Statistical Analysis for COVID in California

Thomas McHale

Table of contents

Cleaning Data

See quarto document for code

Statistical Analysis

Linear Mixed Effects Regression

Univariate

Table 1: Univariate LME Model of Smoke on COVID-19 Incidence

Lag_Period	estimate	lower_95	upper_95	p_value
1 Month	264.59	215.31	313.87	0
2 Months	153.53	100.61	206.45	0

Table 2: Univariate LME Model of Smoke on COVID-19 Death

Lag_Period	estimate	lower_95	upper_95	p_value
1 Month	3.75	2.76	4.74	0.0000
2 Months	0.69	-0.41	1.79	0.2178

Multivariate

```
Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula:
covid_incidence_1mo ~ I(smoke/10) + median_income + outdoor_laborer_rate +
    avg_temp + precip + elevation + ALWAYS + Month_Code + (1 |      NAME)
   Data: data

REML criterion at convergence: 8054.1

Scaled residuals:
    Min      1Q  Median      3Q     Max
-2.4363 -0.5009 -0.1808  0.2785  7.2206

Random effects:
 Groups   Name        Variance Std.Dev.
 NAME     (Intercept) 108356   329.2
 Residual             446151   667.9
Number of obs: 510, groups:  NAME, 58

Fixed effects:
                     Estimate Std. Error      df t value Pr(>|t|)
(Intercept)          -625.09      99.66  359.92  -6.273 1.02e-09 ***
I(smoke/10)           202.13      24.34  469.31   8.304 1.09e-15 ***
median_income         -50.18      74.26   55.47  -0.676 0.502008
outdoor_laborer_rate  -69.90      65.56   59.43  -1.066 0.290669
avg_temp              379.67      96.62   52.88   3.930 0.000249 ***
precip                 60.89      40.30  481.66   1.511 0.131523
elevation              88.47      93.51   51.75   0.946 0.348507
ALWAYS                -19.88      61.52   53.74  -0.323 0.747790
Month_Code            150.67      11.19  460.88  13.467  < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Correlation of Fixed Effects:
            (Intr) I(/10) mdn_nc otdr__ avg_tm precip elevtn ALWAYS
I(smoke/10) -0.025
median_incm -0.005  0.032
otdr_lbrr_r  0.006 -0.056  0.553
avg_temp    -0.019  0.078  0.358  0.110
precip      -0.120  0.365  0.042 -0.025  0.096
elevation    0.011 -0.008  0.341  0.023  0.788  0.009
ALWAYS      -0.008 -0.028 -0.317  0.056 -0.326  0.035 -0.133
Month_Code  -0.826 -0.198 -0.008 -0.018  0.026  0.101  0.009  0.015

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula:
death_incidence_1mo ~ I(smoke/10) + median_income + outdoor_laborer_rate +
    avg_temp + precip + elevation + ALWAYS + Month_Code + (1 |      NAME)
   Data: data

REML criterion at convergence: 4218.6

Scaled residuals:
    Min      1Q  Median      3Q     Max
-3.1574 -0.4511 -0.1104  0.2534  9.1308

Random effects:
 Groups   Name        Variance Std.Dev.
 NAME     (Intercept)  24.65    4.965
 Residual             221.46   14.881
Number of obs: 510, groups:  NAME, 58

Fixed effects:
                     Estimate Std. Error       df t value Pr(>|t|)
(Intercept)           -7.0112     2.0944 440.0009  -3.348 0.000885 ***
I(smoke/10)            2.7151     0.5385 479.9623   5.042 6.54e-07 ***
median_income         -1.8668     1.3294  60.9521  -1.404 0.165332
outdoor_laborer_rate  -1.0614     1.1846  67.5567  -0.896 0.373470
avg_temp               9.8377     1.7187  56.8980   5.724 4.07e-07 ***
precip                -0.4987     0.8871 493.4649  -0.562 0.574241
elevation              4.1879     1.6583  55.0539   2.525 0.014467 *
ALWAYS                 1.8481     1.0969  58.5036   1.685 0.097340 .
Month_Code             1.8829     0.2483 468.4075   7.584 1.82e-13 ***
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:
            (Intr) I(/10) mdn_nc otdr__ avg_tm precip elevtn ALWAYS
I(smoke/10) -0.028
median_incm -0.001  0.039
otdr_lbrr_r  0.021 -0.067  0.556
avg_temp    -0.035  0.098  0.357  0.109
precip      -0.130  0.365  0.050 -0.028  0.118
elevation    0.007 -0.008  0.334  0.024  0.785  0.008
ALWAYS      -0.007 -0.031 -0.316  0.052 -0.321  0.043 -0.126
Month_Code  -0.871 -0.196 -0.009 -0.022  0.030  0.102  0.008  0.018


Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula:
covid_incidence_2mo ~ I(smoke/10) + median_income + outdoor_laborer_rate +
    avg_temp + precip + ALWAYS + elevation + Month_Code + (1 |      NAME)
   Data: data

REML criterion at convergence: 7581.2

Scaled residuals:
    Min      1Q  Median      3Q     Max
-2.0427 -0.5711 -0.1943  0.3184  7.1221

Random effects:
 Groups   Name        Variance Std.Dev.
 NAME     (Intercept)  74382   272.7
 Residual             464320   681.4
Number of obs: 480, groups:  NAME, 58

Fixed effects:
                     Estimate Std. Error      df t value Pr(>|t|)
(Intercept)          -890.44     107.63  419.07  -8.273 1.75e-15 ***
I(smoke/10)            87.80      25.08  446.97   3.500 0.000511 ***
median_income         -67.57      68.22   59.58  -0.991 0.325934
outdoor_laborer_rate  -48.93      59.78   62.60  -0.819 0.416134
avg_temp              337.31      88.11   55.55   3.828 0.000330 ***
precip                -40.13      44.57  458.34  -0.900 0.368382
ALWAYS                 21.52      56.12   56.63   0.383 0.702843
elevation              59.23      84.84   53.31   0.698 0.488145
```

```
Month_Code             175.71      12.28  437.37  14.307  < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:
            (Intr) I(/10) mdn_nc otdr__ avg_tm precip ALWAYS elevtn
I(smoke/10) -0.007
median_incm  0.018  0.032
otdr_lbrr_r  0.017 -0.071  0.554
avg_temp    -0.037  0.100  0.354  0.107
precip      -0.018  0.386  0.042 -0.037  0.114
ALWAYS       0.015 -0.038 -0.316  0.054 -0.333  0.036
elevation   -0.005 -0.006  0.334  0.029  0.787  0.011 -0.132
Month_Code  -0.875 -0.199 -0.023 -0.021  0.034  0.003 -0.002  0.019


Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula:
death_incidence_2mo ~ I(smoke/10) + median_income + outdoor_laborer_rate +
    avg_temp + precip + ALWAYS + elevation + Month_Code + (1 |      NAME)
   Data: data

REML criterion at convergence: 3964.7

Scaled residuals:
    Min      1Q  Median      3Q     Max
-2.5917 -0.4393 -0.1147  0.2230  8.9526

Random effects:
 Groups   Name        Variance Std.Dev.
 NAME     (Intercept)  22.43    4.736
 Residual             220.38   14.845
Number of obs: 480, groups:  NAME, 58

Fixed effects:
                     Estimate Std. Error       df t value Pr(>|t|)
(Intercept)          -15.4317     2.2891 441.0490  -6.741 4.93e-11 ***
I(smoke/10)           -0.5704     0.5439 452.6051  -1.049  0.29486
median_income         -2.3655     1.3328  63.3972  -1.775  0.08073 .
outdoor_laborer_rate  -0.7815     1.1715  67.6516  -0.667  0.50699
avg_temp               9.6249     1.7141  58.3795   5.615 5.73e-07 ***
precip                -0.8433     0.9639 464.0705  -0.875  0.38210
```

```
ALWAYS                 2.2040     1.0931  59.9323   2.016  0.04825 *
elevation              4.7501     1.6462  55.5083   2.885  0.00556 **
Month_Code             3.1436     0.2668 442.0394  11.782  < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:
            (Intr) I(/10) mdn_nc otdr__ avg_tm precip ALWAYS elevtn
I(smoke/10) -0.009
median_incm  0.022  0.036
otdr_lbrr_r  0.024 -0.077  0.556
avg_temp    -0.047  0.112  0.354  0.106
precip      -0.021  0.387  0.045 -0.041  0.126
ALWAYS       0.018 -0.040 -0.315  0.052 -0.332  0.040
elevation   -0.009 -0.006  0.329  0.031  0.785  0.010 -0.129
Month_Code  -0.893 -0.197 -0.025 -0.023  0.037  0.005 -0.002  0.020


Table for: 1-COVID Incidence 1-Month Lag
# A tibble: 11 x 6
   term                 estimate std.error   p.value conf.low conf.high
   <chr>                   <dbl>     <dbl>     <dbl>    <dbl>     <dbl>
 1 (Intercept)            -625.       99.7  1.02e- 9   -816.     -431.
 2 I(smoke/10)             202.       24.3  1.09e-15    153.      249.
 3 median_income           -50.2      74.3  5.02e- 1   -191.       89.8
 4 outdoor_laborer_rate    -69.9      65.6  2.91e- 1   -194.       54.3
 5 avg_temp                380.       96.6  2.49e- 4    197.      562.
 6 precip                   60.9      40.3  1.32e- 1    -21.6     137.
 7 elevation                88.5      93.5  3.49e- 1    -88.0     265.
 8 ALWAYS                  -19.9      61.5  7.48e- 1   -136.       96.7
 9 Month_Code              151.       11.2  4.28e-35    129.      172.
10 sd__(Intercept)         329.       NA   NA             NA        NA
11 sd__Observation         668.       NA   NA             NA        NA

Table for: 2-COVID Incidence 2-Month Lag
# A tibble: 11 x 6
   term                 estimate std.error   p.value conf.low conf.high
   <chr>                   <dbl>     <dbl>     <dbl>    <dbl>     <dbl>
 1 (Intercept)            -890.      108.   1.75e-15  -1096.     -677.
 2 I(smoke/10)              87.8      25.1  5.11e- 4     37.8     136.
 3 median_income           -67.6      68.2  3.26e- 1   -197.       61.1
 4 outdoor_laborer_rate    -48.9      59.8  4.16e- 1   -162.       64.4
 5 avg_temp                337.       88.1  3.30e- 4    170.      504.
```

```
 6 precip                  -40.1      44.6  3.68e- 1   -130.       44.8
 7 ALWAYS                   21.5      56.1  7.03e- 1    -84.2     128.
 8 elevation                59.2      84.8  4.88e- 1   -101.      219.
 9 Month_Code              176.       12.3  2.33e-38    151.      199.
10 sd__(Intercept)         273.       NA    NA            NA        NA
11 sd__Observation         681.       NA    NA            NA        NA

Table for: 3-COVID Death 1-Month Lag
# A tibble: 11 x 6
   term                 estimate std.error   p.value conf.low conf.high
   <chr>                   <dbl>     <dbl>     <dbl>    <dbl>     <dbl>
 1 (Intercept)            -7.01      2.09   8.85e- 4  -11.0      -2.94
 2 I(smoke/10)             2.72      0.539  6.54e- 7    1.65      3.76
 3 median_income          -1.87      1.33   1.65e- 1   -4.39      0.647
 4 outdoor_laborer_rate   -1.06      1.18   3.73e- 1   -3.30      1.19
 5 avg_temp                9.84      1.72   4.07e- 7    6.58     13.1
 6 precip                 -0.499     0.887  5.74e- 1   -2.24      1.22
 7 elevation               4.19      1.66   1.45e- 2    1.05      7.32
 8 ALWAYS                  1.85      1.10   9.73e- 2   -0.225     3.93
 9 Month_Code              1.88      0.248  1.82e-13    1.40      2.37
10 sd__(Intercept)         4.97     NA     NA          NA        NA
11 sd__Observation        14.9      NA     NA          NA        NA

Table for: 4-COVID Death 2-Month Lag
# A tibble: 11 x 6
   term                 estimate std.error   p.value conf.low conf.high
   <chr>                   <dbl>     <dbl>     <dbl>    <dbl>     <dbl>
 1 (Intercept)           -15.4       2.29   4.93e-11  -19.8     -10.9
 2 I(smoke/10)            -0.570     0.544  2.95e- 1   -1.63      0.489
 3 median_income          -2.37      1.33   8.07e- 2   -4.90      0.155
 4 outdoor_laborer_rate   -0.782     1.17   5.07e- 1   -3.00      1.44
 5 avg_temp                9.62      1.71   5.73e- 7    6.37     12.9
 6 precip                 -0.843     0.964  3.82e- 1   -2.74      1.02
 7 ALWAYS                  2.20      1.09   4.83e- 2    0.139     4.28
 8 elevation               4.75      1.65   5.56e- 3    1.63      7.86
 9 Month_Code              3.14      0.267  4.72e-28    2.61      3.66
10 sd__(Intercept)         4.74     NA     NA          NA        NA
11 sd__Observation        14.8      NA     NA          NA        NA


[[1]]
NULL
```

```
[[2]]
NULL

[[3]]
NULL

[[4]]
NULL
```

Spatial Auto-regressive Model

Spatial Lag Model

```
[1] "Empty geometries removed"


Call:lagsarlm(formula = formula1, data = data, listw = weights)

Residuals:
     Min       1Q   Median       3Q      Max
-2353.39  -440.97  -260.49   257.60  6240.73

Type: lag
Coefficients: (asymptotic standard errors)
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   18.876     72.463  0.2605   0.7945
I(smoke/10)  248.069     25.849  9.5970   <2e-16

Rho: 0.66577, LR test value: 29.65, p-value: 5.1748e-08
Asymptotic standard error: 0.090837
    z-value: 7.3293, p-value: 2.3137e-13
Wald statistic: 53.718, p-value: 2.3137e-13

Log likelihood: -4433.476 for lag model
ML residual variance (sigma squared): 692650, (sigma: 832.26)
Number of observations: 544
Number of parameters estimated: 4
AIC: 8875, (AIC for lm: 8902.6)
LM test for residual autocorrelation
test value: 4.6555, p-value: 0.030955


Call:lagsarlm(formula = formula2, data = data, listw = weights)
```

```
Residuals:
     Min       1Q   Median       3Q      Max
-1642.38  -360.25  -138.89   163.93  5519.78

Type: lag
Coefficients: (asymptotic standard errors)
                     Estimate Std. Error z value  Pr(>|z|)
(Intercept)          -991.229    128.384 -7.7208 1.155e-14
I(smoke/10)           192.157     25.525  7.5282 5.151e-14
median_income         -55.508     44.422 -1.2496    0.2115
outdoor_laborer_rate  -45.419     42.420 -1.0707    0.2843
avg_temp              251.959     40.469  6.2260 4.786e-10
precip                 35.391     41.542  0.8519    0.3943
Month_Code            149.584     11.866 12.6065 < 2.2e-16
ALWAYS                -32.523     37.921 -0.8577    0.3911

Rho: 0.53228, LR test value: 16.686, p-value: 4.4117e-05
Asymptotic standard error: 0.11465
    z-value: 4.6429, p-value: 3.4363e-06
Wald statistic: 21.556, p-value: 3.4363e-06

Log likelihood: -4079.382 for lag model
ML residual variance (sigma squared): 514840, (sigma: 717.52)
Number of observations: 510
Number of parameters estimated: 10
AIC: 8178.8, (AIC for lm: 8193.4)
LM test for residual autocorrelation
test value: 2.2443, p-value: 0.13411


Table for: 1-Unadjusted COVID Incidence 1-Month Lag
# A tibble: 3 x 6
  term        estimate std.error  p.value conf.low conf.high
  <chr>          <dbl>     <dbl>    <dbl>    <dbl>     <dbl>
1 rho            0.666    0.0908 2.31e-13    0.488     0.844
2 (Intercept)   18.9     72.5    7.94e- 1 -123.      161.
3 I(smoke/10)  248.      25.8    0         197.      299.

Table for: 2-Unadjusted COVID Incidence 2-Month Lag
# A tibble: 3 x 6
  term        estimate std.error  p.value conf.low conf.high
  <chr>          <dbl>     <dbl>    <dbl>    <dbl>     <dbl>
```

```
1 rho            0.669    0.0953 2.19e-12    0.482     0.856
2 (Intercept)   66.9     72.8    3.58e- 1  -75.8     210.
3 I(smoke/10)  145.      27.1    7.67e- 8   92.4     199.

Table for: 3-Adjusted COVID Incidence 1-Month Lag
# A tibble: 9 x 6
  term                 estimate std.error  p.value  conf.low conf.high
  <chr>                   <dbl>     <dbl>    <dbl>     <dbl>     <dbl>
1 rho                     0.532     0.115 3.44e- 6     0.308     0.757
2 (Intercept)          -991.      128.    1.15e-14 -1243.     -740.
3 I(smoke/10)           192.       25.5   5.15e-14   142.      242.
4 median_income         -55.5      44.4   2.11e- 1  -143.       31.6
5 outdoor_laborer_rate  -45.4      42.4   2.84e- 1  -129.       37.7
6 avg_temp              252.       40.5   4.79e-10   173.      331.
7 precip                 35.4      41.5   3.94e- 1   -46.0     117.
8 Month_Code            150.       11.9   0          126.      173.
9 ALWAYS                -32.5      37.9   3.91e- 1  -107.       41.8

Table for: 4-Adjusted COVID Incidence 2-Month Lag
# A tibble: 10 x 6
   term                  estimate std.error  p.value  conf.low conf.high
   <chr>                    <dbl>     <dbl>    <dbl>     <dbl>     <dbl>
 1 rho                      0.474     0.122 0.000102     0.235     0.714
 2 (Intercept)          -1151.      130.    0         -1405.     -897.
 3 I(smoke/10)             85.3      25.7   0.000906    34.9     136.
 4 median_income          -78.5      48.2   0.104     -173.       16.1
 5 outdoor_laborer_rate   -33.6      43.0   0.434     -118.       50.6
 6 avg_temp               234.       66.5   0.000437   103.      364.
 7 precip                 -48.8      45.0   0.278     -137.       39.4
 8 elevation                1.44     58.8   0.980     -114.      117.
 9 ALWAYS                  -5.00     39.3   0.899      -82.1      72.1
10 Month_Code             173.       12.7   0          148.      198.

[[1]]
NULL

[[2]]
NULL

[[3]]
NULL
```

```
[[4]]
NULL


Table for: 1-Unadjusted COVID Death 1-Month Lag
# A tibble: 3 x 6
  term        estimate std.error  p.value conf.low conf.high
  <chr>          <dbl>     <dbl>    <dbl>    <dbl>     <dbl>
1 rho            0.768    0.0726 0           0.626     0.911
2 (Intercept)   -0.708    1.06   5.04e- 1   -2.79      1.37
3 I(smoke/10)    3.50     0.514  1.04e-11    2.49      4.51

Table for: 2-Unadjusted COVID Death 2-Month Lag
# A tibble: 3 x 6
  term        estimate std.error  p.value conf.low conf.high
  <chr>          <dbl>     <dbl>    <dbl>    <dbl>     <dbl>
1 rho            0.720    0.0874 2.22e-16    0.548     0.891
2 (Intercept)    2.06     1.26   1.01e- 1   -0.403     4.52
3 I(smoke/10)    0.628    0.562  2.64e- 1   -0.473     1.73

Table for: 3-Adjusted COVID Death 1-Month Lag
# A tibble: 10 x 6
   term                 estimate std.error  p.value  conf.low conf.high
   <chr>                   <dbl>     <dbl>    <dbl>     <dbl>     <dbl>
 1 rho                     0.282     0.146 5.27e- 2  -0.00331     0.568
 2 (Intercept)            -9.84      2.58  1.40e- 4 -14.9        -4.78
 3 I(smoke/10)             2.67      0.550 1.19e- 6   1.59        3.75
 4 median_income          -2.11      1.00  3.57e- 2  -4.07       -0.141
 5 outdoor_laborer_rate   -0.974     0.913 2.86e- 1  -2.76        0.816
 6 avg_temp                7.80      1.68  3.42e- 6   4.51       11.1
 7 precip                 -0.488     0.895 5.85e- 1  -2.24        1.26
 8 elevation               2.77      1.39  4.64e- 2   0.0439      5.50
 9 ALWAYS                  1.55      0.841 6.57e- 2  -0.100       3.20
10 Month_Code              1.88      0.255 1.55e-13   1.38        2.39

Table for: 4-Adjusted COVID Death 2-Month Lag
# A tibble: 10 x 6
   term                 estimate std.error  p.value conf.low conf.high
   <chr>                   <dbl>     <dbl>    <dbl>    <dbl>     <dbl>
 1 rho                     0.237     0.145 1.02e- 1  -0.0473     0.520
 2 (Intercept)           -17.3       2.67  8.60e-11 -22.6      -12.1
 3 I(smoke/10)            -0.551     0.554 3.20e- 1  -1.64        0.535
 4 median_income          -2.60      1.04  1.22e- 2  -4.64       -0.567
```

```
 5 outdoor_laborer_rate   -0.686     0.926 4.59e- 1  -2.50       1.13
 6 avg_temp                7.84      1.73  5.64e- 6   4.45      11.2
 7 precip                 -0.865     0.970 3.72e- 1  -2.77       1.04
 8 elevation               3.48      1.42  1.45e- 2   0.691      6.27
 9 ALWAYS                  1.97      0.868 2.30e- 2   0.272      3.67
10 Month_Code              3.11      0.273 0          2.57       3.64
```

```
[[1]]
NULL

[[2]]
NULL

[[3]]
NULL

[[4]]
NULL
```

Spatial Error Model

```
Table for: 1-Unadjusted COVID Incidence 1-Month Lag
# A tibble: 3 x 6
  term        estimate std.error  p.value conf.low conf.high
  <chr>          <dbl>     <dbl>    <dbl>    <dbl>     <dbl>
1 (Intercept)  451.     112.     5.22e- 5  233.      670.
2 I(smoke/10)  261.      25.8    0         210.      311.
3 lambda         0.677    0.0967 2.63e-12    0.487     0.866

Table for: 2-Unadjusted COVID Incidence 2-Month Lag
# A tibble: 3 x 6
  term        estimate std.error  p.value conf.low conf.high
  <chr>          <dbl>     <dbl>    <dbl>    <dbl>     <dbl>
1 (Intercept)  459.     121.     1.56e- 4  221.      697.
2 I(smoke/10)  157.      27.2    7.40e- 9  104.      211.
3 lambda         0.674    0.0974 4.46e-12    0.483     0.865

Table for: 3-Adjusted COVID Incidence 1-Month Lag
# A tibble: 9 x 6
  term                estimate std.error  p.value conf.low conf.high
  <chr>                  <dbl>     <dbl>    <dbl>    <dbl>     <dbl>
1 (Intercept)          -585.      122.    1.74e- 6 -825.     -345.
```

```
2 I(smoke/10)           194.       25.4   2.44e-14  144.      243.
3 median_income         -67.9      56.6   2.30e- 1 -179.       43.0
4 outdoor_laborer_rate  -48.9      43.4   2.60e- 1 -134.       36.1
5 avg_temp              322.       51.5   4.00e-10  221.      423.
6 precip                 42.9      41.7   3.04e- 1  -38.9     125.
7 Month_Code            148.       11.7   0         125.      171.
8 ALWAYS                -75.7      46.6   1.04e- 1 -167.       15.5
9 lambda                  0.627     0.107 5.04e- 9    0.417     0.837
```

Table for: 4-Adjusted COVID Incidence 2-Month Lag

```
# A tibble: 10 x 6
   term                estimate std.error  p.value  conf.low conf.high
   <chr>                  <dbl>     <dbl>    <dbl>     <dbl>     <dbl>
 1 (Intercept)          -857.      127.    1.45e-11 -1105.     -608.
 2 I(smoke/10)            84.6      25.5   9.08e- 4    34.6     135.
 3 median_income         -79.1      58.9   1.79e- 1  -195.       36.4
 4 outdoor_laborer_rate  -29.2      44.2   5.09e- 1  -116.       57.5
 5 avg_temp              290.      100.    3.90e- 3    93.0     487.
 6 precip                -43.7      45.1   3.33e- 1  -132.       44.8
 7 elevation             -19.1      93.4   8.38e- 1  -202.      164.
 8 ALWAYS                -39.5      47.3   4.04e- 1  -132.       53.2
 9 Month_Code            173.       12.5   0          149.      198.
10 lambda                  0.598     0.113 1.36e- 7     0.376     0.820
```

```
[[1]]
NULL

[[2]]
NULL

[[3]]
NULL

[[4]]
NULL
```