Coastal Analysis

Read in data

```
library(readxl)
library(lme4)
```

```
## Loading required package: Matrix
```

```
library(sjPlot)
```

```
## Learn more about sjPlot with 'browseVignettes("sjPlot")'.
```

```
library(sjmisc)
library(sjlabelled)

# Read in dataset with coastal coding. Read in summary sheet (sheet
# 13)
coastal <- read_excel("FIPS-based datasets_05232021.xlsx", sheet = 13)
```

```
## New names:
## * `` -> ...12
## * `` -> ...22
## * `` -> ...25
## * `` -> ...39
```

```
# summary(coastal)

# Read in PM25 data from our 2020 study, created with: PM25 =
# data.frame(fips = aggregate_pm_census_cdc_test_beds$fips, mean_pm25
# = aggregate_pm_census_cdc_test_beds$mean_pm25) save(PM25, file =
# 'PM25.Rda')
load("PM25.Rda")
```

Create smaller datasets from previous datasets, dataclean, merge region dataset with summary dataset, finally merge with PM25 dataset.

```
coastal.new = data.frame(coastal$`FIPS as Text`, coastal$state, coastal$cases,
    coastal$deaths, coastal$`Country REGION`, coastal$`Coastal Distance`,
    coastal$`Population 2019 Estimate`, coastal$`Population Density`, coastal$`All Ages in Poverty (%)`
    coastal$`Under 18s in Poverty`, coastal$`Median Income`, coastal$`percent adult obesity`,
    coastal$`diff/total`, coastal$`Politcal alignment 2020 election`, coastal$`median age 2019`,
```

```
    coastal$Humid)
colnames(coastal.new) = c("fips", "state", "cases", "deaths", "region",
    "coastal.distance", "population2019", "popdensity", "poverty", "under18poverty",
    "median_income", "pct_obesity", "voter_margin_2020", "party", "median_age",
    "humidity")

# change NAs in coastal.distance to level 4, and save as factor with
# reference level 4.
coastal.new$coastal.distance[is.na(coastal.new$coastal.distance)] <- 4
coastal.new$coastal.distance = as.factor(coastal.new$coastal.distance)
coastal.new <- within(coastal.new, coastal.distance <- relevel(coastal.distance,
    ref = 4))

# change NAs in coastal region to Inland, and save as factor with
# reference level Inland
coastal.new$region[is.na(coastal.new$region)] <- "Inland"
coastal.new$region[coastal.new$region == "0"] <- "Inland"
coastal.new$region = tolower(coastal.new$region)
coastal.new$region = as.factor(coastal.new$region)
coastal.new <- within(coastal.new, region <- relevel(region, ref = "inland"))

# Merge with PM25 dataset
coastal.new = merge(coastal.new, PM25, by = "fips")
summary(coastal.new)
```

```
##      fips              state               cases             deaths
##  Length:3088        Length:3088        Min.   :      1   Min.   :    0.0
##  Class :character   Class :character   1st Qu.:   1025   1st Qu.:   18.0
##  Mode  :character   Mode  :character   Median :   2456   Median :   47.0
##                                        Mean   :   9416   Mean   :  165.9
##                                        3rd Qu.:   6160   3rd Qu.:  110.0
##                                        Max.   :1219237   Max.   :23101.0
##
##             region     coastal.distance population2019       popdensity
##  inland        :2417   4:2417           Min.   :     169   Min.   :    0.1
##  atlantic      : 230   1: 300           1st Qu.:   11137   1st Qu.:   17.5
##  gulf of mexico: 129   2: 200           Median :   26163   Median :   45.3
##  pacific       :  87   3: 171           Mean   :  102696   Mean   :  202.6
##  michigan      :  86                    3rd Qu.:   68022   3rd Qu.:  112.7
##  erie          :  45                    Max.   :10039107   Max.   :17179.1
##  (Other)       :  94
##     poverty       under18poverty   median_income     pct_obesity
##  Min.   :0.0270   Min.   :0.0240   Min.   : 24732   Min.   :13.6
##  1st Qu.:0.1050   1st Qu.:0.1370   1st Qu.: 46212   1st Qu.:29.4
##  Median :0.1340   Median :0.1870   Median : 53242   Median :32.4
##  Mean   :0.1447   Mean   :0.1999   Mean   : 55573   Mean   :32.1
##  3rd Qu.:0.1750   3rd Qu.:0.2490   3rd Qu.: 61767   3rd Qu.:35.1
##  Max.   :0.4770   Max.   :0.6340   Max.   :151806   Max.   :49.5
##
##  voter_margin_2020    party             median_age     humidity
##  Min.   :-0.8675   Length:3088        Min.   :23.4   Length:3088
##  1st Qu.: 0.1375   Class :character   1st Qu.:38.2   Class :character
##  Median : 0.3859   Mode  :character   Median :41.4   Mode  :character
```

```
##  Mean   : 0.3203                    Mean   :41.5
##  3rd Qu.: 0.5666                    3rd Qu.:44.6
##  Max.   : 0.9309                    Max.   :67.4
##
##    mean_pm25
##  Min.   : 2.060
##  1st Qu.: 6.335
##  Median : 8.789
##  Mean   : 8.398
##  3rd Qu.:10.483
##  Max.   :15.786
##
```

PRELIMINARY ANALYSIS on only coastal counties

```
# Subset coastal counties only
coastal.only = coastal.new[coastal.new$coastal.distance != 4, ]
nrow(coastal.only)
```

```
## [1] 671
```

```
nrow(na.omit(coastal.only))
```

```
## [1] 633
```

```
# Model cases
model.initial.cases = glmer(cases ~ (1 | state) + coastal.distance + offset(log(population2019)) +
    scale(popdensity) + scale(poverty) + scale(log(median_income)) + scale(pct_obesity) +
    scale(voter_margin_2020) + scale(median_age) + factor(party) + factor(humidity) +
    mean_pm25, family = poisson(link = "log"), data = coastal.only)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, : Model is nearly unide
##  - Rescale variables?
```

```
summary(model.initial.cases)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula:
## cases ~ (1 | state) + coastal.distance + offset(log(population2019)) +
##     scale(popdensity) + scale(poverty) + scale(log(median_income)) +
##     scale(pct_obesity) + scale(voter_margin_2020) + scale(median_age) +
##     factor(party) + factor(humidity) + mean_pm25
##    Data: coastal.only
##
##       AIC       BIC    logLik  deviance  df.resid
##  489510.4  489572.7 -244741.2  489482.4       619
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -137.952  -12.341   -1.138    9.761  302.294
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  state  (Intercept) 0.04082  0.202
## Number of obs: 633, groups:  state, 29
##
## Fixed effects:
##                            Estimate Std. Error  z value Pr(>|z|)
## (Intercept)              -2.8945199  0.0905050  -31.982  < 2e-16 ***
## coastal.distance2        -0.0083465  0.0007805  -10.694  < 2e-16 ***
## coastal.distance3         0.0032707  0.0010161    3.219  0.00129 **
```

```
## scale(popdensity)         -0.0157230  0.0002362  -66.553  < 2e-16 ***
## scale(poverty)             0.0453624  0.0009874   45.939  < 2e-16 ***
## scale(log(median_income)) -0.0333711  0.0009787  -34.098  < 2e-16 ***
## scale(pct_obesity)        -0.0667857  0.0005562 -120.075  < 2e-16 ***
## scale(voter_margin_2020)   0.0539723  0.0006596   81.828  < 2e-16 ***
## scale(median_age)         -0.1103005  0.0005729 -192.535  < 2e-16 ***
## factor(party)Republican   -0.0055143  0.0010650   -5.178 2.25e-07 ***
## factor(humidity)Marine    -0.3254818  0.0018670 -174.337  < 2e-16 ***
## factor(humidity)Moist      0.1085565  0.0994371    1.092  0.27496
## mean_pm25                  0.0326665  0.0002082  156.909  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Correlation matrix not shown by default, as p = 13 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it

## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

```
# Model deaths
model.initial.deaths = glmer(deaths ~ (1 | state) + coastal.distance +
    offset(log(population2019)) + scale(popdensity) + scale(poverty) +
    scale(log(median_income)) + scale(pct_obesity) + scale(voter_margin_2020) +
    scale(median_age) + factor(party) + factor(humidity) + mean_pm25, family = poisson(link = "log"),
    data = coastal.only)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, : Model is nearly unide
##  - Rescale variables?
```

```
summary(model.initial.deaths)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula:
## deaths ~ (1 | state) + coastal.distance + offset(log(population2019)) +
##     scale(popdensity) + scale(poverty) + scale(log(median_income)) +
##     scale(pct_obesity) + scale(voter_margin_2020) + scale(median_age) +
##     factor(party) + factor(humidity) + mean_pm25
##    Data: coastal.only
##
##      AIC      BIC   logLik deviance df.resid
##  19261.6  19323.9  -9616.8  19233.6      619
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -21.5020  -2.6453  -0.4458   2.1176  25.4407
##
## Random effects:
```

```
##  Groups Name        Variance Std.Dev.
##  state  (Intercept) 0.09803  0.3131
## Number of obs: 633, groups:  state, 29
##
## Fixed effects:
##                             Estimate Std. Error z value Pr(>|z|)
## (Intercept)                -7.497281   0.146351 -51.228  < 2e-16 ***
## coastal.distance2           0.042181   0.005735   7.355 1.90e-13 ***
## coastal.distance3           0.023638   0.007407   3.191  0.00142 **
## scale(popdensity)          -0.019259   0.001658 -11.616  < 2e-16 ***
## scale(poverty)              0.217943   0.007131  30.563  < 2e-16 ***
## scale(log(median_income)) -0.021899   0.007304  -2.998  0.00271 **
## scale(pct_obesity)         -0.030917   0.004250  -7.275 3.46e-13 ***
## scale(voter_margin_2020)    0.023010   0.004848   4.746 2.07e-06 ***
## scale(median_age)           0.129801   0.004205  30.868  < 2e-16 ***
## factor(party)Republican     0.018457   0.007942   2.324  0.02012 *
## factor(humidity)Marine     -0.223662   0.015466 -14.462  < 2e-16 ***
## factor(humidity)Moist       0.280738   0.158825   1.768  0.07713 .
## mean_pm25                   0.085450   0.001641  52.064  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Correlation matrix not shown by default, as p = 13 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it

## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

Redo: Create indicator for being a coast (levels 1,2,3) instead.

```
# Indicator Coastal or NonCoastal
coastal.new$indicatorcoast = ifelse(coastal.new$coastal.distance == "1",
    "Coastal", "NonCoastal")

# Model cases
model.indicator.cases = glmer(cases ~ (1 | state) + factor(indicatorcoast) +
    offset(log(population2019)) + scale(popdensity) + scale(poverty) +
    scale(log(median_income)) + scale(pct_obesity) + scale(voter_margin_2020) +
    scale(median_age) + factor(party) + factor(humidity) + mean_pm25, family = poisson(link = "log"),
    data = coastal.new)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, : Model is nearly unide
##  - Rescale variables?
```

```
summary(model.indicator.cases)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula:
## cases ~ (1 | state) + factor(indicatorcoast) + offset(log(population2019)) +
##     scale(popdensity) + scale(poverty) + scale(log(median_income)) +
##     scale(pct_obesity) + scale(voter_margin_2020) + scale(median_age) +
##     factor(party) + factor(humidity) + mean_pm25
##    Data: coastal.new
##
##       AIC       BIC    logLik  deviance  df.resid
##  965316.9  965394.9 -482645.4  965290.9      2973
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -148.11   -6.67   -0.42    6.51  350.45
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  state  (Intercept) 0.07185  0.2681
## Number of obs: 2986, groups:  state, 49
##
## Fixed effects:
##                                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)                     -2.4332540  0.0383408  -63.46   <2e-16 ***
## factor(indicatorcoast)NonCoastal -0.0066361  0.0005517  -12.03   <2e-16 ***
## scale(popdensity)               -0.0017168  0.0001109  -15.47   <2e-16 ***
## scale(poverty)                   0.0154338  0.0006411   24.07   <2e-16 ***
## scale(log(median_income))       -0.0332828  0.0005583  -59.62   <2e-16 ***
## scale(pct_obesity)              -0.0129600  0.0003363  -38.53   <2e-16 ***
## scale(voter_margin_2020)         0.0832380  0.0004119  202.09   <2e-16 ***
## scale(median_age)               -0.0833038  0.0003370 -247.18   <2e-16 ***
## factor(party)Republican         -0.0222963  0.0007196  -30.98   <2e-16 ***
## factor(humidity)Marine          -0.2732304  0.0015830 -172.61   <2e-16 ***
```

```
## factor(humidity)Moist            -0.3765673  0.0016796 -224.20   <2e-16 ***
## mean_pm25                         0.0424528  0.0001587  267.51   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##               (Intr) fc()NC scl(pp) scl(pv) s((_)) scl(p_) s(__20 scl(m_)
## fctr(ndc)NC   -0.019
## scl(ppdnst)    0.008  0.189
## scal(pvrty)    0.001  0.009 -0.159
## scl(lg(m_))    0.004 -0.019 -0.088   0.868
## scl(pct_bs)    0.005 -0.101  0.116   0.077   0.342
## scl(__2020)    0.008 -0.045  0.238   0.150   0.117 -0.148
## scal(mdn_g)    0.001  0.193 -0.006   0.297   0.252  0.132  -0.179
## fctr(prty)R   -0.019  0.019 -0.102   0.007  -0.019 -0.077  -0.662 -0.074
## fctr(hmdty)Mr -0.015  0.167 -0.070  -0.100  -0.204 -0.097   0.157 -0.081
## fctr(hmdty)Ms -0.029  0.016  0.005   0.025  -0.014 -0.027   0.011 -0.085
## mean_pm25     -0.033  0.182 -0.243  -0.032  -0.096 -0.055   0.142  0.090
##               fct()R fctr(hmdty)Mr fctr(hmdty)Ms
## fctr(ndc)NC
## scl(ppdnst)
## scal(pvrty)
## scl(lg(m_))
## scl(pct_bs)
## scl(__2020)
## scal(mdn_g)
## fctr(prty)R
## fctr(hmdty)Mr -0.015
## fctr(hmdty)Ms  0.016 -0.021
## mean_pm25      0.062  0.409        -0.148
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

```
# Model deaths
model.indicator.deaths = glmer(deaths ~ (1 | state) + factor(indicatorcoast) +
    offset(log(population2019)) + scale(popdensity) + scale(poverty) +
    scale(log(median_income)) + scale(pct_obesity) + scale(voter_margin_2020) +
    scale(median_age) + factor(party) + factor(humidity) + mean_pm25, family = poisson(link = "log"),
    data = coastal.new)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, : Model is nearly unide
##  - Rescale variables?
```

```
summary(model.indicator.deaths)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula:
## deaths ~ (1 | state) + factor(indicatorcoast) + offset(log(population2019)) +
##     scale(popdensity) + scale(poverty) + scale(log(median_income)) +
##     scale(pct_obesity) + scale(voter_margin_2020) + scale(median_age) +
```

```
##     factor(party) + factor(humidity) + mean_pm25
##    Data: coastal.new
##
##      AIC      BIC   logLik deviance df.resid
##  56248.4  56326.4 -28111.2  56222.4     2973
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -24.3868  -1.8580  -0.1744   1.8524  28.3373
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  state  (Intercept) 0.1973   0.4442
## Number of obs: 2986, groups:  state, 49
##
## Fixed effects:
##                                    Estimate Std. Error z value Pr(>|z|)
## (Intercept)                       -6.4773342  0.0651787 -99.378  < 2e-16 ***
## factor(indicatorcoast)NonCoastal -0.0115666  0.0040629  -2.847  0.00442 **
## scale(popdensity)                  0.0002414  0.0007636   0.316  0.75190
## scale(poverty)                     0.1470811  0.0046156  31.866  < 2e-16 ***
## scale(log(median_income))         -0.0794677  0.0041466 -19.165  < 2e-16 ***
## scale(pct_obesity)                 0.0074566  0.0025492   2.925  0.00344 **
## scale(voter_margin_2020)           0.0930697  0.0030756  30.261  < 2e-16 ***
## scale(median_age)                  0.1106983  0.0024700  44.818  < 2e-16 ***
## factor(party)Republican           -0.0315627  0.0054647  -5.776 7.66e-09 ***
## factor(humidity)Marine            -0.1808182  0.0129626 -13.949  < 2e-16 ***
## factor(humidity)Moist             -0.6391584  0.0118184 -54.082  < 2e-16 ***
## mean_pm25                          0.0792811  0.0012108  65.481  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##               (Intr) fc()NC scl(pp) scl(pv) s((_)) scl(p_) s(__20 scl(m_)
## fctr(ndc)NC   -0.087
## scl(ppdnst)    0.036  0.188
## scal(pvrty)    0.005 -0.004 -0.175
## scl(lg(m_))    0.019 -0.024 -0.079   0.861
## scl(pct_bs)    0.026 -0.092  0.160   0.052   0.336
## scl(__2020)    0.039 -0.055  0.249   0.150   0.108 -0.131
## scal(mdn_g)   -0.001  0.180  0.036   0.283   0.261  0.159  -0.172
## fctr(prty)R   -0.086  0.024 -0.133   0.013  -0.006 -0.085  -0.664 -0.096
## fctr(hmdty)Mr -0.067  0.154 -0.060  -0.090  -0.192 -0.090   0.145 -0.073
## fctr(hmdty)Ms -0.117  0.028 -0.005   0.018  -0.026 -0.041  -0.007 -0.087
## mean_pm25     -0.147  0.183 -0.217  -0.034  -0.107 -0.056   0.149  0.106
##               fct()R fctr(hmdty)Mr fctr(hmdty)Ms
## fctr(ndc)NC
## scl(ppdnst)
## scal(pvrty)
## scl(lg(m_))
## scl(pct_bs)
## scl(__2020)
## scal(mdn_g)
## fctr(prty)R
```

```
## fctr(hmdty)Mr -0.007
## fctr(hmdty)Ms  0.026 -0.024
## mean_pm25      0.059  0.394        -0.154
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

Repeat above, - humidity

```
# Model cases
model.initial.cases.nohumidity = glmer(cases ~ (1 | state) + coastal.distance +
    offset(log(population2019)) + scale(popdensity) + scale(poverty) +
    scale(log(median_income)) + scale(pct_obesity) + scale(voter_margin_2020) +
    scale(median_age) + factor(party) + mean_pm25, family = poisson(link = "log"),
    data = coastal.only)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, : Model is nearly unide
##  - Rescale variables?
```

```
summary(model.initial.cases.nohumidity)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula:
## cases ~ (1 | state) + coastal.distance + offset(log(population2019)) +
##     scale(popdensity) + scale(poverty) + scale(log(median_income)) +
##     scale(pct_obesity) + scale(voter_margin_2020) + scale(median_age) +
##     factor(party) + mean_pm25
##    Data: coastal.only
##
##       AIC       BIC    logLik  deviance  df.resid
##  527346.4  527400.5 -263661.2  527322.4       659
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -134.073  -12.358   -0.726    9.286  307.251
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  state  (Intercept) 0.05554  0.2357
## Number of obs: 671, groups:  state, 30
##
## Fixed effects:
##                              Estimate Std. Error z value Pr(>|z|)
## (Intercept)                -2.9758995  0.0430803  -69.08   <2e-16 ***
## coastal.distance2           0.0126640  0.0007663   16.53   <2e-16 ***
## coastal.distance3           0.0220155  0.0010005   22.00   <2e-16 ***
## scale(popdensity)          -0.0181007  0.0002334  -77.57   <2e-16 ***
## scale(poverty)              0.0239593  0.0009704   24.69   <2e-16 ***
## scale(log(median_income)) -0.0812242  0.0009311  -87.23   <2e-16 ***
```

```
## scale(pct_obesity)        -0.0810283  0.0005513 -146.97   <2e-16 ***
## scale(voter_margin_2020)   0.0828887  0.0006381  129.91   <2e-16 ***
## scale(median_age)         -0.1150409  0.0005626 -204.47   <2e-16 ***
## factor(party)Republican   -0.0225069  0.0010564  -21.30   <2e-16 ***
## mean_pm25                  0.0510268  0.0001765  289.11   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) cstl.2 cstl.3 scl(pp) scl(pv) s((_)) scl(p_) s(__20 scl(m_)
## cstl.dstnc2 -0.011
## cstl.dstnc3 -0.013  0.361
## scl(ppdnst)  0.008  0.197  0.156
## scal(pvrty)  0.007 -0.104 -0.131 -0.206
## scl(lg(m_))  0.002 -0.154 -0.081 -0.157   0.844
## scl(pct_bs) -0.001 -0.130 -0.110  0.107   0.070   0.392
## scl(__2020)  0.016 -0.170 -0.237  0.237   0.280   0.202 -0.113
## scal(mdn_g)  0.003  0.232  0.118  0.017   0.304   0.198  0.140  -0.051
## fctr(prty)R -0.019  0.042  0.092 -0.124  -0.055  -0.044 -0.099  -0.624 -0.188
## mean_pm25   -0.040  0.116  0.128 -0.224  -0.088  -0.010  0.088  -0.070  0.103
##             fct()R
## cstl.dstnc2
## cstl.dstnc3
## scl(ppdnst)
## scal(pvrty)
## scl(lg(m_))
## scl(pct_bs)
## scl(__2020)
## scal(mdn_g)
## fctr(prty)R
## mean_pm25    0.086
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

```
# Model deaths
model.initial.deaths.nohumidity = glmer(deaths ~ (1 | state) + coastal.distance +
    offset(log(population2019)) + scale(popdensity) + scale(poverty) +
    scale(log(median_income)) + scale(pct_obesity) + scale(voter_margin_2020) +
    scale(median_age) + factor(party) + mean_pm25, family = poisson(link = "log"),
    data = coastal.only)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, : Model is nearly unide
##  - Rescale variables?
```

```
summary(model.initial.deaths.nohumidity)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula:
## deaths ~ (1 | state) + coastal.distance + offset(log(population2019)) +
##     scale(popdensity) + scale(poverty) + scale(log(median_income)) +
```

```
##     scale(pct_obesity) + scale(voter_margin_2020) + scale(median_age) +
##     factor(party) + mean_pm25
##    Data: coastal.only
##
##      AIC      BIC   logLik deviance df.resid
##  20037.7  20091.8 -10006.8  20013.7      659
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -21.9505  -2.7575  -0.4996   2.0563  25.8188
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  state  (Intercept) 0.1185   0.3442
## Number of obs: 671, groups:  state, 30
##
## Fixed effects:
##                             Estimate Std. Error  z value Pr(>|z|)
## (Intercept)               -7.367694   0.064917 -113.493  < 2e-16 ***
## coastal.distance2          0.057546   0.005621   10.239  < 2e-16 ***
## coastal.distance3          0.036126   0.007306    4.945 7.63e-07 ***
## scale(popdensity)         -0.020616   0.001644  -12.543  < 2e-16 ***
## scale(poverty)             0.202320   0.007016   28.838  < 2e-16 ***
## scale(log(median_income)) -0.056214   0.006948   -8.091 5.93e-16 ***
## scale(pct_obesity)        -0.043184   0.004192  -10.303  < 2e-16 ***
## scale(voter_margin_2020)   0.039597   0.004702    8.422  < 2e-16 ***
## scale(median_age)          0.128092   0.004131   31.010  < 2e-16 ***
## factor(party)Republican    0.009171   0.007901    1.161    0.246
## mean_pm25                  0.096793   0.001379   70.176  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) cstl.2 cstl.3 scl(pp) scl(pv) s((_)) scl(p_) s(__20 scl(m_)
## cstl.dstnc2 -0.056
## cstl.dstnc3 -0.062  0.348
## scl(ppdnst)  0.042  0.209  0.171
## scal(pvrty)  0.033 -0.113 -0.131 -0.211
## scl(lg(m_))  0.012 -0.164 -0.081 -0.133   0.840
## scl(pct_bs) -0.003 -0.107 -0.097  0.150   0.071   0.411
## scl(__2020)  0.070 -0.154 -0.214  0.239   0.248   0.160 -0.129
## scal(mdn_g)  0.006  0.201  0.119  0.061   0.310   0.229  0.179  -0.074
## fctr(prty)R -0.092  0.050  0.079 -0.147  -0.042  -0.033 -0.106  -0.615 -0.203
## mean_pm25   -0.206  0.126  0.118 -0.199  -0.091  -0.034  0.072  -0.022  0.102
##             fct()R
## cstl.dstnc2
## cstl.dstnc3
## scl(ppdnst)
## scal(pvrty)
## scl(lg(m_))
## scl(pct_bs)
## scl(__2020)
## scal(mdn_g)
## fctr(prty)R
```

```
## mean_pm25    0.064
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

```
# Model cases
model.indicator.cases.nohumidity = glmer(cases ~ (1 | state) + factor(indicatorcoast) +
    offset(log(population2019)) + scale(popdensity) + scale(poverty) +
    scale(log(median_income)) + scale(pct_obesity) + scale(voter_margin_2020) +
    scale(median_age) + factor(party) + mean_pm25, family = poisson(link = "log"),
    data = coastal.new)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, : Model is nearly unide
##  - Rescale variables?
```

```
summary(model.indicator.cases.nohumidity)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula:
## cases ~ (1 | state) + factor(indicatorcoast) + offset(log(population2019)) +
##     scale(popdensity) + scale(poverty) + scale(log(median_income)) +
##     scale(pct_obesity) + scale(voter_margin_2020) + scale(median_age) +
##     factor(party) + mean_pm25
##    Data: coastal.new
##
##      AIC      BIC   logLik deviance df.resid
##  1058254  1058320  -529116  1058232     3077
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -155.63   -6.48   -0.34    6.61  350.89
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  state  (Intercept) 0.06215  0.2493
## Number of obs: 3088, groups:  state, 49
##
## Fixed effects:
##                                  Estimate Std. Error z value Pr(>|z|)
## (Intercept)                     -2.7888748  0.0356456  -78.24   <2e-16 ***
## factor(indicatorcoast)NonCoastal  0.0113348  0.0005398   21.00   <2e-16 ***
## scale(popdensity)               -0.0030231  0.0001093  -27.66   <2e-16 ***
## scale(poverty)                   0.0072247  0.0006343   11.39   <2e-16 ***
## scale(log(median_income))       -0.0558493  0.0005436 -102.75   <2e-16 ***
## scale(pct_obesity)              -0.0209702  0.0003335  -62.89   <2e-16 ***
## scale(voter_margin_2020)         0.0955407  0.0004050  235.88   <2e-16 ***
## scale(median_age)               -0.0924895  0.0003315 -278.99   <2e-16 ***
## factor(party)Republican         -0.0232713  0.0007156  -32.52   <2e-16 ***
## mean_pm25                        0.0487934  0.0001410  346.07   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Correlation of Fixed Effects:
##             (Intr) fc()NC scl(pp) scl(pv) s((_)) scl(p_) s(__20 scl(m_) fct()R
## fctr(ndc)NC -0.017
## scl(ppdnst)  0.007  0.201
## scal(pvrty)  0.000  0.026 -0.169
## scl(lg(m_))  0.000  0.014 -0.109   0.870
## scl(pct_bs)  0.003 -0.087  0.105   0.067   0.330
## scl(__2020)  0.012 -0.077  0.256   0.172   0.161 -0.136
## scal(mdn_g) -0.004  0.211 -0.020   0.294   0.239  0.119  -0.171
## fctr(prty)R -0.020  0.020 -0.104   0.004  -0.026 -0.078  -0.667 -0.073
## mean_pm25   -0.036  0.119 -0.236   0.016  -0.015 -0.020   0.079  0.140   0.080
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

```
# Model deaths
model.indicator.deaths.nohumidity = glmer(deaths ~ (1 | state) + factor(indicatorcoast) +
    offset(log(population2019)) + scale(popdensity) + scale(poverty) +
    scale(log(median_income)) + scale(pct_obesity) + scale(voter_margin_2020) +
    scale(median_age) + factor(party) + mean_pm25, family = poisson(link = "log"),
    data = coastal.new)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, : Model is nearly unide
##  - Rescale variables?
```

```
summary(model.indicator.deaths.nohumidity)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula:
## deaths ~ (1 | state) + factor(indicatorcoast) + offset(log(population2019)) +
##     scale(popdensity) + scale(poverty) + scale(log(median_income)) +
##     scale(pct_obesity) + scale(voter_margin_2020) + scale(median_age) +
##     factor(party) + mean_pm25
##    Data: coastal.new
##
##      AIC      BIC   logLik deviance df.resid
##  60295.8  60362.1 -30136.9  60273.8     3077
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -30.6176  -1.8819  -0.1612   1.9077  30.2565
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  state  (Intercept) 0.1421   0.377
## Number of obs: 3088, groups:  state, 49
##
## Fixed effects:
##                                 Estimate Std. Error  z value Pr(>|z|)
## (Intercept)                   -6.9678367  0.0551329 -126.383  < 2e-16 ***
```

```
## factor(indicatorcoast)NonCoastal  0.0031276  0.0039742    0.787    0.431
## scale(popdensity)                -0.0002864  0.0007564   -0.379    0.705
## scale(poverty)                    0.1438658  0.0045751   31.445  < 2e-16 ***
## scale(log(median_income))        -0.0969172  0.0040564  -23.893  < 2e-16 ***
## scale(pct_obesity)               -0.0001422  0.0025259   -0.056    0.955
## scale(voter_margin_2020)          0.1005832  0.0030384   33.104  < 2e-16 ***
## scale(median_age)                 0.0999162  0.0024367   41.005  < 2e-16 ***
## factor(party)Republican          -0.0299615  0.0054325   -5.515 3.48e-08 ***
## mean_pm25                         0.0776299  0.0010857   71.501  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##             (Intr) fc()NC scl(pp) scl(pv) s((_)) scl(p_) s(__20 scl(m_) fct()R
## fctr(ndc)NC -0.084
## scl(ppdnst)  0.038  0.196
## scal(pvrty)  0.000  0.011 -0.181
## scl(lg(m_))  0.004  0.004 -0.093   0.865
## scl(pct_bs)  0.018 -0.080  0.150   0.046   0.325
## scl(__2020)  0.059 -0.082  0.268   0.169   0.147 -0.119
## scal(mdn_g) -0.023  0.197  0.022   0.281   0.248  0.144  -0.166
## fctr(prty)R -0.098  0.022 -0.135   0.011  -0.011 -0.086  -0.669 -0.093
## mean_pm25   -0.177  0.131 -0.216   0.008  -0.038 -0.030   0.090  0.153   0.074
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

Analysis by region

```
model.byregion.cases = glmer(cases ~ (1 | state) + region + offset(log(population2019)) +
    scale(popdensity) + scale(poverty) + scale(log(median_income)) + scale(pct_obesity) +
    scale(voter_margin_2020) + scale(median_age) + factor(party) + factor(humidity) +
    mean_pm25, family = poisson(link = "log"), data = coastal.new)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, : Model is nearly unide
##  - Rescale variables?
```

```
summary(model.byregion.cases)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: cases ~ (1 | state) + region + offset(log(population2019)) +
##     scale(popdensity) + scale(poverty) + scale(log(median_income)) +
##     scale(pct_obesity) + scale(voter_margin_2020) + scale(median_age) +
##     factor(party) + factor(humidity) + mean_pm25
##    Data: coastal.new
##
##       AIC       BIC    logLik  deviance  df.resid
##  854542.1  854668.1 -427250.0  854500.1      2965
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -147.731   -6.836   -0.535    6.192  282.346
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  state  (Intercept) 0.07703  0.2775
## Number of obs: 2986, groups:  state, 49
##
## Fixed effects:
##                              Estimate Std. Error  z value Pr(>|z|)
## (Intercept)                -2.5412906  0.0396930  -64.024  < 2e-16 ***
## regionatlantic              0.1091478  0.0009356  116.658  < 2e-16 ***
## regionerie                 -0.0938930  0.0014384  -65.276  < 2e-16 ***
## regiongreat salt lake       0.2350591  0.0061768   38.055  < 2e-16 ***
## regiongulf of mexico       -0.1642553  0.0009808 -167.477  < 2e-16 ***
## regionhuron                 0.0087662  0.0033821    2.592  0.00954 **
## regionmichigan              0.0301481  0.0012898   23.374  < 2e-16 ***
## regionontario              -0.3365806  0.0027122 -124.100  < 2e-16 ***
## regionpacific               0.2185686  0.0019389  112.727  < 2e-16 ***
## regionsuperior              0.1462612  0.0078511   18.629  < 2e-16 ***
## scale(popdensity)          -0.0023970  0.0001105  -21.693  < 2e-16 ***
## scale(poverty)              0.0098911  0.0006541   15.121  < 2e-16 ***
## scale(log(median_income)) -0.0484659  0.0005728  -84.614  < 2e-16 ***
## scale(pct_obesity)        -0.0083154  0.0003372  -24.660  < 2e-16 ***
## scale(voter_margin_2020)   0.0746637  0.0004151  179.860  < 2e-16 ***
## scale(median_age)         -0.0782786  0.0003339 -234.408  < 2e-16 ***
## factor(party)Republican   -0.0005742  0.0007228   -0.794  0.42697
```

```
## factor(humidity)Marine    -0.2891216  0.0016473 -175.508  < 2e-16 ***
## factor(humidity)Moist     -0.3037754  0.0017157 -177.056  < 2e-16 ***
## mean_pm25                  0.0438859  0.0001622  270.507  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Correlation matrix not shown by default, as p = 20 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it

## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

```
model.byregion.deaths = glmer(deaths ~ (1 | state) + region + offset(log(population2019)) +
    scale(popdensity) + scale(poverty) + scale(log(median_income)) + scale(pct_obesity) +
    scale(voter_margin_2020) + scale(median_age) + factor(party) + factor(humidity) +
    mean_pm25, family = poisson(link = "log"), data = coastal.new)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, : Model is nearly unide
##  - Rescale variables?
```

```
summary(model.byregion.deaths)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: deaths ~ (1 | state) + region + offset(log(population2019)) +
##     scale(popdensity) + scale(poverty) + scale(log(median_income)) +
##     scale(pct_obesity) + scale(voter_margin_2020) + scale(median_age) +
##     factor(party) + factor(humidity) + mean_pm25
##    Data: coastal.new
##
##      AIC      BIC   logLik deviance df.resid
##  54797.4  54923.4 -27377.7  54755.4     2965
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -20.3777  -1.8597  -0.1594   1.8253  24.7136
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  state  (Intercept) 0.2014   0.4488
## Number of obs: 2986, groups:  state, 49
##
## Fixed effects:
##                             Estimate Std. Error z value Pr(>|z|)
## (Intercept)               -6.5501762  0.0657052 -99.690  < 2e-16 ***
## regionatlantic             0.1234091  0.0069198  17.834  < 2e-16 ***
## regionerie                 0.0330084  0.0099179   3.328 0.000874 ***
## regiongreat salt lake     -0.0943665  0.0701265  -1.346 0.178412
```

```
## regiongulf of mexico      -0.0696576  0.0071843  -9.696  < 2e-16 ***
## regionhuron                0.0820439  0.0214192   3.830 0.000128 ***
## regionmichigan             0.0039762  0.0096547   0.412 0.680456
## regionontario             -0.3328381  0.0197894 -16.819  < 2e-16 ***
## regionpacific              0.3009605  0.0158226  19.021  < 2e-16 ***
## regionsuperior            -0.0493770  0.0710890  -0.695 0.487318
## scale(popdensity)          0.0004902  0.0007582   0.647 0.517950
## scale(poverty)             0.1317248  0.0047158  27.933  < 2e-16 ***
## scale(log(median_income)) -0.0976898  0.0042648 -22.906  < 2e-16 ***
## scale(pct_obesity)         0.0127388  0.0025565   4.983 6.26e-07 ***
## scale(voter_margin_2020)   0.0832888  0.0030955  26.906  < 2e-16 ***
## scale(median_age)          0.1105617  0.0024569  45.001  < 2e-16 ***
## factor(party)Republican   -0.0107710  0.0054902  -1.962 0.049780 *
## factor(humidity)Marine    -0.2220364  0.0135196 -16.423  < 2e-16 ***
## factor(humidity)Moist     -0.5962848  0.0121402 -49.117  < 2e-16 ***
## mean_pm25                  0.0777761  0.0012370  62.873  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Correlation matrix not shown by default, as p = 20 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it

## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

```
model.byregion.cases.nohumidity = glmer(cases ~ (1 | state) + region +
    offset(log(population2019)) + scale(popdensity) + scale(poverty) +
    scale(log(median_income)) + scale(pct_obesity) + scale(voter_margin_2020) +
    scale(median_age) + factor(party) + mean_pm25, family = poisson(link = "log"),
    data = coastal.new)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, : Model is nearly unide
##  - Rescale variables?
```

```
summary(model.byregion.cases.nohumidity)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: cases ~ (1 | state) + region + offset(log(population2019)) +
##     scale(popdensity) + scale(poverty) + scale(log(median_income)) +
##     scale(pct_obesity) + scale(voter_margin_2020) + scale(median_age) +
##     factor(party) + mean_pm25
##    Data: coastal.new
##
##       AIC       BIC    logLik  deviance  df.resid
##  931231.4  931346.1 -465596.7  931193.4      3069
##
## Scaled residuals:
```

```
##      Min       1Q   Median       3Q      Max
## -130.254   -6.738   -0.460    6.189  271.320
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  state  (Intercept) 0.06862  0.262
## Number of obs: 3088, groups:  state, 49
##
## Fixed effects:
##                              Estimate Std. Error  z value Pr(>|z|)
## (Intercept)                -2.8418438  0.0374454  -75.893  < 2e-16 ***
## regionatlantic              0.1064722  0.0009305  114.422  < 2e-16 ***
## regionerie                 -0.0952163  0.0014326  -66.463  < 2e-16 ***
## regiongreat salt lake       0.2393593  0.0061609   38.851  < 2e-16 ***
## regiongulf of mexico       -0.2024530  0.0009592 -211.069  < 2e-16 ***
## regionhuron                 0.0308557  0.0033188    9.297  < 2e-16 ***
## regionmichigan              0.0383847  0.0012777   30.043  < 2e-16 ***
## regionontario              -0.3497800  0.0027094 -129.100  < 2e-16 ***
## regionpacific               0.1321633  0.0018614   71.002  < 2e-16 ***
## regionsuperior              0.0980263  0.0035481   27.628  < 2e-16 ***
## scale(popdensity)          -0.0048310  0.0001088  -44.413  < 2e-16 ***
## scale(poverty)              0.0035266  0.0006464    5.456 4.88e-08 ***
## scale(log(median_income)) -0.0695858  0.0005572 -124.895  < 2e-16 ***
## scale(pct_obesity)         -0.0160157  0.0003345  -47.875  < 2e-16 ***
## scale(voter_margin_2020)    0.0896284  0.0004064  220.523  < 2e-16 ***
## scale(median_age)          -0.0882476  0.0003285 -268.623  < 2e-16 ***
## factor(party)Republican    -0.0035625  0.0007185   -4.958 7.11e-07 ***
## mean_pm25                   0.0528512  0.0001437  367.913  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Correlation matrix not shown by default, as p = 18 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it

## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

```
model.byregion.deaths.nohumidity = glmer(deaths ~ (1 | state) + region +
    offset(log(population2019)) + scale(popdensity) + scale(poverty) +
    scale(log(median_income)) + scale(pct_obesity) + scale(voter_margin_2020) +
    scale(median_age) + factor(party) + mean_pm25, family = poisson(link = "log"),
    data = coastal.new)
```

```
## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control$checkConv, : Model is nearly unide
##  - Rescale variables?
```

```
summary(model.byregion.deaths.nohumidity)
```

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
```

```
##   Approximation) [glmerMod]
##  Family: poisson  ( log )
## Formula: deaths ~ (1 | state) + region + offset(log(population2019)) +
##     scale(popdensity) + scale(poverty) + scale(log(median_income)) +
##     scale(pct_obesity) + scale(voter_margin_2020) + scale(median_age) +
##     factor(party) + mean_pm25
##    Data: coastal.new
##
##      AIC      BIC   logLik deviance df.resid
##  58512.1  58626.8 -29237.1  58474.1     3069
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -23.4477  -1.9135  -0.1639   1.8834  27.2890
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  state  (Intercept) 0.1513   0.389
## Number of obs: 3088, groups:  state, 49
##
## Fixed effects:
##                              Estimate Std. Error  z value Pr(>|z|)
## (Intercept)                -7.0211535  0.0566981 -123.834  < 2e-16 ***
## regionatlantic              0.1088215  0.0068730   15.833  < 2e-16 ***
## regionerie                  0.0312780  0.0098547    3.174 0.001504 **
## regiongreat salt lake      -0.0687425  0.0697357   -0.986 0.324252
## regiongulf of mexico       -0.1403308  0.0069751  -20.119  < 2e-16 ***
## regionhuron                 0.0732004  0.0212201    3.450 0.000561 ***
## regionmichigan              0.0138502  0.0095508    1.450 0.147014
## regionontario              -0.3574070  0.0197611  -18.086  < 2e-16 ***
## regionpacific               0.2490344  0.0152416   16.339  < 2e-16 ***
## regionsuperior              0.1172098  0.0277579    4.223 2.42e-05 ***
## scale(popdensity)          -0.0011162  0.0007494   -1.489 0.136406
## scale(poverty)              0.1329823  0.0046683   28.487  < 2e-16 ***
## scale(log(median_income)) -0.1132945  0.0041645  -27.205  < 2e-16 ***
## scale(pct_obesity)          0.0050817  0.0025344    2.005 0.044957 *
## scale(voter_margin_2020)    0.0944571  0.0030456   31.014  < 2e-16 ***
## scale(median_age)           0.0993954  0.0024255   40.979  < 2e-16 ***
## factor(party)Republican    -0.0089050  0.0054566   -1.632 0.102685
## mean_pm25                   0.0798862  0.0011044   72.335  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

##
## Correlation matrix not shown by default, as p = 18 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it

## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model is nearly unidentifiable: very large eigenvalue
##  - Rescale variables?
```

Print exponentiated coefficients (ratio of probabilities)

Printing tables

```
tab_model(model.initial.cases, digits = 3)
tab_model(model.initial.deaths, digits = 3)
tab_model(model.initial.cases.nohumidity, digits = 3)
tab_model(model.initial.deaths.nohumidity, digits = 3)
tab_model(model.indicator.cases, digits = 3)
tab_model(model.indicator.deaths, digits = 3)
tab_model(model.indicator.cases.nohumidity, digits = 3)
tab_model(model.indicator.deaths.nohumidity, digits = 3)
tab_model(model.byregion.cases, digits = 3)
tab_model(model.byregion.deaths, digits = 3)
tab_model(model.byregion.cases.nohumidity, digits = 3)
tab_model(model.byregion.deaths.nohumidity, digits = 3)
```