49, BIC = 1727.64
## Pseudo-R² (fixed effects) = 0.21
## Pseudo-R² (total) = 0.41
##
## FIXED EFFECTS:
## ------------------------------------------------
##                   Est.    S.E.   z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)       -5.52   0.27   -20.09   0.00
## var.x1             3.88   0.27    14.44   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ------------------------------------------------
##      Group          Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     1.12
##  species.grouping    var.x1        0.24
```

```
## -----------------------------------------------
##
## Grouping variables:
## ---------------------------------------
##       Group          # groups   ICC
## -----------------  ----------  ------
##  species.grouping       60      0.28
## ---------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.6336

Deviation n.s.

Dispersion test: p= 0.50

Deviation n.s.

Outlier test: p= 0.69652

Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
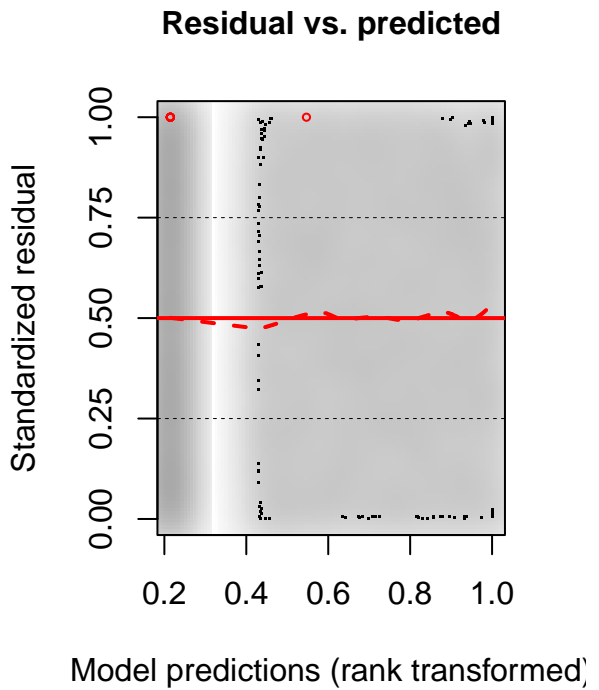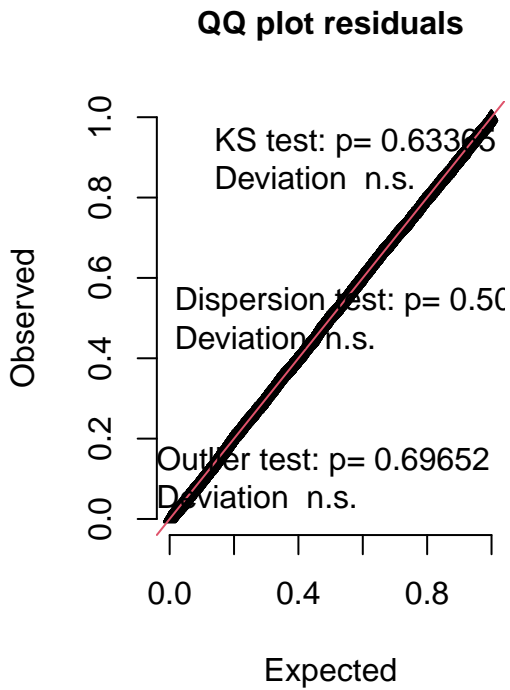
Model estimates and residuals for hkk
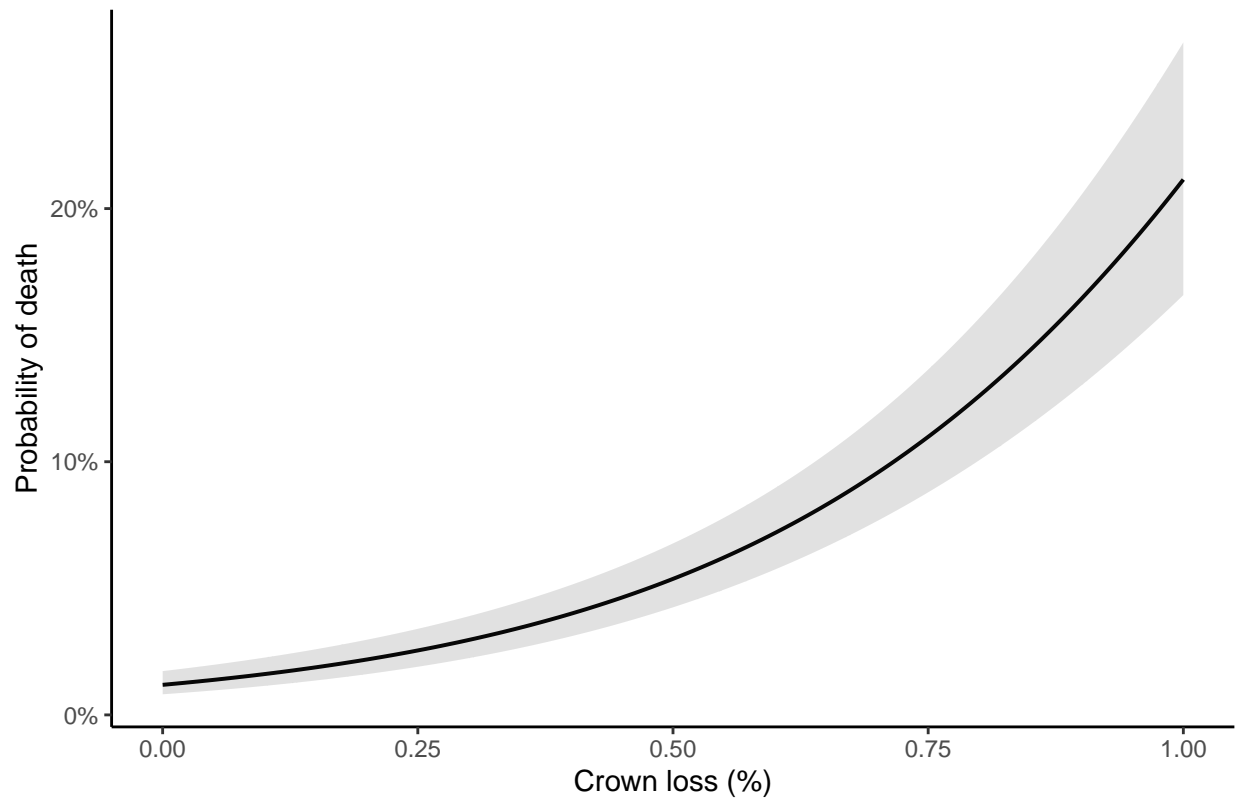

```
## MODEL INFO:
## Observations: 9174
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2094.05, BIC = 2129.67
## Pseudo-R² (fixed effects) = 0.09
## Pseudo-R² (total) = 0.33
##
## FIXED EFFECTS:
## -------------------------------------------------
##                    Est.   S.E.   z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)       -4.42   0.19   -22.70   0.00
## var.x1             3.10   0.24    12.76   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ------------------------------------------------
##      Group         Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     1.15
##  species.grouping    var.x1        0.87
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group         # groups   ICC
## ----------------- ---------- ------
## species.grouping     199      0.29
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.50819
Deviation n.s.

Dispersion test: p= 0.65
Deviation n.s.

Outlier test: p= 0.51817
Deviation n.s.

Observed — Expected

Residual vs. predicted

Standardized residual — Model predictions (rank transformed)
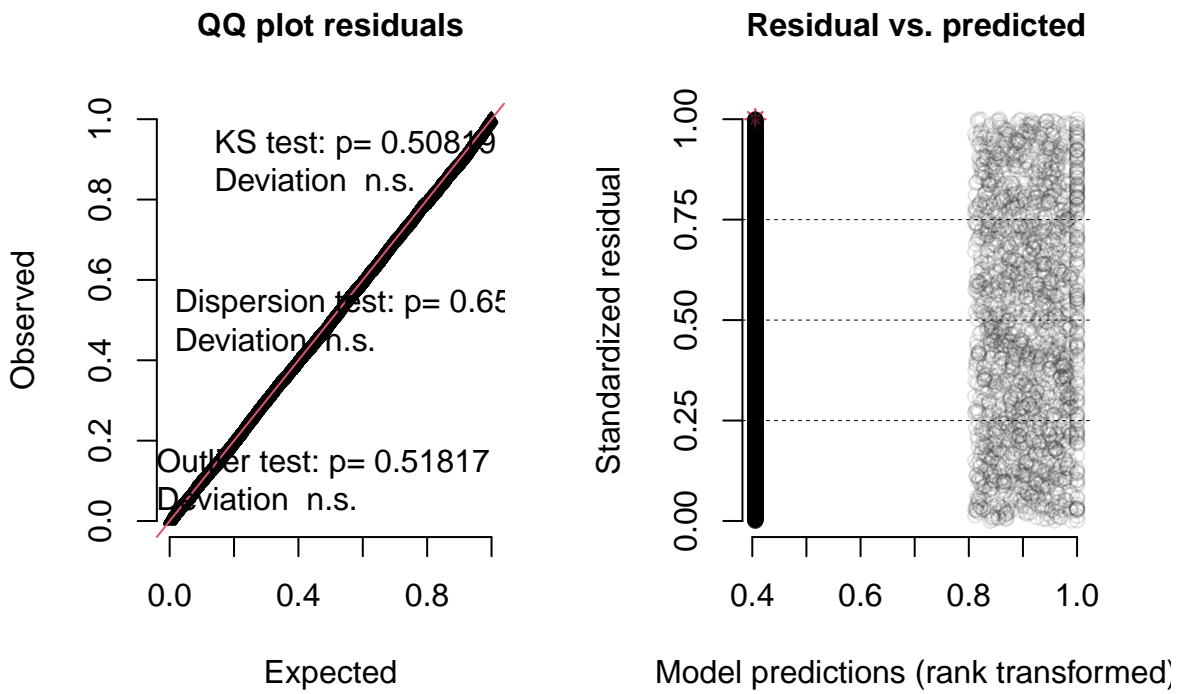
Model estimates and residuals for kc
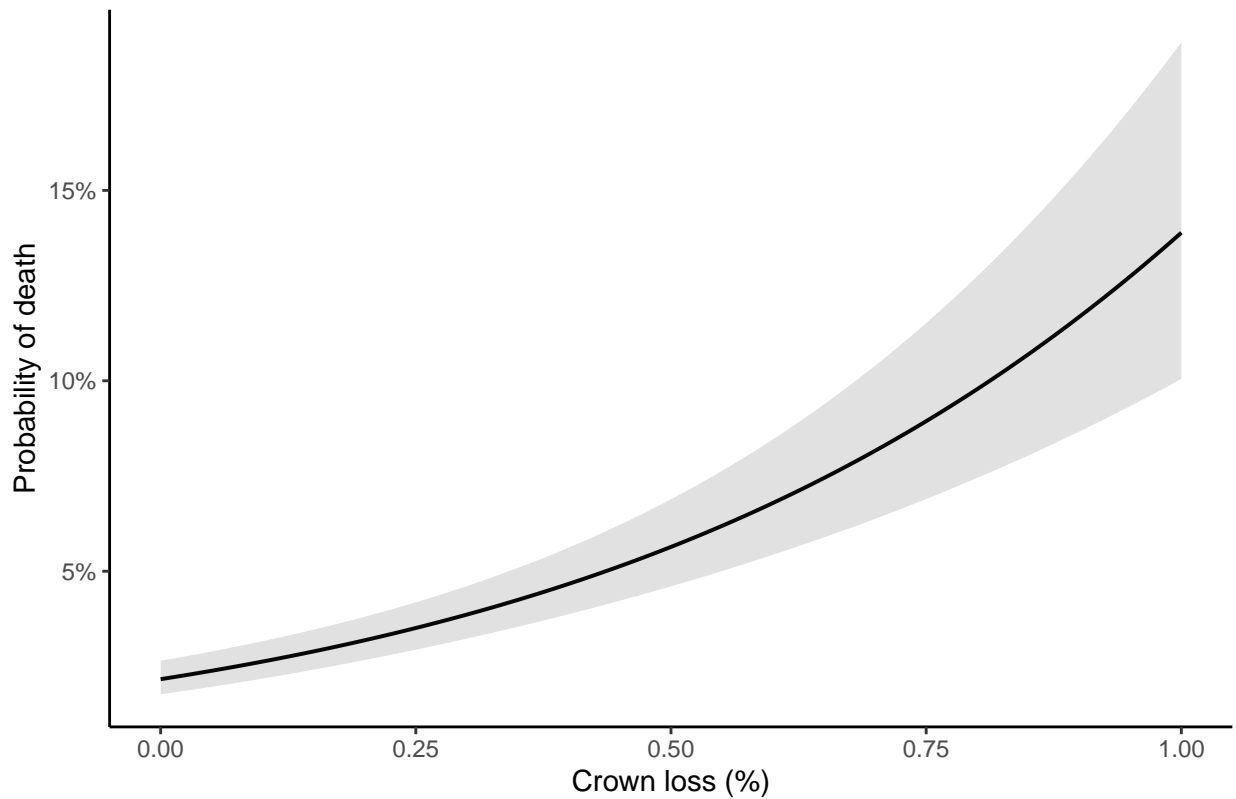

```
## MODEL INFO:
## Observations: 8113
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2235.08, BIC = 2270.09
## Pseudo-R² (fixed effects) = 0.06
## Pseudo-R² (total) = 0.16
##
## FIXED EFFECTS:
## ------------------------------------------------
##                    Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)       -3.81    0.11   -36.13   0.00
## var.x1             1.99    0.21     9.38   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##      Group        Parameter     Std. Dev.
## ----------------- ------------ ----------
##  species.grouping  (Intercept)     0.62
##  species.grouping    var.x1        0.20
```

```
## ---------------------------------------------
## 
## Grouping variables:
## ------------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping    372      0.10
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.0987
Deviation n.s.

Dispersion test: p= 0.30
Deviation n.s.

Outlier test: p= 0.45332
Deviation n.s.

Observed / Expected

Residual vs. predicted

Standardized residual / Model predictions (rank transformed)
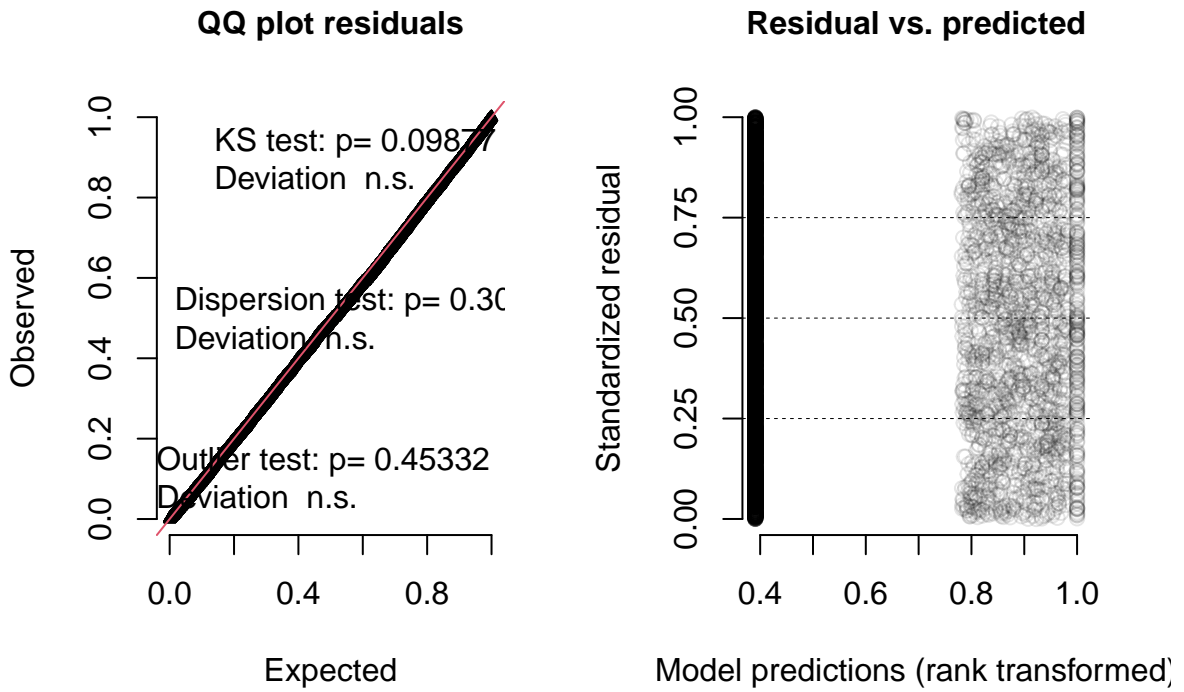
Model estimates and residuals for pasoh
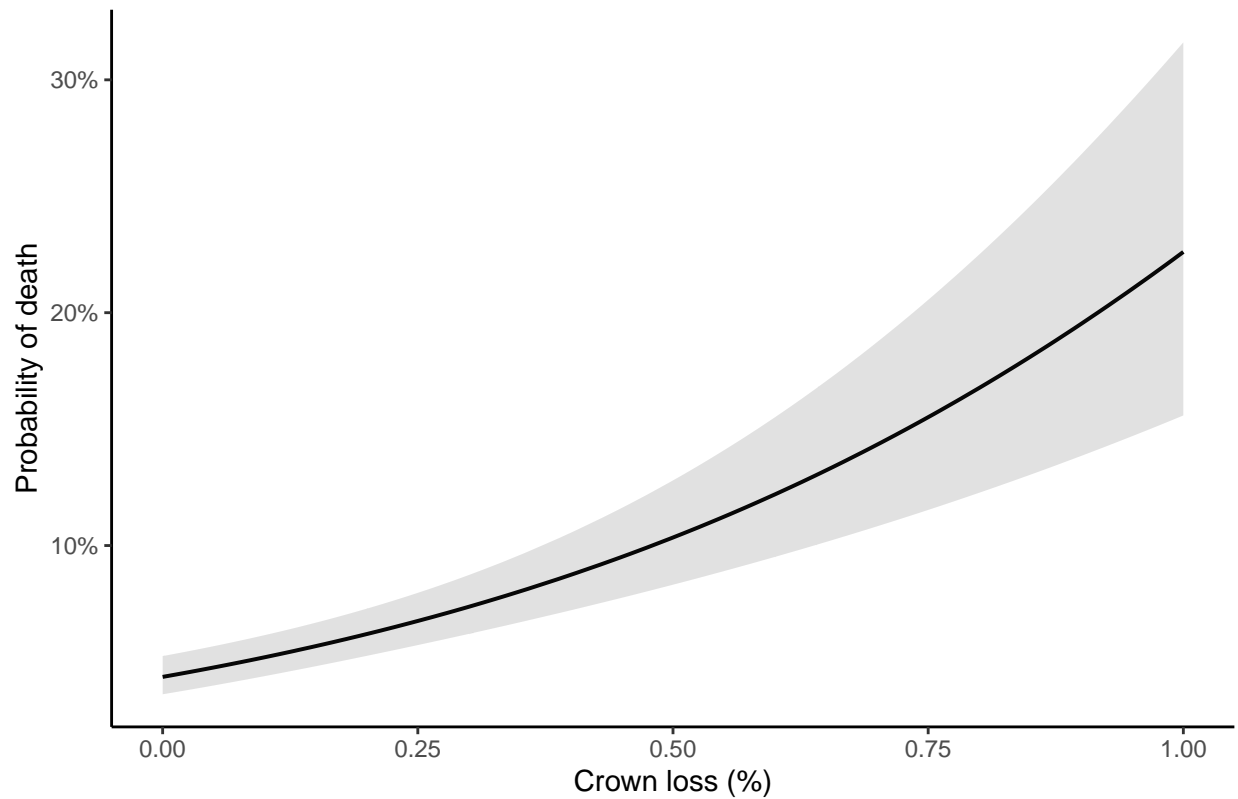

```
## MODEL INFO:
## Observations: 4971
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2082.78, BIC = 2115.34
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.12
##
## FIXED EFFECTS:
## ------------------------------------------------
##                     Est.    S.E.   z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -3.09    0.10   -30.88   0.00
## var.x1              1.86    0.26     7.05   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##       Group          Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)      0.63
##  species.grouping     var.x1        0.74
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group         # groups   ICC
## ----------------- ---------- ------
## species.grouping     473      0.11
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.7596
Deviation n.s.

Dispersion test: p= 0.83
Deviation n.s.

Outlier test: p= 0.7496
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Site-specific mortality model for condition: Defoliation
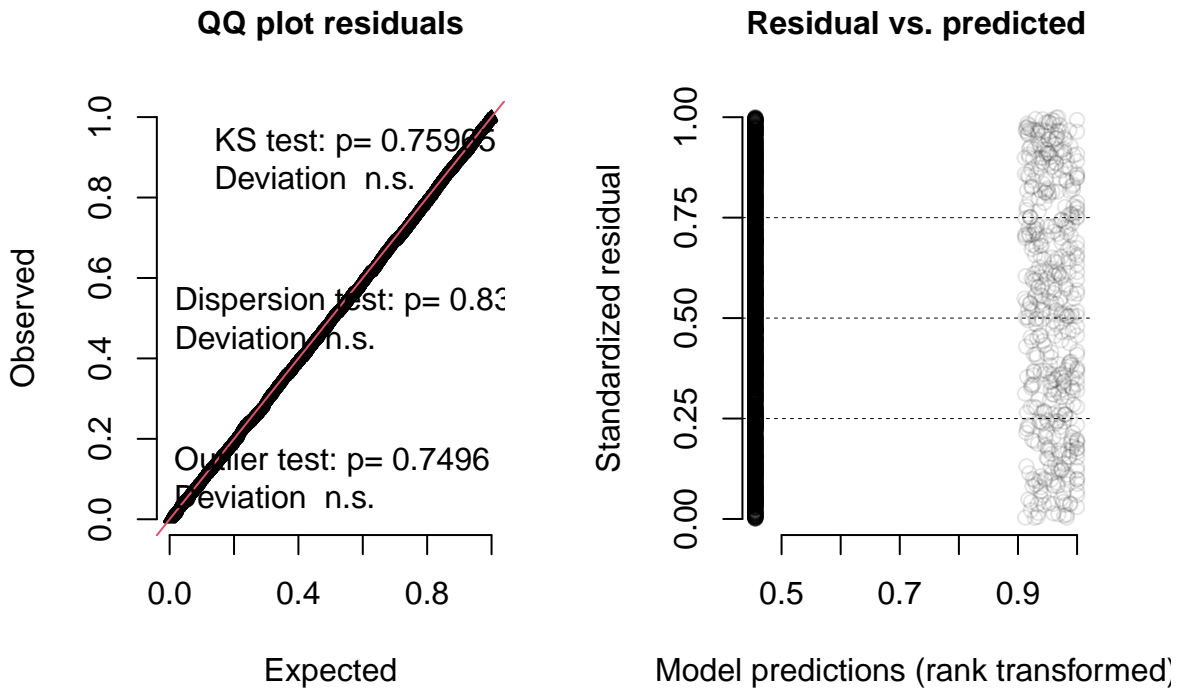
Model estimates and residuals for amacayacu
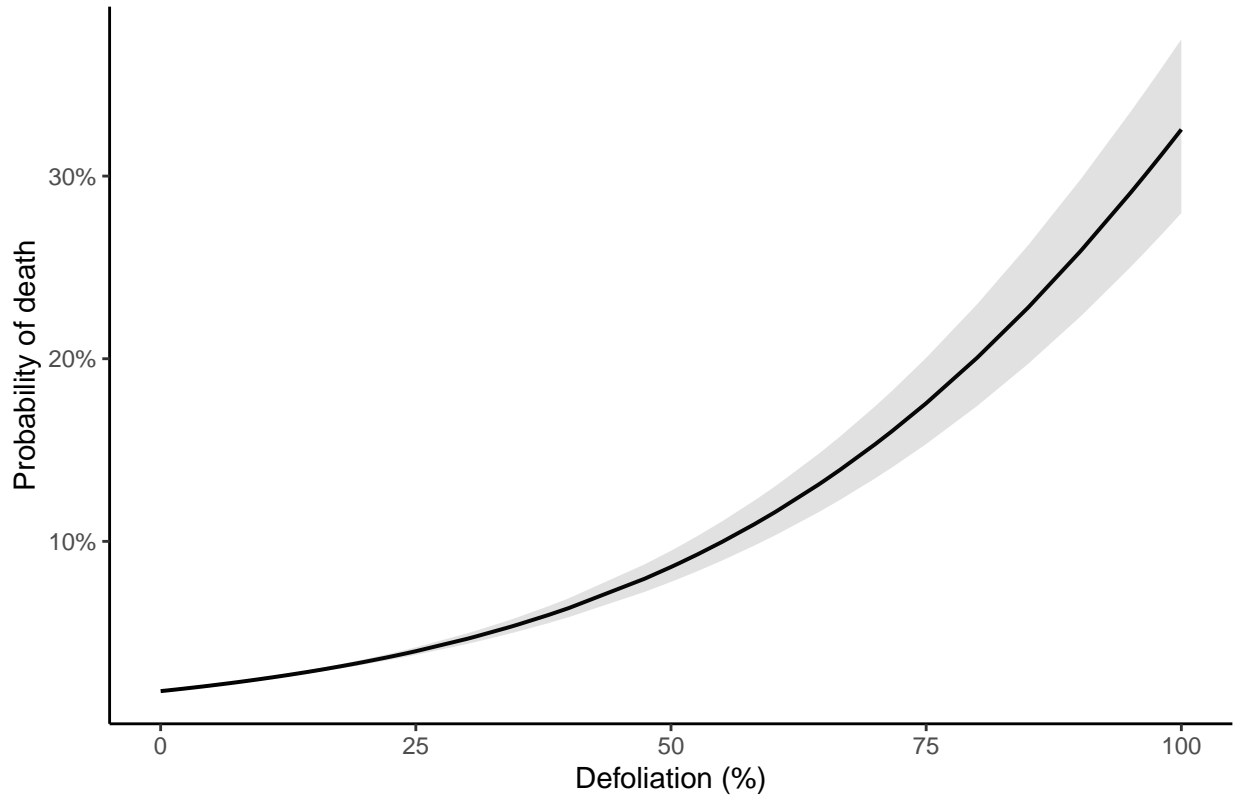

```
## MODEL INFO:
## Observations: 12826
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2993.31, BIC = 3030.61
## Pseudo-R² (fixed effects) = 0.05
## Pseudo-R² (total) = 0.12
##
## FIXED EFFECTS:
## --------------------------------------------------------
##                      Est.    S.E.     z val.        p
## ---------------- ------- ------ ---------- ------
## (Intercept)         -4.00    0.00   -2988.51    0.00
## var.x1               0.03    0.00      29.50    0.00
## --------------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter    Std. Dev.
```

```
## ------------------- ------------- -----------
##  species.grouping   (Intercept)      0.58
##  species.grouping      var.x1        0.01
## ----------------------------------------------
##
## Grouping variables:
## -----------------------------------
##      Group        # groups    ICC
## ----------------- ---------- ------
##  species.grouping     697     0.09
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.0932̶6̶
Deviation n.s.

Dispersion test: p= 0.1(

Deviation n.s.

Outlier test: p= 0.37125
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
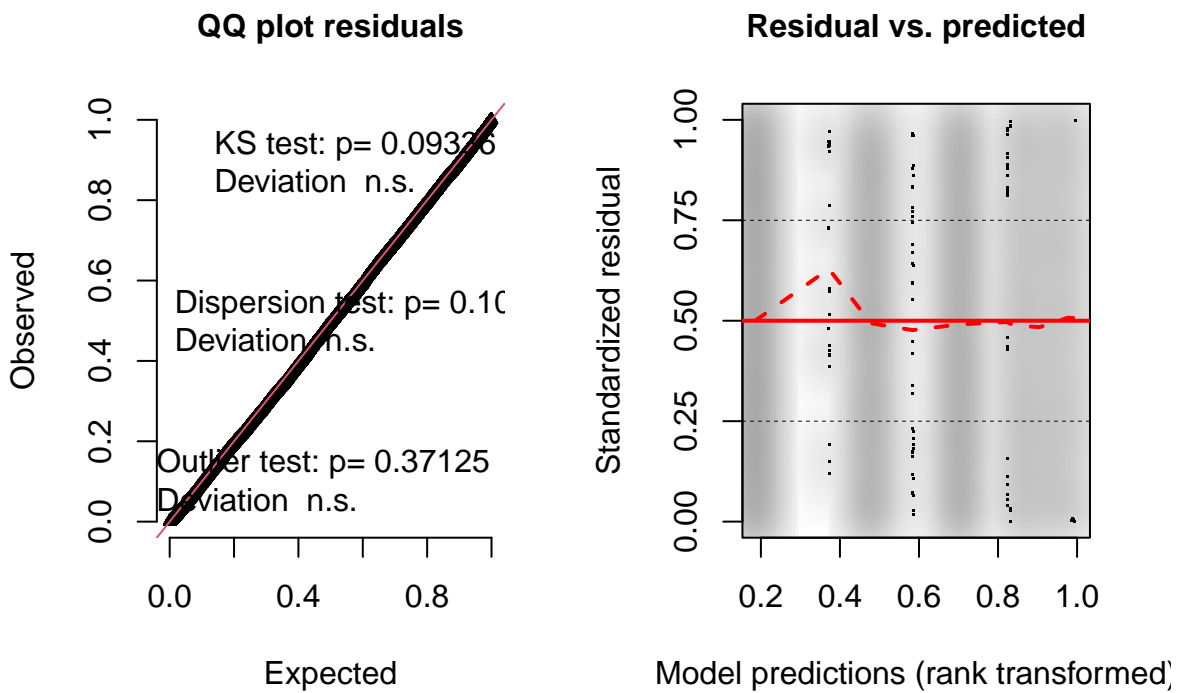
Model estimates and residuals for bci
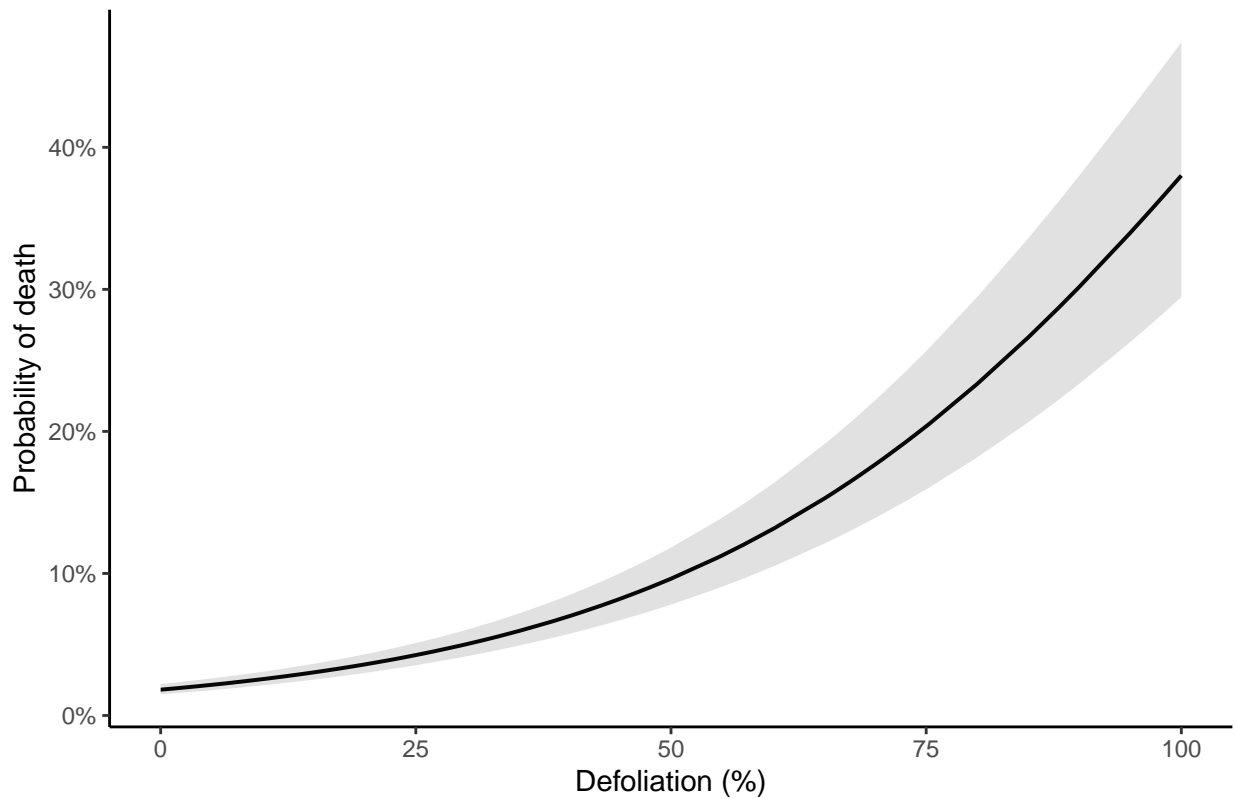

```
## MODEL INFO:
## Observations: 21824
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 4921.85, BIC = 4961.81
## Pseudo-R² (fixed effects) = 0.04
## Pseudo-R² (total) = 0.20
##
## FIXED EFFECTS:
## ------------------------------------------------
##                    Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)       -3.99    0.10   -38.79   0.00
## var.x1             0.04    0.00    16.87   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group         Parameter    Std. Dev.
## ----------------- ------------- -----------
##  species.grouping  (Intercept)      0.84
##  species.grouping     var.x1        0.01
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##        Group         # groups   ICC
## -----------------   ----------  ------
##  species.grouping      220       0.17
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

Observed

KS test: p= 0.18286
Deviation n.s.

Dispersion test: p= 0.52
Deviation n.s.

Outlier test: p= 0.46958
Deviation n.s.

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
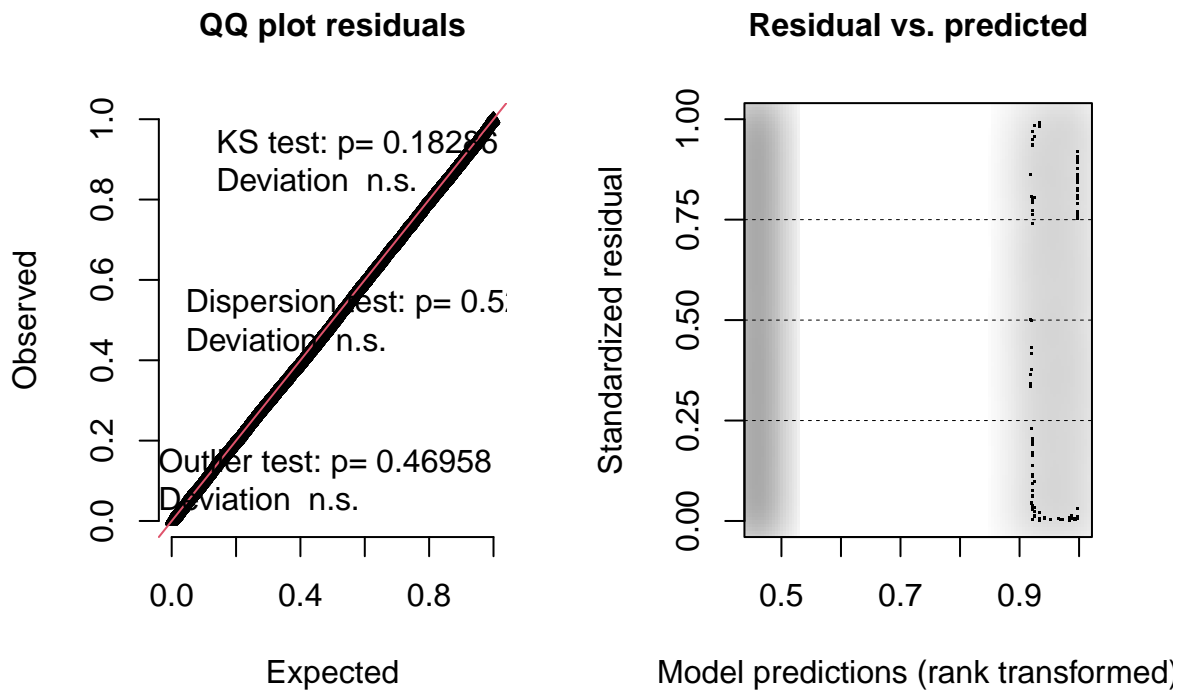
Model estimates and residuals for fushan
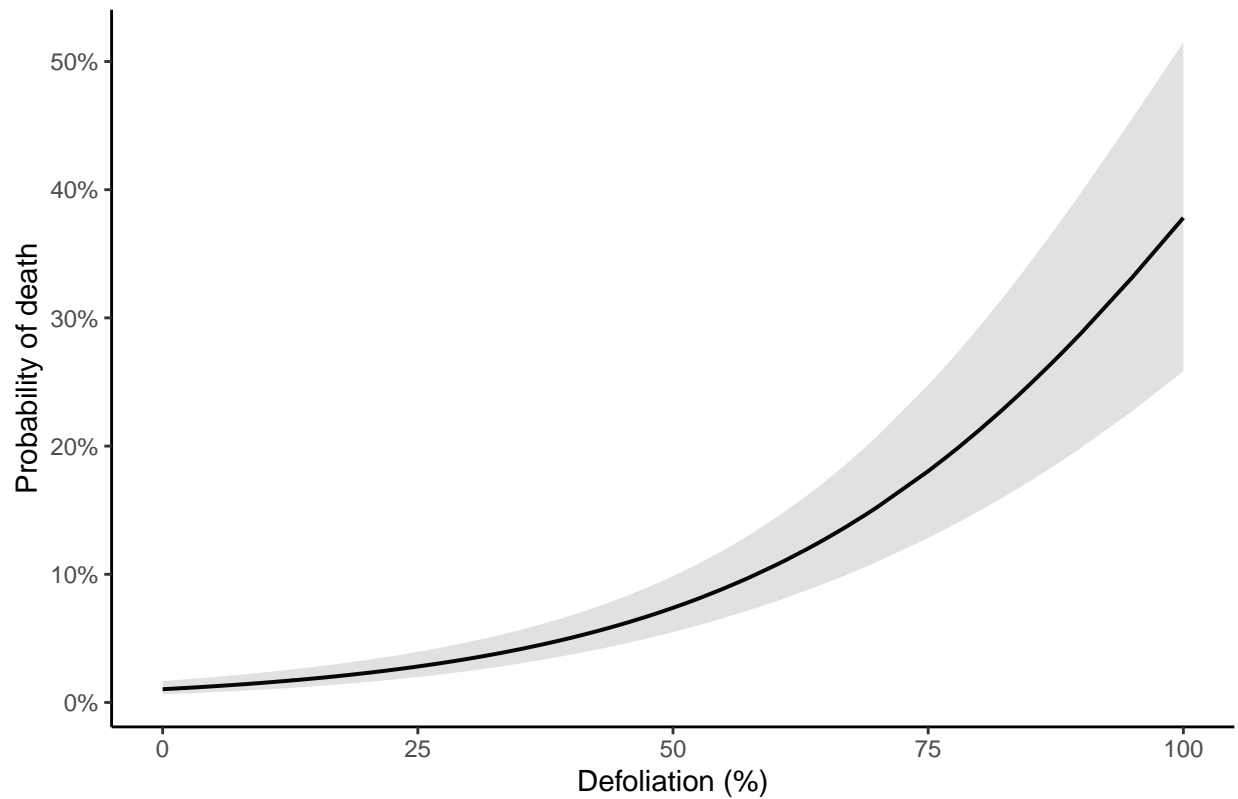
```
## MODEL INFO:
## Observations: 10929
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2392.65, BIC = 2429.15
## Pseudo-R² (fixed effects) = 0.06
## Pseudo-R² (total) = 0.33
##
## FIXED EFFECTS:
## ------------------------------------------------
##                    Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)       -4.56    0.25   -18.28   0.00
## var.x1             0.04    0.00     9.52   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     1.23
##  species.grouping    var.x1        0.02
```

```
## -----------------------------------------------
##
## Grouping variables:
## -----------------------------------
##         Group       # groups   ICC
## ----------------- ---------- ------
##  species.grouping      64     0.31
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.56655
Deviation n.s.

Dispersion test: p= 0.7
Deviation n.s.

Outlier test: p= 0.33254
Deviation n.s.

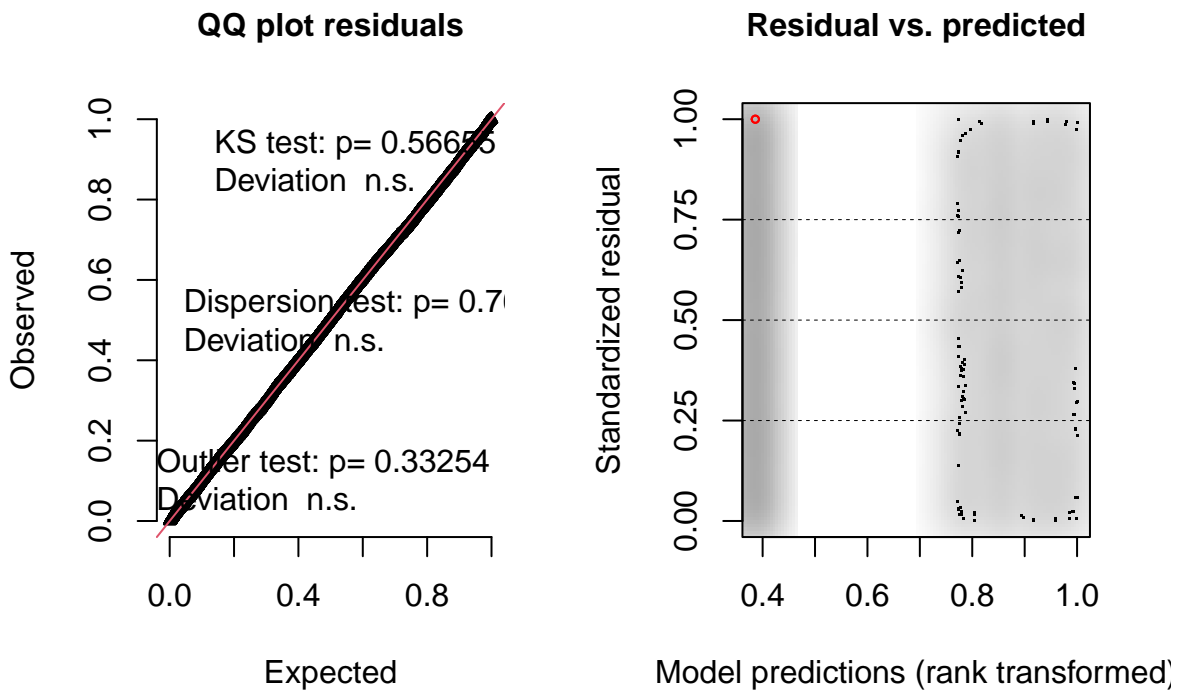### Residual vs. predicted

Model estimates and residuals for hkk
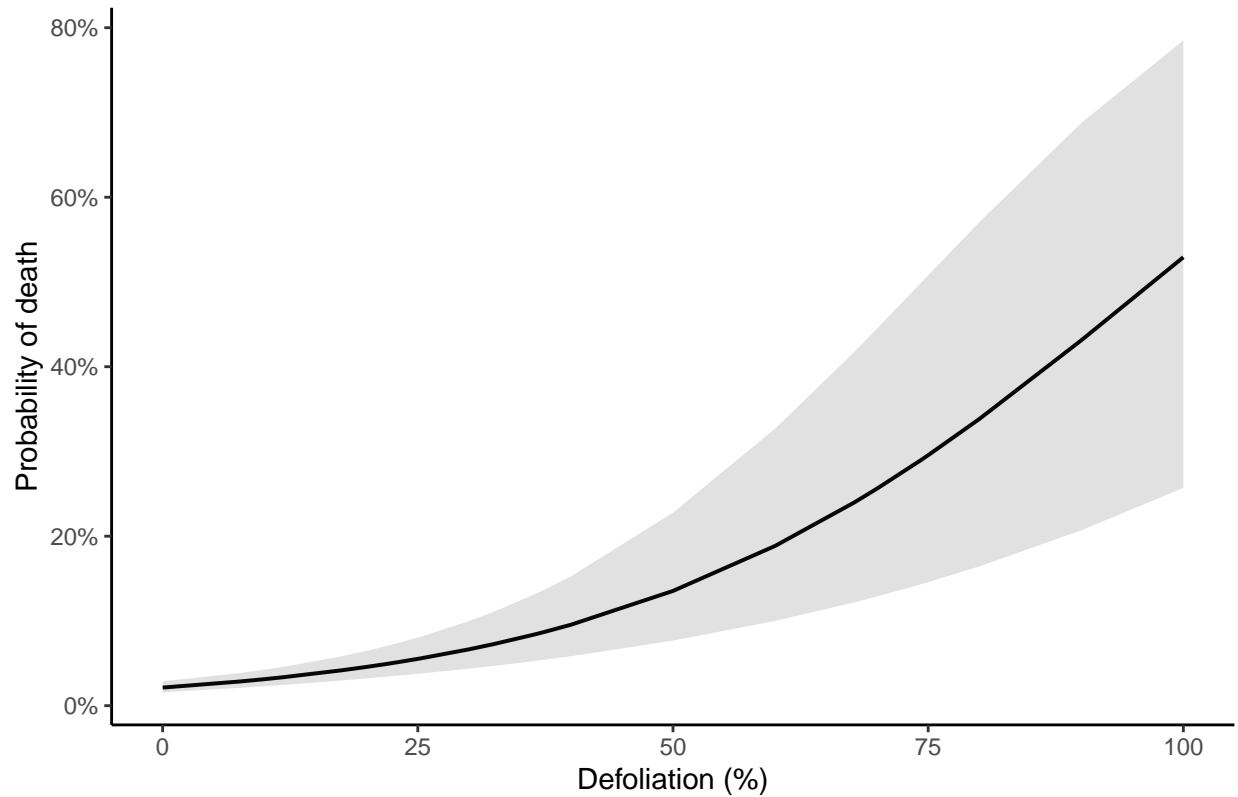

```
## MODEL INFO:
## Observations: 9451
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2446.20, BIC = 2481.97
## Pseudo-R² (fixed effects) = 0.01
## Pseudo-R² (total) = 0.27
##
## FIXED EFFECTS:
## -------------------------------------------------
##                      Est.    S.E.    z val.      p
## ----------------- -------  ------  --------  ------
## (Intercept)         -3.82    0.16    -24.49    0.00
## var.x1               0.04    0.01      6.61    0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ------------------------------------------------
##      Group           Parameter     Std. Dev.
## ----------------- -------------   ----------
##  species.grouping   (Intercept)       1.08
##  species.grouping     var.x1          0.00
```

```
## --------------------------------------------
##
## Grouping variables:
## ------------------------------------
##        Group          # groups   ICC
## ------------------   ----------  ------
##   species.grouping      202       0.26
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.11276
Deviation n.s.

Dispersion test: p= 0.6
Deviation n.s.

Outlier test: p= 0.60226
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
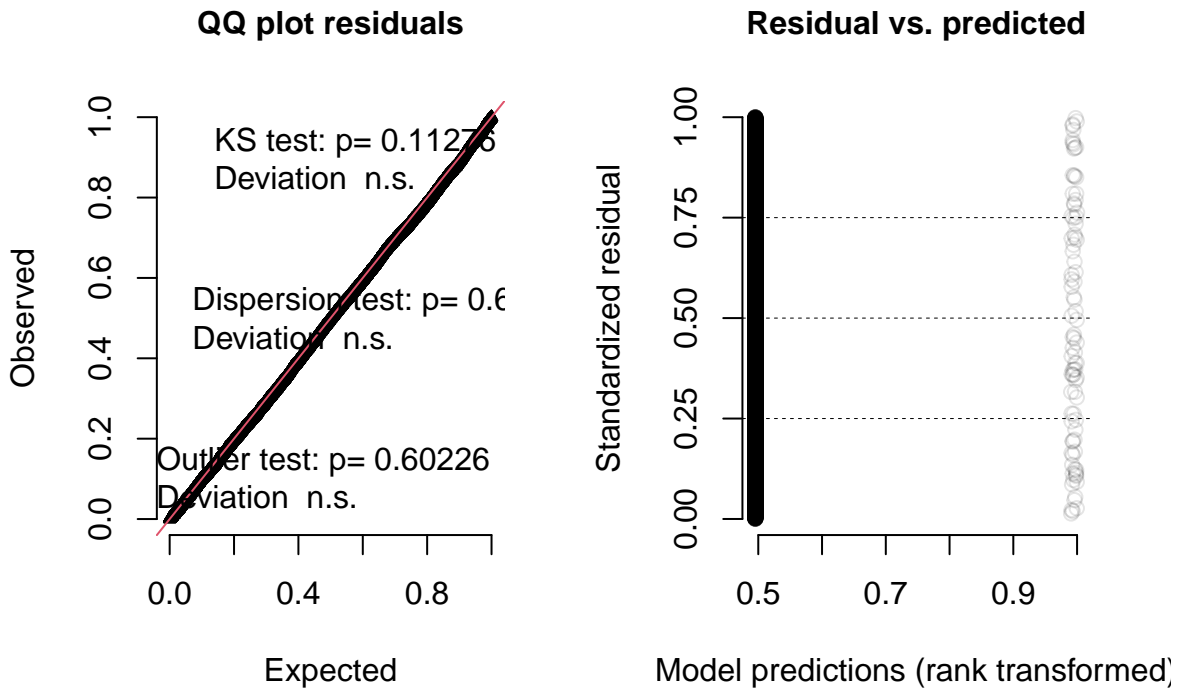
Model estimates and residuals for kc
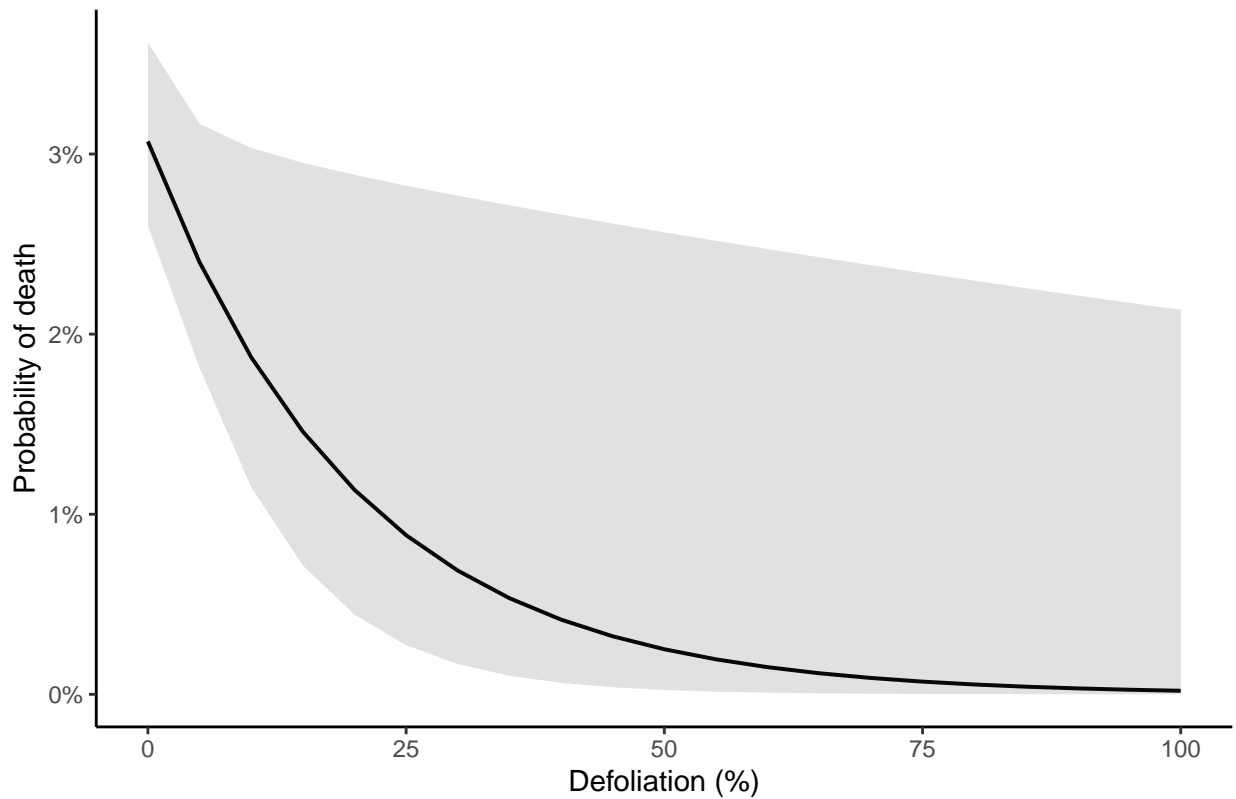

```
## MODEL INFO:
## Observations: 8309
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2432.16, BIC = 2467.28
## Pseudo-R² (fixed effects) = 0.05
## Pseudo-R² (total) = 0.33
##
## FIXED EFFECTS:
## -------------------------------------------------
##                    Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)       -3.45    0.09   -39.67   0.00
## var.x1            -0.05    0.02    -2.11   0.03
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group         Parameter     Std. Dev.
## ---------------- ------------- ----------
##  species.grouping  (Intercept)      0.59
##  species.grouping     var.x1        0.10
```

```
## ----------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group         # groups   ICC
## ----------------- ---------- ------
##  species.grouping     379      0.10
## -----------------------------------
```

DHARMa residual diagnostics
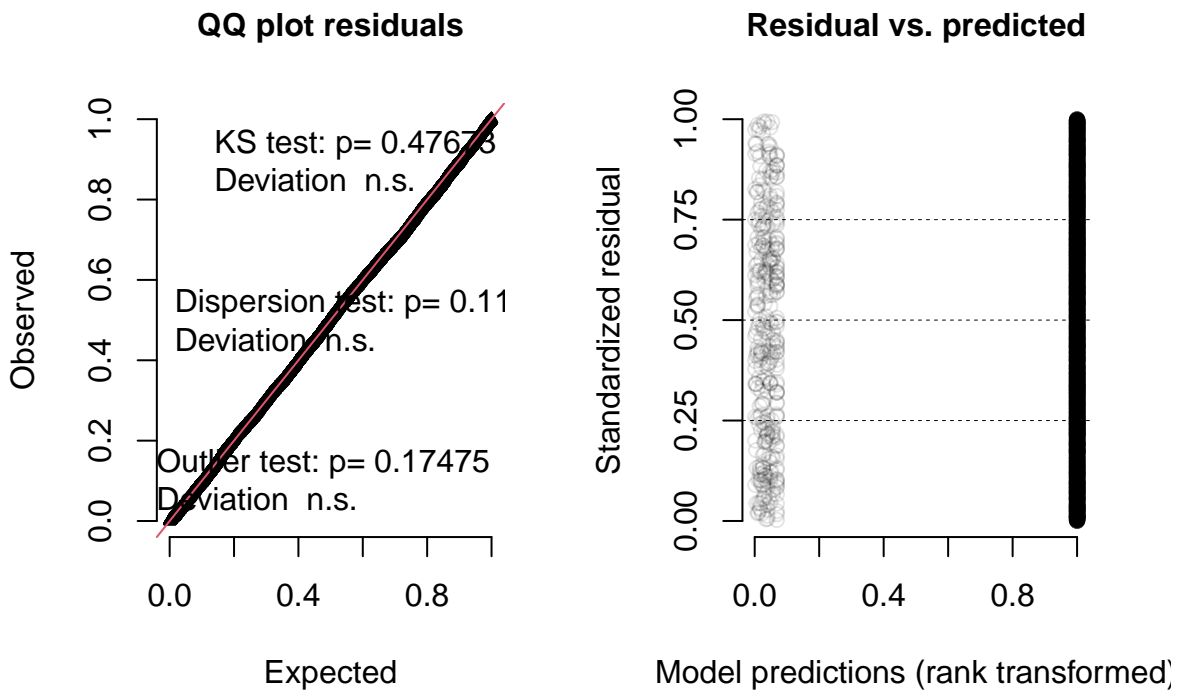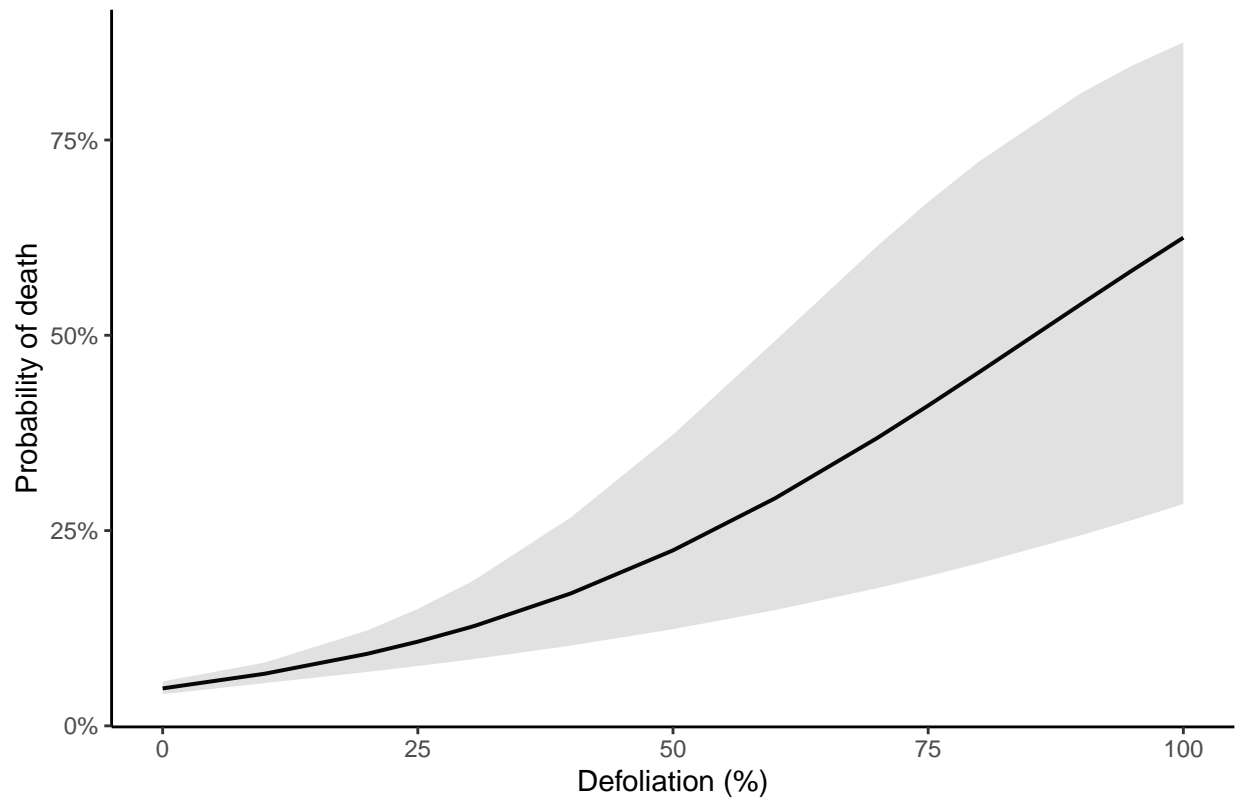
QQ plot residuals

KS test: p= 0.47673
Deviation n.s.

Dispersion test: p= 0.11
Deviation n.s.

Outlier test: p= 0.17475
Deviation n.s.

Residual vs. predicted

Model estimates and residuals for pasoh

```
## MODEL INFO:
## Observations: 5041
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2163.28, BIC = 2195.91
## Pseudo-R² (fixed effects) = 0.01
## Pseudo-R² (total) = 0.11
##
## FIXED EFFECTS:
## --------------------------------------------------
##                    Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)       -2.99    0.09   -32.60   0.00
## var.x1             0.03    0.01     4.71   0.00
## --------------------------------------------------
##
## RANDOM EFFECTS:
## ------------------------------------------------
##      Group         Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)      0.61
##  species.grouping    var.x1         0.02
```

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group         # groups   ICC
## ----------------- ---------- ------
##  species.grouping     477       0.10
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.2226
Deviation n.s.

Dispersion test: p= 0.8
Deviation n.s.

Outlier test: p= 0.30213
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
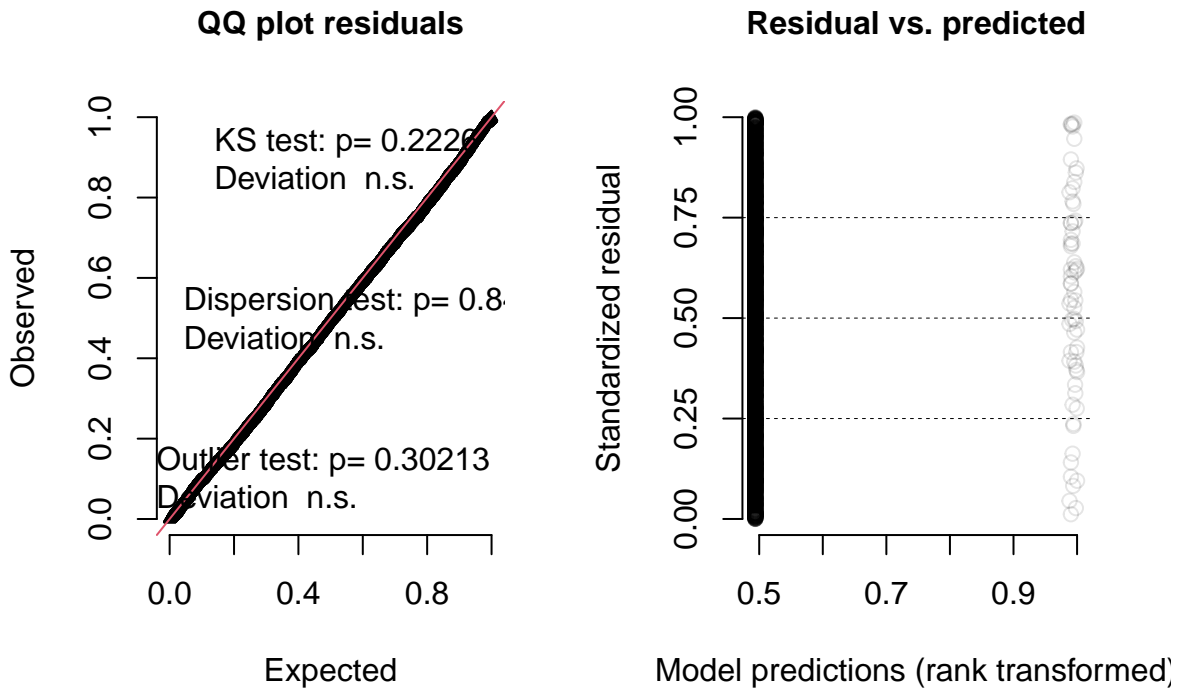
Site-specific mortality model for condition: Leaning

Model estimates and residuals for amacayacu
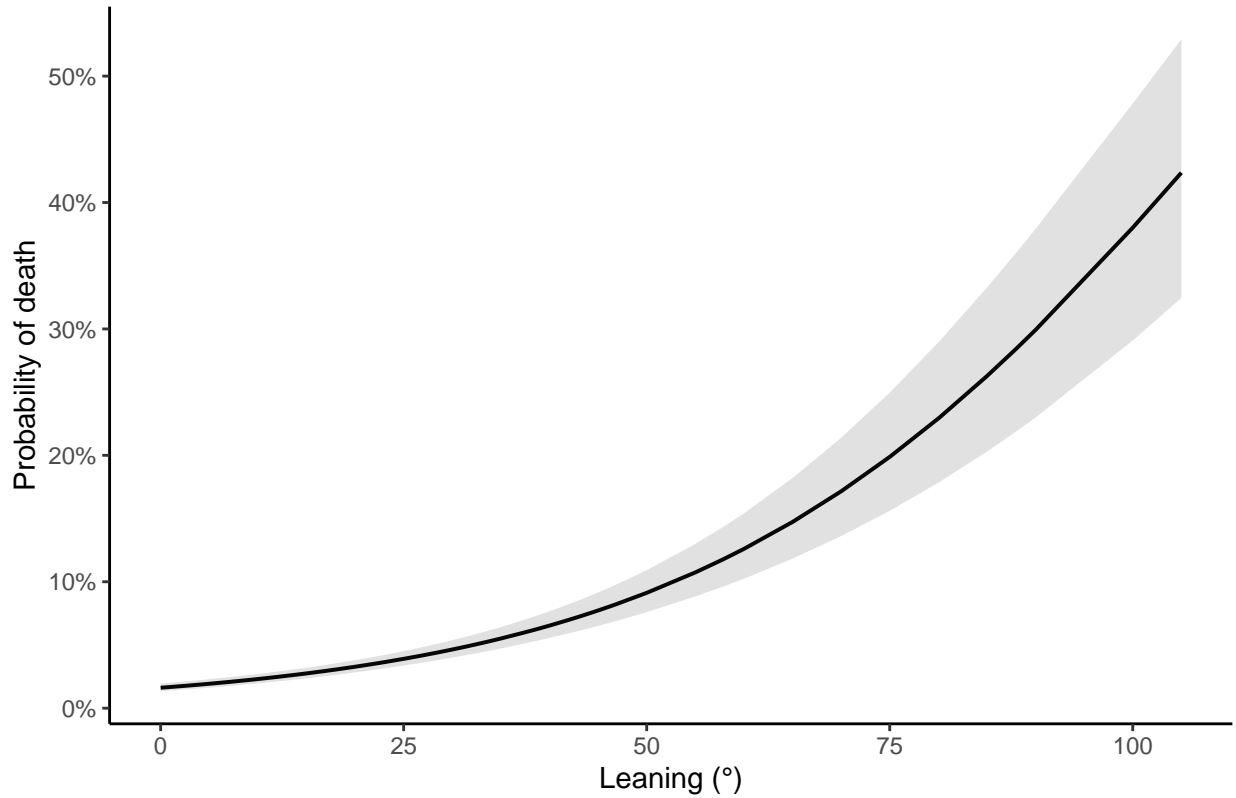
```
## MODEL INFO:
## Observations: 12802
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2943.14, BIC = 2980.42
## Pseudo-R² (fixed effects) = 0.06
## Pseudo-R² (total) = 0.15
##
## FIXED EFFECTS:
## -----------------------------------------------------
##                     Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -4.11    0.10   -42.55    0.00
## var.x1              0.04    0.00    14.61    0.00
## -----------------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##      Group         Parameter     Std. Dev.
```

```
## ------------------ ------------- -----------
##  species.grouping   (Intercept)     0.62
##  species.grouping     var.x1        0.01
## ---------------------------------------------
## 
## Grouping variables:
## -----------------------------------
##       Group         # groups   ICC
## ----------------- ---------- ------
##  species.grouping     697      0.10
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.11059
Deviation n.s.

Dispersion test: p= 0.41
Deviation n.s.

Outlier test: p= 0.11164
Deviation n.s.

Observed / Expected

Residual vs. predicted

Standardized residual / Model predictions (rank transformed)

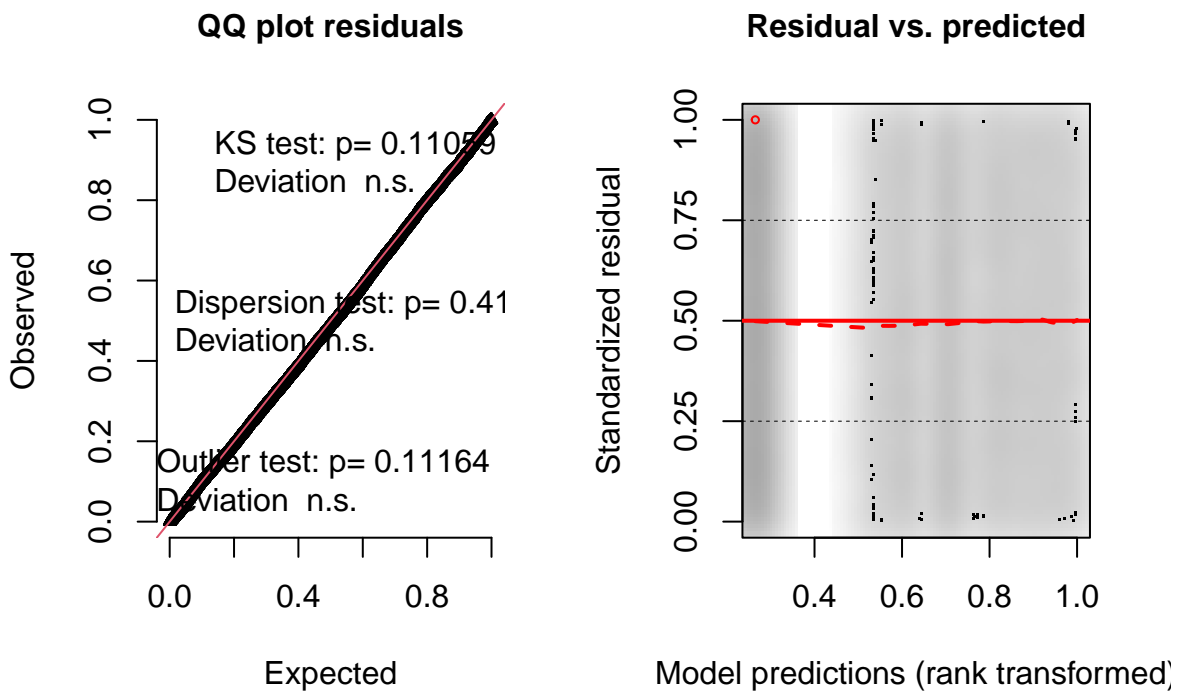## Model estimates and residuals for bci
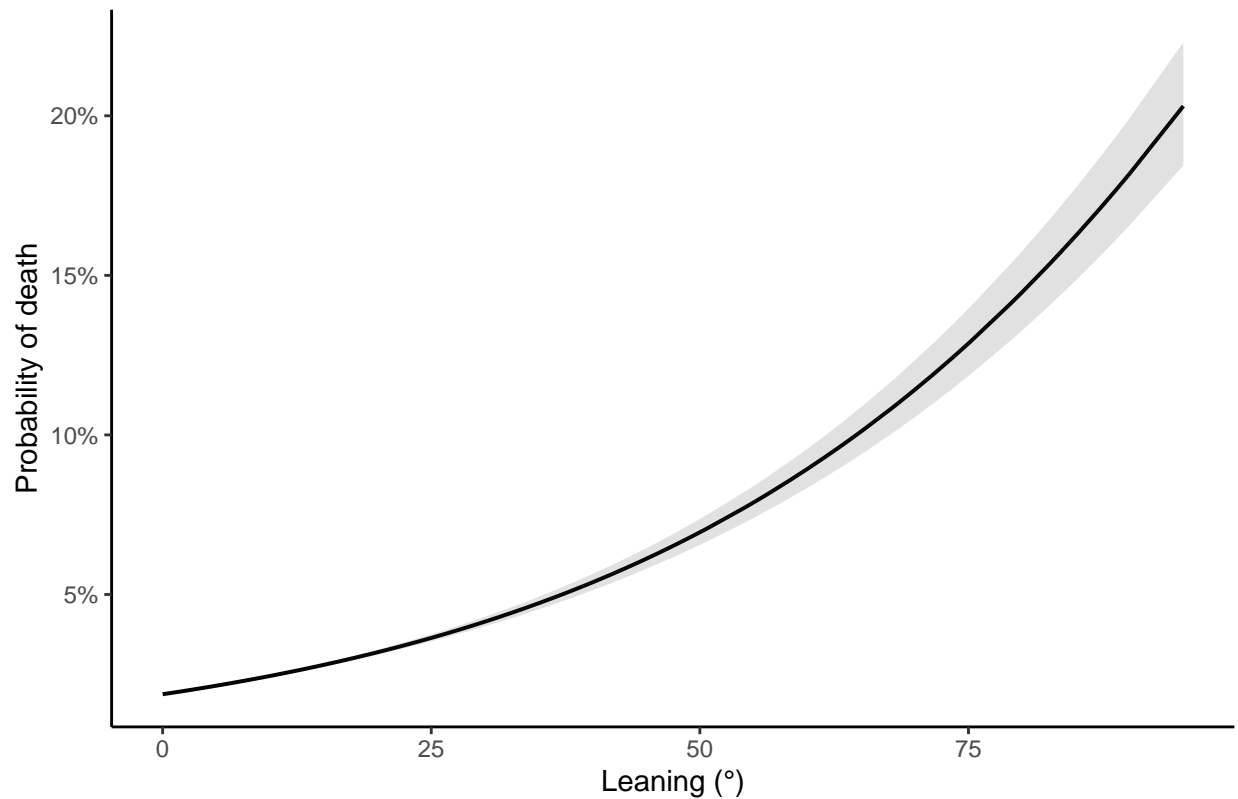

```
## MODEL INFO:
## Observations: 21915
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 5139.14, BIC = 5179.11
## Pseudo-R² (fixed effects) = 0.04
## Pseudo-R² (total) = 0.20
##
## FIXED EFFECTS:
## -------------------------------------------------
##                     Est.    S.E.    z val.      p
## ----------------- ------- ------ ---------- ------
## (Intercept)        -3.96    0.00   -6039.86   0.00
## var.x1              0.03    0.00      42.59   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##      Group          Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)      0.81
##  species.grouping    var.x1         0.01
```

```
## ----------------------------------------------
##
## Grouping variables:
## ----------------------------------------
##        Group         # groups   ICC
## ----------------- ---------- ------
## species.grouping     220      0.17
## ----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.0033
Deviation significant

Dispersion test: p= 0.14
Deviation n.s.

Outlier test: p= 0.19623
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
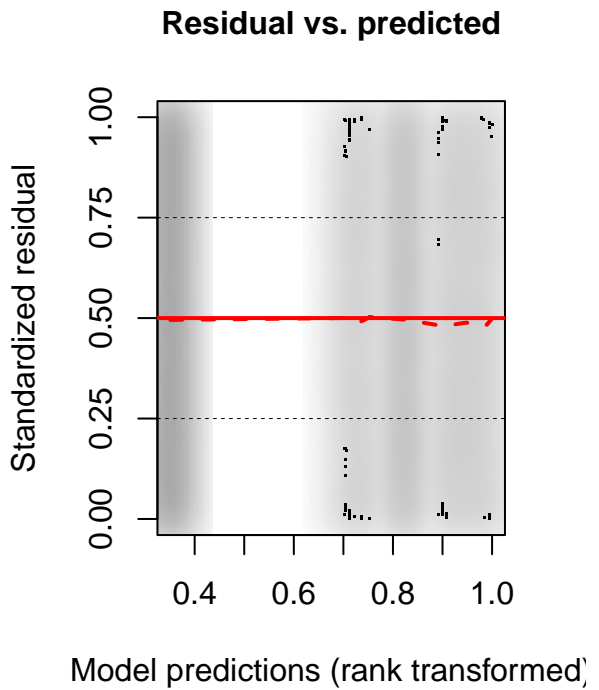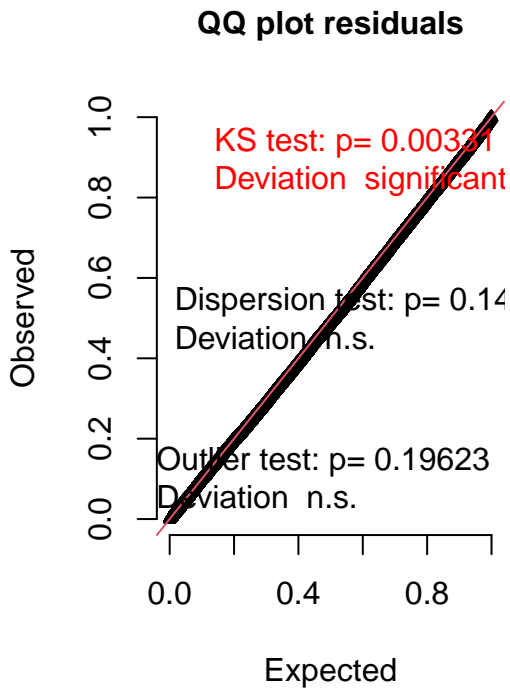
Model estimates and residuals for fushan


```
## MODEL INFO:
## Observations: 10934
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2634.33, BIC = 2670.83
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.35
##
## FIXED EFFECTS:
## -------------------------------------------------
##                    Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -4.36    0.27   -15.95   0.00
## var.x1              0.02    0.00     3.62   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##       Group          Parameter     Std. Dev.
## ------------------ ------------- ----------
##  species.grouping   (Intercept)      1.39
##  species.grouping     var.x1         0.01
```
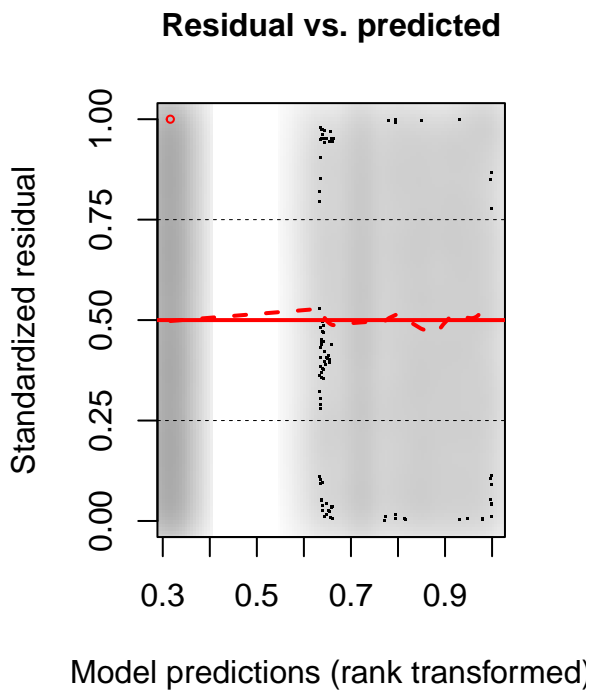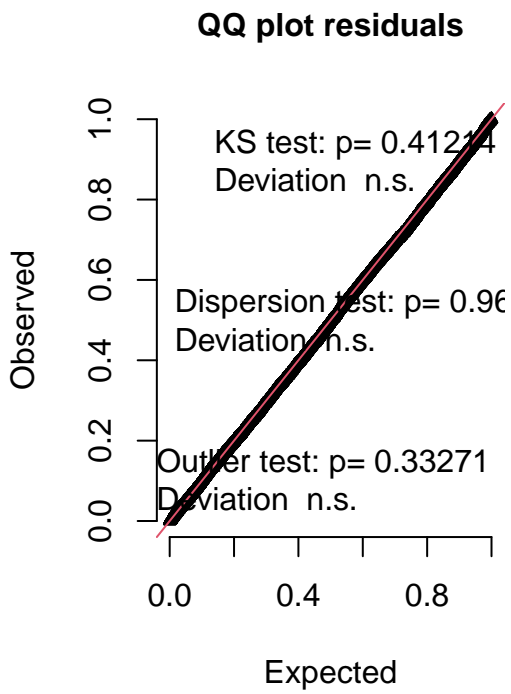
Model estimates and residuals for fushan


```
## MODEL INFO:
## Observations: 10934
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2634.33, BIC = 2670.83
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.35
##
## FIXED EFFECTS:
## -------------------------------------------------
##                    Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -4.36    0.27   -15.95   0.00
## var.x1              0.02    0.00     3.62   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##       Group          Parameter     Std. Dev.
## ------------------ ------------- ----------
##  species.grouping   (Intercept)      1.39
##  species.grouping     var.x1         0.01
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     64      0.37
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.41214
Deviation n.s.

Dispersion test: p= 0.96
Deviation n.s.

Outlier test: p= 0.33271
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Model estimates and residuals for hkk


```
## MODEL INFO:
## Observations: 9427
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2439.43, BIC = 2475.19
## Pseudo-R² (fixed effects) = 0.01
## Pseudo-R² (total) = 0.26
##
## FIXED EFFECTS:
## -------------------------------------------------
##                     Est.    S.E.    z val.     p
## ----------------- ------- ------ -------- ------
## (Intercept)        -3.85    0.15   -25.75   0.00
## var.x1              0.02    0.00     4.17   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##      Group          Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     1.04
##  species.grouping    var.x1        0.00
```
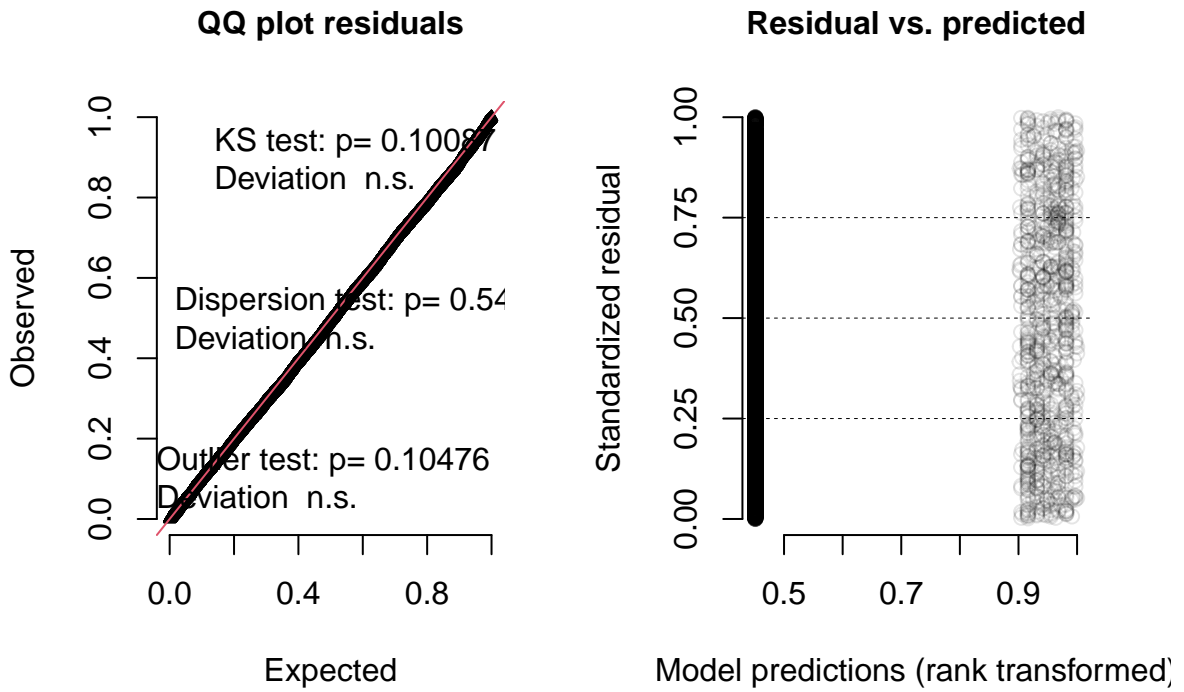
```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group         # groups   ICC
## ----------------- ---------- ------
##  species.grouping     202      0.25
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.1008?
Deviation n.s.

Dispersion test: p= 0.54
Deviation n.s.

Outlier test: p= 0.10476
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Model estimates and residuals for kc
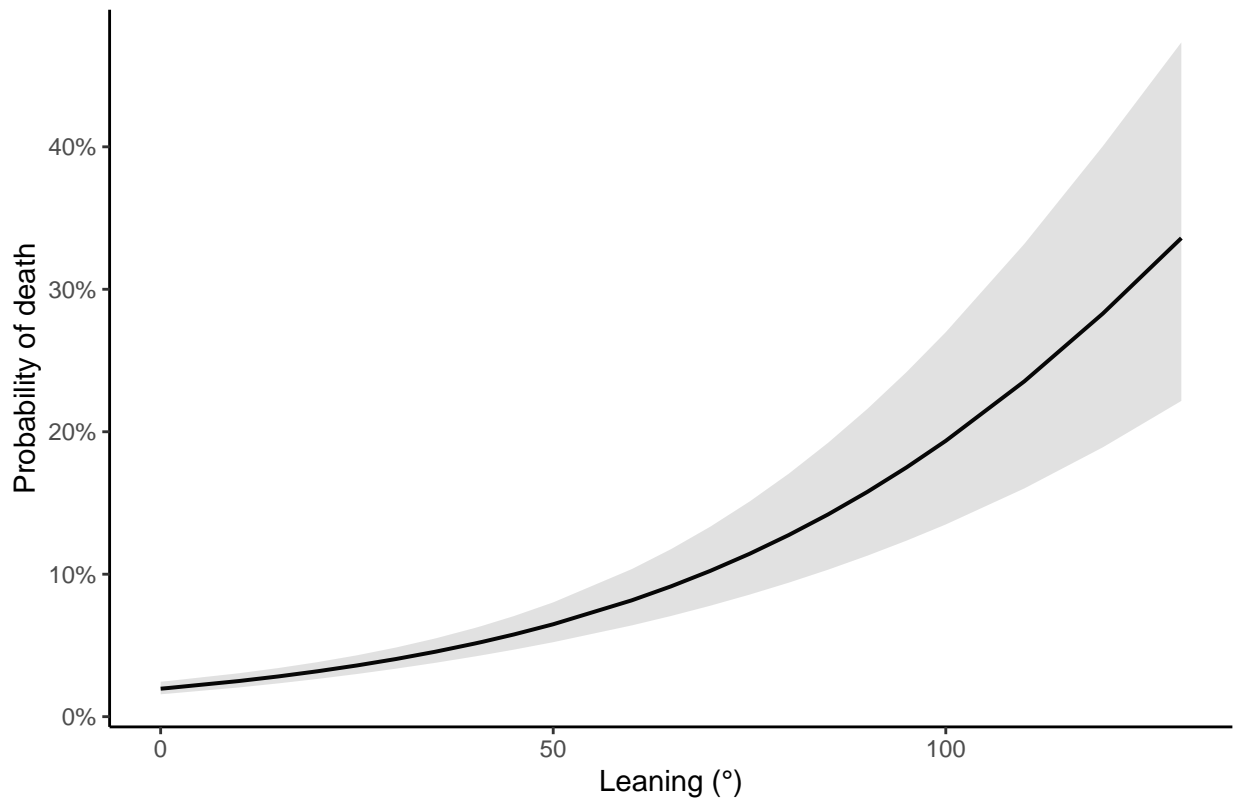

```
## MODEL INFO:
## Observations: 8282
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2280.24, BIC = 2315.35
## Pseudo-R² (fixed effects) = 0.06
## Pseudo-R² (total) = 0.18
##
## FIXED EFFECTS:
## ------------------------------------------------
##                    Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -3.91   0.12   -33.63   0.00
## var.x1              0.02   0.00     9.44   0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##      Group          Parameter      Std. Dev.
## ------------------ ------------- ----------
##  species.grouping   (Intercept)      0.73
##  species.grouping     var.x1         0.01
```
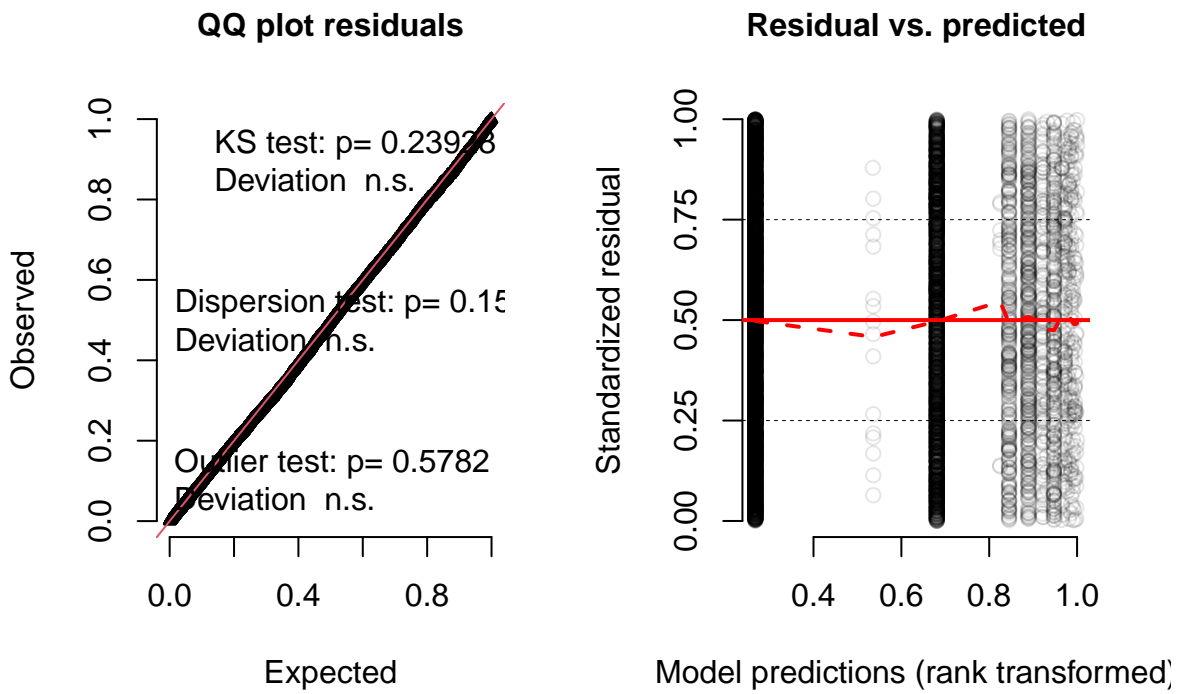
```
## ----------------------------------------
##
## Grouping variables:
## ----------------------------------
##         Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     378     0.14
## ----------------------------------
```

DHARMa residual diagnostics
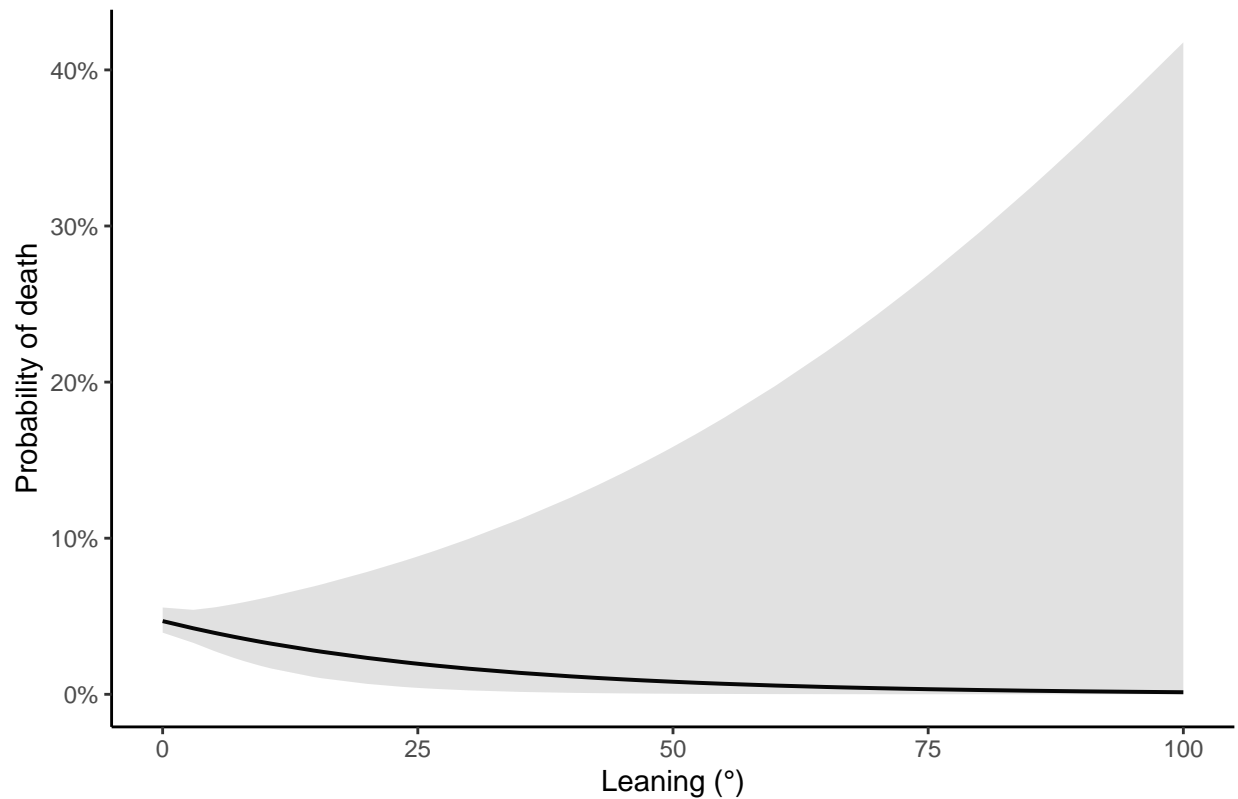
QQ plot residuals

KS test: p= 0.23973
Deviation n.s.

Dispersion test: p= 0.15
Deviation n.s.

Outlier test: p= 0.5782
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Model estimates and residuals for pasoh


```
## MODEL INFO:
## Observations: 5041
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2160.32, BIC = 2192.94
## Pseudo-R² (fixed effects) = 0.03
## Pseudo-R² (total) = 0.35
##
## FIXED EFFECTS:
## -----------------------------------------------
##                     Est.    S.E.   z val.     p
## ----------------- ------- ------ -------- ------
## (Intercept)        -3.01   0.09   -32.87   0.00
## var.x1             -0.04   0.03    -1.12   0.26
## -----------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     0.53
##  species.grouping    var.x1        0.10
```
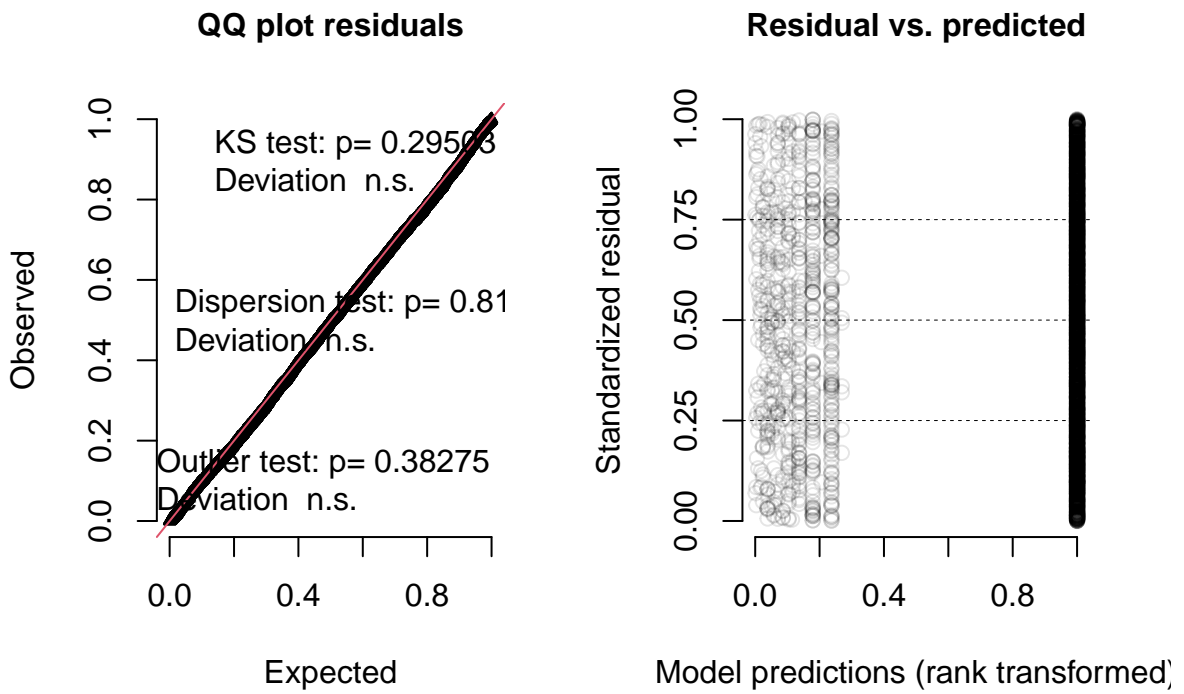
```
## ---------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group         # groups   ICC
## ----------------- ---------- ------
## species.grouping     477      0.08
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.29503
Deviation n.s.

Dispersion test: p= 0.81
Deviation n.s.

Outlier test: p= 0.38275
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Site-specific mortality model for condition: Fungal infection

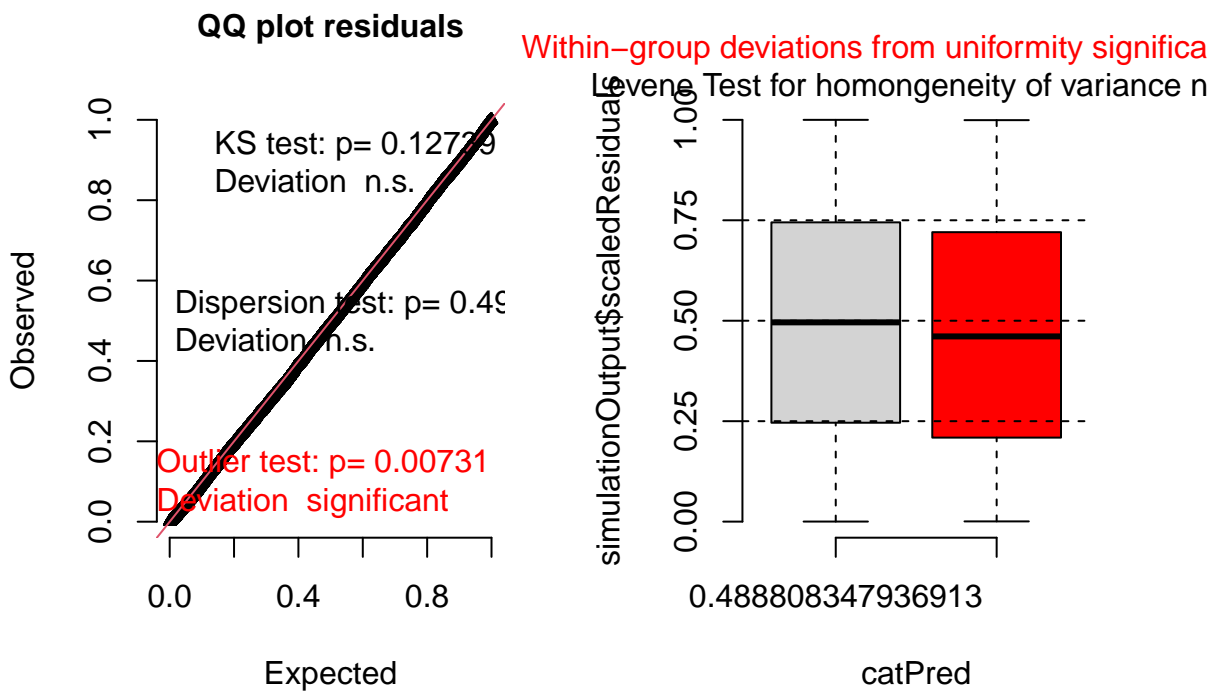## Model estimates and residuals for amacayacu
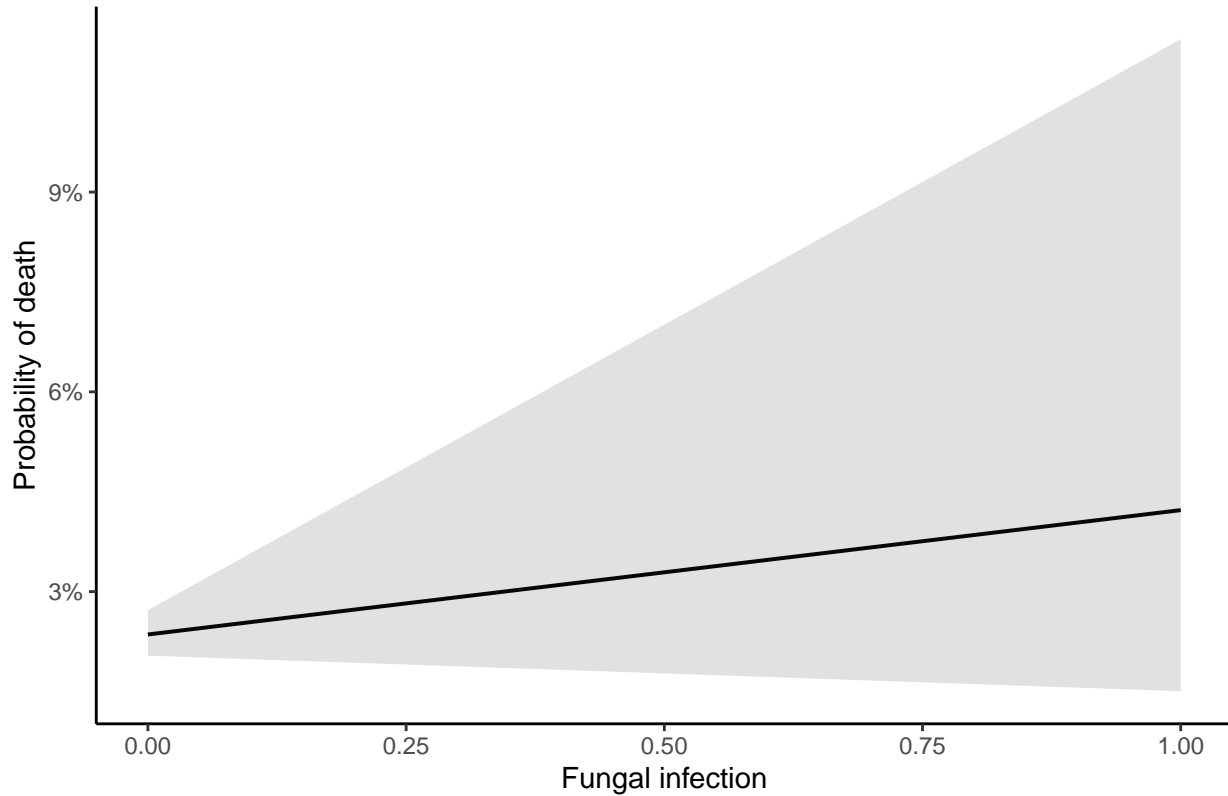

```
## MODEL INFO:
## Observations: 12835
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 3184.80, BIC = 3222.10
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.09
##
## FIXED EFFECTS:
## -------------------------------------------------
##                   Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)      -3.72    0.08   -49.17   0.00
## var.x1            0.60    0.54     1.11   0.27
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter     Std. Dev.
```

```
## ------------------- ------------- -----------
##  species.grouping   (Intercept)      0.48
##  species.grouping     var.x1         1.38
## -----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##      Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping    697      0.07
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.12779
Deviation n.s.

Dispersion test: p= 0.49
Deviation n.s.

Outlier test: p= 0.00731
Deviation significant

Within−group deviations from uniformity significa
Levene Test for homongeneity of variance n
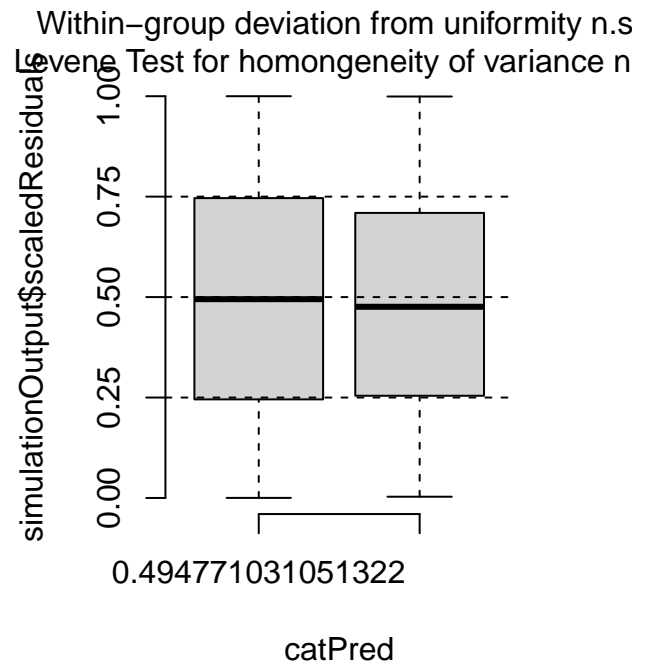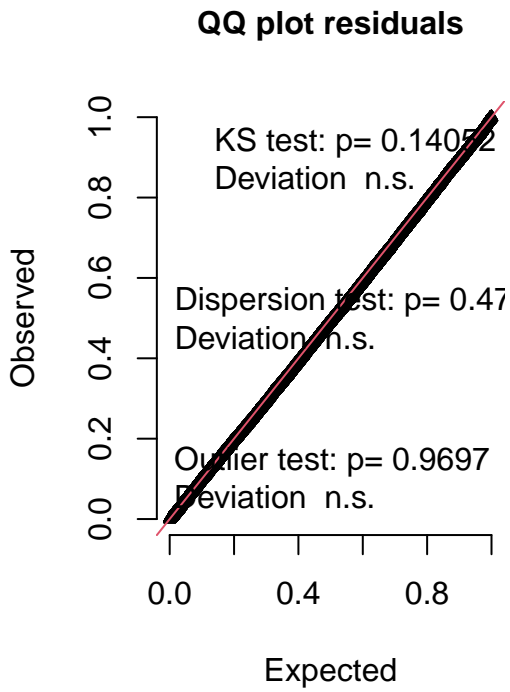
99

Model estimates and residuals for bci
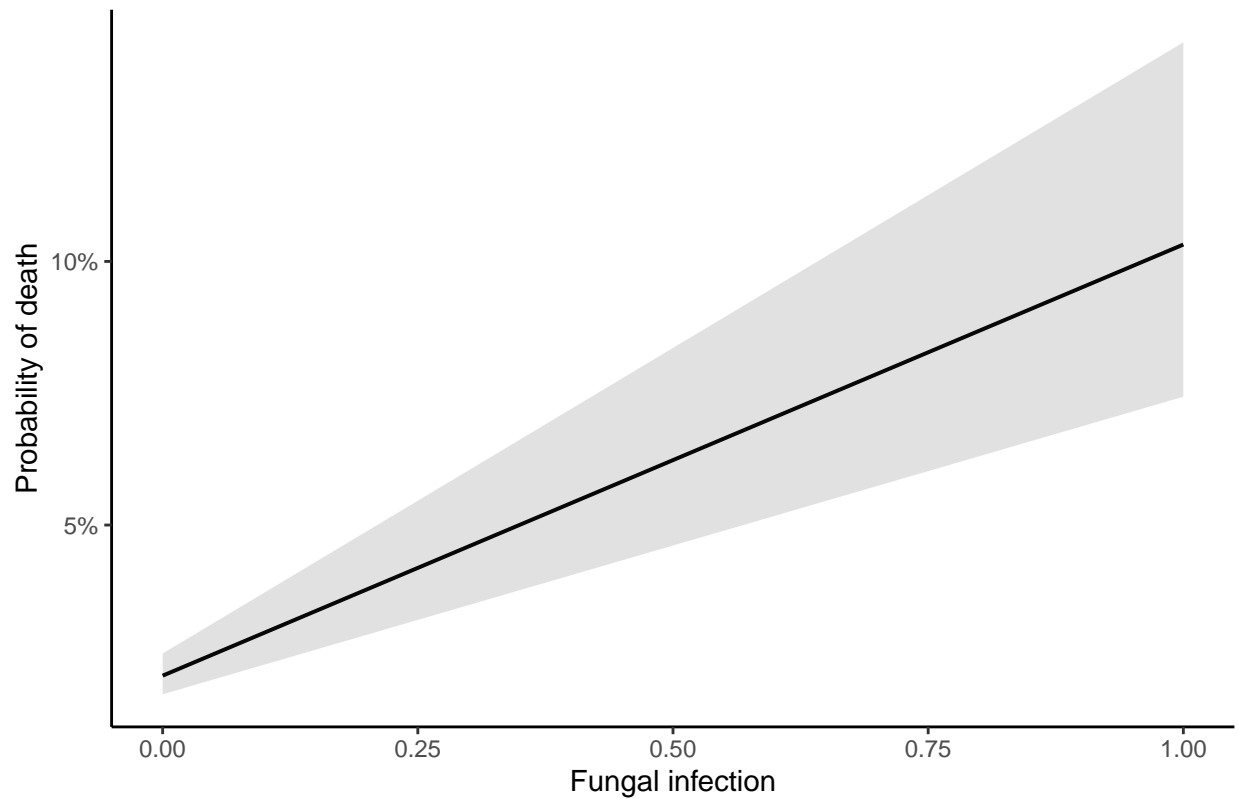

```
## MODEL INFO:
## Observations: 21933
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 5210.52, BIC = 5250.50
## Pseudo-R² (fixed effects) = 0.01
## Pseudo-R² (total) = 0.17
##
## FIXED EFFECTS:
## -------------------------------------------------
##                      Est.    S.E.   z val.     p
## ----------------- ------- ------ -------- ------
## (Intercept)         -3.82    0.09   -40.77   0.00
## var.x1               1.66    0.18     9.33   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##      Group          Parameter     Std. Dev.
## ----------------- ------------- -----------
##  species.grouping  (Intercept)       0.80
##  species.grouping    var.x1          0.02
```

```
## ------------------------------------------------
##
## Grouping variables:
## ------------------------------------------------
##         Group         # groups   ICC
## ------------------- ---------- ------
## species.grouping      220       0.16
## ------------------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.14052
Deviation n.s.

Dispersion test: p= 0.47
Deviation n.s.

Outlier test: p= 0.9697
Deviation n.s.

Observed

Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance n

simulationOutput$scaledResiduals
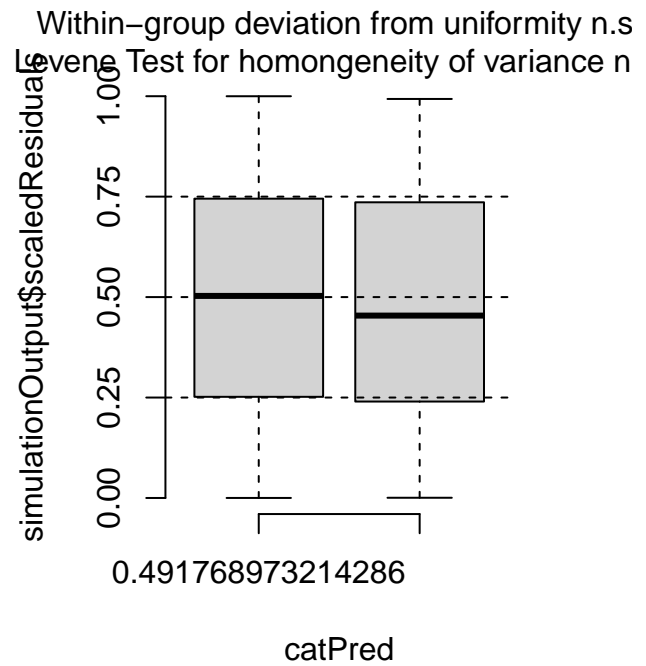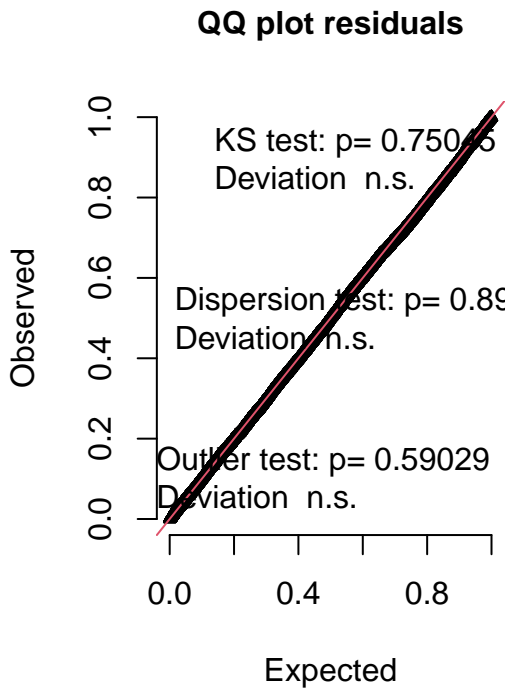
0.494771031051322

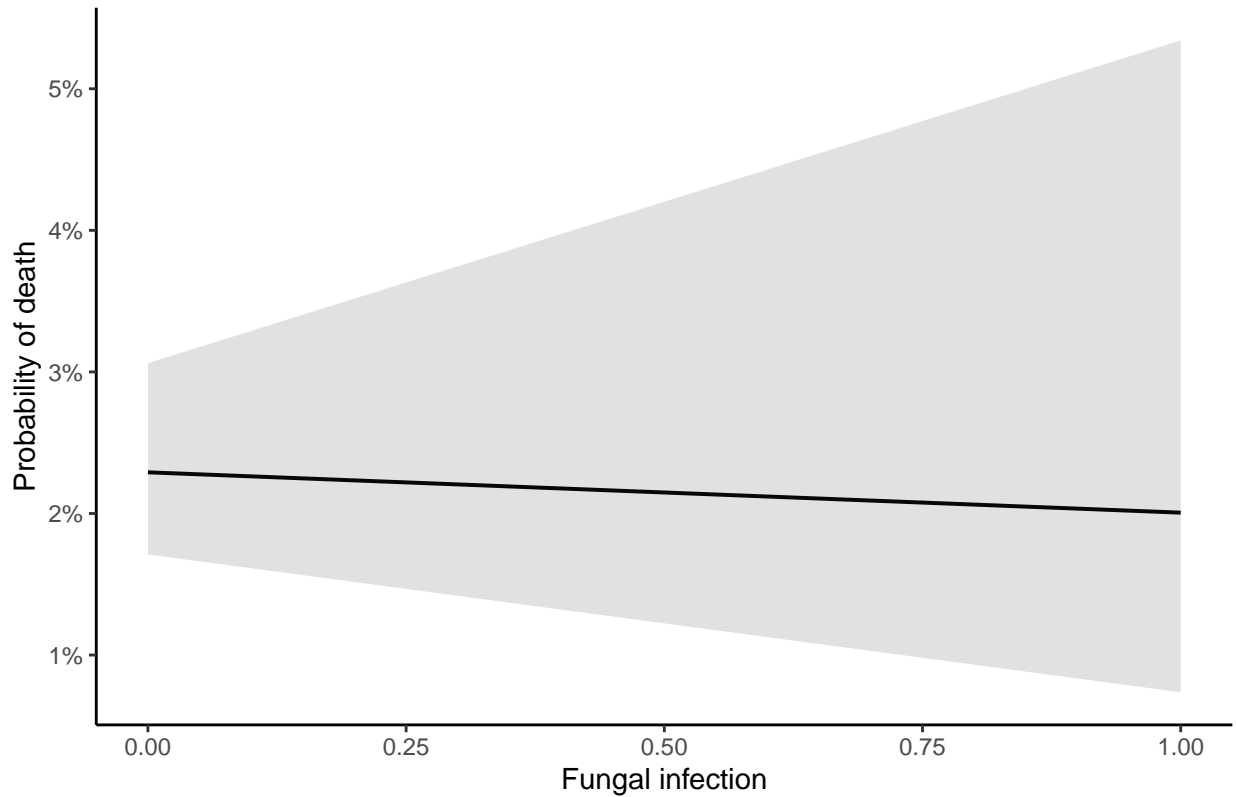catPred

Model estimates and residuals for fushan
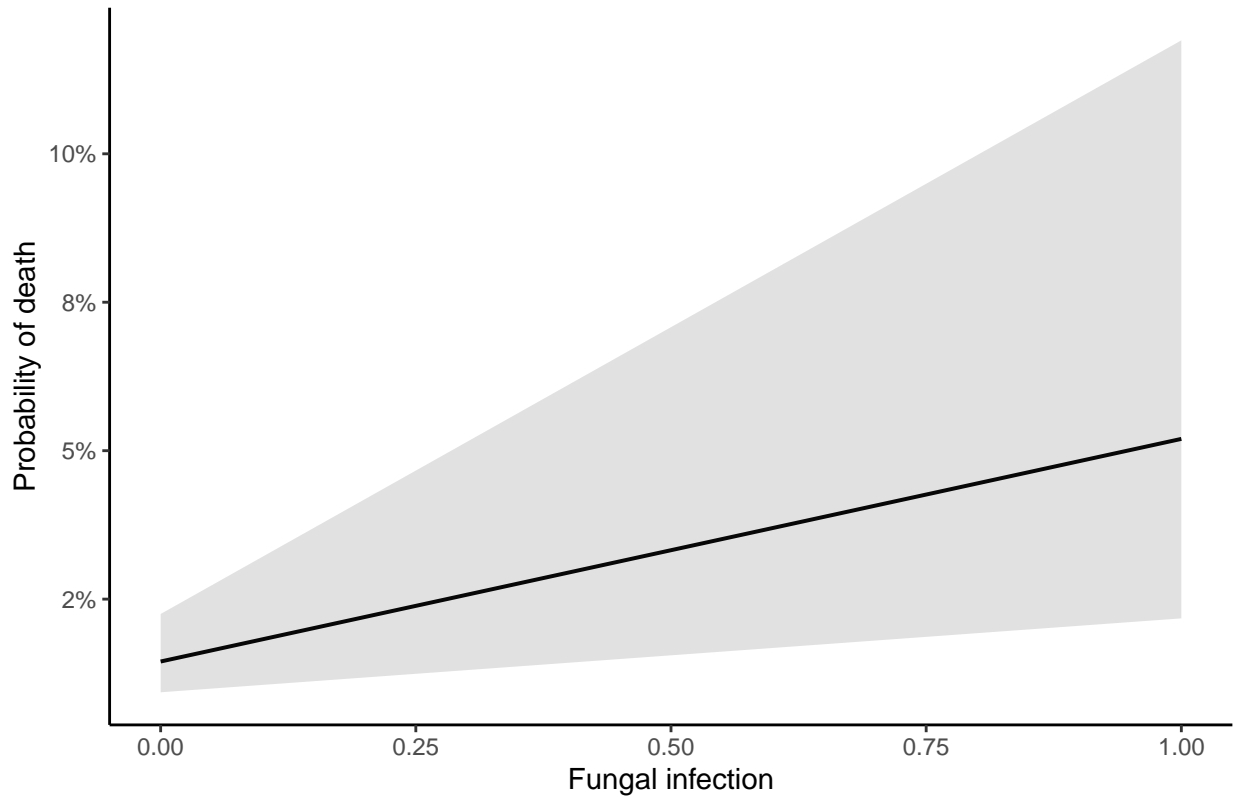

```
## MODEL INFO:
## Observations: 10929
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2486.51, BIC = 2523.01
## Pseudo-R² (fixed effects) = 0.01
## Pseudo-R² (total) = 0.31
##
## FIXED EFFECTS:
## -------------------------------------------------
##                      Est.    S.E.   z val.      p
## ----------------- -------  ------ -------- ------
## (Intercept)         -4.22    0.23   -18.45   0.00
## var.x1               1.32    0.44     3.00   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)      1.18
##  species.grouping    var.x1         0.77
```

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##       Group       # groups   ICC
## ----------------- ---------- ------
##  species.grouping     64      0.30
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.750
Deviation n.s.

Dispersion test: p= 0.89
Deviation n.s.

Outlier test: p= 0.59029
Deviation n.s.

Observed

Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance n

simulationOutput$scaledResiduals

0.491768973214286

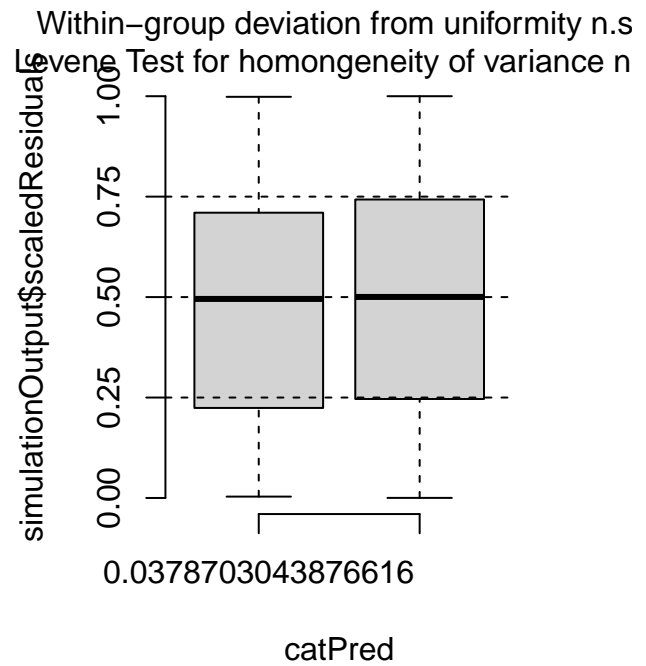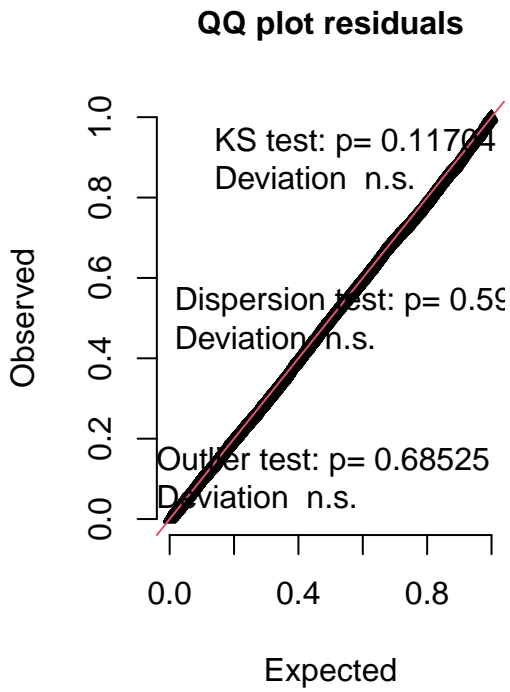catPred

Model estimates and residuals for hkk

```
## MODEL INFO:
## Observations: 9451
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2491.06, BIC = 2526.83
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.25
##
## FIXED EFFECTS:
## -------------------------------------------------
##                      Est.    S.E.    z val.     p
## ----------------- ------- ------ -------- ------
## (Intercept)         -3.75    0.15   -24.68   0.00
## var.x1              -0.14    0.50    -0.27   0.79
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ------------------------------------------------
##       Group          Parameter    Std. Dev.
## ------------------ ------------- ----------
##  species.grouping   (Intercept)      1.05
##  species.grouping     var.x1         0.14
```

```
## ----------------------------------------------
## 
## Grouping variables:
## ------------------------------------
##        Group        # groups   ICC
## ----------------- ---------- ------
## species.grouping     202      0.25
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.11704
Deviation n.s.

Dispersion test: p= 0.59
Deviation n.s.

Outlier test: p= 0.68525
Deviation n.s.

Observed

Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance n

simulationOutput$scaledResiduals

0.0378703043876616

catPred

Model estimates and residuals for kc
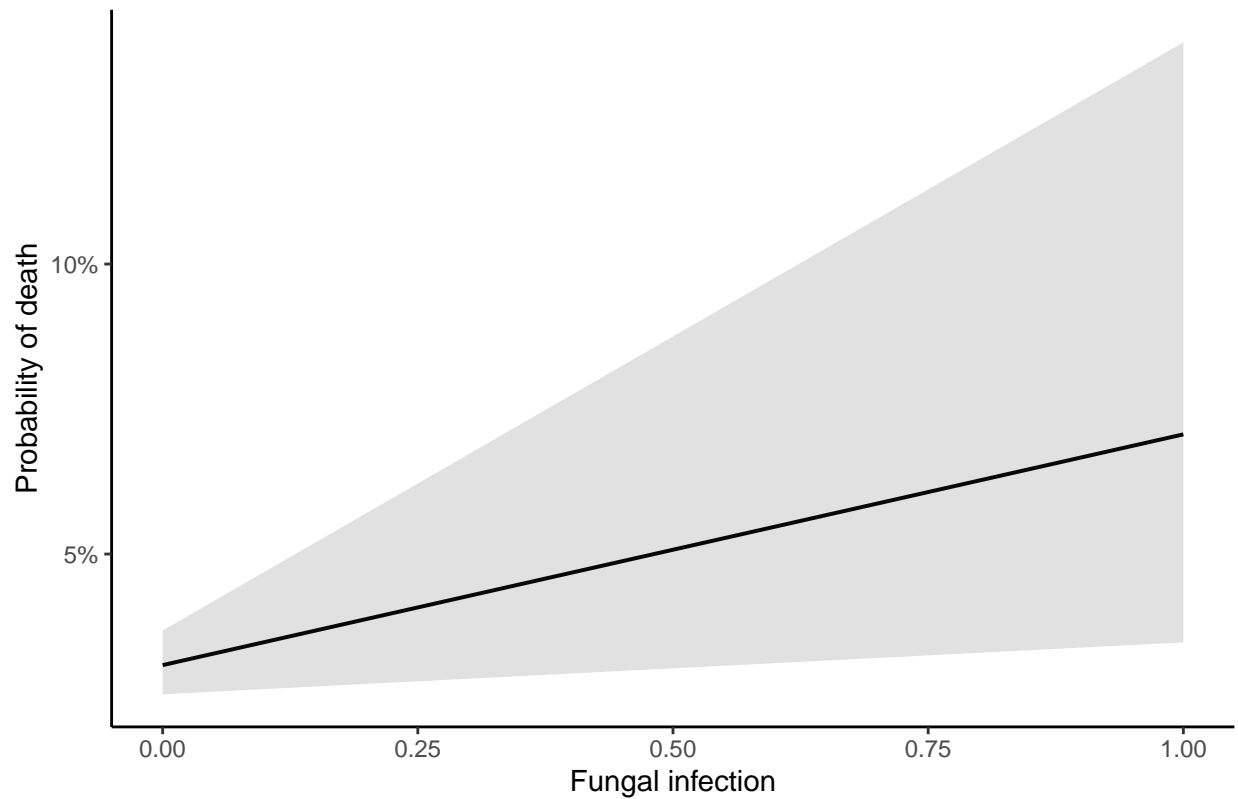

```
## MODEL INFO:
## Observations: 8309
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2465.13, BIC = 2500.25
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## ------------------------------------------------
##                    Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)       -3.45    0.09   -36.88   0.00
## var.x1             0.87    0.39     2.25   0.02
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter    Std. Dev.
## ---------------- ------------- ----------
##  species.grouping  (Intercept)      0.71
##  species.grouping    var.x1         0.28
```
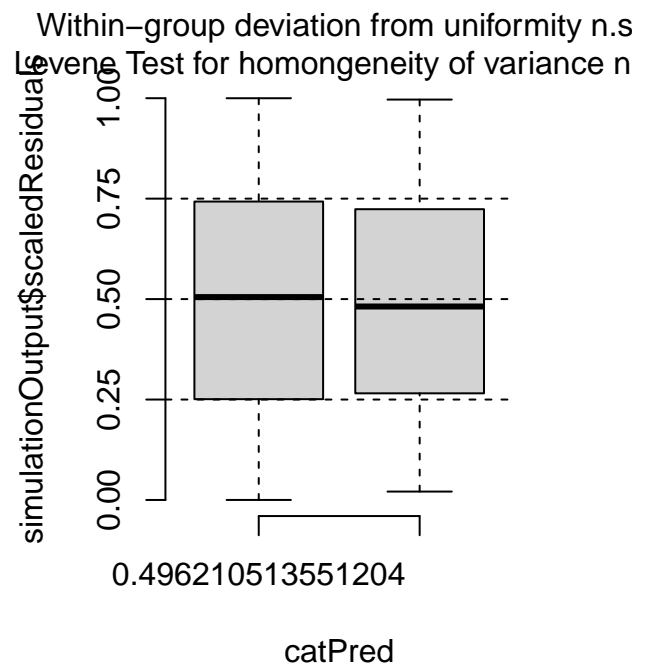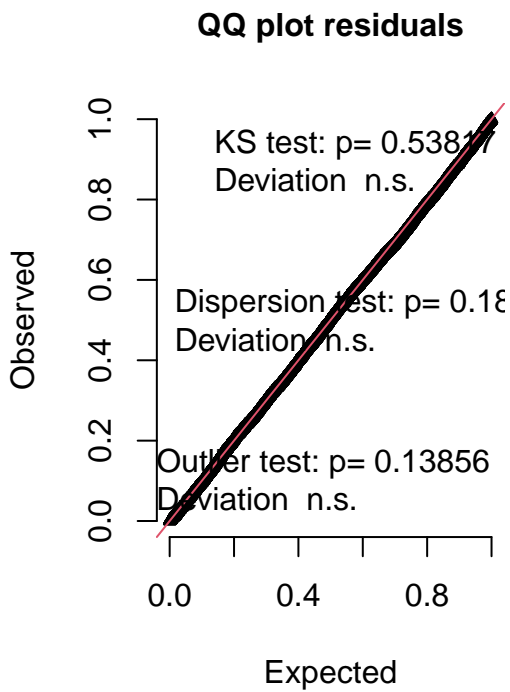
```
## ------------------------------------------------
## 
## Grouping variables:
## ------------------------------------------
##      Group          # groups   ICC
## ----------------   ----------  ------
## species.grouping      379       0.13
## ------------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.53817
Deviation n.s.

Dispersion test: p= 0.18
Deviation n.s.

Outlier test: p= 0.13856
Deviation n.s.

Observed

Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance n

simulationOutput$scaledResiduals

0.496210513551204

catPred

Model estimates and residuals for pasoh
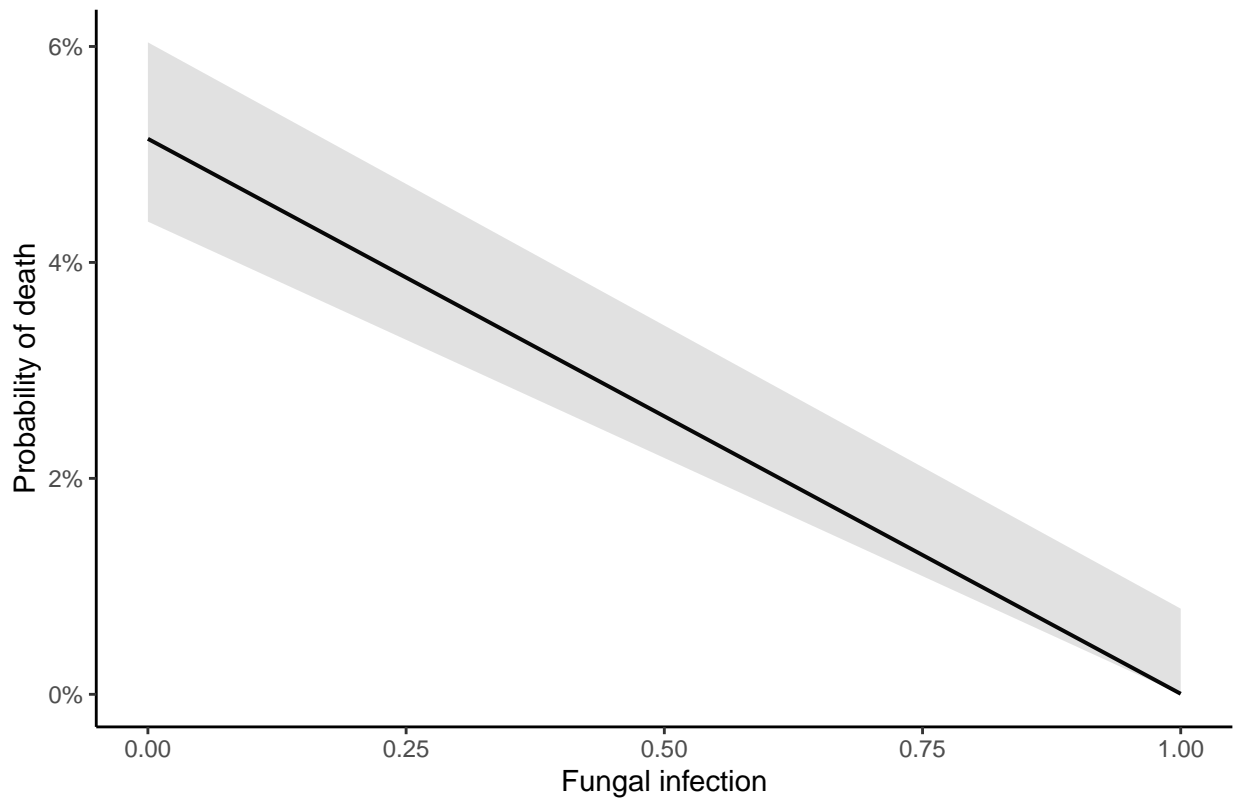
```
## MODEL INFO:
## Observations: 5041
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2190.50, BIC = 2223.12
## Pseudo-R² (fixed effects) = 0.12
## Pseudo-R² (total) = 0.60
##
## FIXED EFFECTS:
## -------------------------------------------------
##                     Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)        -2.91    0.09   -33.68   0.00
## var.x1             -7.02    2.60    -2.70   0.01
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##      Group          Parameter     Std. Dev.
## ------------------ ------------ ----------
##  species.grouping   (Intercept)     0.55
##  species.grouping     var.x1        13.27
```
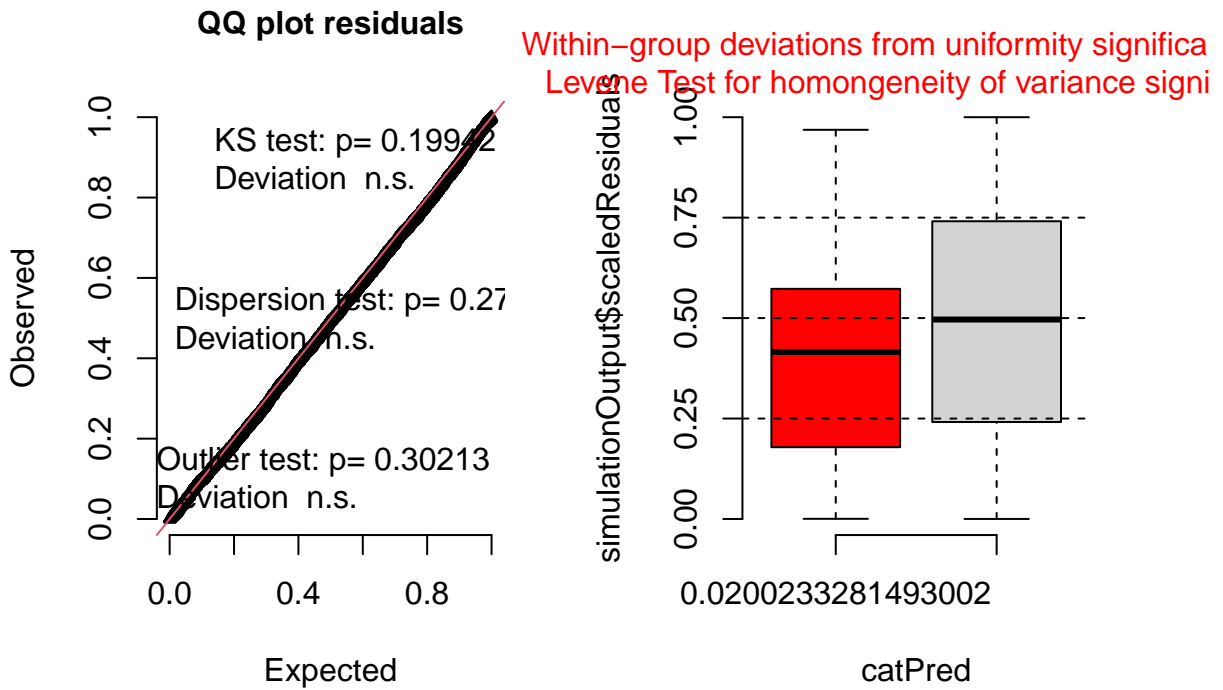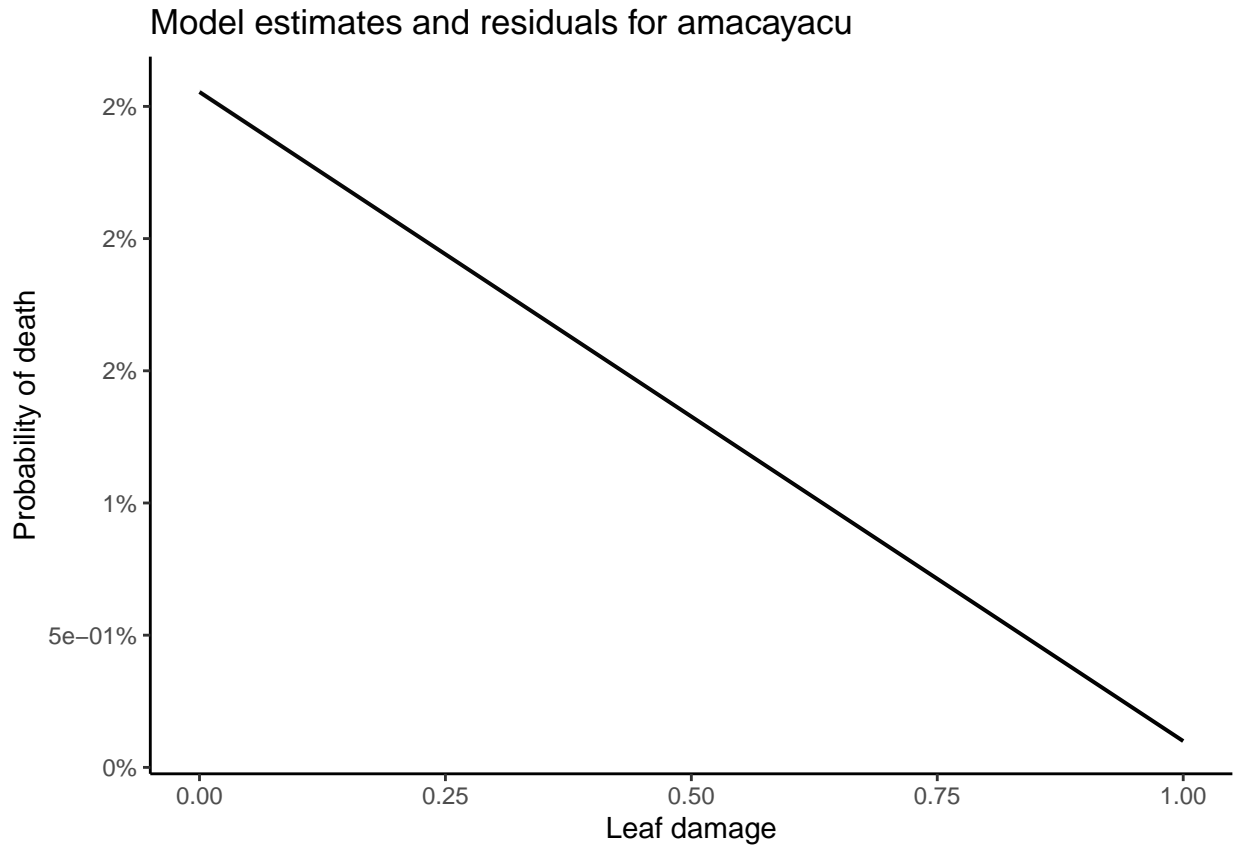
```
## ---------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group         # groups   ICC
## ----------------- ---------- ------
##  species.grouping     477     0.08
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

Observed

KS test: p= 0.19942
Deviation n.s.

Dispersion test: p= 0.27
Deviation n.s.

Outlier test: p= 0.30213
Deviation n.s.

Expected

Within−group deviations from uniformity significa
Levene Test for homongeneity of variance signi

simulationOutput$scaledResiduals

0.0200233281493002

catPred

Site-specific mortality model for condition: Leaf damage
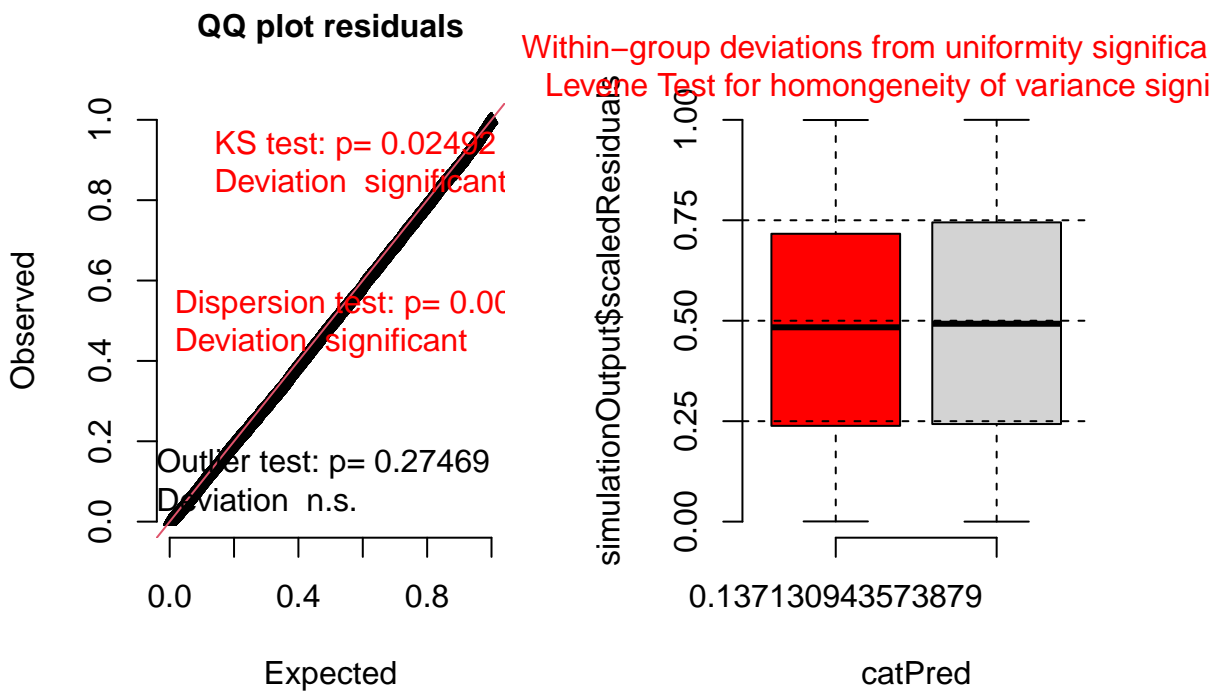
Model estimates and residuals for amacayacu


```
## MODEL INFO:
## Observations: 12830
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 3194.42, BIC = 3231.72
## Pseudo-R² (fixed effects) = 0.18
## Pseudo-R² (total) = 0.58
##
## FIXED EFFECTS:
## -------------------------------------------------------
##                      Est.    S.E.     z val.       p
## ---------------- ------- ------ ---------- ------
## (Intercept)          -3.64    0.00   -1717.06    0.00
## var.x1               -3.27    0.00   -1541.44    0.00
## -------------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter     Std. Dev.
```

```
## -------------------- -------------- -----------
##  species.grouping    (Intercept)      0.54
##  species.grouping      var.x1         4.45
## ------------------------------------------------
##
## Grouping variables:
## ----------------------------------------
##       Group        # groups    ICC
## ------------------ ----------  ------
##  species.grouping     697       0.08
## ----------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.02492
Deviation significant

Dispersion test: p= 0.00
Deviation significant

Outlier test: p= 0.27469
Deviation n.s.

Observed

Expected

Within−group deviations from uniformity significa
Levene Test for homongeneity of variance signi

simulationOutput$scaledResiduals
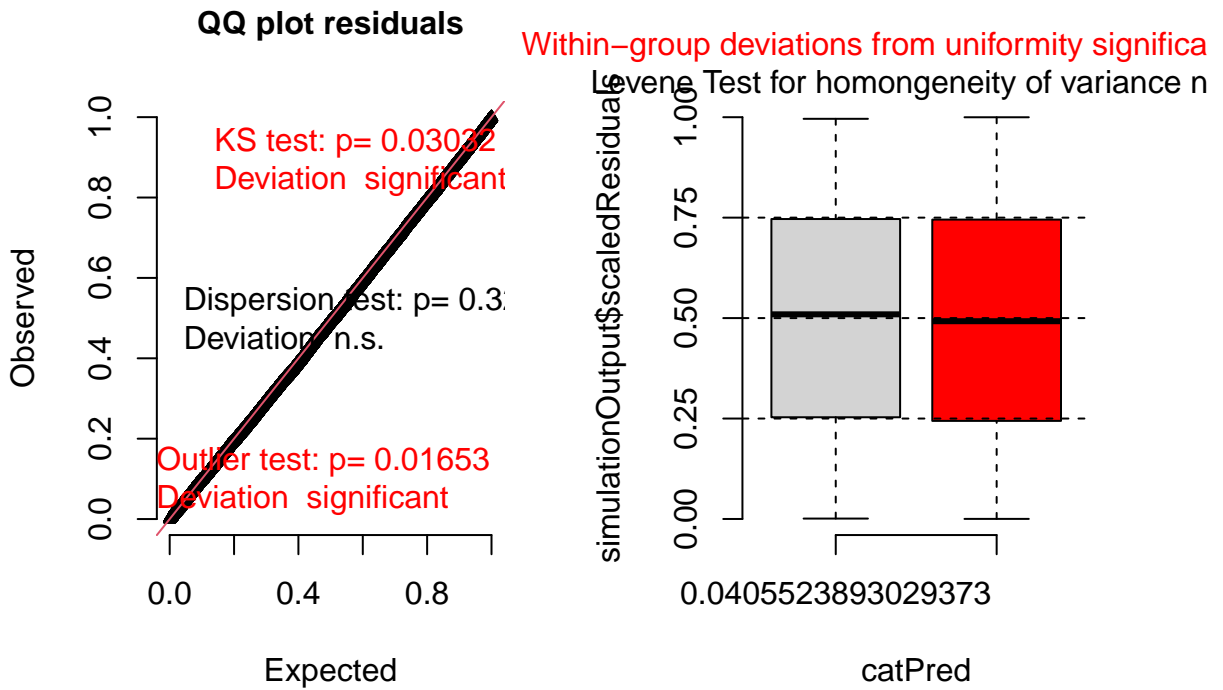
0.137130943573879

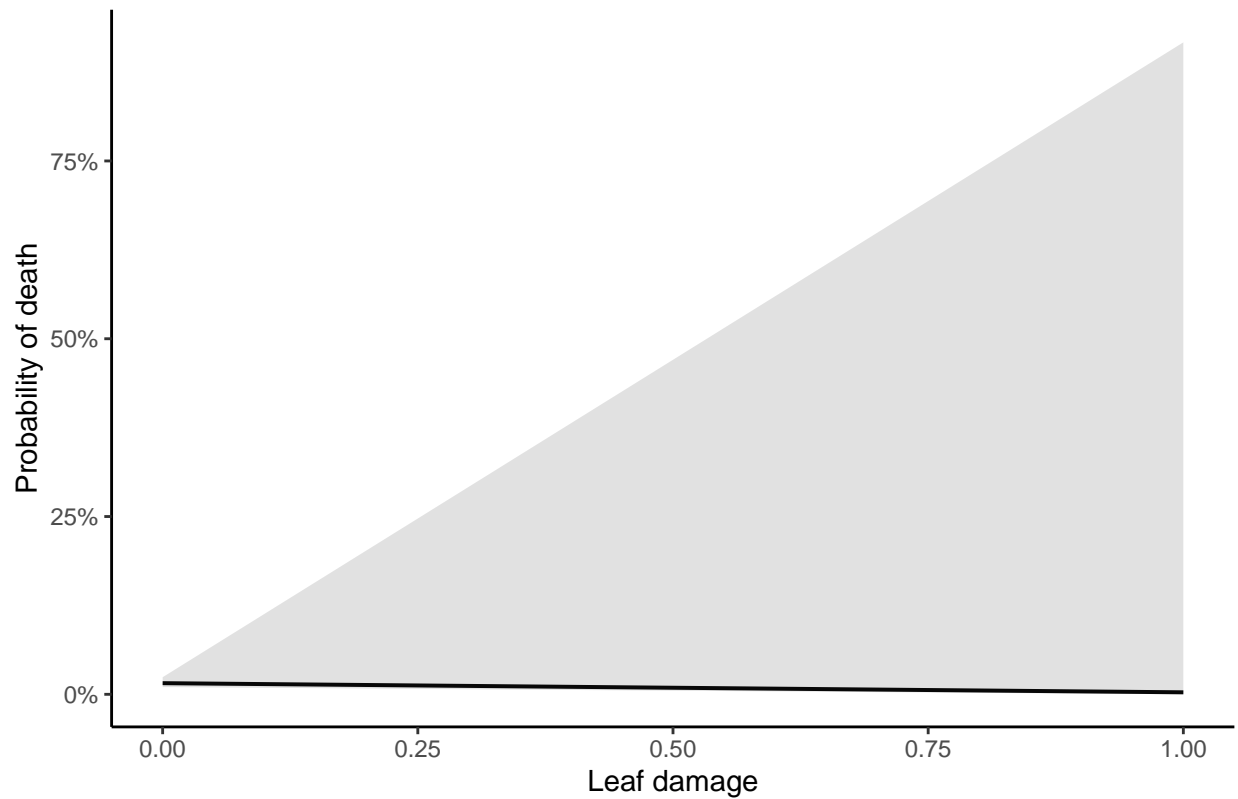catPred

Model estimates and residuals for bci
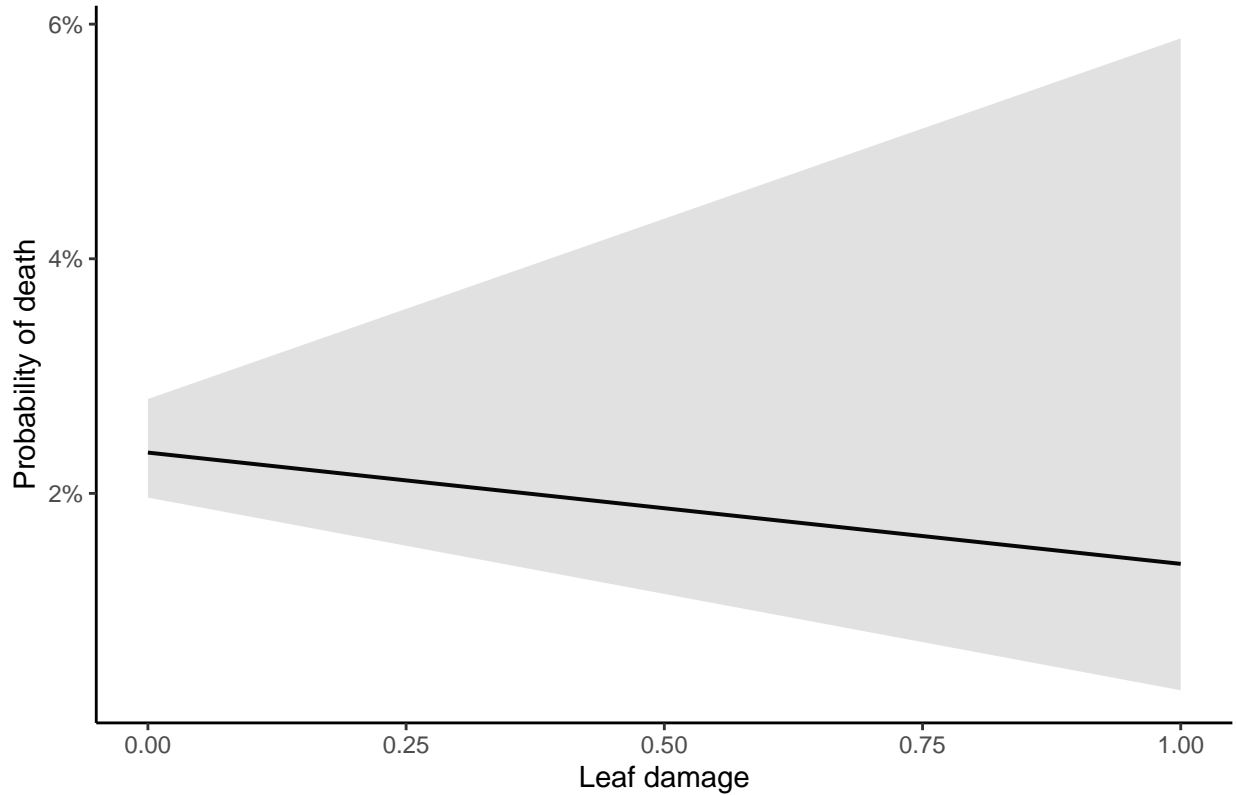
```
## MODEL INFO:
## Observations: 21885
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 5258.06, BIC = 5298.03
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.18
##
## FIXED EFFECTS:
## -------------------------------------------------
##                      Est.    S.E.    z val.     p
## ----------------- ------- ------ -------- ------
## (Intercept)          -3.73    0.09    -40.05   0.00
## var.x1               -0.53    0.75     -0.70   0.48
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group          Parameter     Std. Dev.
## ----------------- ------------ ----------
##  species.grouping   (Intercept)       0.78
##  species.grouping     var.x1          1.45
```

```
## ------------------------------------------------
##
## Grouping variables:
## ------------------------------------
##        Group       # groups   ICC
## ------------------- ---------- ------
##  species.grouping     220      0.16
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

Within−group deviations from uniformity significa
Levene Test for homongeneity of variance n

KS test: p= 0.03032
Deviation significant

Dispersion test: p= 0.3
Deviation n.s.

Outlier test: p= 0.01653
Deviation significant

Observed

Expected

simulationOutput$scaledResiduals
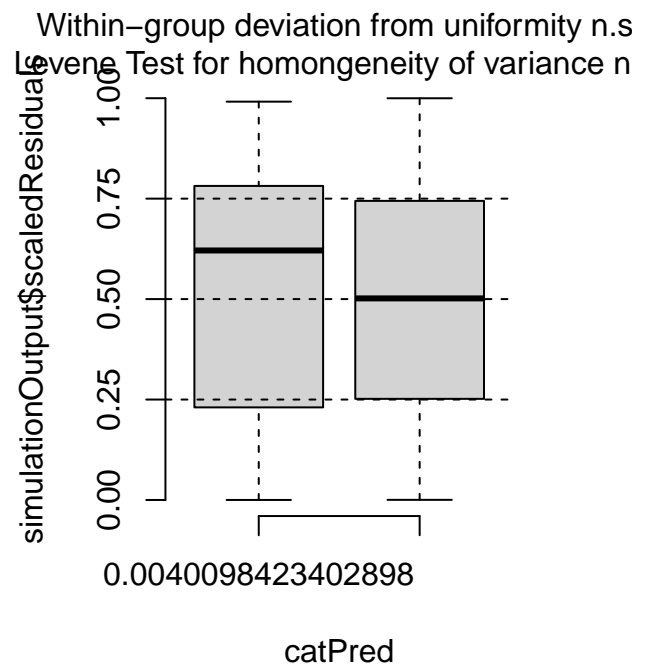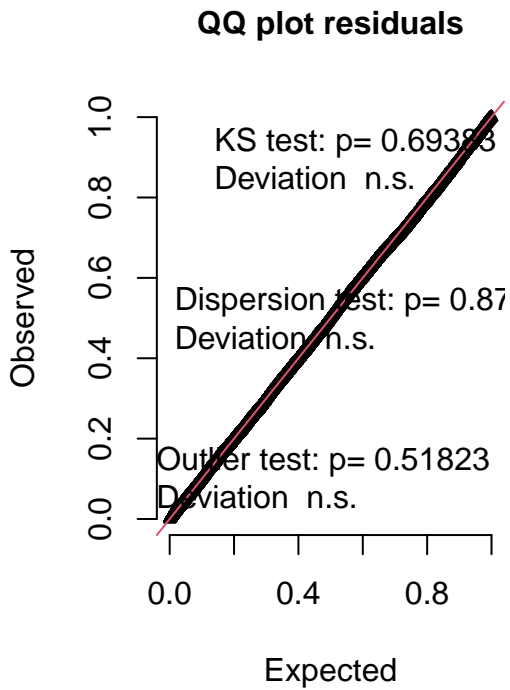
0.0405523893029373

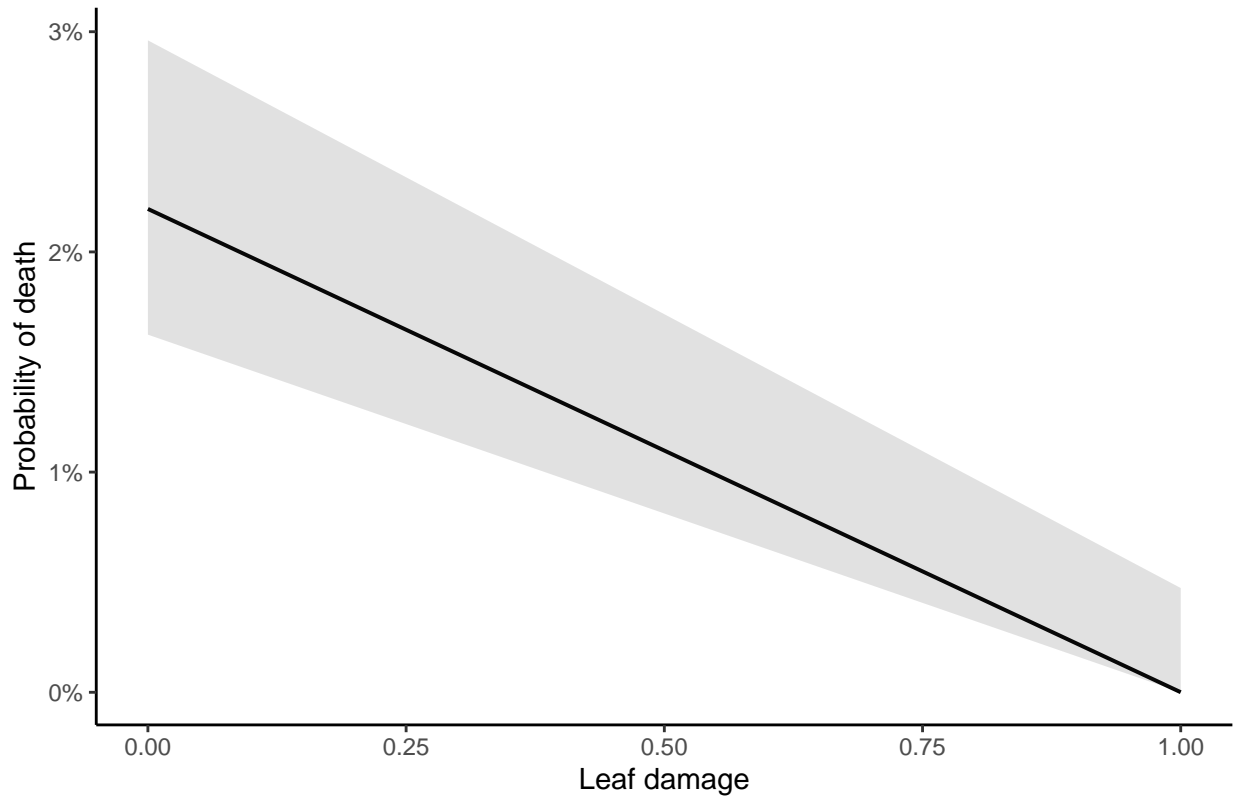catPred

Model estimates and residuals for fushan

```
## MODEL INFO:
## Observations: 10929
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2509.82, BIC = 2546.31
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.29
##
## FIXED EFFECTS:
## --------------------------------------------------
##                    Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)        -4.14   0.22   -18.56   0.00
## var.x1             -1.74   4.21    -0.41   0.68
## --------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##      Group          Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)      1.16
##  species.grouping     var.x1        0.80
```

```
## ------------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     64      0.29
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.69383
Deviation n.s.

Dispersion test: p= 0.87
Deviation n.s.

Outlier test: p= 0.51823
Deviation n.s.

Observed

Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance n

simulationOutput$scaledResiduals
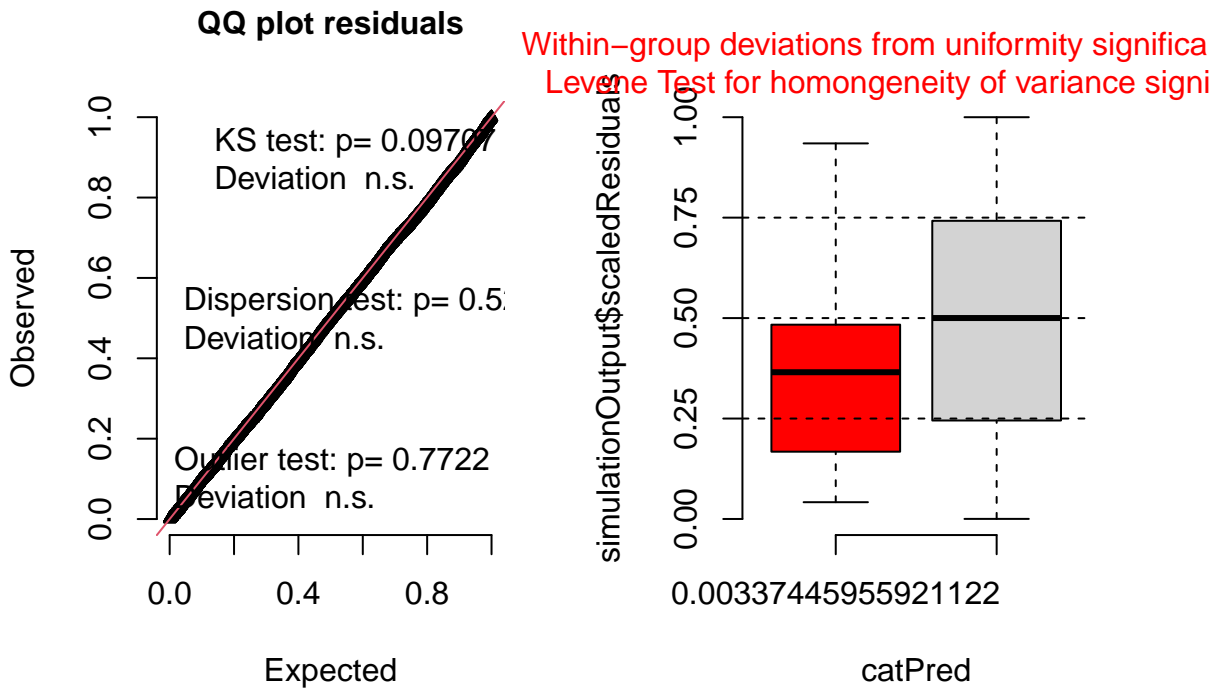
0.0040098423402898

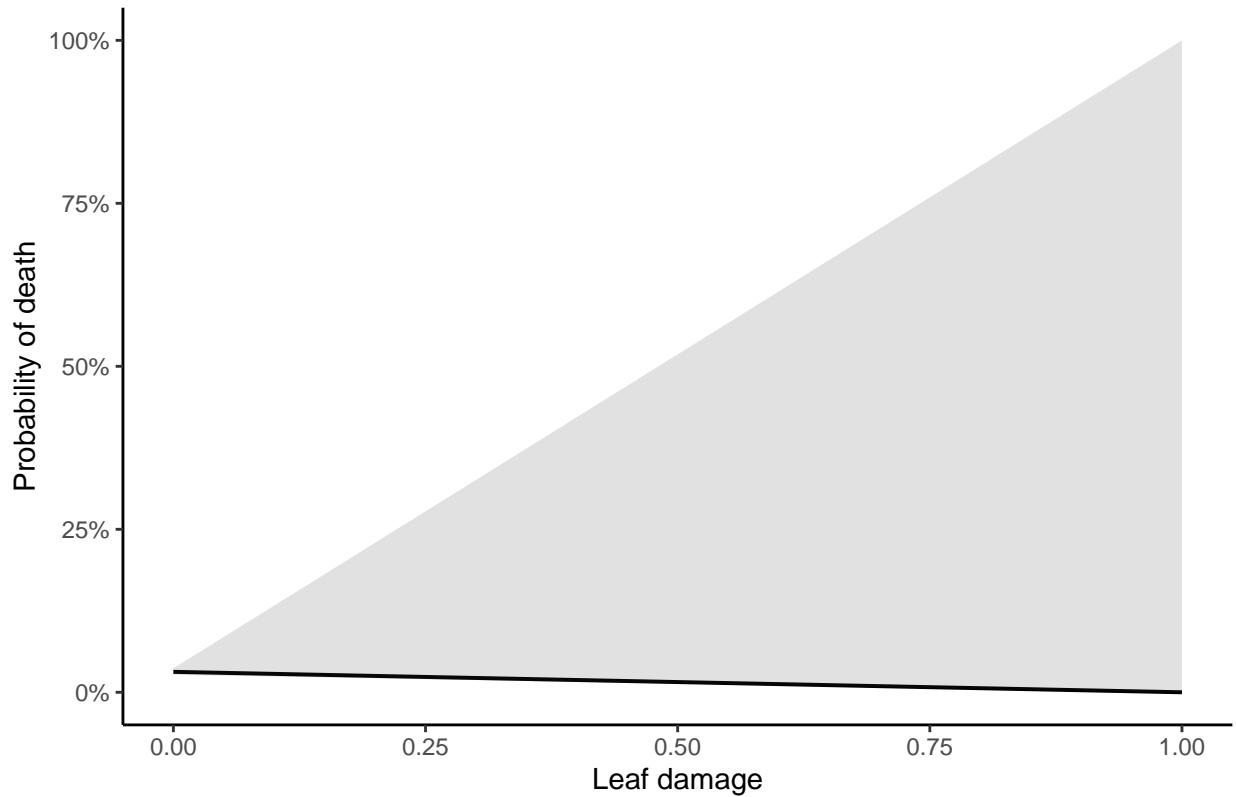catPred

Model estimates and residuals for hkk

```
## MODEL INFO:
## Observations: 9451
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2469.28, BIC = 2505.05
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.70
##
## FIXED EFFECTS:
## -------------------------------------------------
##                    Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -3.80    0.16   -24.23   0.00
## var.x1             -8.71    3.66    -2.38   0.02
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter     Std. Dev.
## ------------------ ------------ ----------
##  species.grouping   (Intercept)     1.08
##  species.grouping     var.x1        44.27
```

```
## -----------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     202      0.26
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

Within−group deviations from uniformity significa
Leverne Test for homongeneity of variance signi

KS test: p= 0.09707
Deviation n.s.

Dispersion test: p= 0.5
Deviation n.s.

Outlier test: p= 0.7722
Deviation n.s.

Observed

Expected

simulationOutput$scaledResiduals
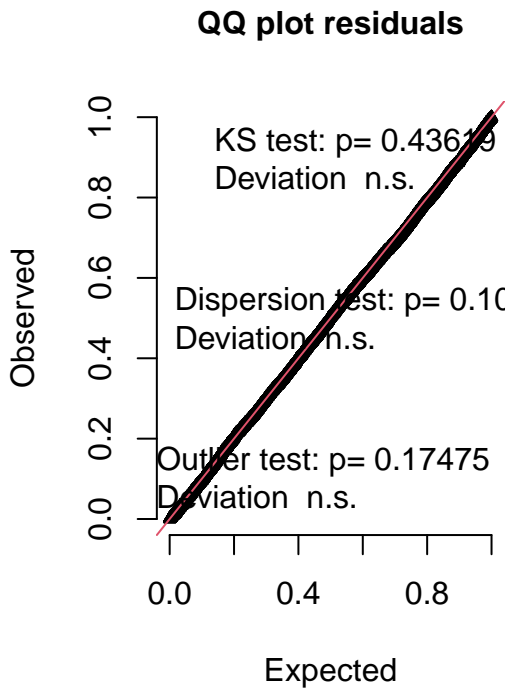
0.00337445955921122

catPred

Model estimates and residuals for kc


```
## MODEL INFO:
## Observations: 8309
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2464.45, BIC = 2499.58
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.71
##
## FIXED EFFECTS:
## ---------------------------------------------------
##                        Est.    S.E.   z val.      p
## ----------------- -------- ------- -------- ------
## (Intercept)           -3.43    0.08   -41.01   0.00
## var.x1               -10.33   52.39    -0.20   0.84
## ---------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter     Std. Dev.
## ----------------- ------------- -----------
##  species.grouping   (Intercept)      0.69
##  species.grouping      var.x1        52.65
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##        Group          # groups   ICC
## ----------------    ----------  ------
##  species.grouping       379      0.13
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.43619
Deviation n.s.

Dispersion test: p= 0.10
Deviation n.s.

Outlier test: p= 0.17475
Deviation n.s.

Observed

Expected

Within−group deviations from uniformity significa
Levene Test for homongeneity of variance n

simulationOutput$scaledResiduals
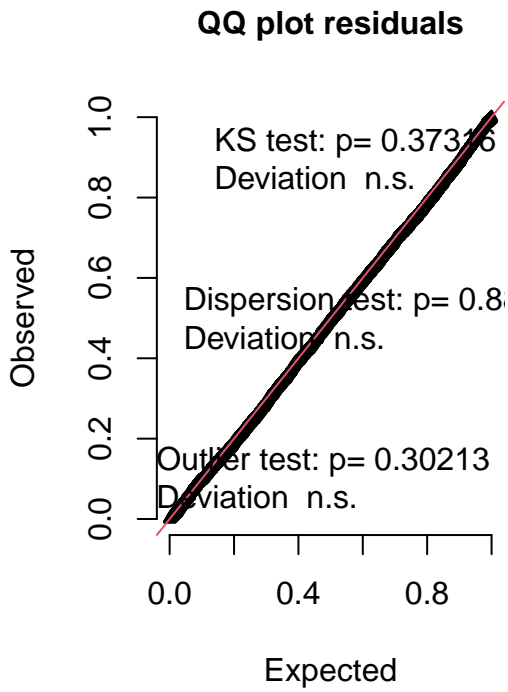
0.00276044167066731

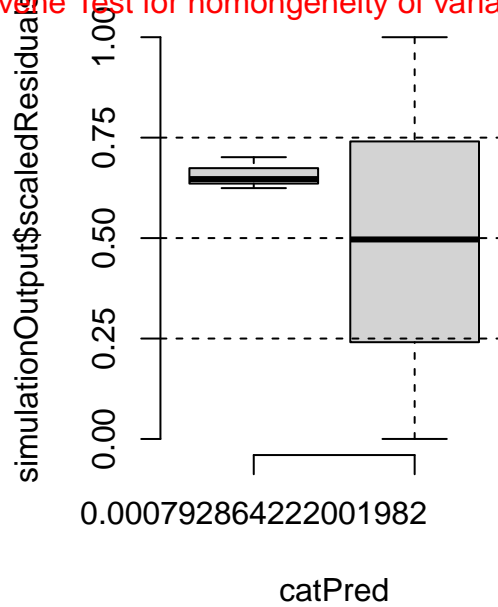catPred
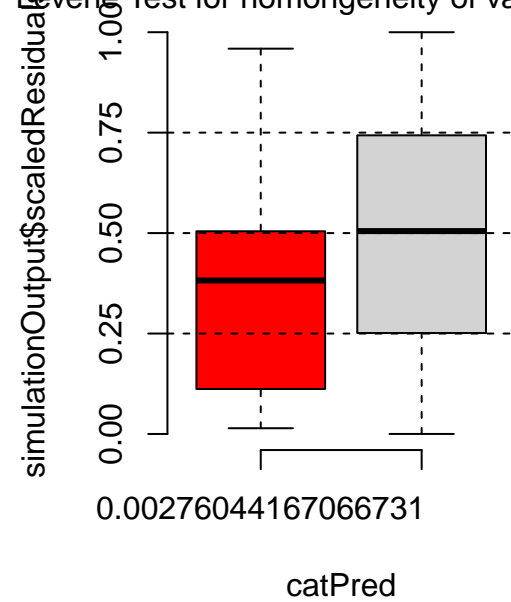
Model estimates and residuals for pasoh
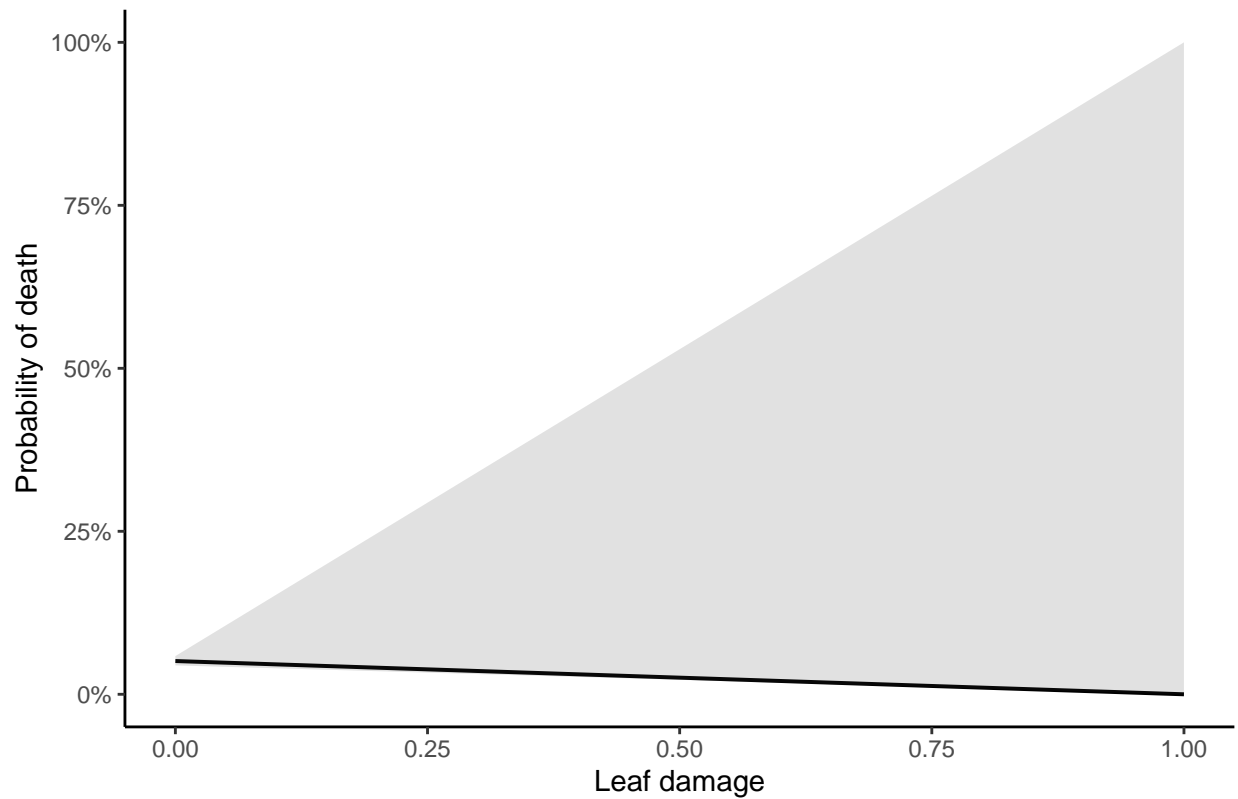
```
## MODEL INFO:
## Observations: 5041
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2197.48, BIC = 2230.10
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.11
##
## FIXED EFFECTS:
## -----------------------------------------------------
##                        Est.      S.E.    z val.      p
## ----------------- -------- -------- -------- ------
## (Intercept)           -2.92      0.08    -38.83   0.00
## var.x1               -11.81    919.07     -0.01   0.99
## -----------------------------------------------------
##
## RANDOM EFFECTS:
## ------------------------------------------------
##       Group          Parameter    Std. Dev.
## ------------------ ------------ ----------
##  species.grouping   (Intercept)      0.57
##  species.grouping     var.x1         0.41
```

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping    477      0.09
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.37316
Deviation n.s.

Dispersion test: p= 0.8
Deviation n.s.

Outlier test: p= 0.30213
Deviation n.s.

Observed

Expected

Within−group deviation from uniformity n.s

Levene Test for homongeneity of variance signi

simulationOutput$scaledResiduals

0.000792864222001982

catPred

Site-specific mortality model for condition: Lianas
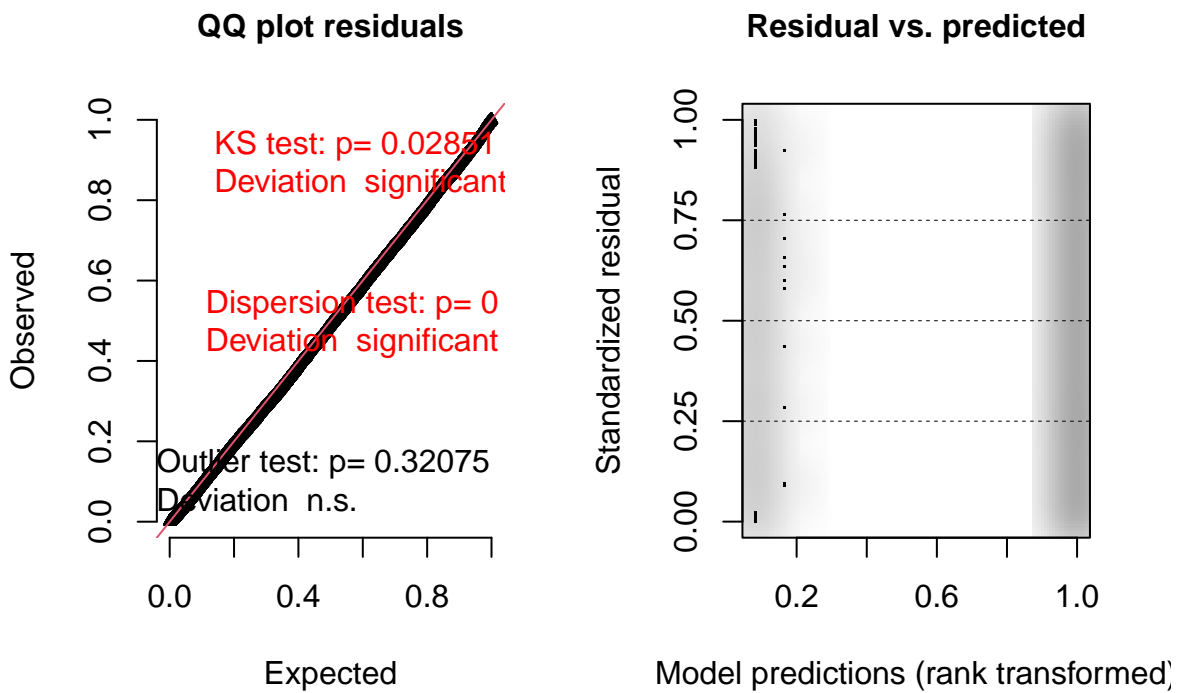
Model estimates and residuals for amacayacu
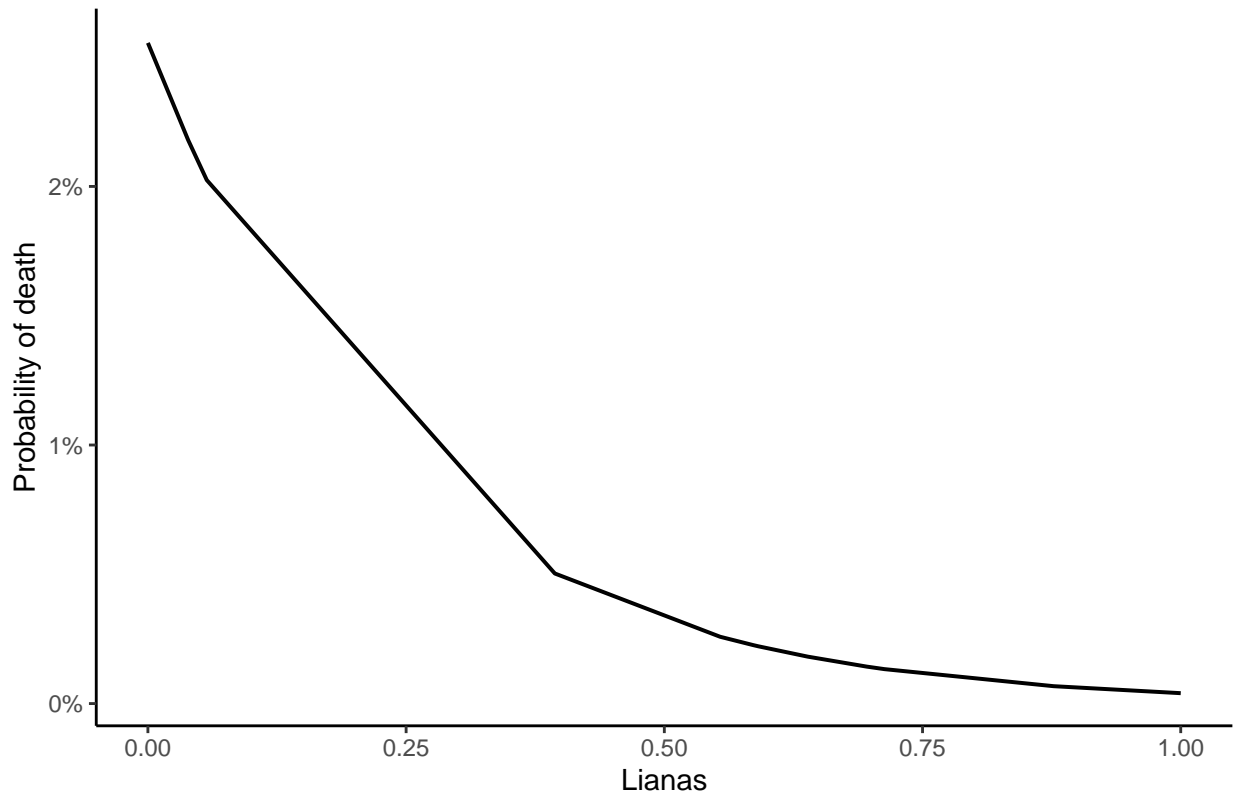

```
## MODEL INFO:
## Observations: 12833
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 3204.43, BIC = 3241.73
## Pseudo-R² (fixed effects) = 0.18
## Pseudo-R² (total) = 0.58
##
## FIXED EFFECTS:
## ------------------------------------------------------
##                      Est.    S.E.    z val.       p
## ---------------- ------- ------ ---------- ------
## (Intercept)         -3.64    0.00   -2767.77    0.00
## var.x1              -4.18    0.00   -3175.02    0.00
## ------------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter     Std. Dev.
```

```
## ------------------- ------------- -----------
##  species.grouping   (Intercept)      0.48
##  species.grouping      var.x1        5.74
## --------------------------------------------
##
## Grouping variables:
## -----------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping    697      0.07
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.02851
Deviation significant

Dispersion test: p= 0
Deviation significant

Outlier test: p= 0.32075
Deviation n.s.

Observed / Expected

Residual vs. predicted

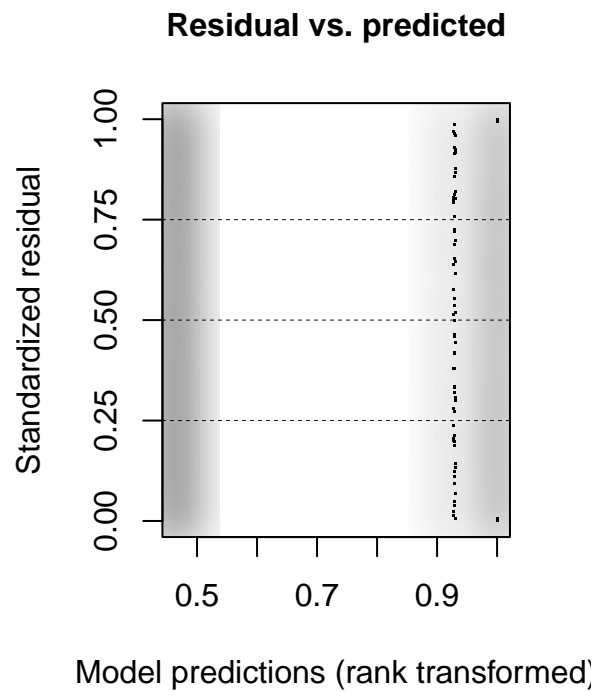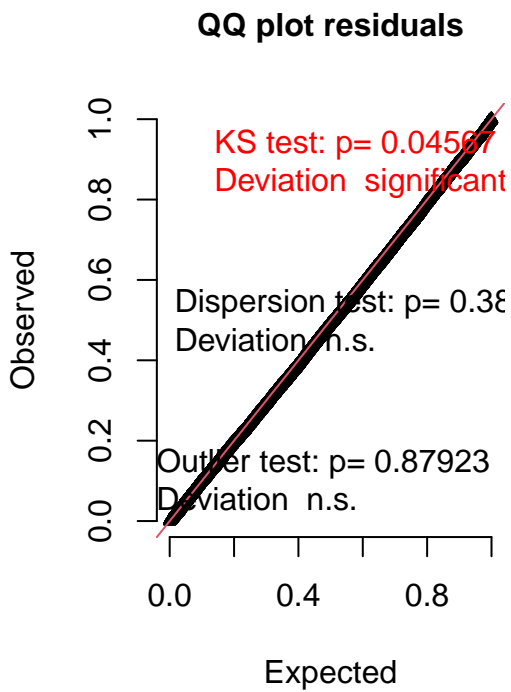Standardized residual / Model predictions (rank transformed)
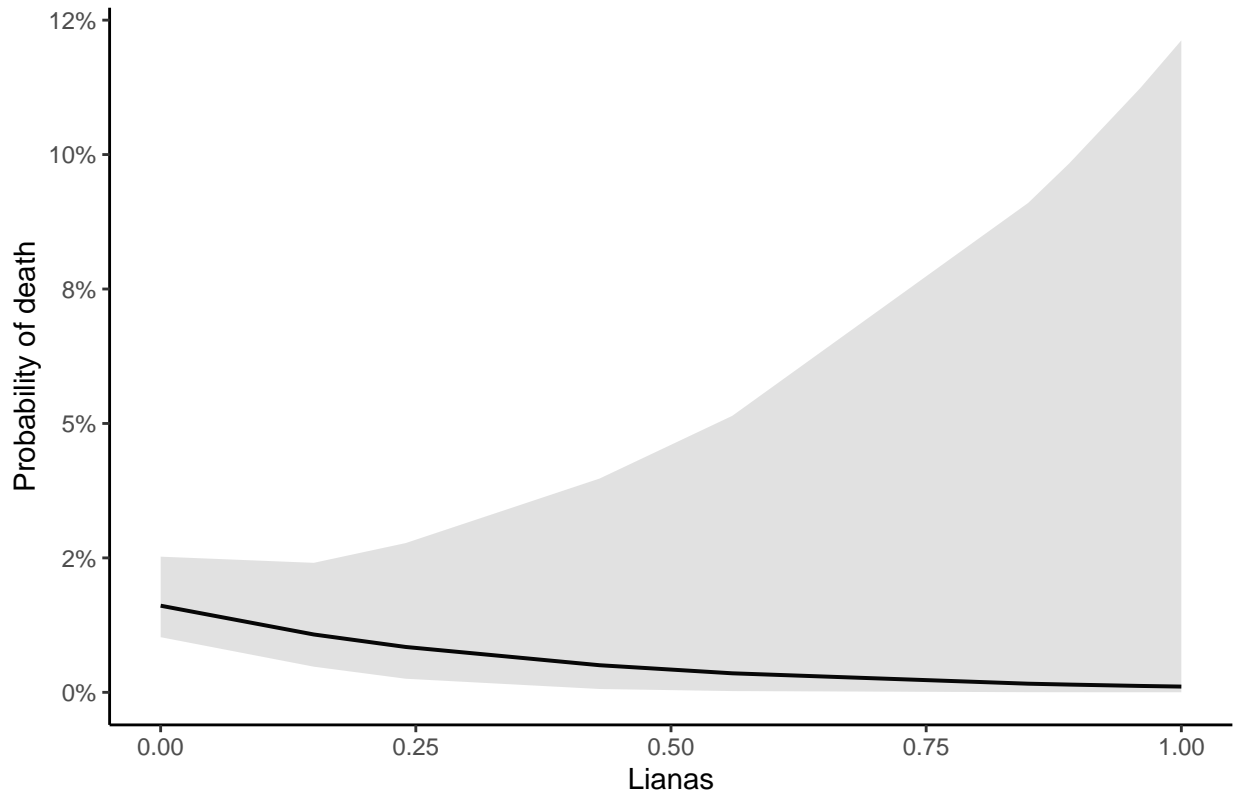
Model estimates and residuals for bci
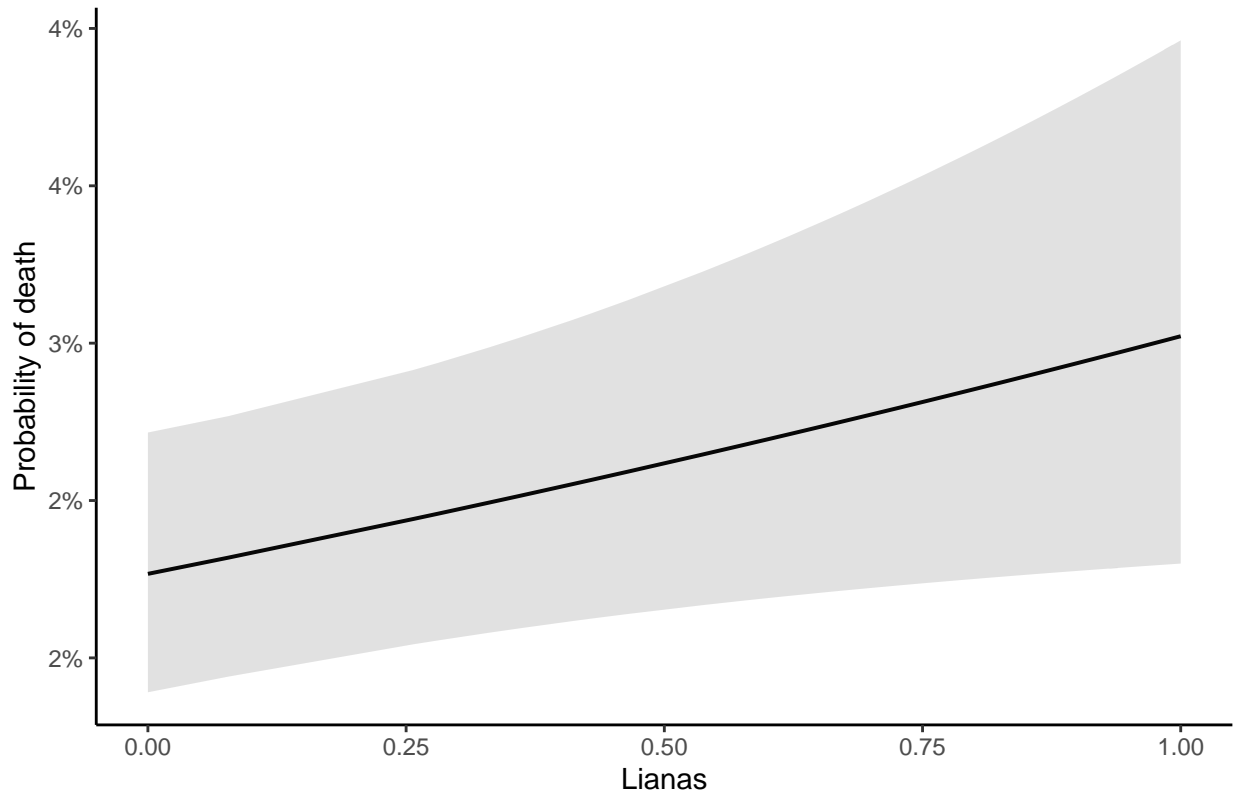
```
## MODEL INFO:
## Observations: 21931
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 5284.24, BIC = 5324.22
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.17
##
## FIXED EFFECTS:
## -------------------------------------------------
##                     Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)        -3.76    0.09   -39.79   0.00
## var.x1              0.30    0.13     2.25   0.02
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ------------------------------------------------
##       Group         Parameter     Std. Dev.
## ----------------- ------------- -----------
##  species.grouping   (Intercept)      0.80
##  species.grouping     var.x1         0.04
```

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group        # groups   ICC
## -----------------   ----------  ------
##  species.grouping      220       0.16
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.04567
Deviation significant

Dispersion test: p= 0.38
Deviation n.s.

Outlier test: p= 0.87923
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual
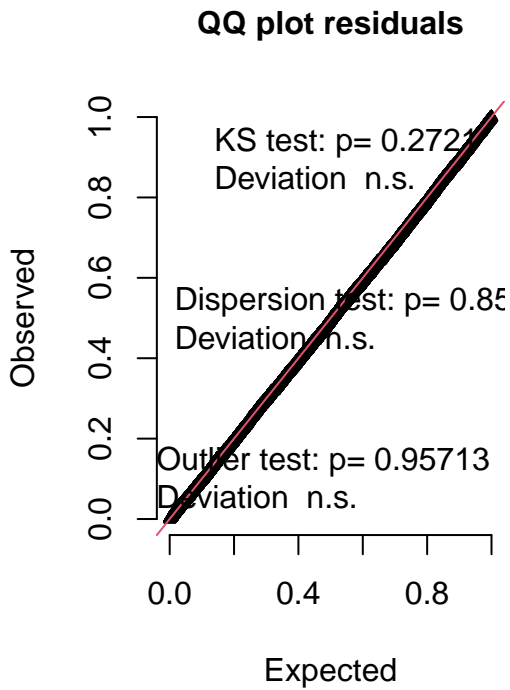
Model predictions (rank transformed)
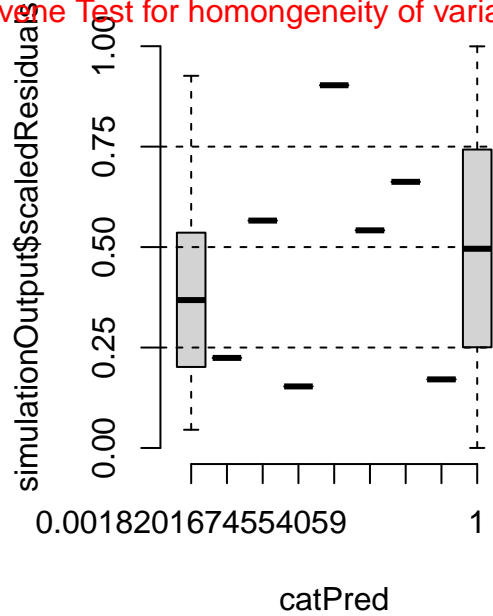
Model estimates and residuals for fushan


```
## MODEL INFO:
## Observations: 10961
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2676.63, BIC = 2713.14
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.32
##
## FIXED EFFECTS:
## ------------------------------------------------
##                     Est.    S.E.    z val.      p
## ----------------- ------- ------ -------- ------
## (Intercept)        -4.11    0.23   -17.61   0.00
## var.x1             -2.73    2.49    -1.09   0.27
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter     Std. Dev.
## ----------------- ------------- -----------
##  species.grouping  (Intercept)       1.23
##  species.grouping     var.x1         5.13
```

126

```
## ----------------------------------------------
##
## Grouping variables:
## -----------------------------------
##      Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping    64       0.31
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.2721
Deviation n.s.

Dispersion test: p= 0.85
Deviation n.s.

Outlier test: p= 0.95713
Deviation n.s.

Observed / Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance signi

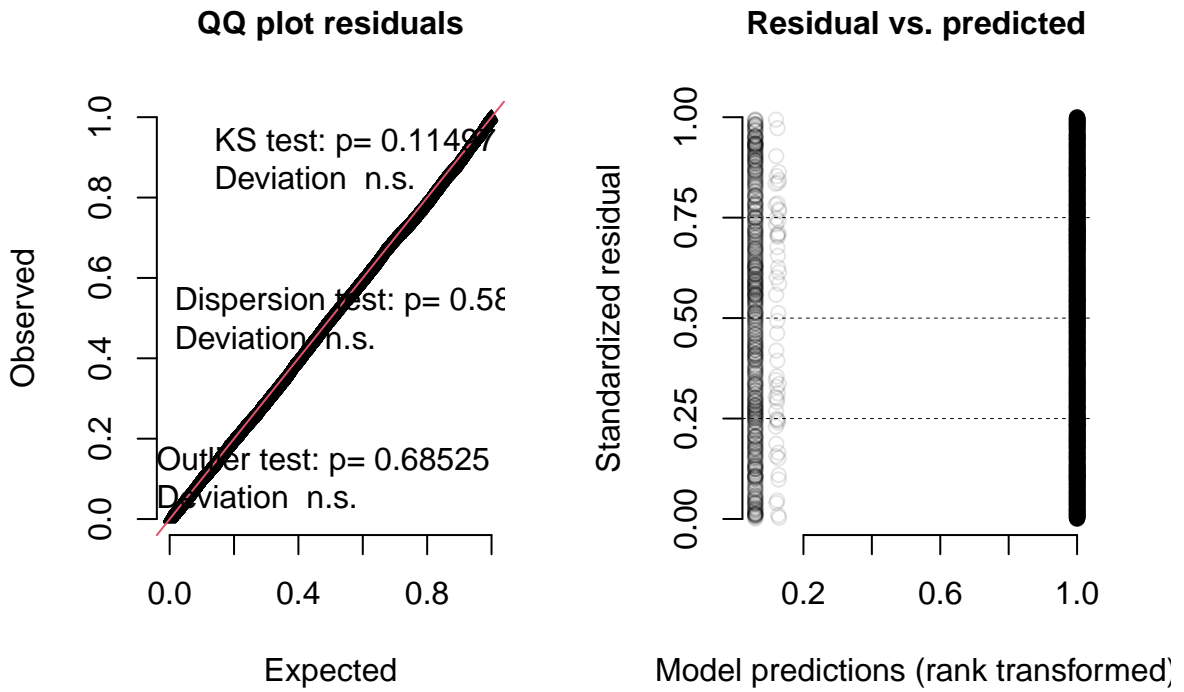simulationOutput$scaledResiduals

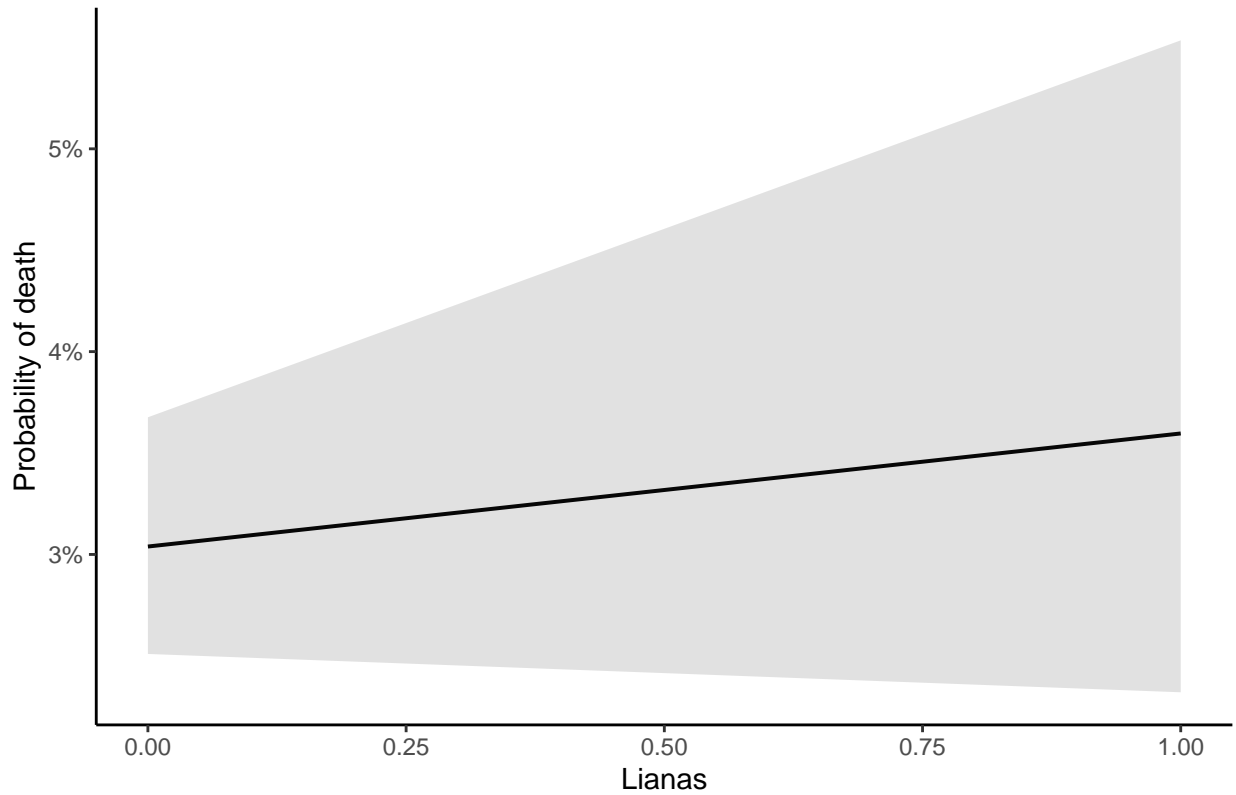catPred

Model estimates and residuals for hkk
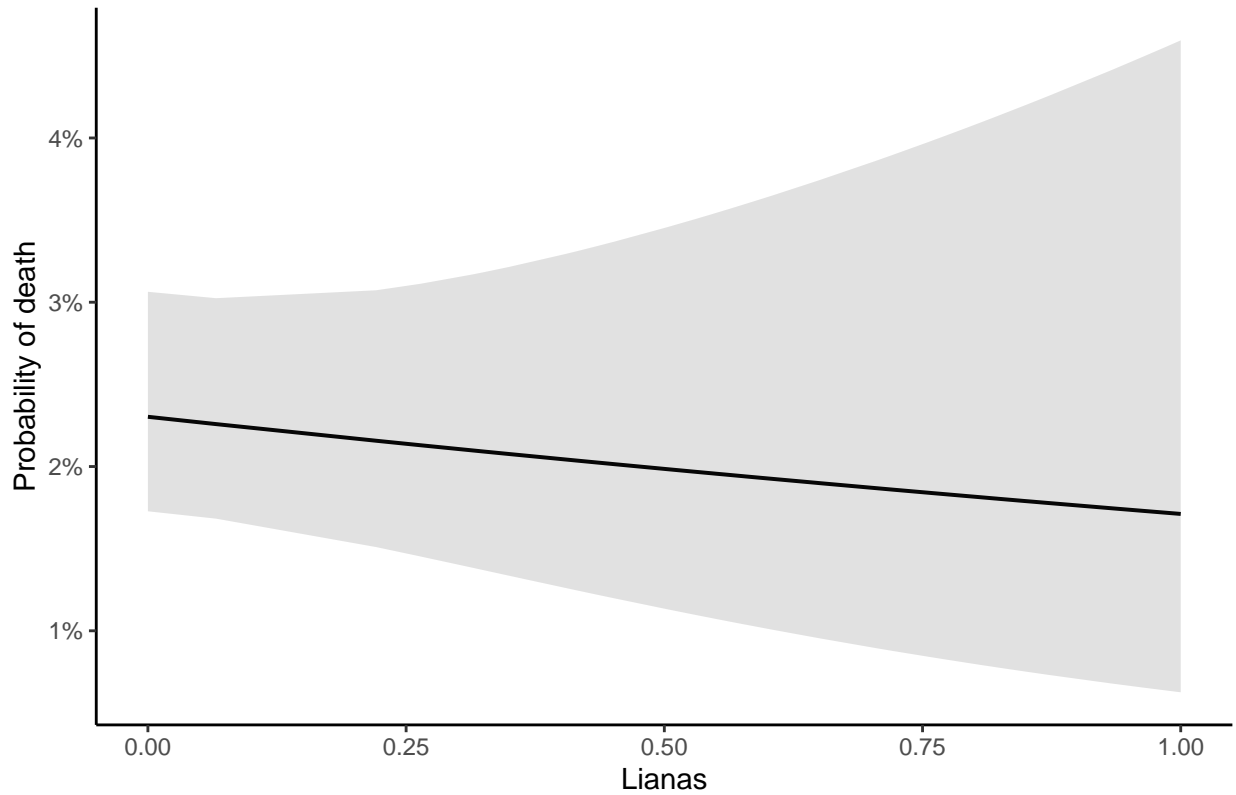

```
## MODEL INFO:
## Observations: 9451
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2490.13, BIC = 2525.90
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.26
##
## FIXED EFFECTS:
## ------------------------------------------------
##                     Est.    S.E.   z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -3.75    0.15   -25.04   0.00
## var.x1             -0.30    0.50    -0.61   0.54
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##      Group         Parameter    Std. Dev.
## ---------------- ------------- ----------
##  species.grouping  (Intercept)     1.02
##  species.grouping    var.x1        0.55
```

```
## ---------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group        # groups   ICC
## ------------------ ---------- ------
##  species.grouping     202     0.24
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.11487
Deviation n.s.

Dispersion test: p= 0.58
Deviation n.s.

Outlier test: p= 0.68525
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual
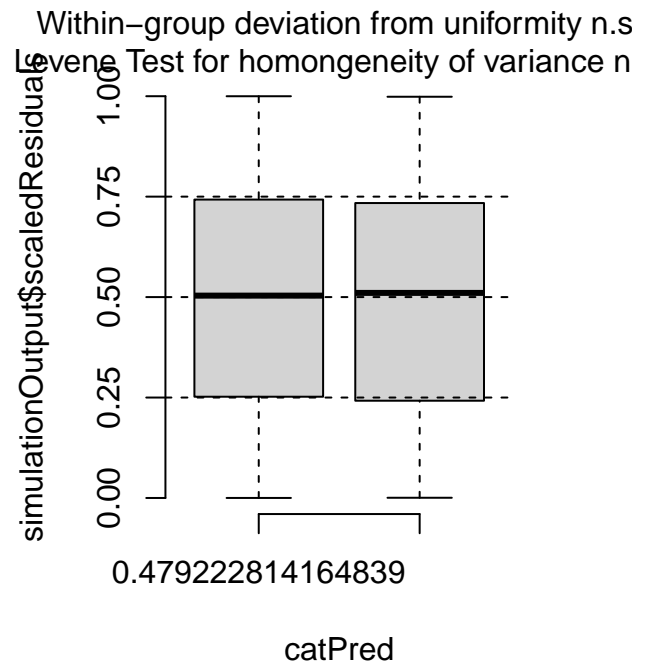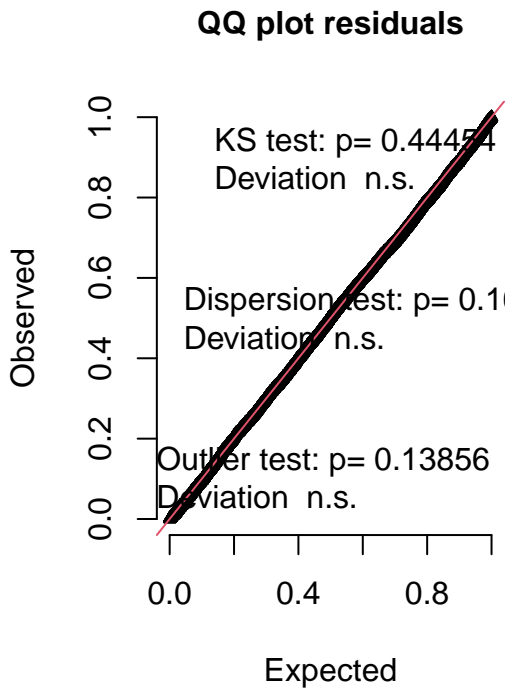
Model predictions (rank transformed)

Model estimates and residuals for kc


```
## MODEL INFO:
## Observations: 8309
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2461.48, BIC = 2496.60
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.15
##
## FIXED EFFECTS:
## ------------------------------------------------
##                      Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -3.46    0.10   -34.45   0.00
## var.x1              0.17    0.26     0.68   0.50
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter     Std. Dev.
## ---------------- ------------- ----------
##  species.grouping  (Intercept)     0.79
##  species.grouping    var.x1        1.00
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##      Group         # groups   ICC
## -----------------  ----------  ------
##  species.grouping     379      0.16
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

Observed

KS test: p= 0.44454
Deviation n.s.

Dispersion test: p= 0.1
Deviation n.s.

Outlier test: p= 0.13856
Deviation n.s.

Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance n

simulationOutput$scaledResiduals

0.479222814164839

catPred
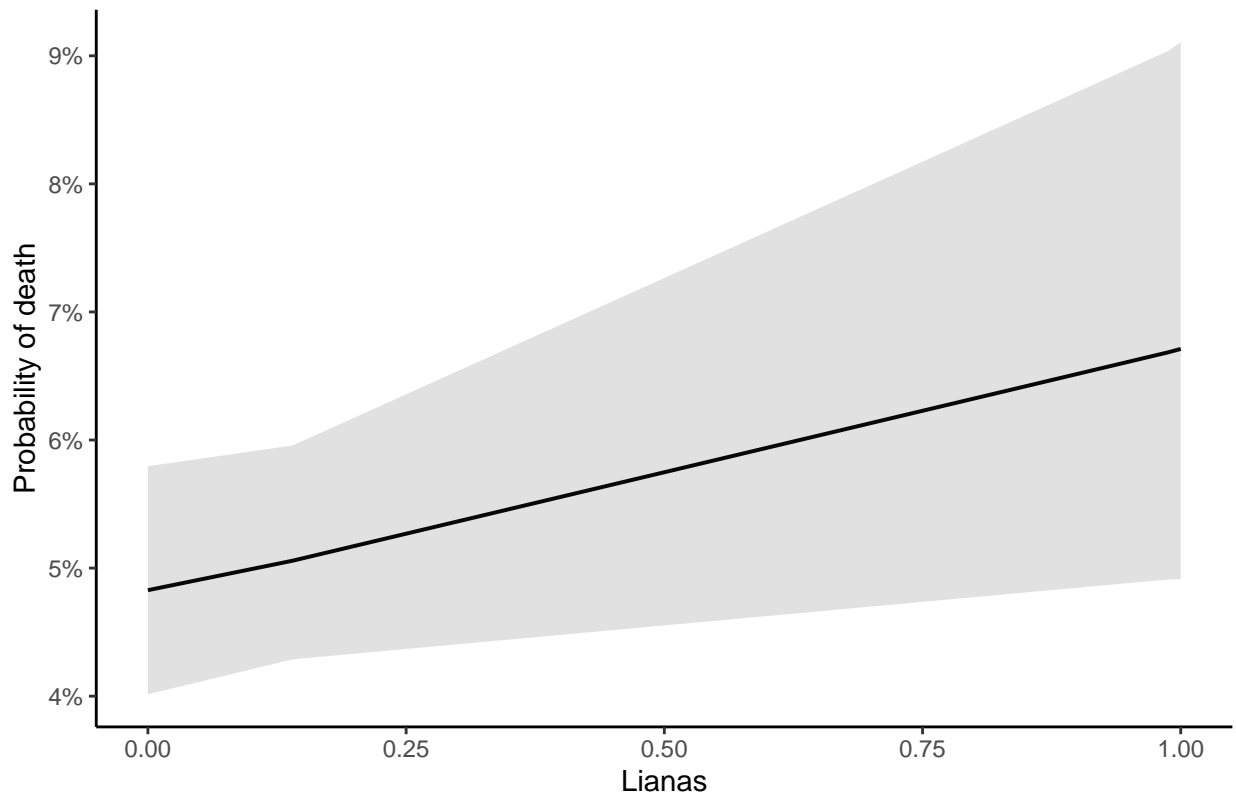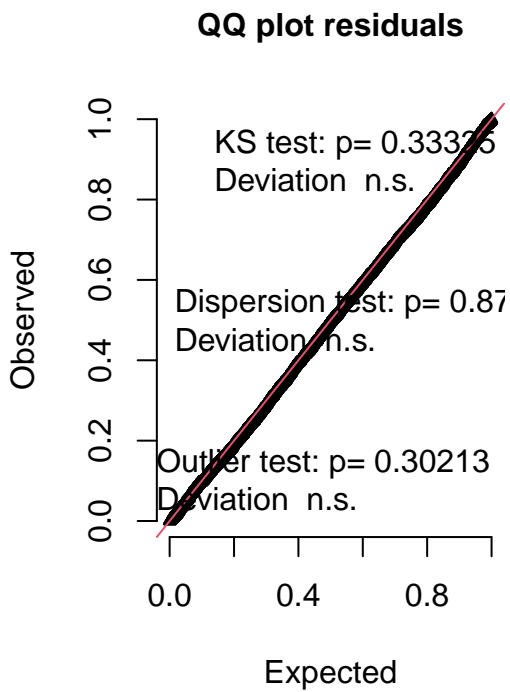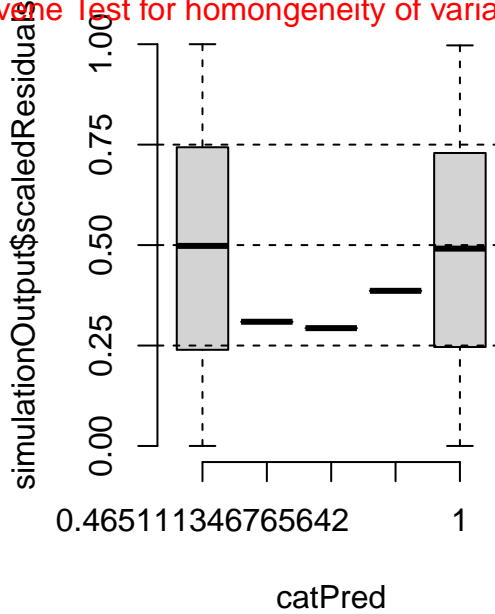
Model estimates and residuals for pasoh


```
## MODEL INFO:
## Observations: 5041
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2195.19, BIC = 2227.82
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.10
##
## FIXED EFFECTS:
## -------------------------------------------------
##                     Est.    S.E.    z val.      p
## ----------------- ------- ------ -------- ------
## (Intercept)        -2.98    0.10   -30.28   0.00
## var.x1              0.35    0.19     1.81   0.07
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)      0.61
##  species.grouping    var.x1         0.34
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group         # groups   ICC
## ----------------- ---------- ------
##  species.grouping     477      0.10
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.33323
Deviation n.s.

Dispersion test: p= 0.87
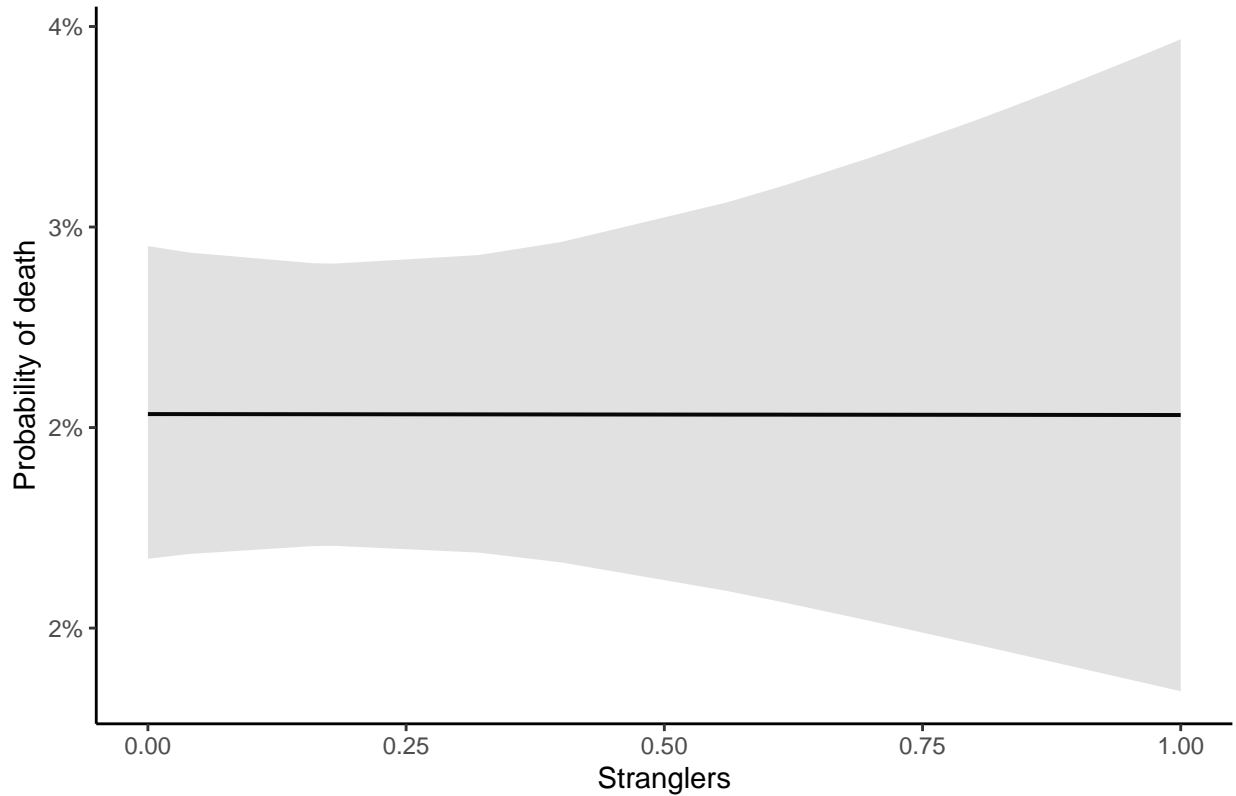Deviation n.s.

Outlier test: p= 0.30213
Deviation n.s.

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance signi

Site-specific mortality model for condition: Stranglers

Model estimates and residuals for amacayacu


```
## MODEL INFO:
## Observations: 12833
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 3217.16, BIC = 3254.46
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.07
##
## FIXED EFFECTS:
## ---------------------------------------------------
##                    Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)        -3.65    0.08   -45.47    0.00
## var.x1             -0.00    0.18    -0.01    1.00
## ---------------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##      Group         Parameter      Std. Dev.
```

```
## ------------------ ------------- -----------
##  species.grouping   (Intercept)      0.52
##  species.grouping      var.x1        0.30
## --------------------------------------------
##
## Grouping variables:
## ----------------------------------
##      Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping    697      0.08
## ----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.10273
Deviation n.s.

Dispersion test: p= 0.62
Deviation n.s.

Outlier test: p= 0.69114
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)
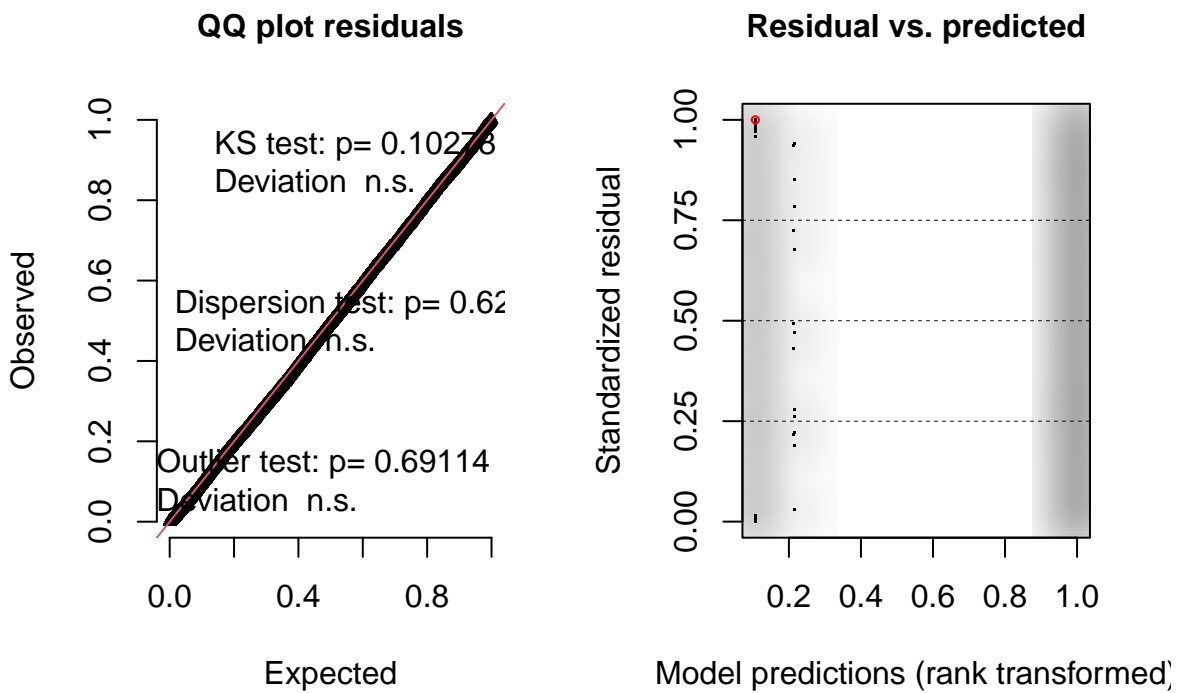
Model estimates and residuals for bci
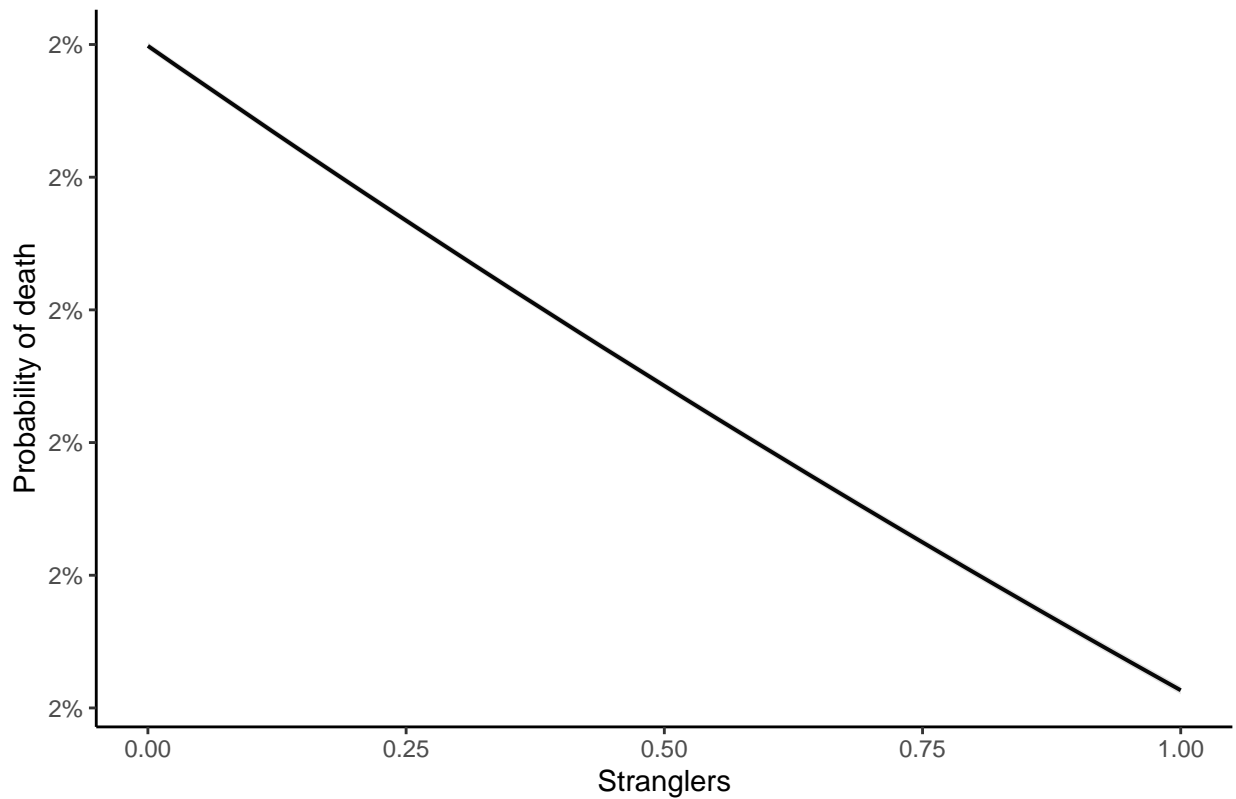

```
## MODEL INFO:
## Observations: 21931
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 5288.37, BIC = 5328.35
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.16
##
## FIXED EFFECTS:
## ------------------------------------------------------
##                        Est.    S.E.     z val.      p
## ---------------- ------- ------ ---------- ------
## (Intercept)            -3.71    0.00   -6337.93    0.00
## var.x1                 -0.23    0.00    -395.56    0.00
## ------------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##      Group          Parameter     Std. Dev.
## ------------------ ------------- ----------
##  species.grouping   (Intercept)     0.79
##  species.grouping     var.x1        0.15
```
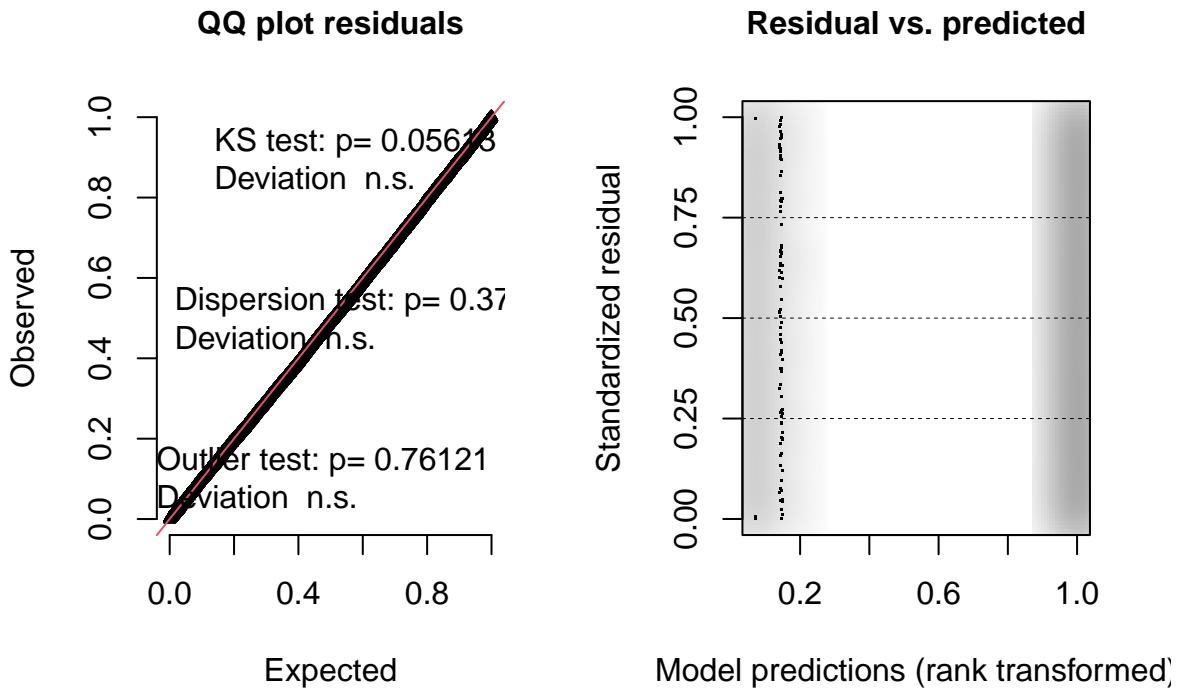
136

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##        Group        # groups   ICC
## ------------------  ---------- ------
## species.grouping      220      0.16
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.056
Deviation n.s.

Dispersion test: p= 0.37
Deviation n.s.

Outlier test: p= 0.76121
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Model estimates and residuals for fushan
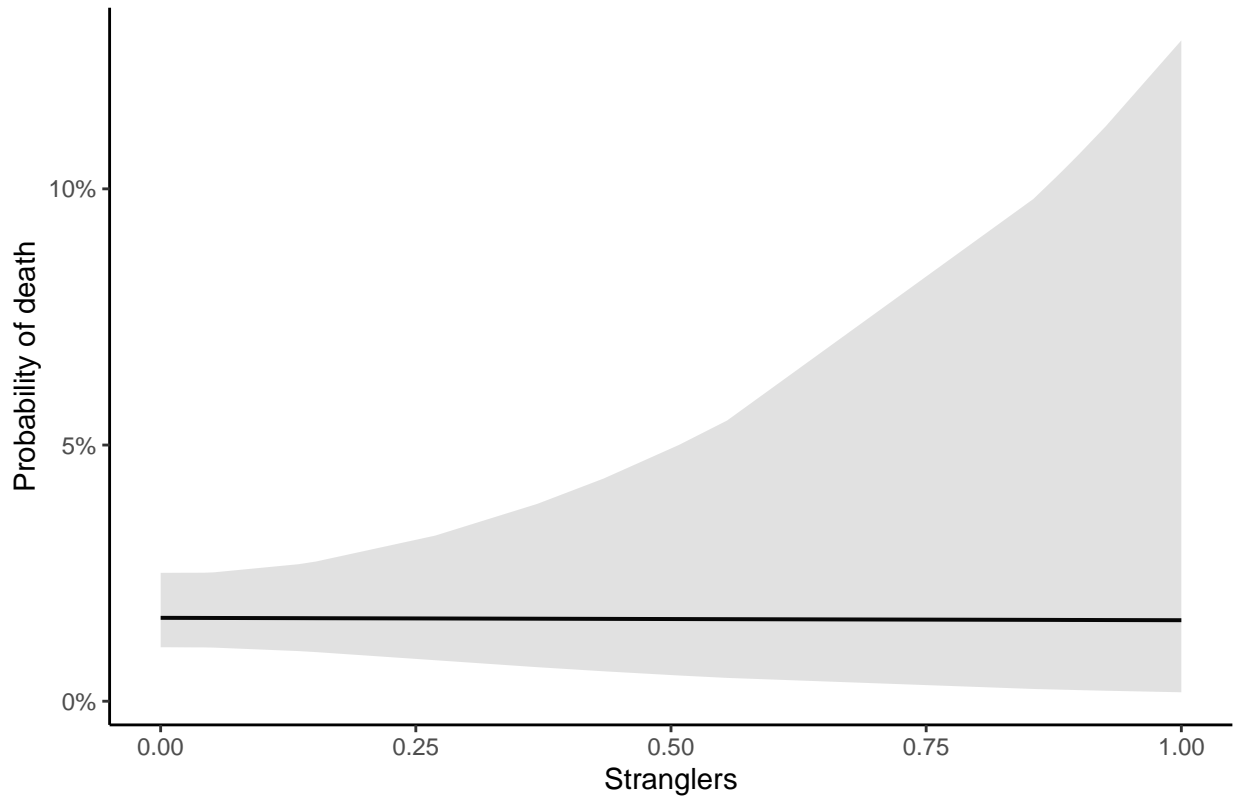

```
## MODEL INFO:
## Observations: 10961
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2678.38, BIC = 2714.89
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.31
##
## FIXED EFFECTS:
## -------------------------------------------------
##                      Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)          -4.10    0.22   -18.24   0.00
## var.x1               -0.03    1.13    -0.03   0.98
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group          Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping   (Intercept)      1.22
##  species.grouping      var.x1        0.44
```
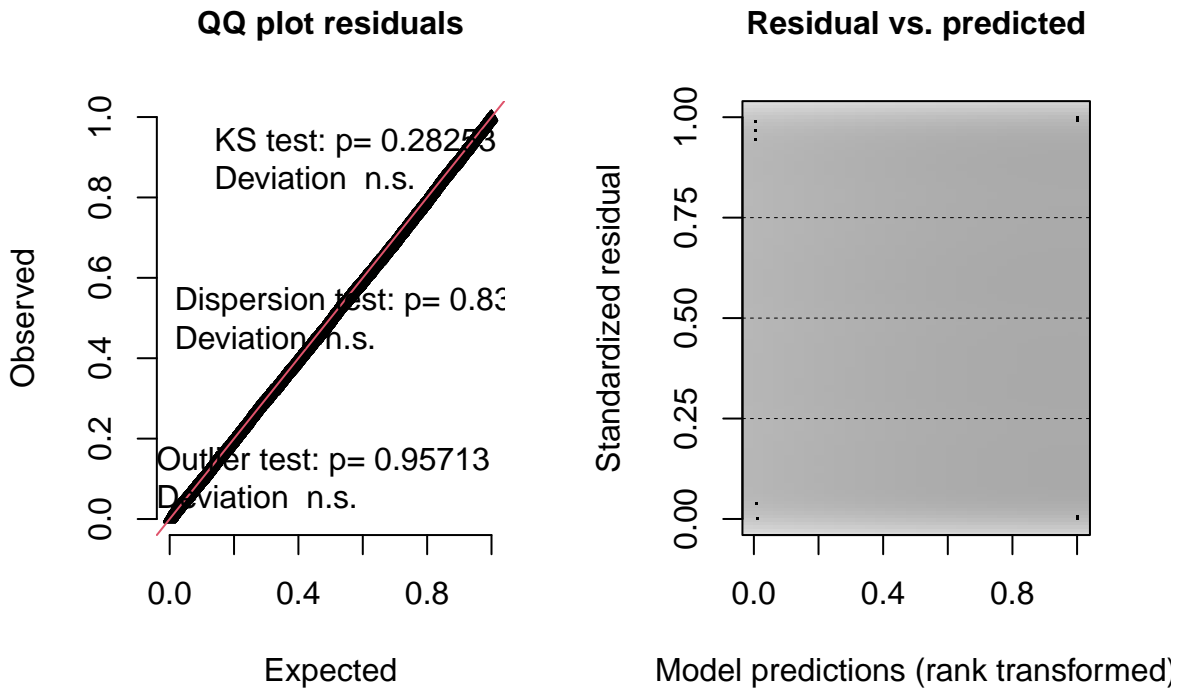
```
## ---------------------------------------------
##
## Grouping variables:
## ------------------------------------
##        Group        # groups   ICC
## ------------------ ---------- ------
##  species.grouping      64      0.31
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.28253
Deviation n.s.

Dispersion test: p= 0.83
Deviation n.s.

Outlier test: p= 0.95713
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Model estimates and residuals for hkk
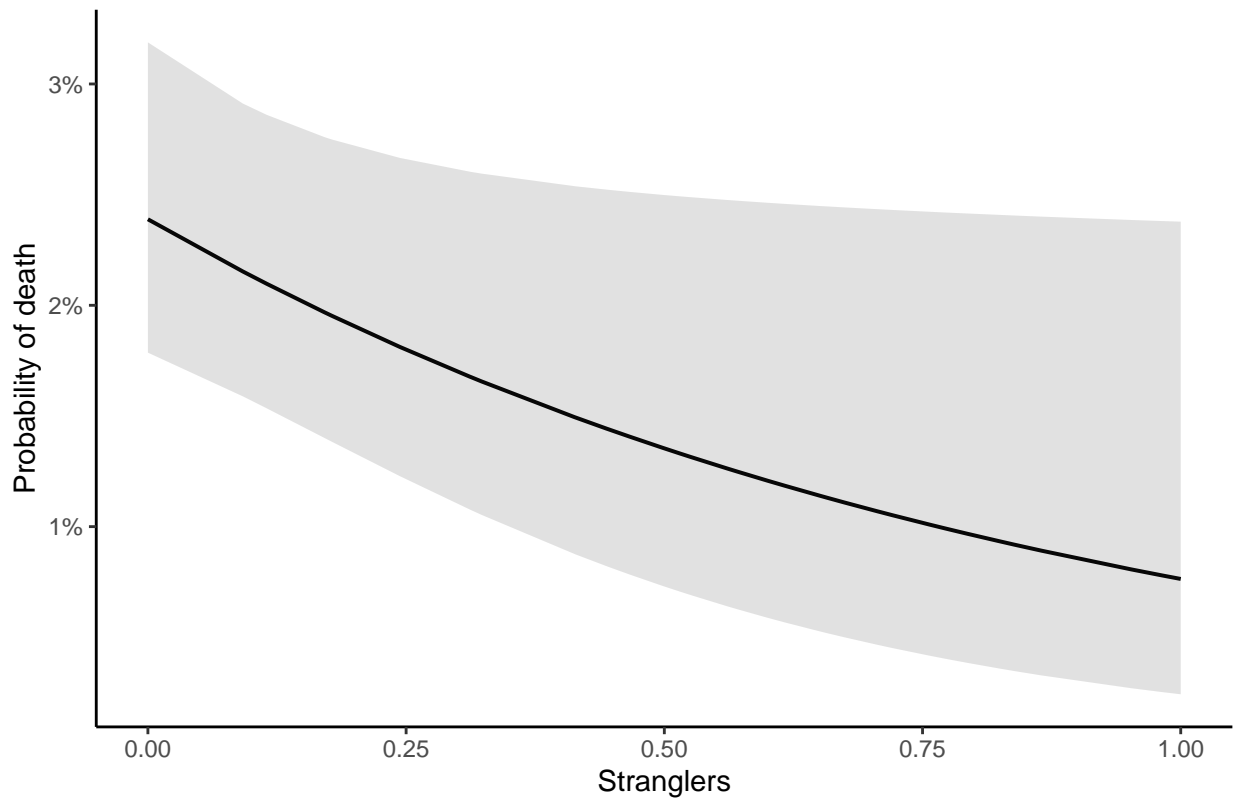

```
## MODEL INFO:
## Observations: 9451
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2481.59, BIC = 2517.36
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.27
##
## FIXED EFFECTS:
## -------------------------------------------------
##                     Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)         -3.71    0.15   -24.49    0.00
## var.x1              -1.16    0.58    -2.01    0.04
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group          Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping   (Intercept)      1.04
##  species.grouping     var.x1         0.24
```
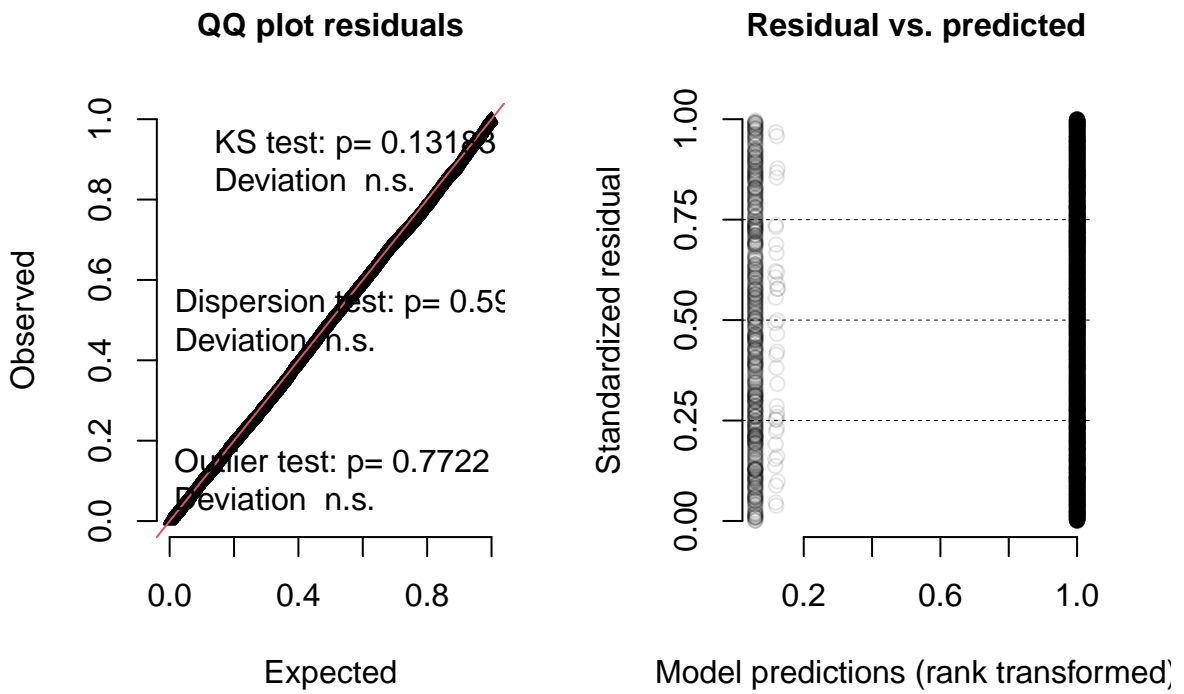
```
## -------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     202     0.25
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.13188
Deviation n.s.

Dispersion test: p= 0.59
Deviation n.s.

Outlier test: p= 0.7722
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Model estimates and residuals for kc
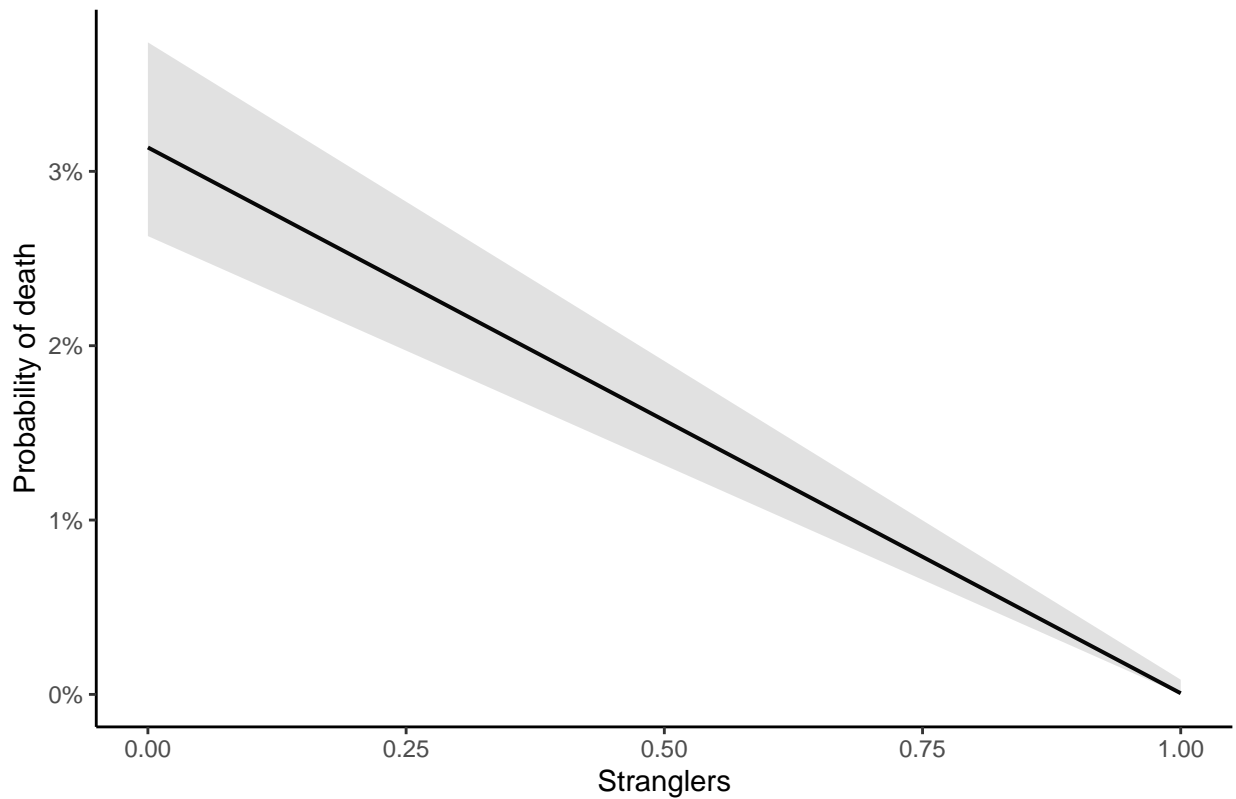

```
## MODEL INFO:
## Observations: 8309
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2458.51, BIC = 2493.64
## Pseudo-R² (fixed effects) = 0.13
## Pseudo-R² (total) = 0.63
##
## FIXED EFFECTS:
## -------------------------------------------------
##                      Est.    S.E.   z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)         -3.43    0.09   -36.92   0.00
## var.x1              -6.21    1.31    -4.75   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group         Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     0.69
##  species.grouping    var.x1        11.20
```
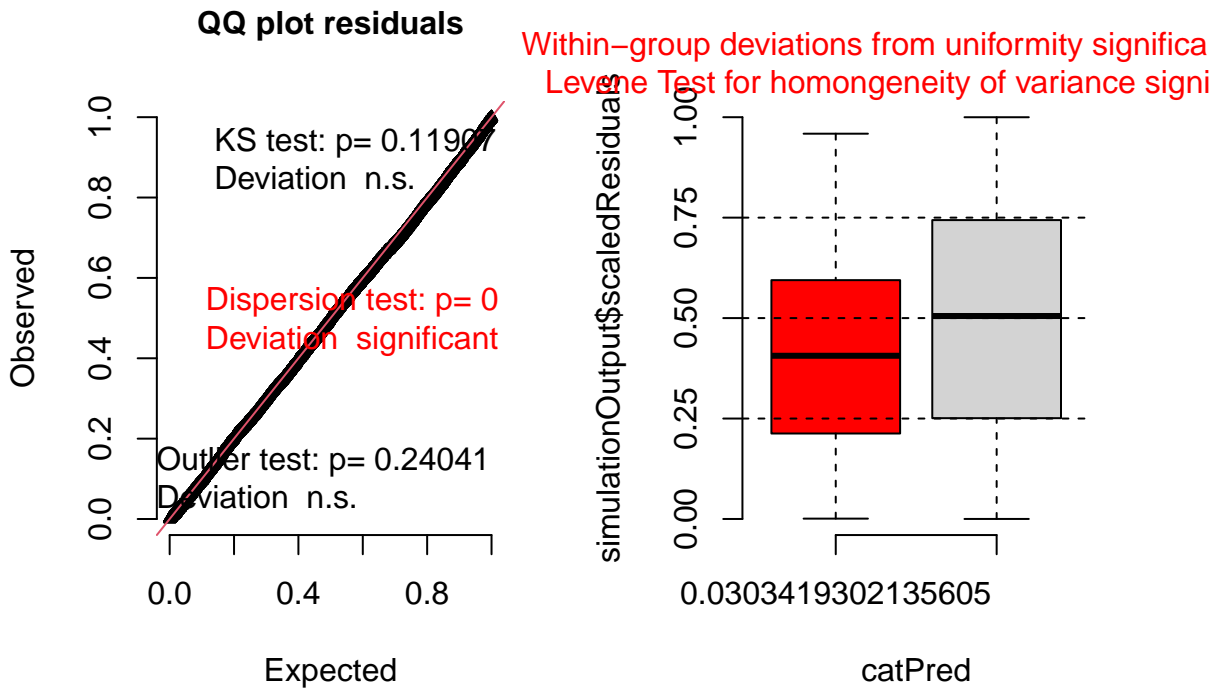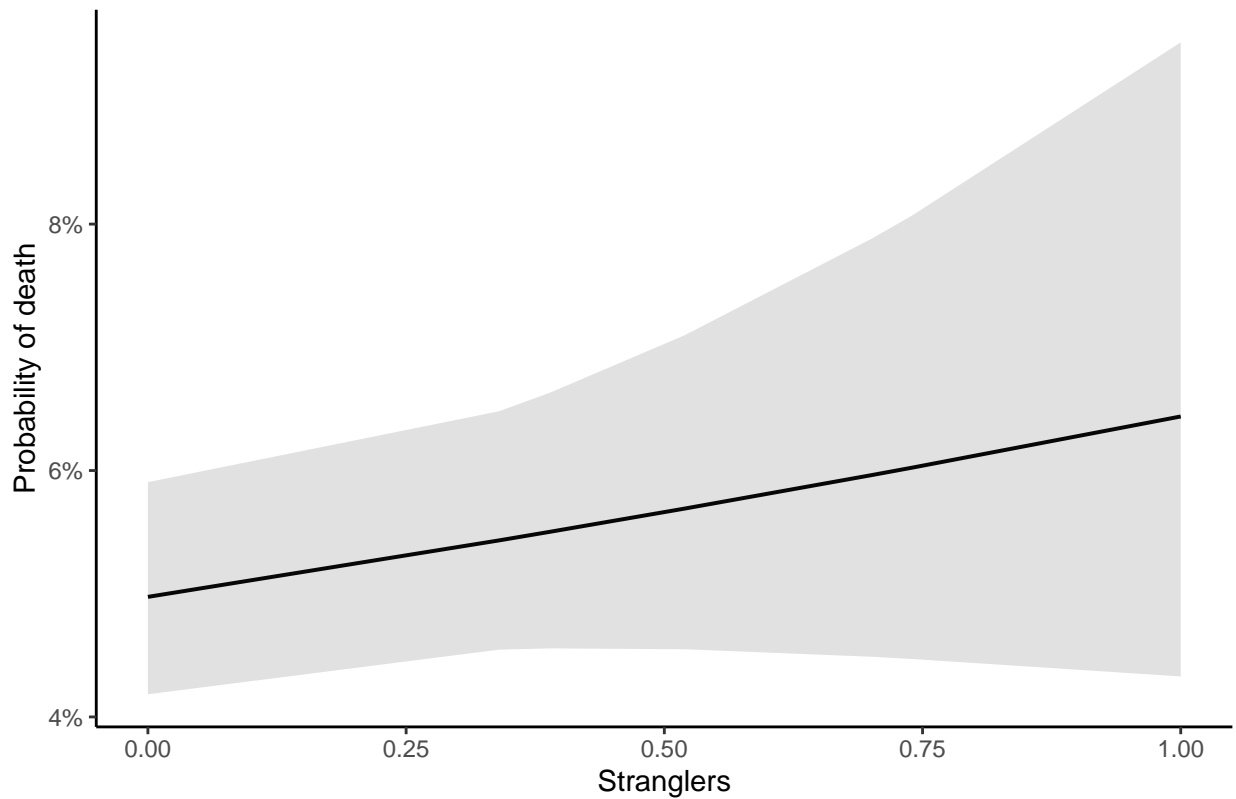
142

```
## -----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##        Group          # groups   ICC
## ------------------ ---------- ------
##  species.grouping      379      0.13
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.11907
Deviation n.s.

Dispersion test: p= 0
Deviation significant

Outlier test: p= 0.24041
Deviation n.s.

Observed

Expected

Within−group deviations from uniformity significa
Levene Test for homongeneity of variance signi

simulationOutput$scaledResiduals
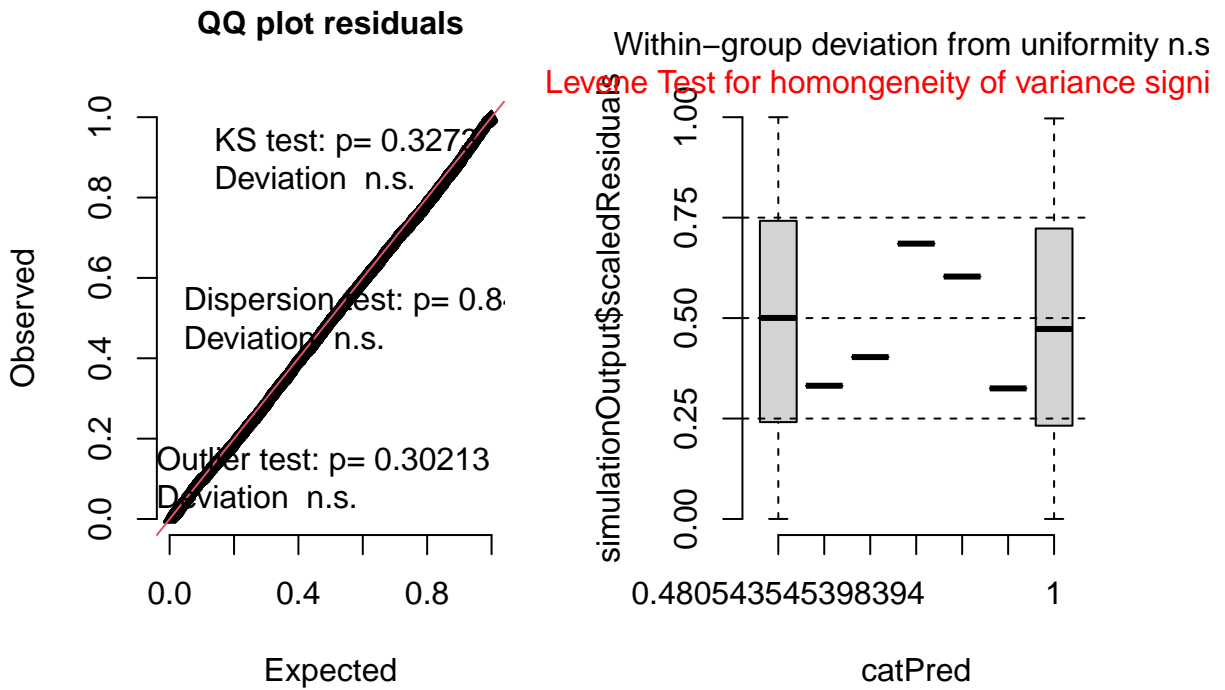
0.0303419302135605

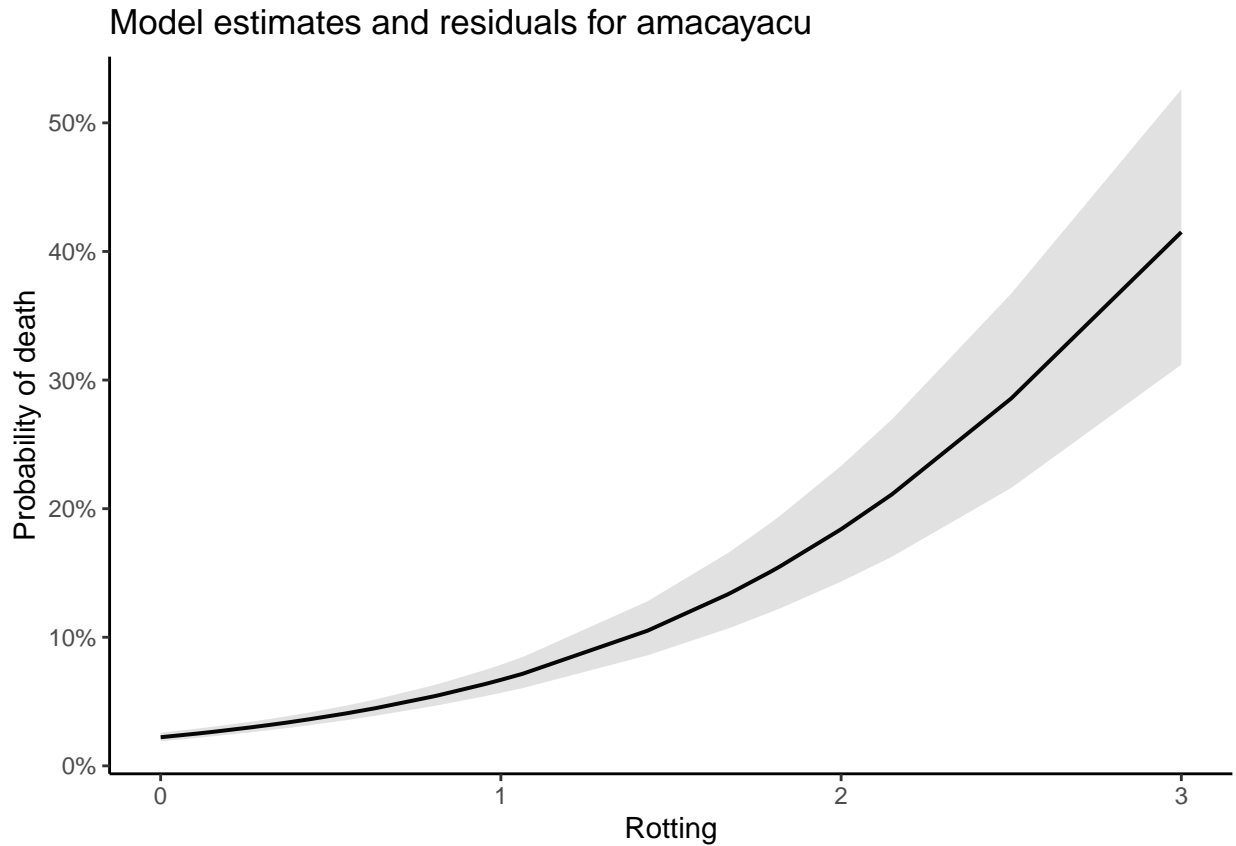catPred

Model estimates and residuals for pasoh


```
## MODEL INFO:
## Observations: 5041
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2196.30, BIC = 2228.93
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.09
##
## FIXED EFFECTS:
## ------------------------------------------------
##                     Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)        -2.95    0.09   -31.87   0.00
## var.x1              0.27    0.23     1.18   0.24
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group         Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)      0.60
##  species.grouping    var.x1         0.49
```

```
## ------------------------------------------------
##
## Grouping variables:
## ------------------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
## species.grouping     477      0.10
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.3277
Deviation n.s.

Dispersion test: p= 0.8
Deviation n.s.

Outlier test: p= 0.30213
Deviation n.s.

Observed

Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance signi

simulationOutput$scaledResiduals

0.480543545398394   1

catPred

Site-specific mortality model for condition: Rotting
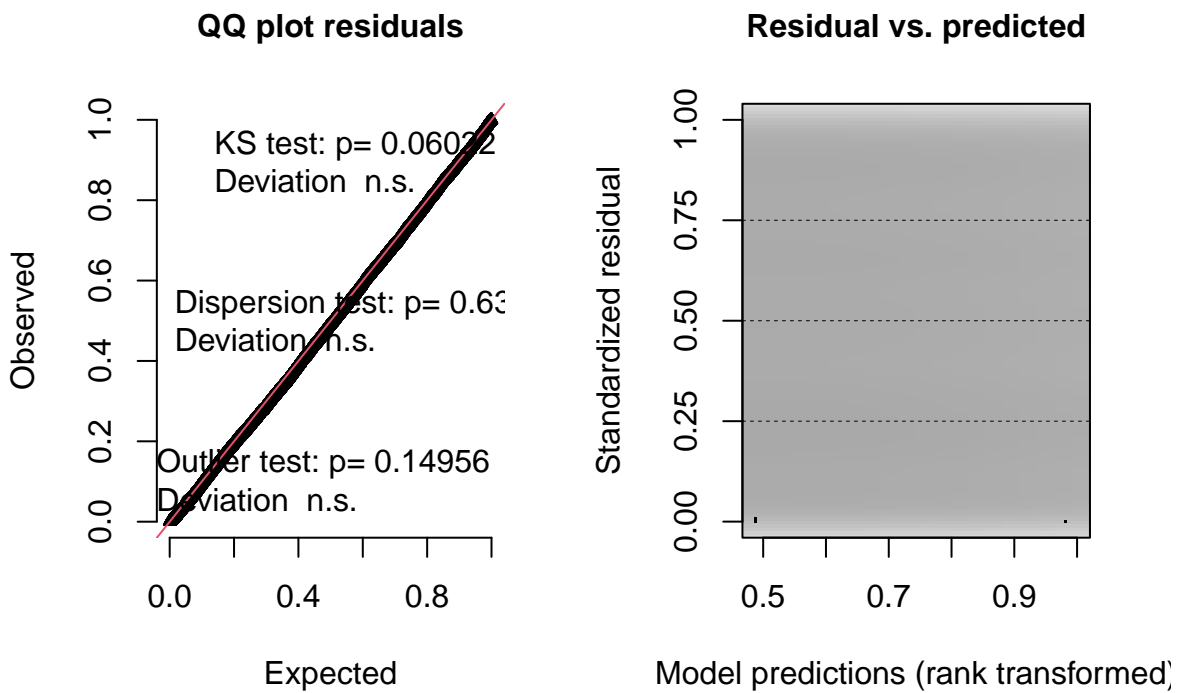
Model estimates and residuals for amacayacu


```
## MODEL INFO:
## Observations: 12834
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 3076.76, BIC = 3114.06
## Pseudo-R² (fixed effects) = 0.03
## Pseudo-R² (total) = 0.09
##
## FIXED EFFECTS:
## ---------------------------------------------------
##                       Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)          -3.78    0.08   -48.51    0.00
## var.x1                1.15    0.08    13.96    0.00
## ---------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter     Std. Dev.
```

```
## ------------------ ------------- -----------
##  species.grouping   (Intercept)     0.49
##  species.grouping      var.x1       0.09
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping    697      0.07
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.06032
Deviation n.s.

Dispersion test: p= 0.63
Deviation n.s.

Outlier test: p= 0.14956
Deviation n.s.

Observed / Expected

Residual vs. predicted

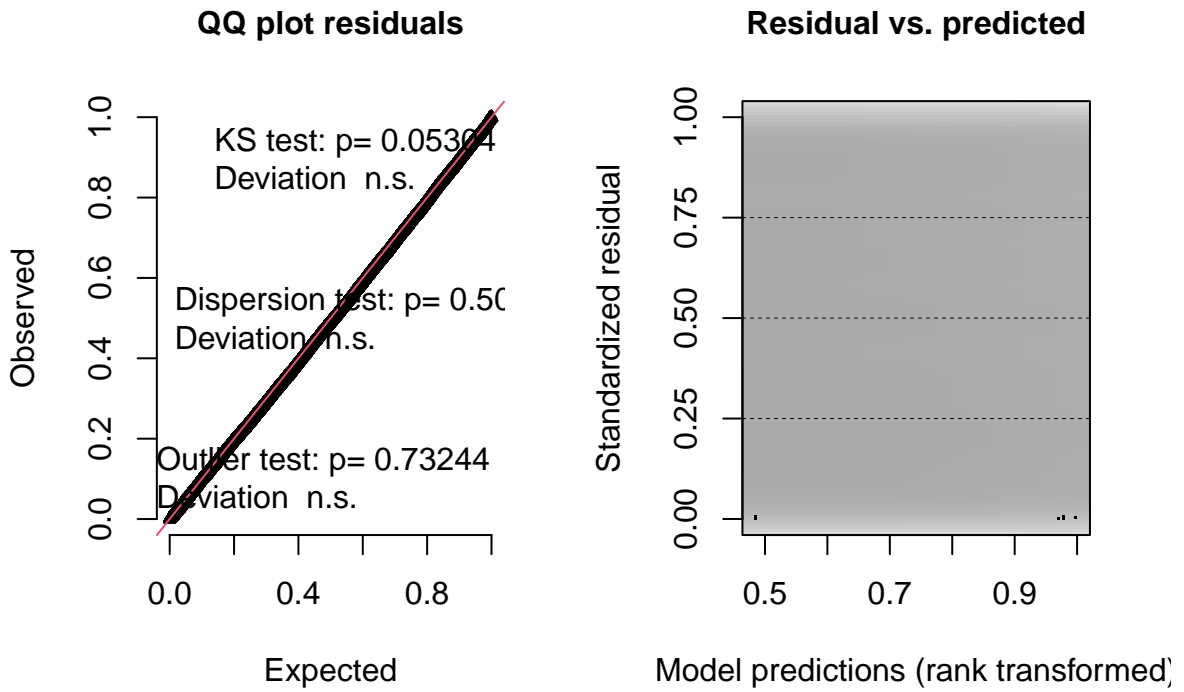Standardized residual / Model predictions (rank transformed)
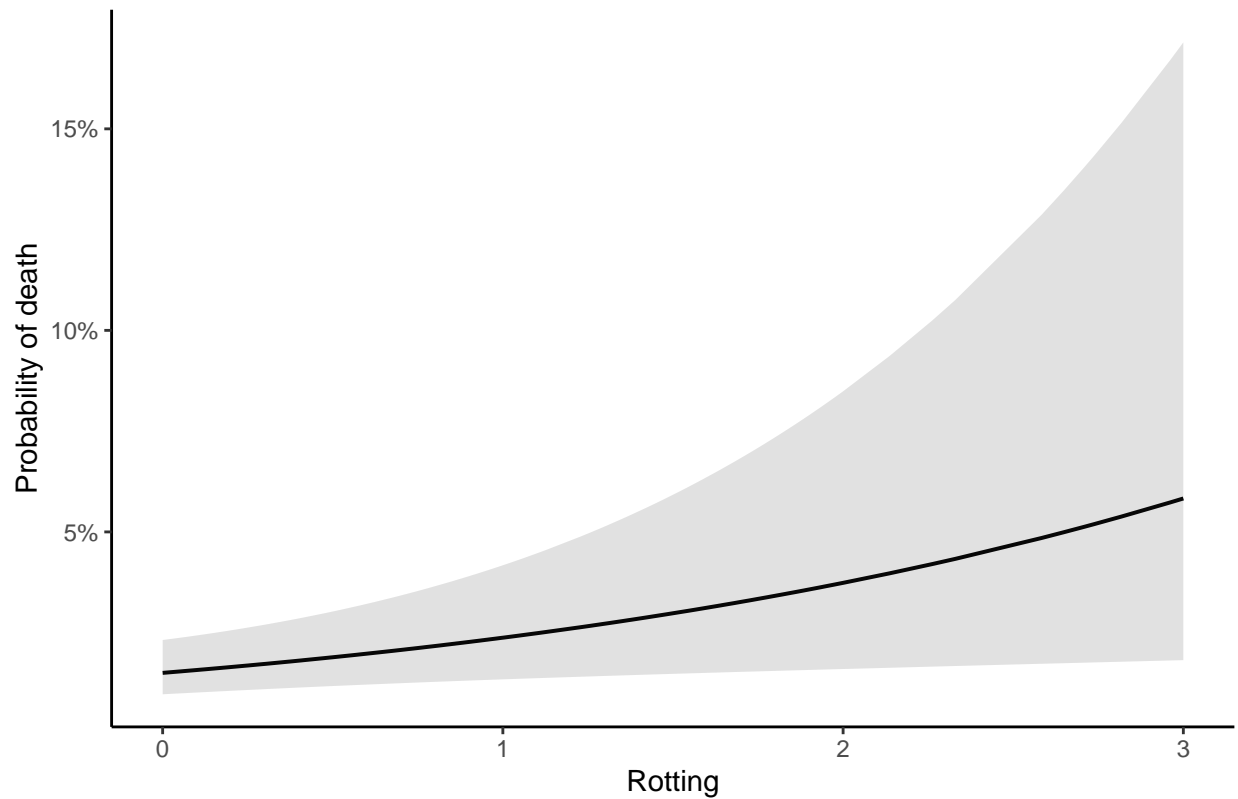
Model estimates and residuals for bci
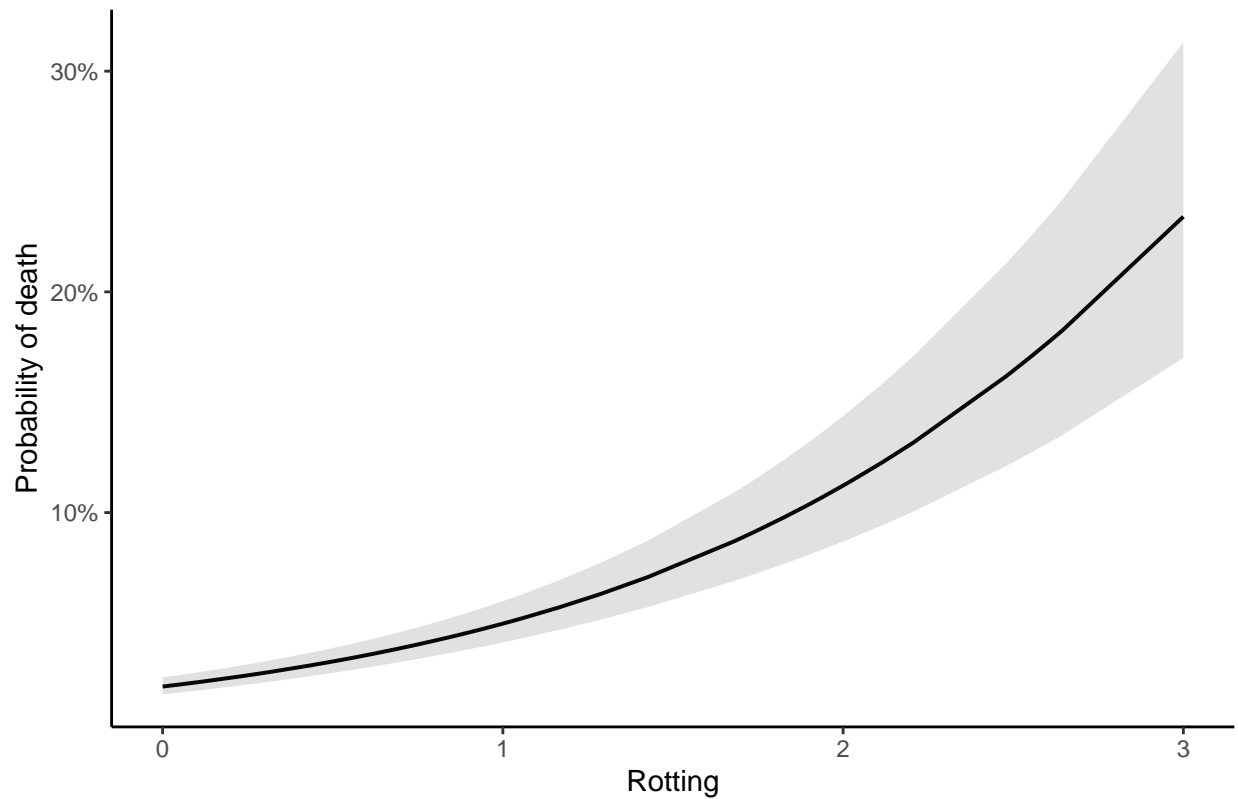

```
## MODEL INFO:
## Observations: 21929
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 5173.10, BIC = 5213.08
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.18
##
## FIXED EFFECTS:
## ------------------------------------------------
##                      Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)         -3.83    0.09   -40.67    0.00
## var.x1               0.88    0.07    12.68    0.00
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter     Std. Dev.
## ----------------- ------------- -----------
##  species.grouping   (Intercept)      0.81
##  species.grouping     var.x1         0.08
```

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     220     0.17
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.05304
Deviation n.s.

Dispersion test: p= 0.50
Deviation n.s.

Outlier test: p= 0.73244
Deviation n.s.

Observed / Expected

Residual vs. predicted

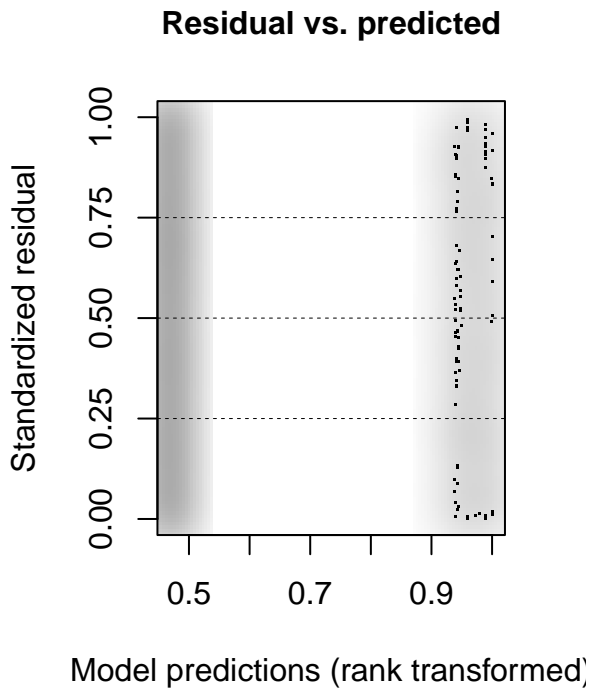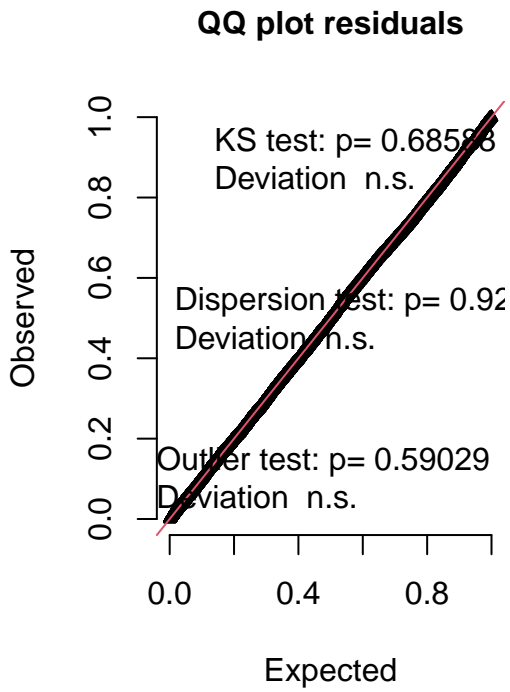Standardized residual / Model predictions (rank transformed)
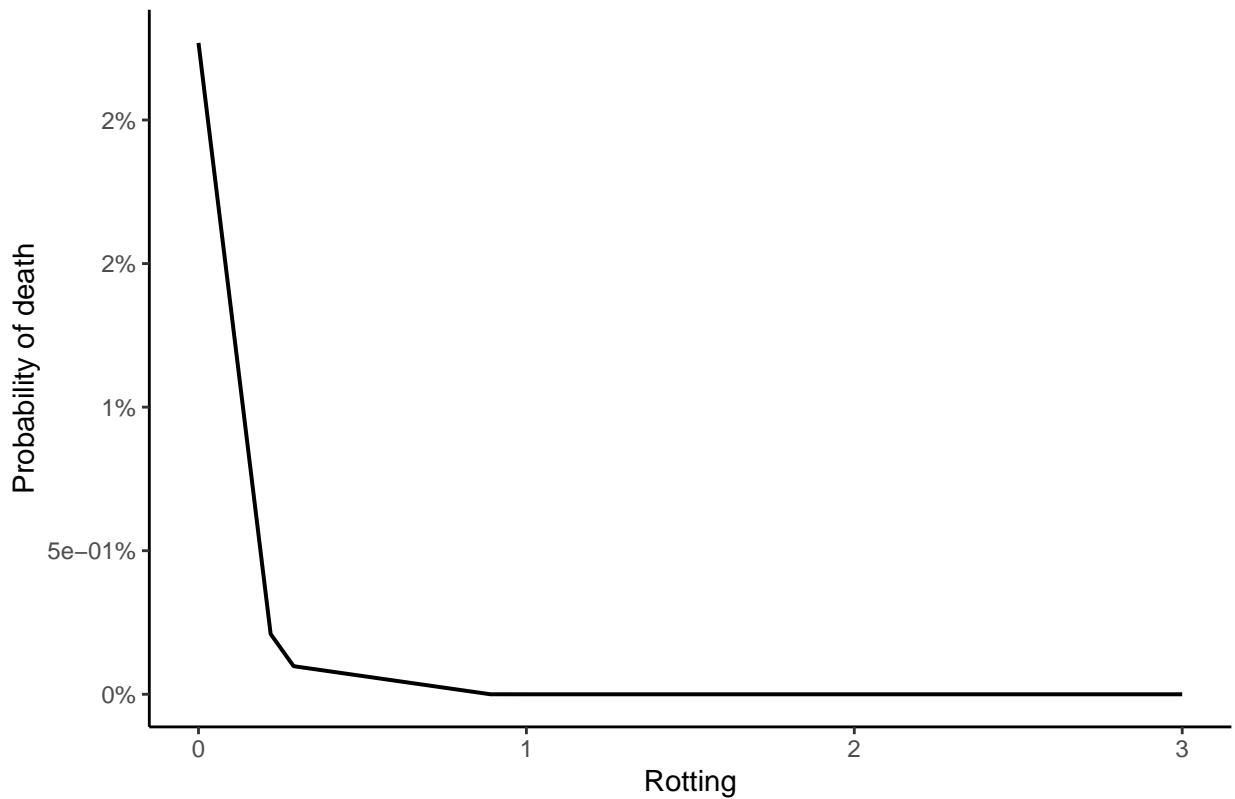
Model estimates and residuals for fushan


```
## MODEL INFO:
## Observations: 10929
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2502.73, BIC = 2539.23
## Pseudo-R² (fixed effects) = 0.01
## Pseudo-R² (total) = 0.30
##
## FIXED EFFECTS:
## ------------------------------------------------
##                    Est.   S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)       -4.18   0.23   -18.55   0.00
## var.x1             0.47   0.19     2.46   0.01
## ------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##      Group         Parameter     Std. Dev.
## ----------------- ------------- -----------
##  species.grouping  (Intercept)      1.17
##  species.grouping    var.x1         0.13
```

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     64      0.29
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.68588
Deviation n.s.

Dispersion test: p= 0.92
Deviation n.s.

Outlier test: p= 0.59029
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual
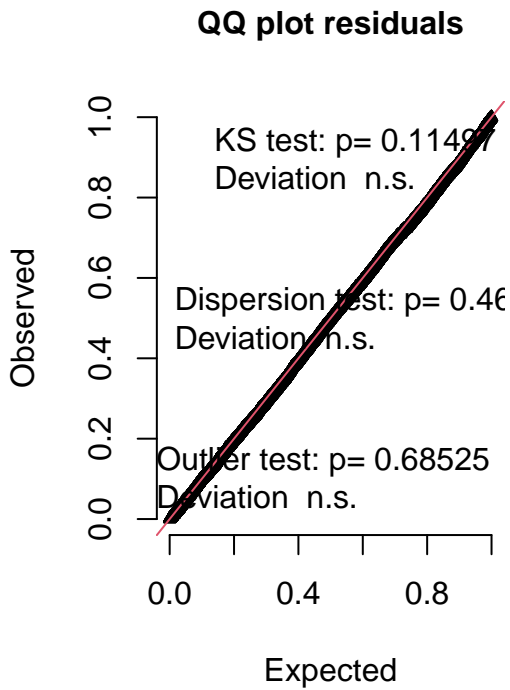
Model predictions (rank transformed)
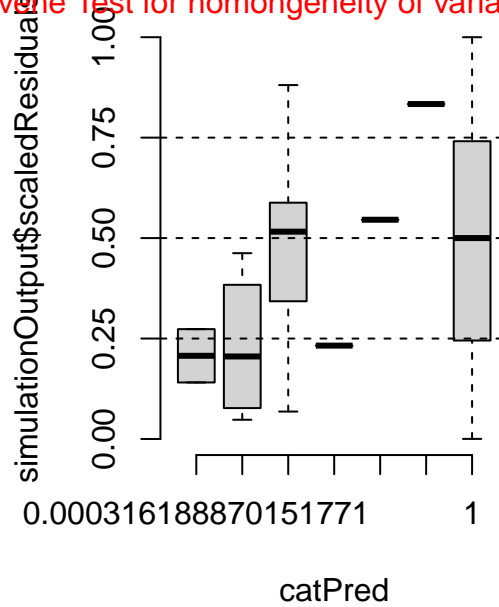
Model estimates and residuals for hkk


```
## MODEL INFO:
## Observations: 9451
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2480.83, BIC = 2516.60
## Pseudo-R² (fixed effects) = 0.09
## Pseudo-R² (total) = 0.64
##
## FIXED EFFECTS:
## -------------------------------------------------------
##                        Est.   S.E.       z val.      p
## ----------------- -------- ------ ----------- ------
## (Intercept)            -3.76   0.00     -8115.20   0.00
## var.x1                -10.91   0.00    -23544.61   0.00
## -------------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter    Std. Dev.
## ----------------- ------------ ----------
##  species.grouping   (Intercept)     1.05
##  species.grouping     var.x1        24.38
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group          # groups   ICC
## ----------------- ---------- ------
##  species.grouping     202      0.25
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.11487
Deviation n.s.

Dispersion test: p= 0.46
Deviation n.s.

Outlier test: p= 0.68525
Deviation n.s.

Observed

Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance signi

simulationOutput$scaledResiduals

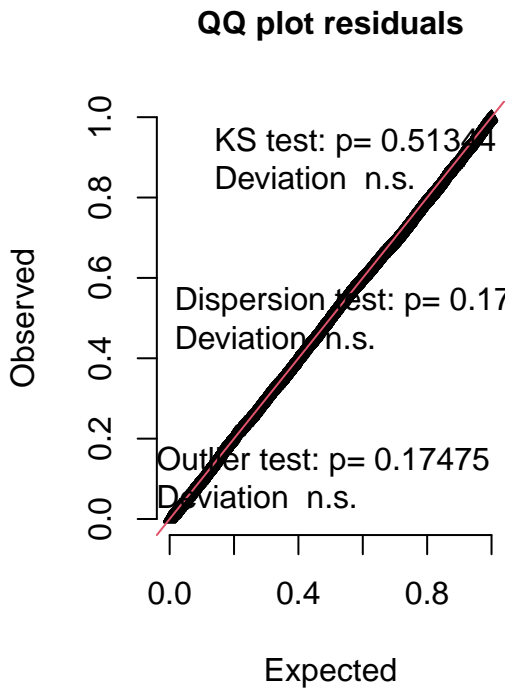0.000316188870151771   1

catPred

Model estimates and residuals for kc
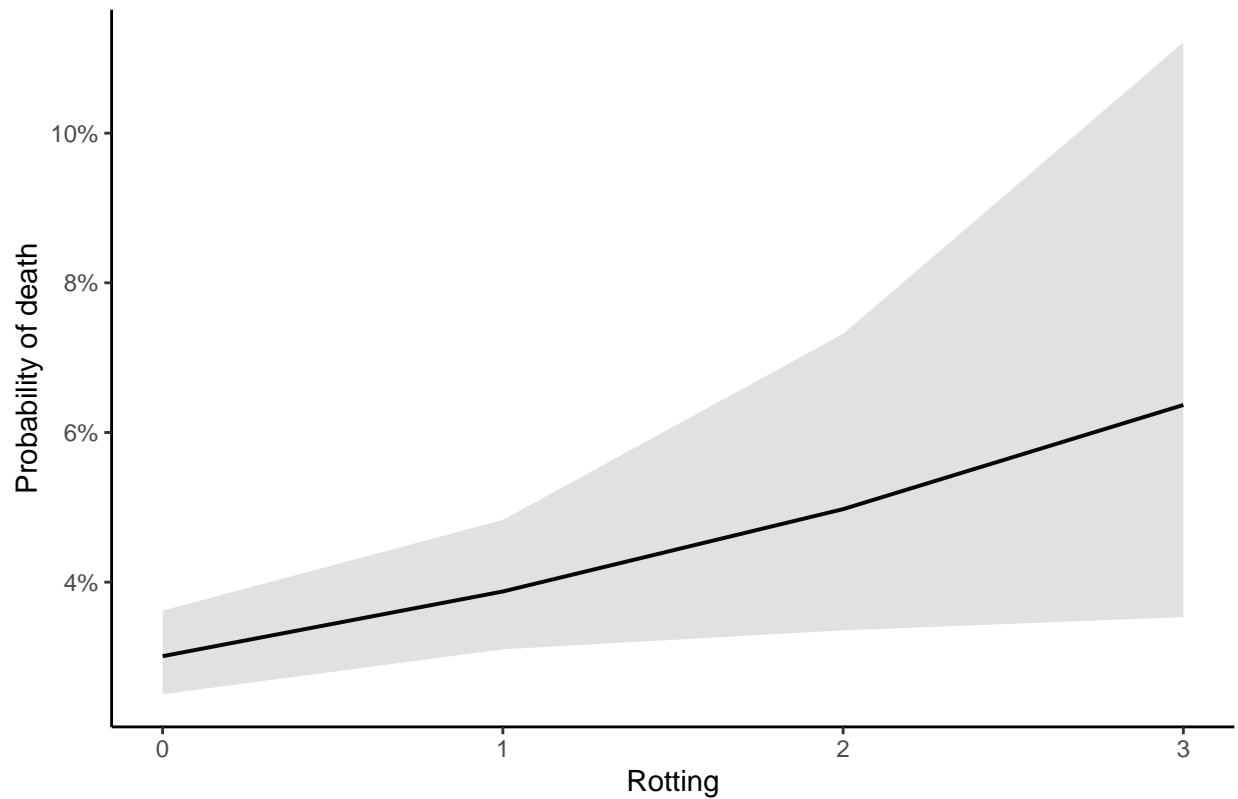
```
## MODEL INFO:
## Observations: 8309
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2461.26, BIC = 2496.39
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.14
##
## FIXED EFFECTS:
## ------------------------------------------------
##                     Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)        -3.47    0.10   -35.72   0.00
## var.x1              0.26    0.11     2.31   0.02
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter    Std. Dev.
## ---------------- ------------- ----------
##  species.grouping  (Intercept)     0.74
##  species.grouping    var.x1        0.34
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group          # groups   ICC
## ------------------   ----------  ------
##   species.grouping      379      0.14
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

Within−group deviations from uniformity significa

Levene Test for homongeneity of variance n

KS test: p= 0.51344
Deviation n.s.

Dispersion test: p= 0.17
Deviation n.s.

Outlier test: p= 0.17475
Deviation n.s.
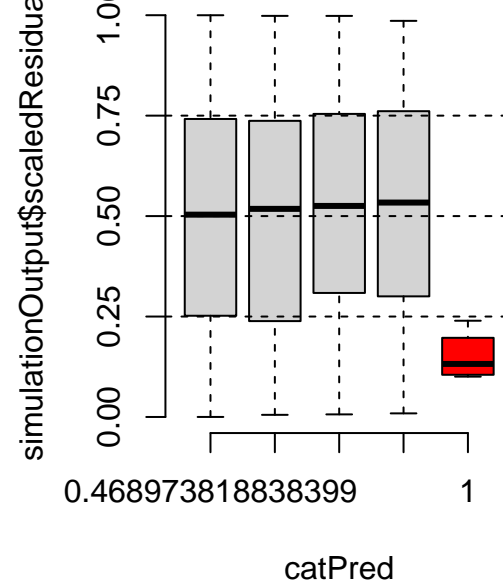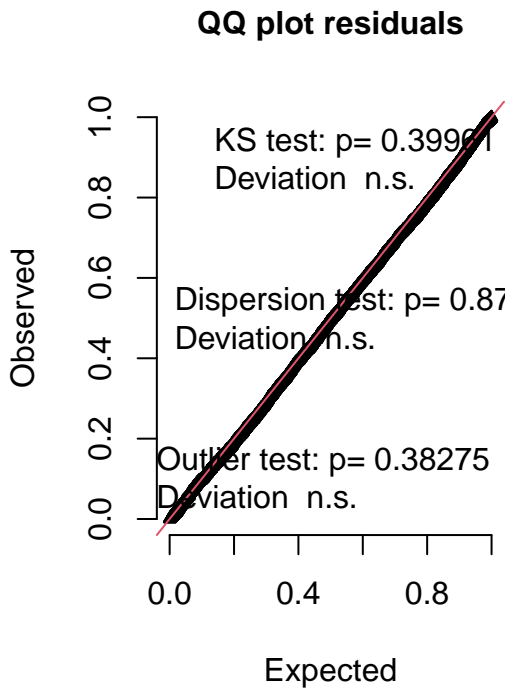
Model estimates and residuals for pasoh
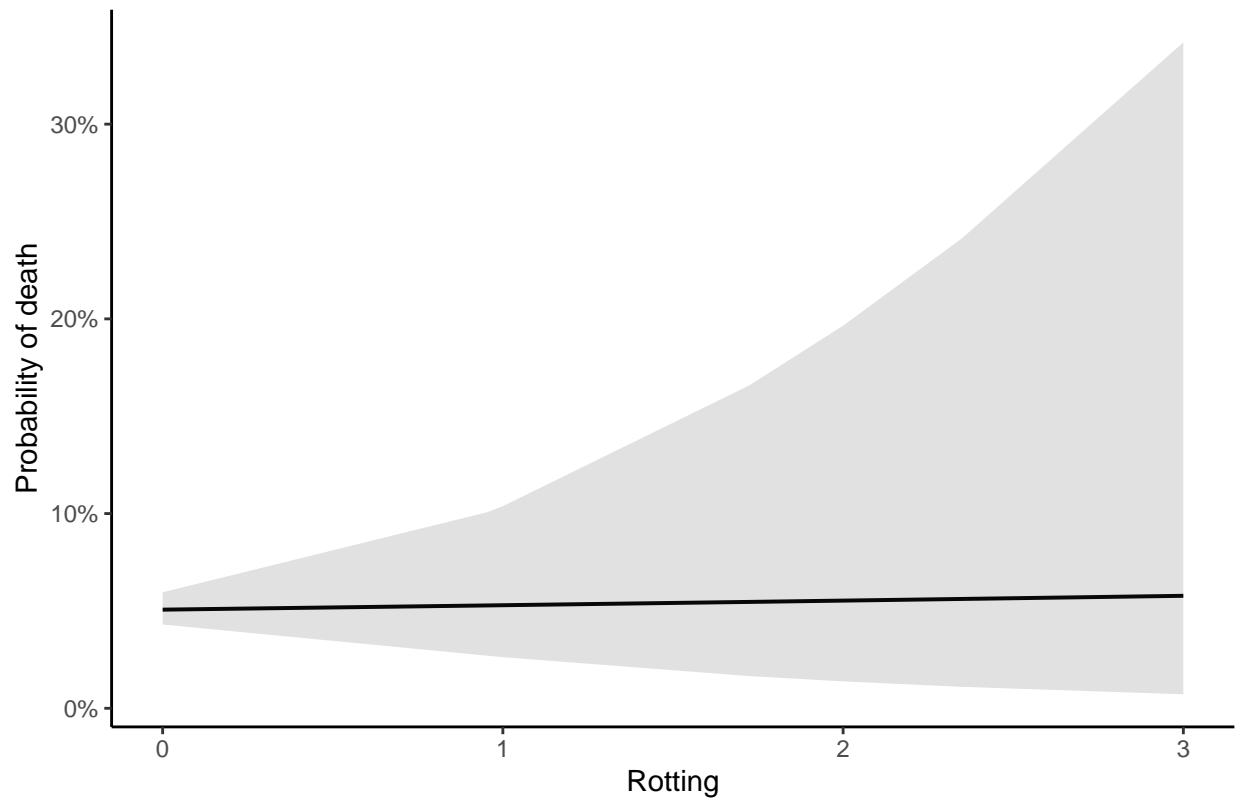

```
## MODEL INFO:
## Observations: 5041
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2197.14, BIC = 2229.77
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.09
##
## FIXED EFFECTS:
## -------------------------------------------------
##                   Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)      -2.93    0.09   -33.48   0.00
## var.x1            0.05    0.36     0.13   0.90
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter    Std. Dev.
## ----------------- ------------- -----------
##  species.grouping  (Intercept)      0.57
##  species.grouping    var.x1         0.23
```

```
## ------------------------------------------------
##
## Grouping variables:
## -----------------------------------
##      Group         # groups   ICC
## ----------------- ---------- ------
##  species.grouping    477      0.09
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.39961
Deviation n.s.

Dispersion test: p= 0.87
Deviation n.s.

Outlier test: p= 0.38275
Deviation n.s.

Observed

Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance signi

simulationOutput$scaledResiduals

0.492295456804851   1

catPred
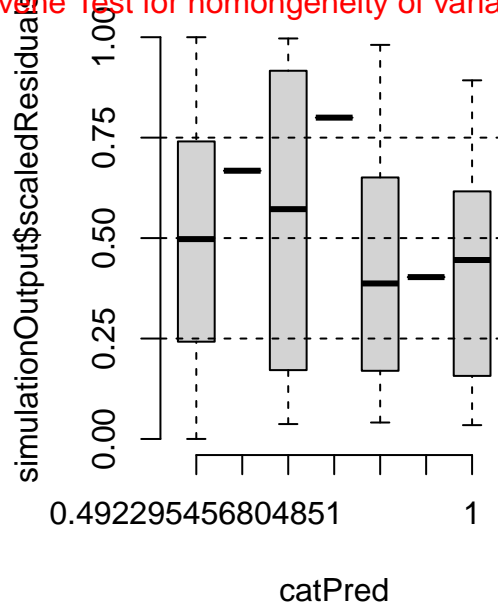
Site-specific mortality model for condition: Wounds
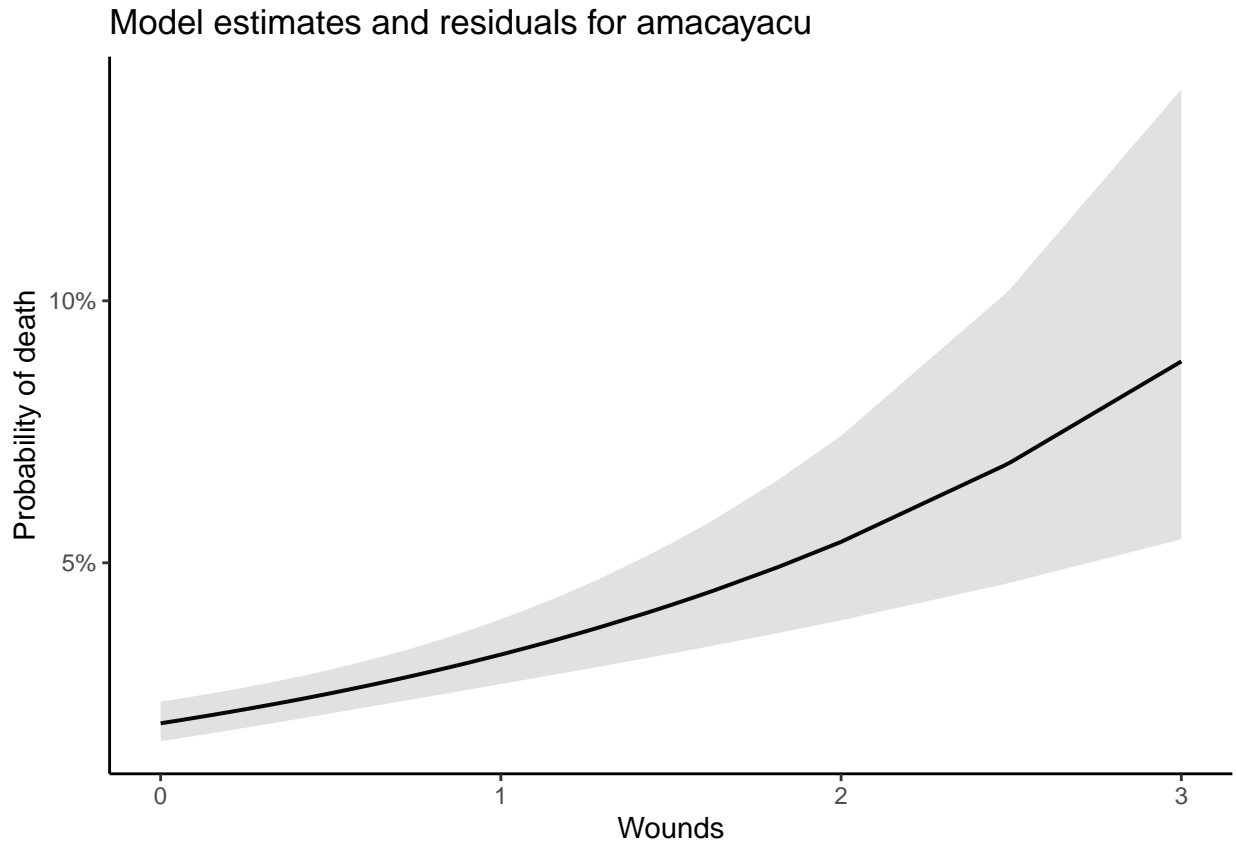
Model estimates and residuals for amacayacu

```
## MODEL INFO:
## Observations: 12835
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 3162.36, BIC = 3199.66
## Pseudo-R² (fixed effects) = 0.03
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## -------------------------------------------------
##                      Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)         -3.92    0.10   -38.88   0.00
## var.x1               0.53    0.10     5.26   0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group          Parameter     Std. Dev.
```

```
## ------------------ ------------- -----------
##  species.grouping   (Intercept)      0.66
##  species.grouping     var.x1         0.39
## ----------------------------------------------
##
## Grouping variables:
## -----------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping    697      0.12
## -----------------------------------
```

DHARMa residual diagnostics
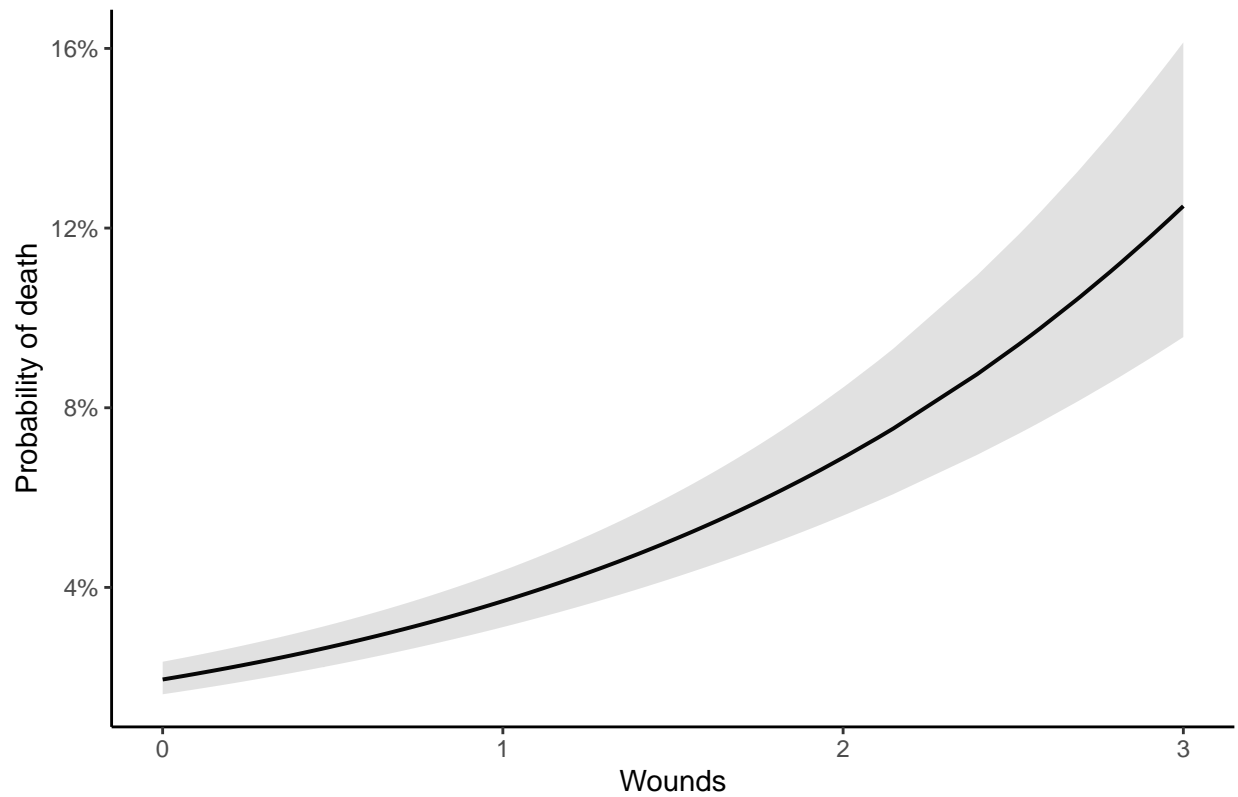
QQ plot residuals

KS test: p= 0.11973
Deviation n.s.

Dispersion test: p= 0.51
Deviation n.s.

Outlier test: p= 0.02221
Deviation significant

Observed / Expected

Residual vs. predicted

Standardized residual / Model predictions (rank transformed)

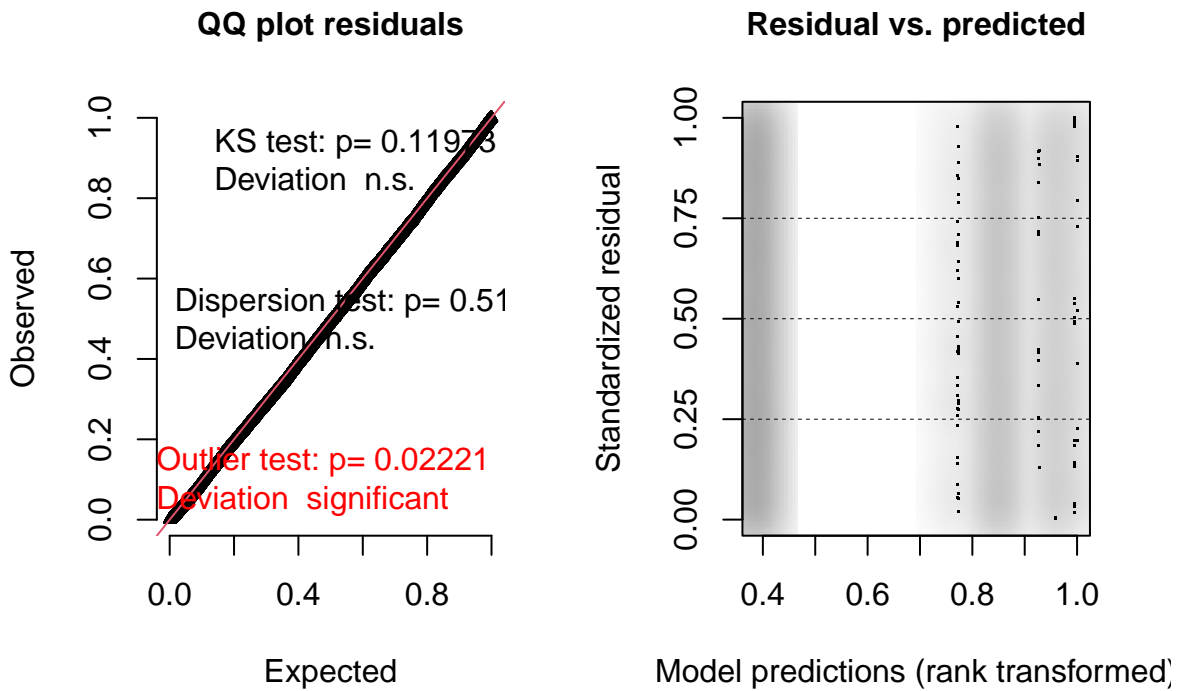## Model estimates and residuals for bci


```
## MODEL INFO:
## Observations: 21932
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 5203.92, BIC = 5243.90
## Pseudo-R² (fixed effects) = 0.03
## Pseudo-R² (total) = 0.19
##
## FIXED EFFECTS:
## -------------------------------------------------
##                    Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)       -3.92    0.10   -40.70    0.00
## var.x1             0.66    0.05    12.16    0.00
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter      Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)       0.81
##  species.grouping     var.x1         0.08
```
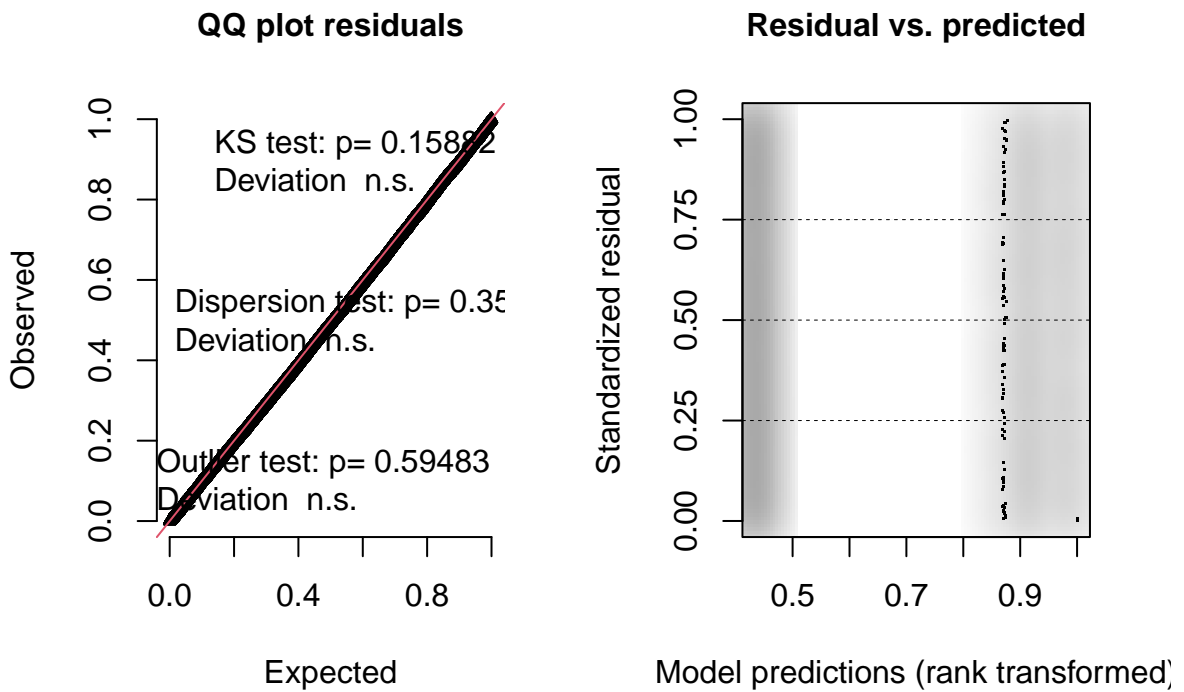
```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##        Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     220     0.16
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.15882
Deviation n.s.

Dispersion test: p= 0.35
Deviation n.s.

Outlier test: p= 0.59483
Deviation n.s.

Observed (y-axis)
Expected (x-axis)

Residual vs. predicted

Standardized residual (y-axis)
Model predictions (rank transformed) (x-axis)

Model estimates and residuals for fushan
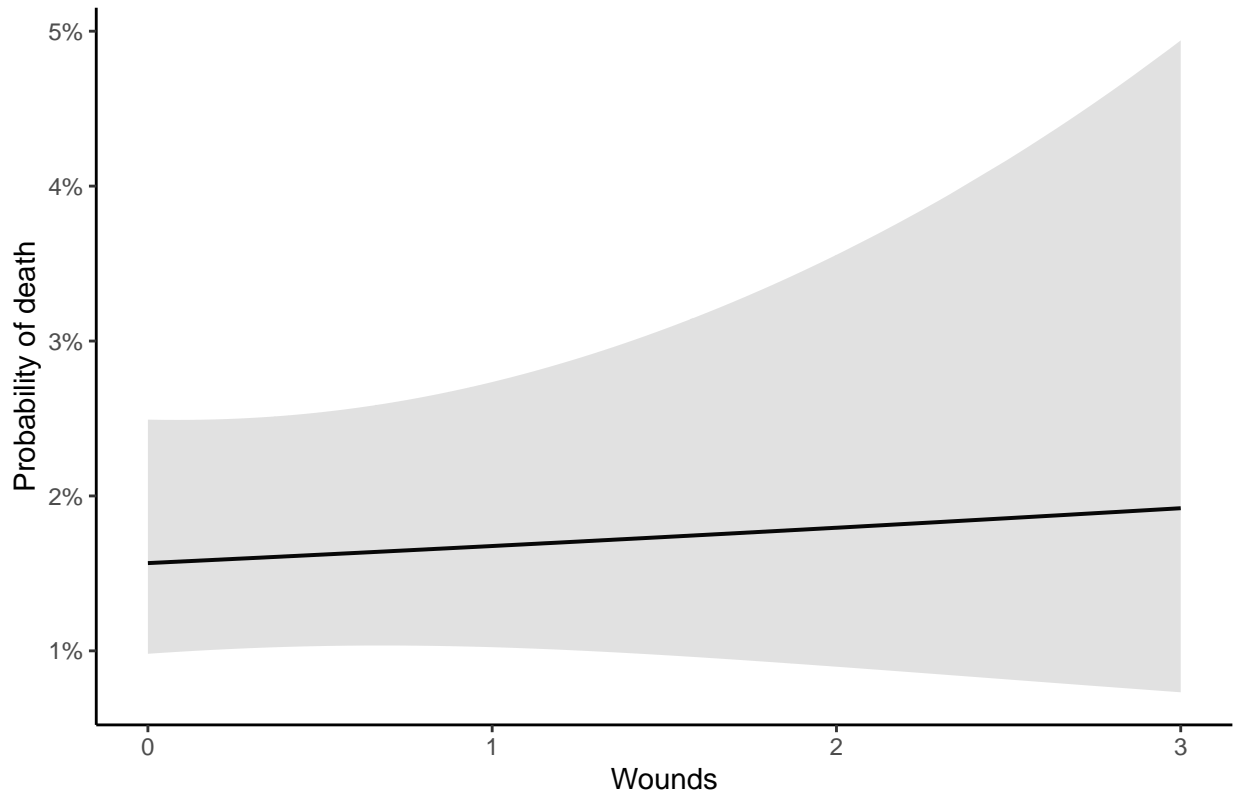

```
## MODEL INFO:
## Observations: 10961
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2677.66, BIC = 2714.17
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.32
##
## FIXED EFFECTS:
## -------------------------------------------------
##                    Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)        -4.14    0.24   -17.12   0.00
## var.x1              0.07    0.17     0.41   0.68
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping   (Intercept)     1.25
##  species.grouping     var.x1        0.25
```
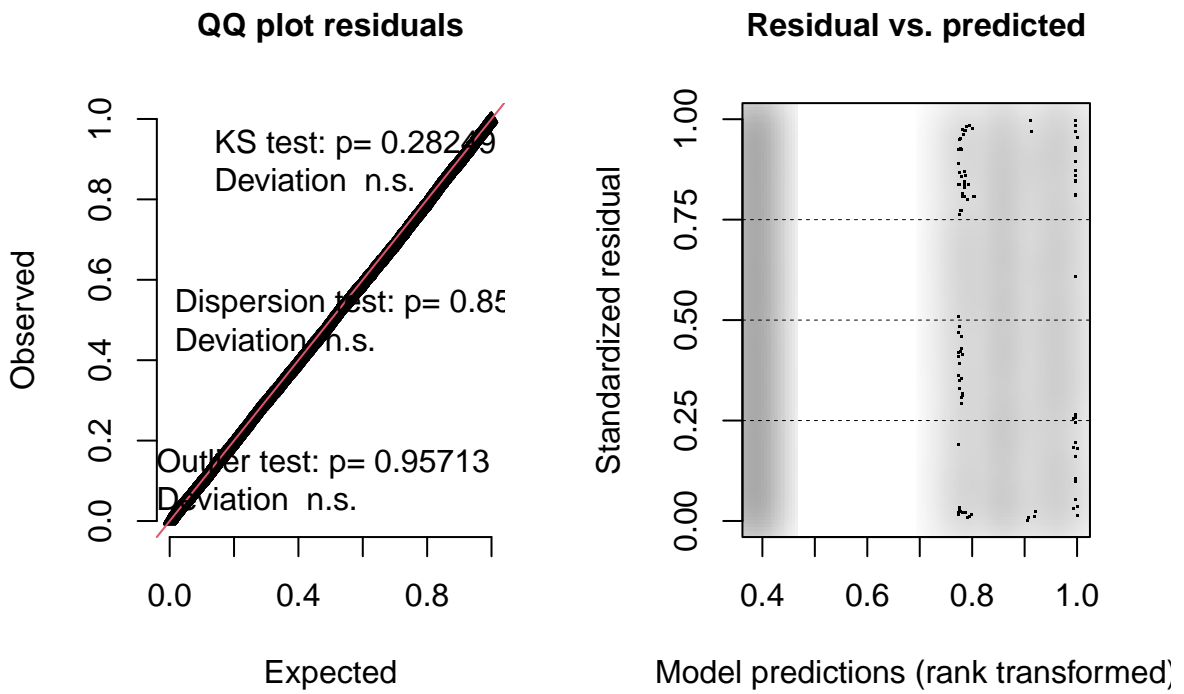
162

```
## ---------------------------------------------
##
## Grouping variables:
## -----------------------------------
##       Group        # groups   ICC
## -----------------  ----------  ------
##  species.grouping      64      0.32
## -----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.28249
Deviation n.s.

Dispersion test: p= 0.85
Deviation n.s.

Outlier test: p= 0.95713
Deviation n.s.

Observed / Expected

Residual vs. predicted

Standardized residual / Model predictions (rank transformed)

Model estimates and residuals for hkk
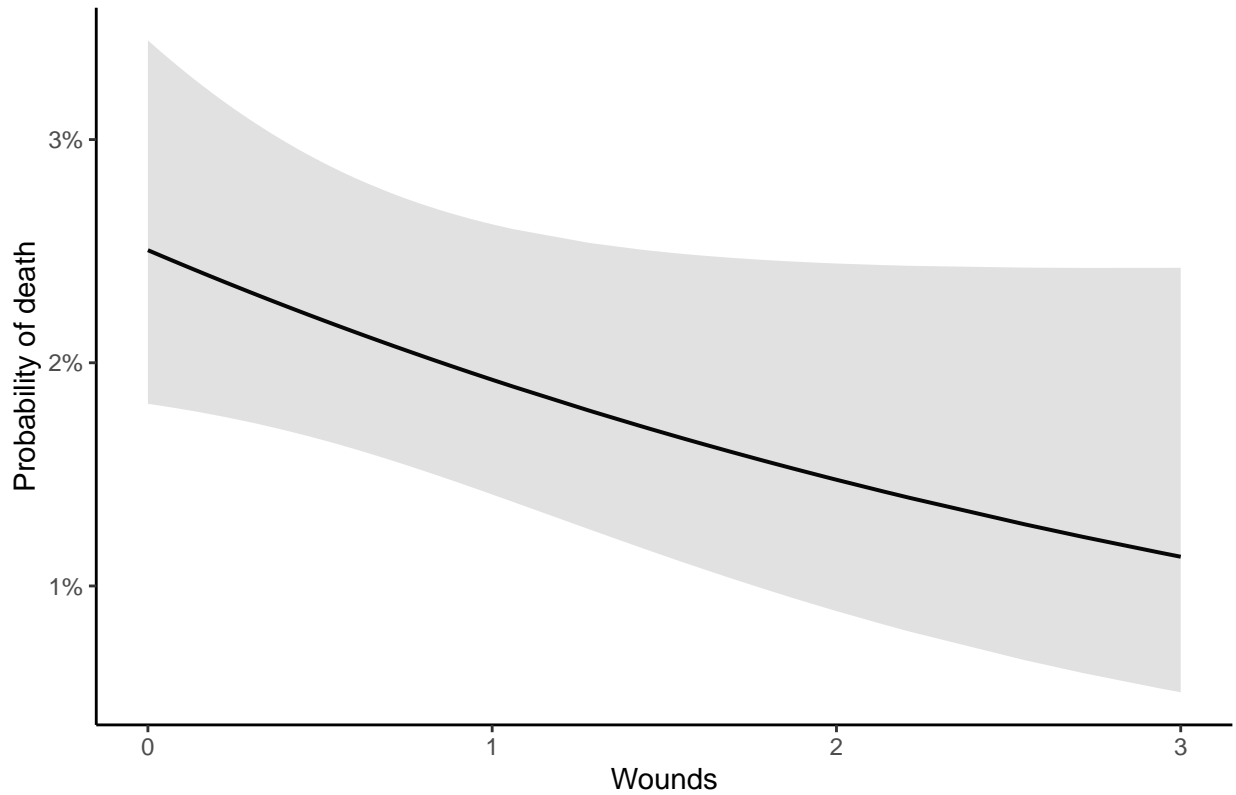

```
## MODEL INFO:
## Observations: 9453
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2477.88, BIC = 2513.65
## Pseudo-R² (fixed effects) = 0.01
## Pseudo-R² (total) = 0.25
##
## FIXED EFFECTS:
## -------------------------------------------------
##                     Est.    S.E.    z val.      p
## ---------------- -------  ------  -------- ------
## (Intercept)        -3.66    0.17    -21.85   0.00
## var.x1             -0.27    0.15     -1.80   0.07
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ------------------------------------------------
##       Group         Parameter     Std. Dev.
## ----------------- ------------- -----------
##  species.grouping  (Intercept)       1.12
##  species.grouping     var.x1         0.27
```
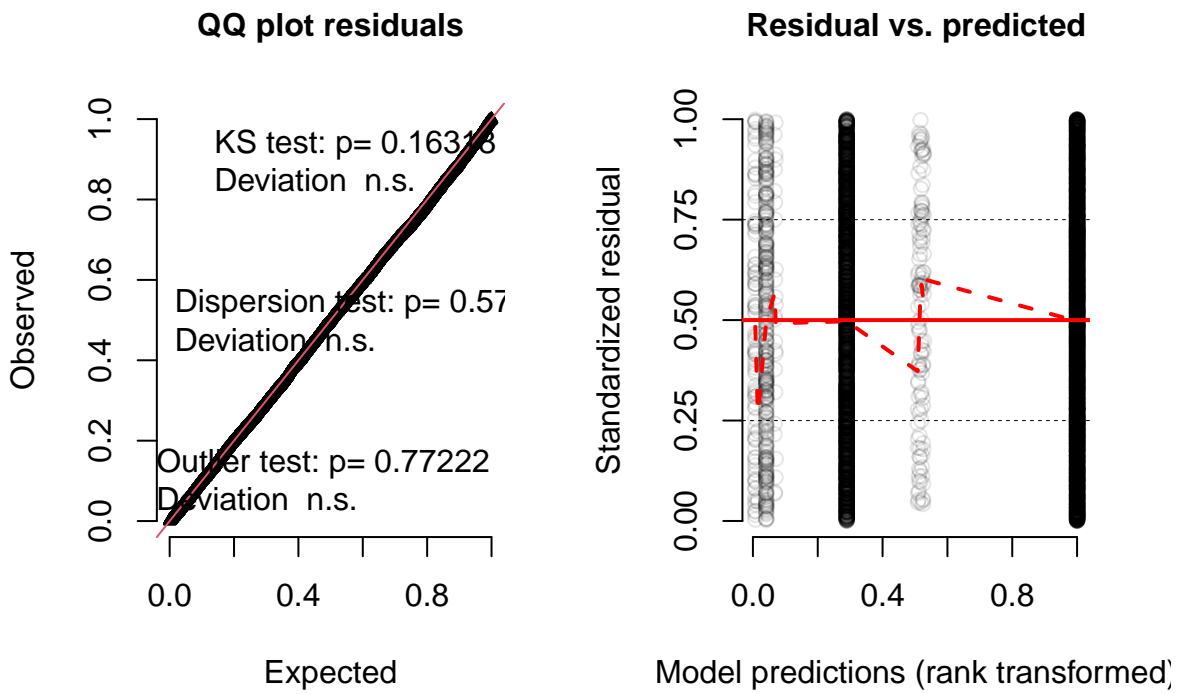
```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     202     0.28
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.16313
Deviation n.s.

Dispersion test: p= 0.57
Deviation n.s.

Outlier test: p= 0.77222
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Model estimates and residuals for kc
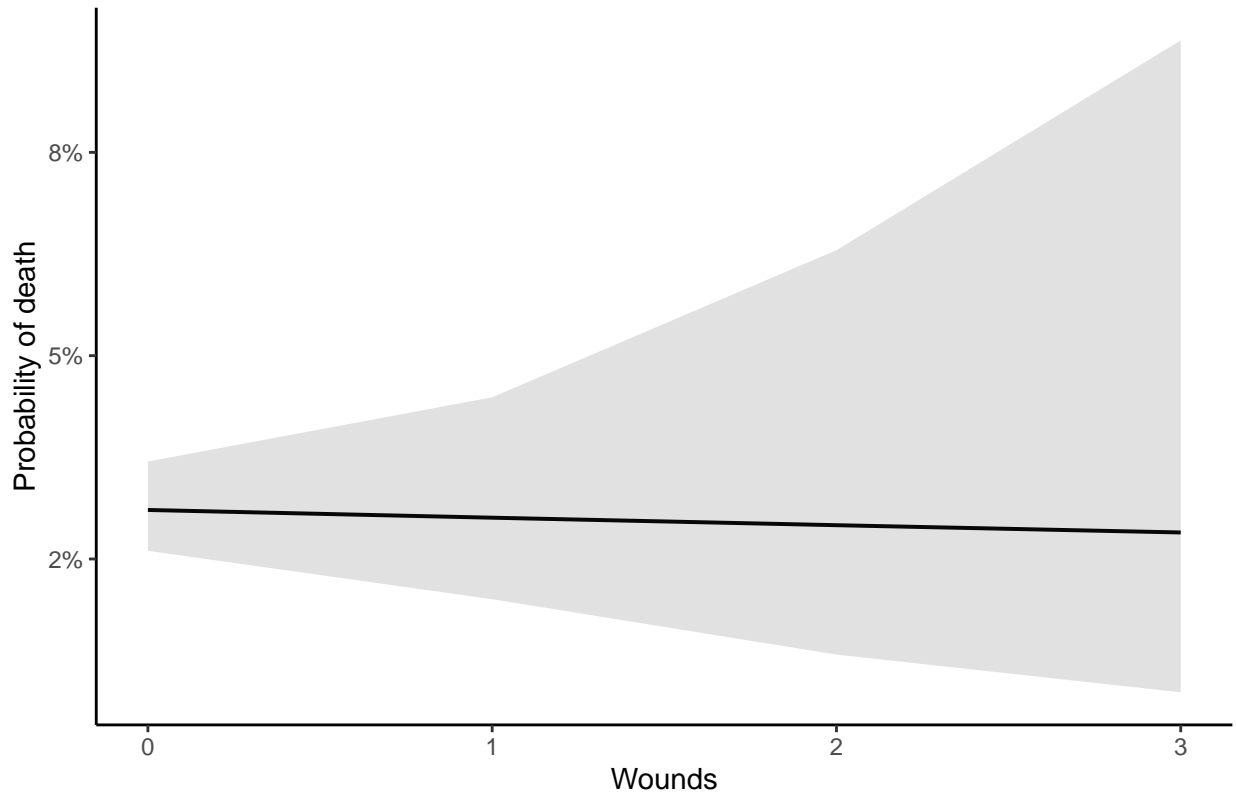

```
## MODEL INFO:
## Observations: 8308
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2462.58, BIC = 2497.70
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.13
##
## FIXED EFFECTS:
## -------------------------------------------------
##                      Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)         -3.44   0.09   -37.10   0.00
## var.x1              -0.03   0.21    -0.15   0.88
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##       Group          Parameter    Std. Dev.
## ------------------ ------------- ----------
##  species.grouping   (Intercept)     0.63
##  species.grouping     var.x1        0.46
```
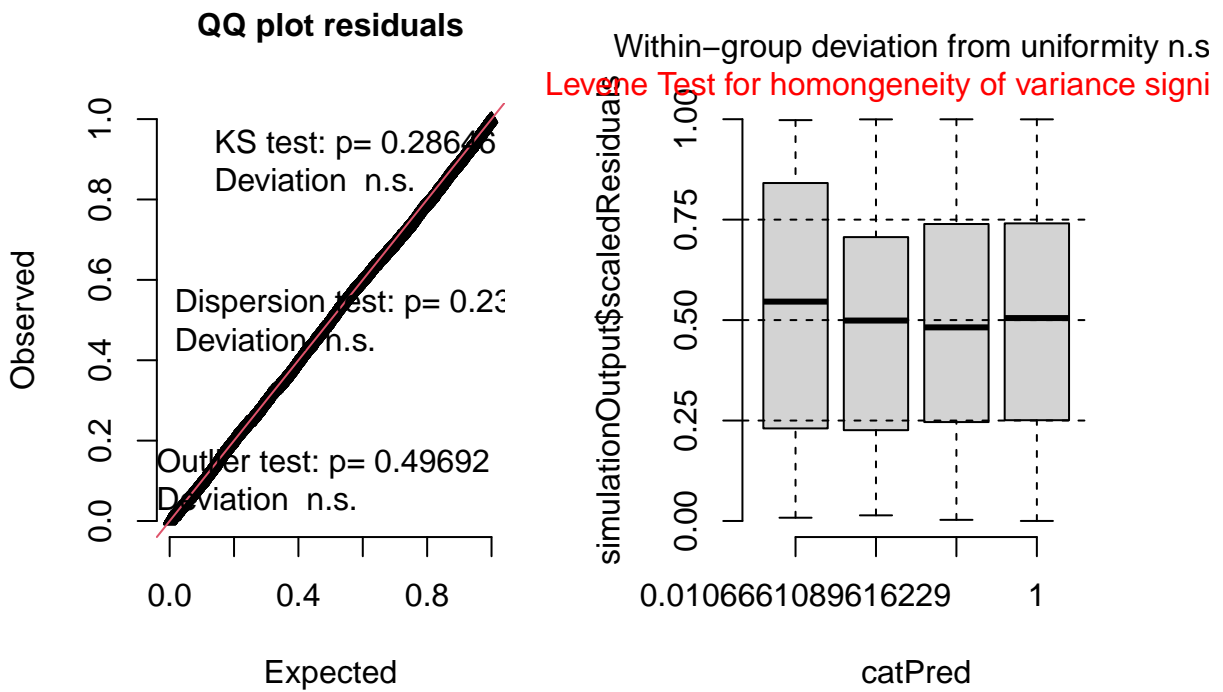
```
## -----------------------------------------------
## 
## Grouping variables:
## ------------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     379     0.11
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.28646
Deviation n.s.

Dispersion test: p= 0.23
Deviation n.s.

Outlier test: p= 0.49692
Deviation n.s.

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance signi

Model estimates and residuals for pasoh

```
## MODEL INFO:
## Observations: 5041
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2193.89, BIC = 2226.52
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.10
##
## FIXED EFFECTS:
## ------------------------------------------------
##                    Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)       -2.98    0.10   -30.89   0.00
## var.x1             0.27    0.13     2.12   0.03
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group         Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)      0.60
##  species.grouping    var.x1         0.14
```
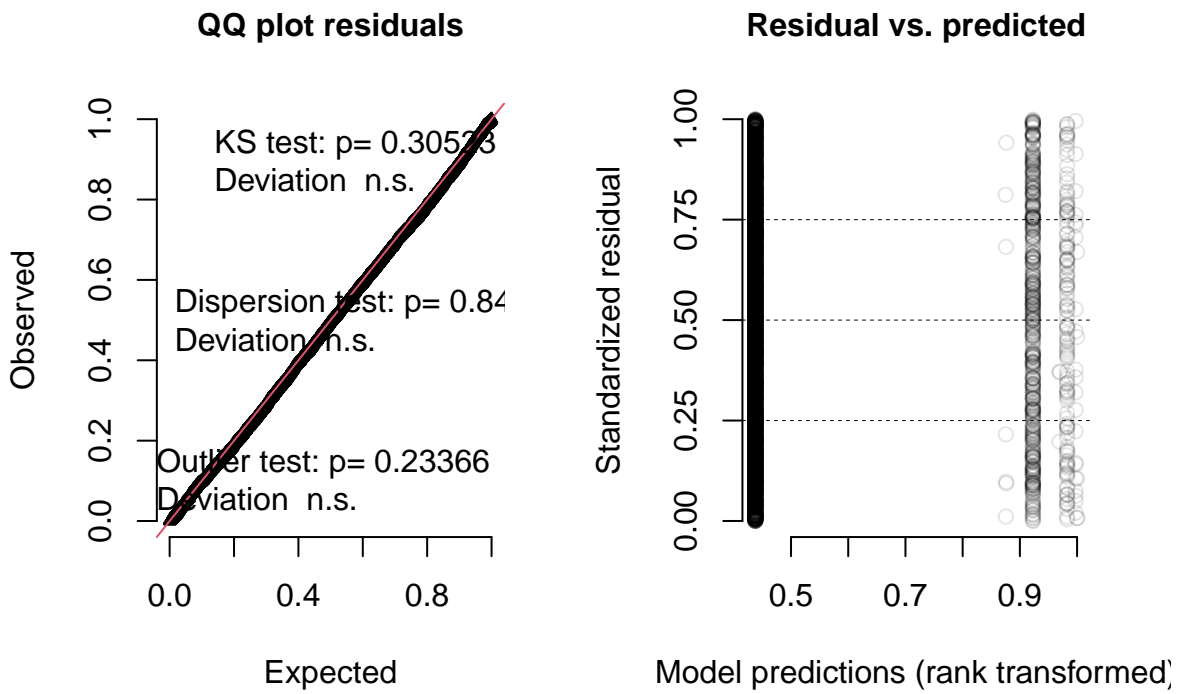
```
## ----------------------------------------------
##
## Grouping variables:
## ----------------------------------
##       Group       # groups   ICC
## ----------------- ---------- ------
##  species.grouping    477      0.10
## ----------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.3052̃3
Deviation n.s.

Dispersion test: p= 0.84̃
Deviation n.s.

Outlier test: p= 0.23366
Deviation n.s.

Observed / Expected

Residual vs. predicted

Standardized residual / Model predictions (rank transformed)
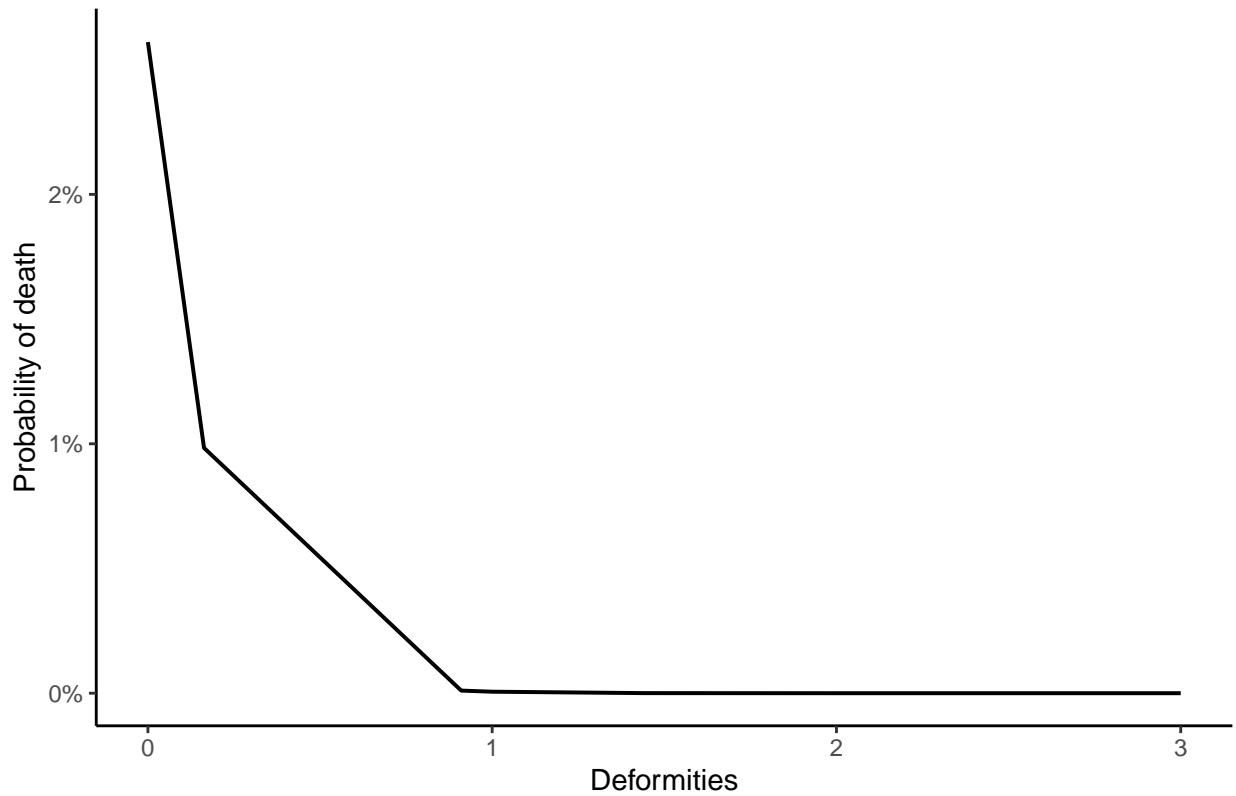
Site-specific mortality model for condition: Deformities
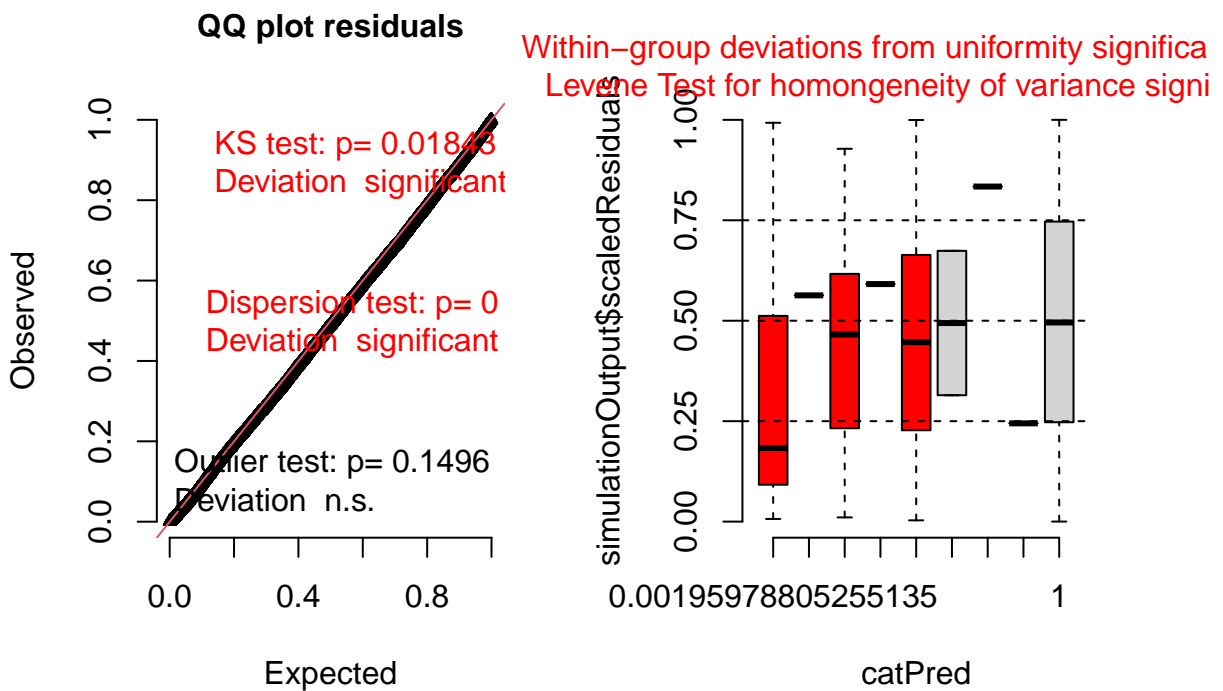
Model estimates and residuals for amacayacu


```
## MODEL INFO:
## Observations: 12836
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 3180.79, BIC = 3218.09
## Pseudo-R² (fixed effects) = 0.28
## Pseudo-R² (total) = 0.79
##
## FIXED EFFECTS:
## -----------------------------------------------------
##                    Est.    S.E.     z val.       p
## ---------------- ------- ------ ---------- ------
## (Intercept)       -3.62    0.00   -5203.48    0.00
## var.x1            -6.09    0.00   -8761.95    0.00
## -----------------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##       Group         Parameter     Std. Dev.
```

```
## ------------------ ------------- -----------
##  species.grouping   (Intercept)      0.49
##  species.grouping     var.x1         8.12
## ----------------------------------------------
##
## Grouping variables:
## -----------------------------------
##      Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping    697      0.07
## -----------------------------------
```

DHARMa residual diagnostics
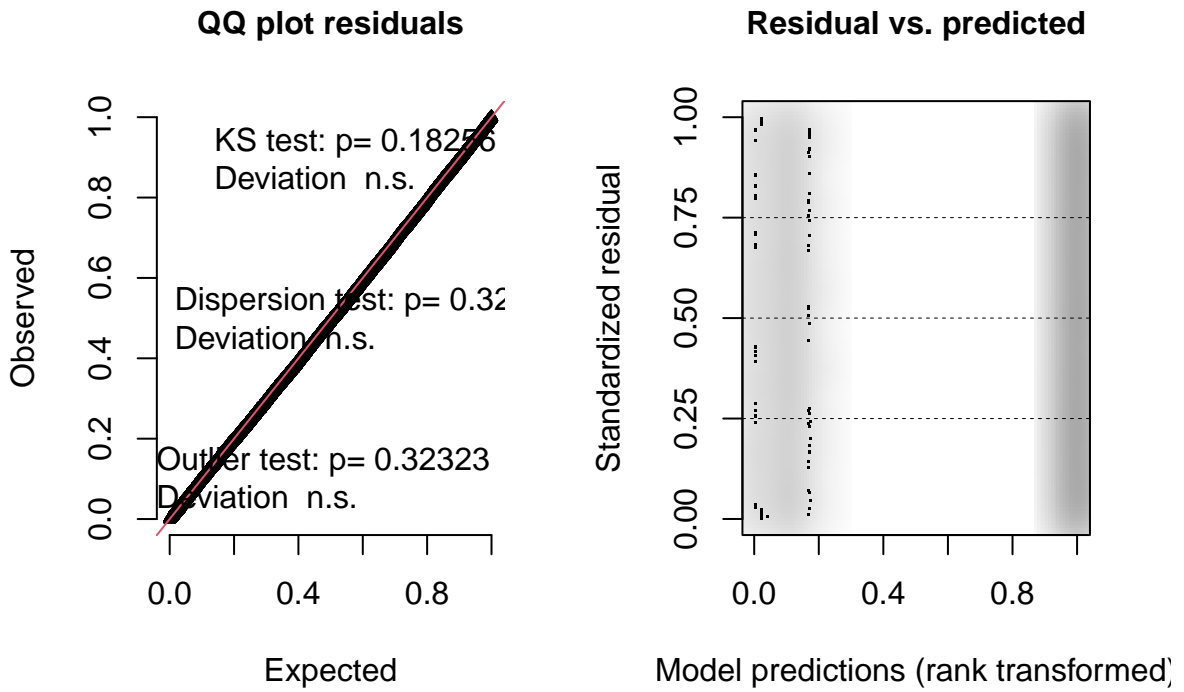
Model estimates and residuals for bci
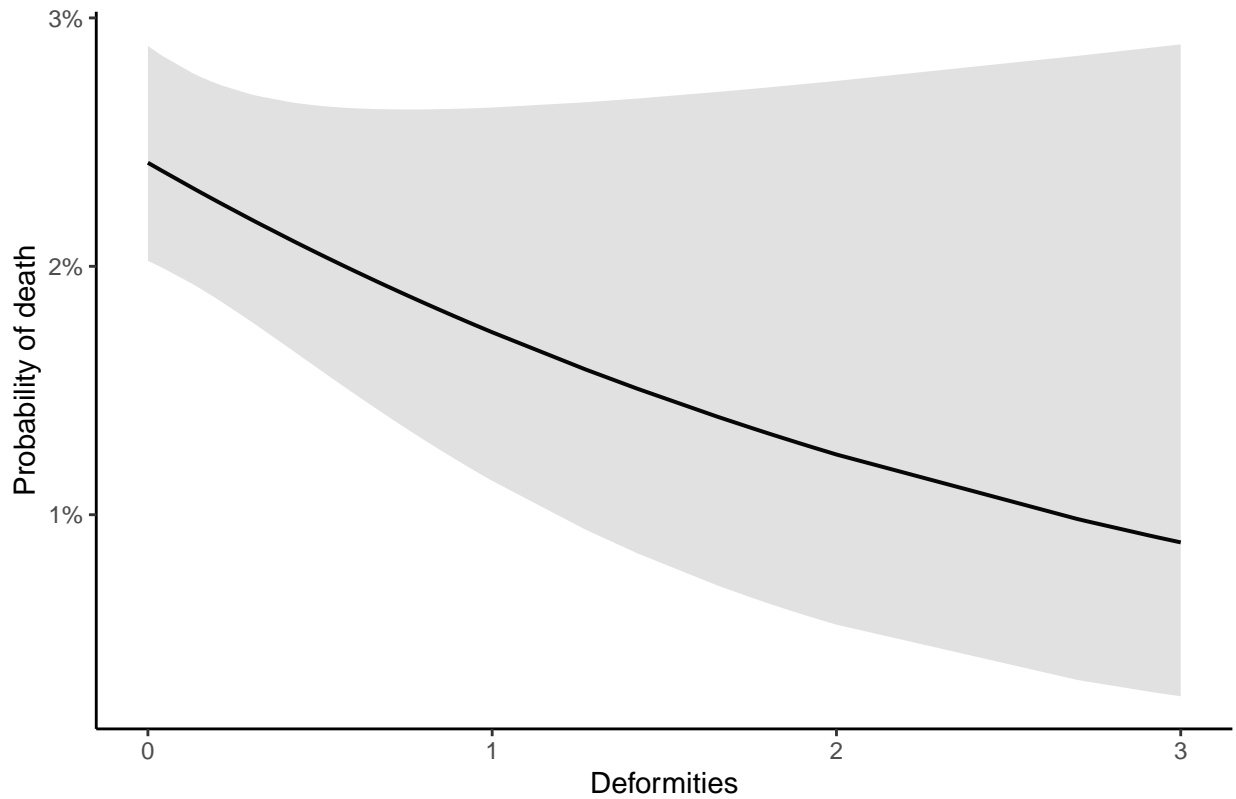
```
## MODEL INFO:
## Observations: 21932
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 5290.73, BIC = 5330.70
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.18
##
## FIXED EFFECTS:
## -------------------------------------------------
##                    Est.    S.E.   z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)       -3.70    0.09   -39.69   0.00
## var.x1            -0.34    0.20    -1.66   0.10
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)      0.79
##  species.grouping    var.x1         0.51
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group          # groups   ICC
## ----------------- ---------- ------
## species.grouping     220       0.16
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.18256
Deviation n.s.

Dispersion test: p= 0.32
Deviation n.s.

Outlier test: p= 0.32323
Deviation n.s.

Observed

Expected

Residual vs. predicted

Standardized residual

Model predictions (rank transformed)

Model estimates and residuals for fushan


```
## MODEL INFO:
## Observations: 10961
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2666.90, BIC = 2703.41
## Pseudo-R² (fixed effects) = 0.02
## Pseudo-R² (total) = 0.33
##
## FIXED EFFECTS:
## ------------------------------------------------
##                   Est.    S.E.    z val.      p
## ---------------- ------- ------ -------- ------
## (Intercept)       -4.10    0.24   -17.04   0.00
## var.x1            -1.01    0.58    -1.75   0.08
## ------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##      Group          Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)      1.26
##  species.grouping    var.x1         0.92
```
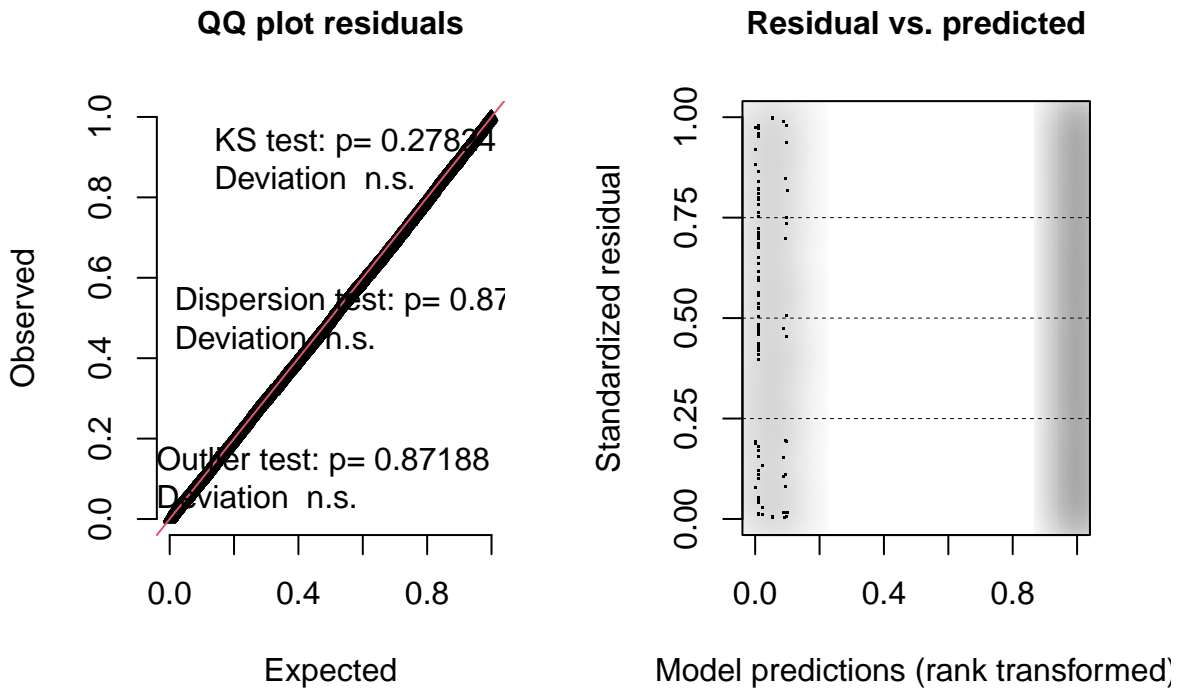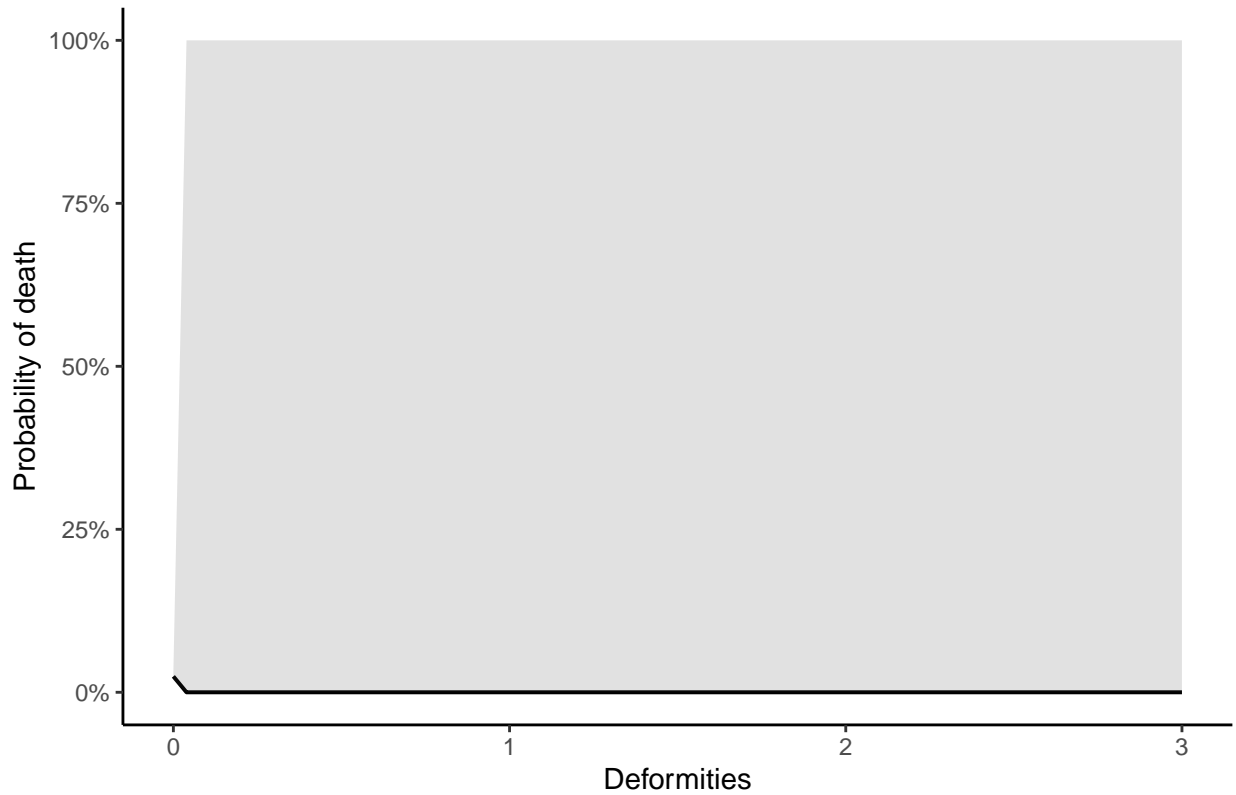
```
## ------------------------------------------------
##
## Grouping variables:
## ------------------------------------
##        Group         # groups   ICC
## ------------------ ---------- ------
##  species.grouping       64     0.32
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

Observed

KS test: p= 0.27824
Deviation n.s.

Dispersion test: p= 0.87
Deviation n.s.

Outlier test: p= 0.87188
Deviation n.s.

Expected

Residual vs. predicted

Standardized residual
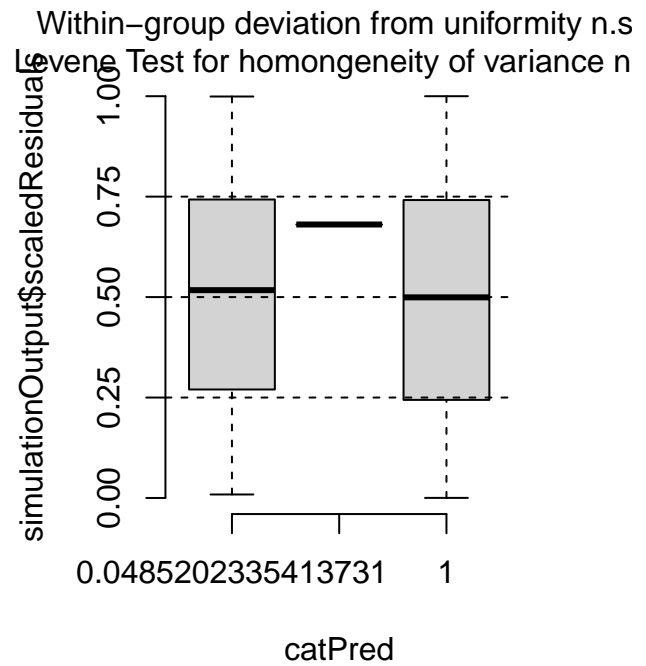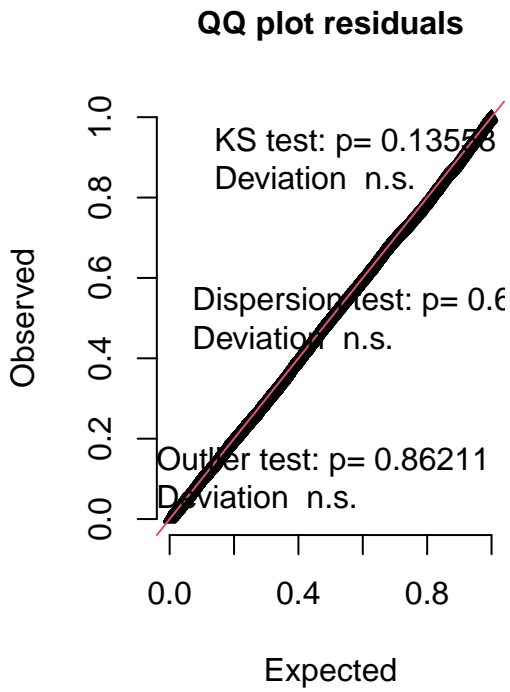
Model predictions (rank transformed)
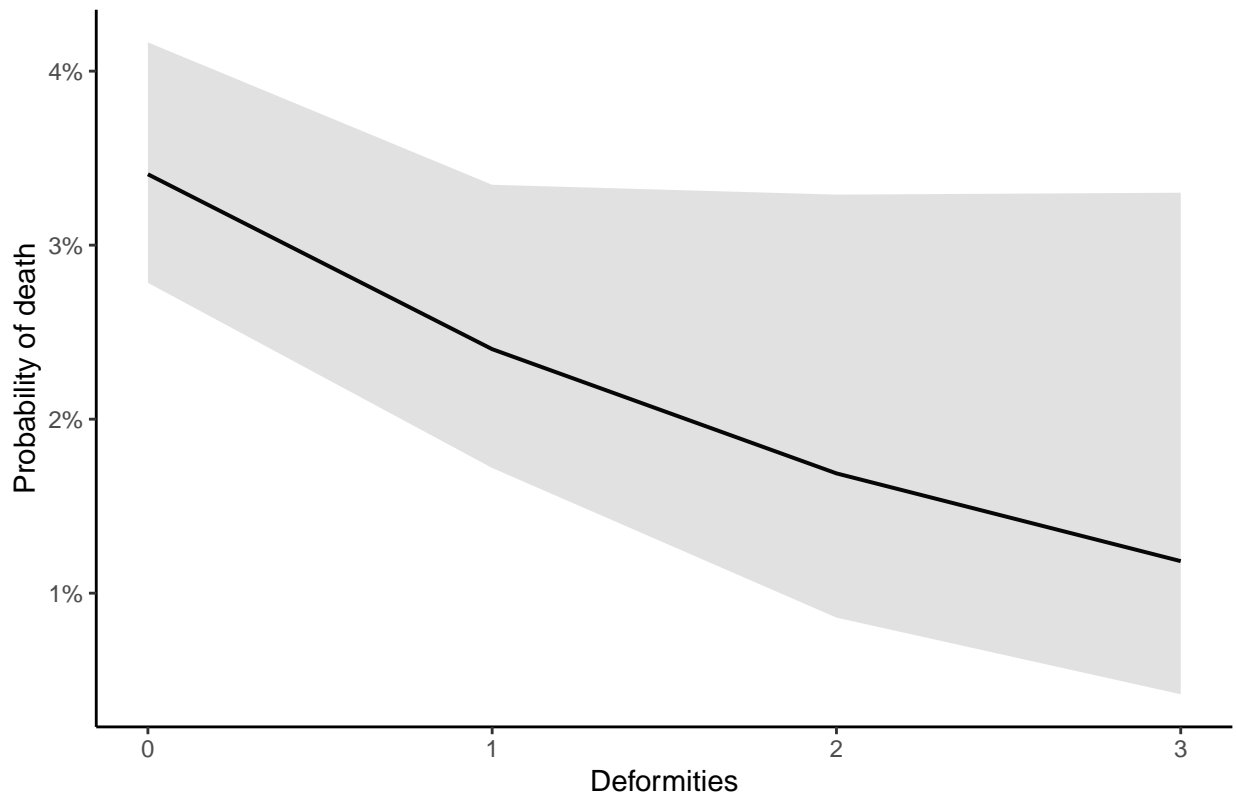
Model estimates and residuals for hkk


```
## MODEL INFO:
## Observations: 9451
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2464.48, BIC = 2500.25
## Pseudo-R² (fixed effects) = 1.00
## Pseudo-R² (total) = 1.00
##
## FIXED EFFECTS:
## -------------------------------------------------------
##                        Est.       S.E.    z val.      p
## ----------------- --------- --------- -------- ------
## (Intercept)           -3.69       0.14   -27.06   0.00
## var.x1              -230.65    8804.19    -0.03   0.98
## -------------------------------------------------------
##
## RANDOM EFFECTS:
## ----------------------------------------------
##       Group          Parameter     Std. Dev.
## ------------------ ------------- ----------
##  species.grouping   (Intercept)        1.03
##  species.grouping     var.x1           1.05
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group          # groups   ICC
## ----------------- ---------- ------
##  species.grouping     202      0.24
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.13553
Deviation n.s.

Dispersion test: p= 0.6
Deviation n.s.

Outlier test: p= 0.86211
Deviation n.s.

Observed

Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance n

simulationOutput$scaledResiduals

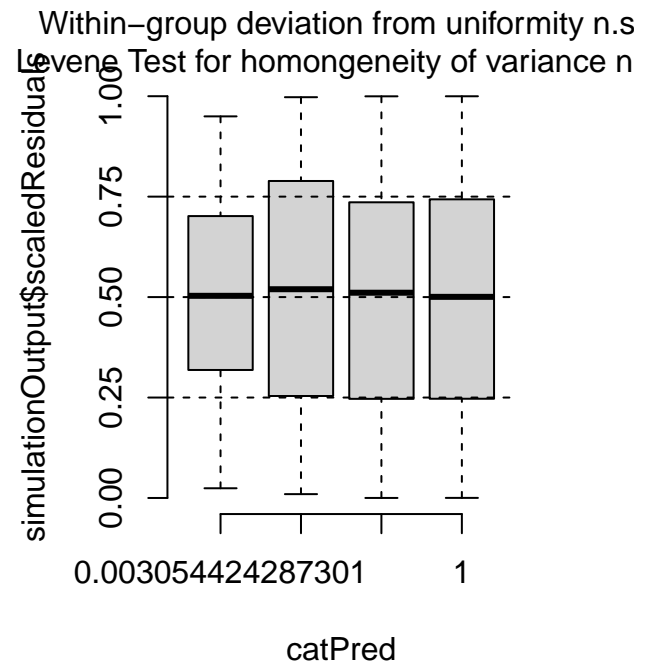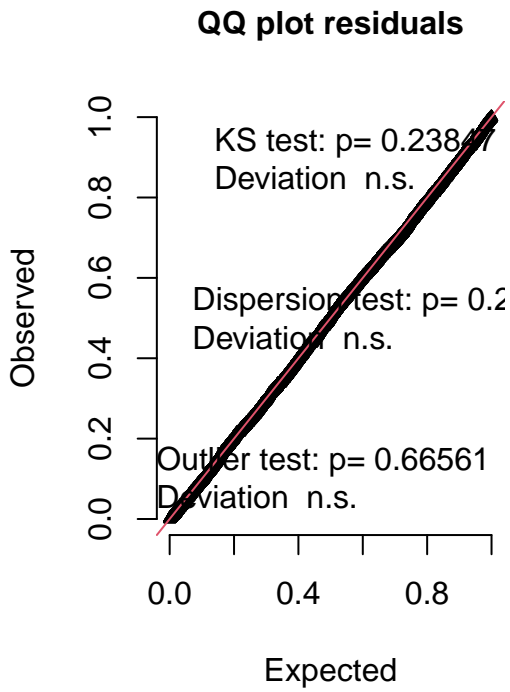0.0485202335413731   1

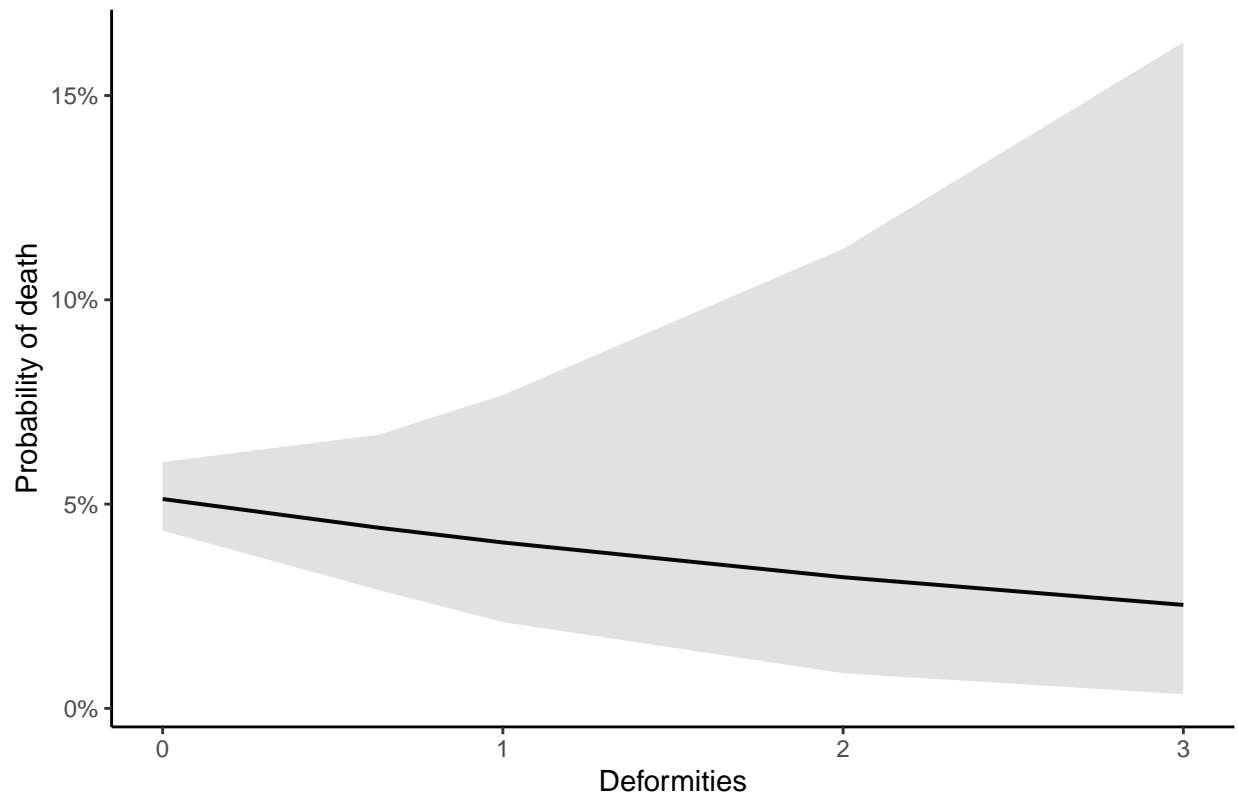catPred

Model estimates and residuals for kc


```
## MODEL INFO:
## Observations: 8310
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2458.06, BIC = 2493.19
## Pseudo-R² (fixed effects) = 0.01
## Pseudo-R² (total) = 0.14
##
## FIXED EFFECTS:
## ------------------------------------------------
##                     Est.    S.E.    z val.     p
## ---------------- ------- ------ -------- ------
## (Intercept)        -3.34    0.11   -31.40   0.00
## var.x1             -0.36    0.19    -1.89   0.06
## ------------------------------------------------
##
## RANDOM EFFECTS:
## -----------------------------------------------
##      Group          Parameter     Std. Dev.
## ----------------- ------------- ----------
##  species.grouping   (Intercept)      0.76
##  species.grouping     var.x1         0.58
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group        # groups   ICC
## ----------------- ---------- ------
##  species.grouping     379     0.15
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.2384
Deviation n.s.

Dispersion test: p= 0.2
Deviation n.s.

Outlier test: p= 0.66561
Deviation n.s.

Observed

Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance n

simulationOutput$scaledResiduals

0.003054424287301   1

catPred

Model estimates and residuals for pasoh


```
## MODEL INFO:
## Observations: 5041
## Dependent Variable: m
## Type: Mixed effects generalized linear regression
## Error Distribution: binomial
## Link function: logit
##
## MODEL FIT:
## AIC = 2196.46, BIC = 2229.09
## Pseudo-R² (fixed effects) = 0.00
## Pseudo-R² (total) = 0.09
##
## FIXED EFFECTS:
## -------------------------------------------------
##                       Est.    S.E.   z val.      p
## ----------------- ------- ------ -------- ------
## (Intercept)          -2.92    0.09   -33.19   0.00
## var.x1               -0.24    0.35    -0.71   0.48
## -------------------------------------------------
##
## RANDOM EFFECTS:
## ---------------------------------------------
##       Group        Parameter    Std. Dev.
## ----------------- ------------- ----------
##  species.grouping  (Intercept)     0.58
##  species.grouping    var.x1        0.24
```

```
## ----------------------------------------------
##
## Grouping variables:
## ------------------------------------
##       Group          # groups   ICC
## ----------------- ---------- ------
##  species.grouping     477      0.09
## ------------------------------------
```

DHARMa residual diagnostics

QQ plot residuals

KS test: p= 0.36226
Deviation n.s.

Dispersion test: p= 0.83
Deviation n.s.

Outlier test: p= 0.30213
Deviation n.s.

Observed

Expected

Within−group deviation from uniformity n.s
Levene Test for homongeneity of variance n

simulationOutput$scaledResiduals

catPred