Initial HHH4 Models: Meeting Notes

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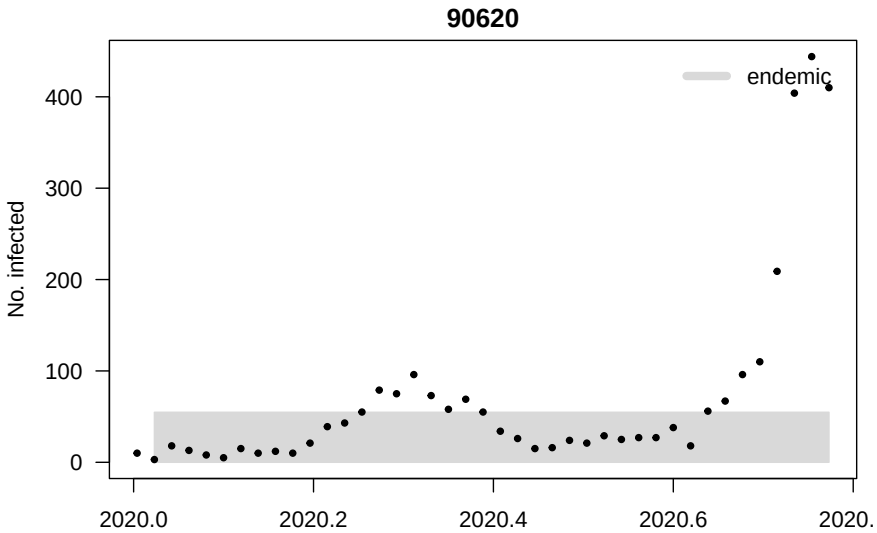
Summary and a few plots from the fitted models.

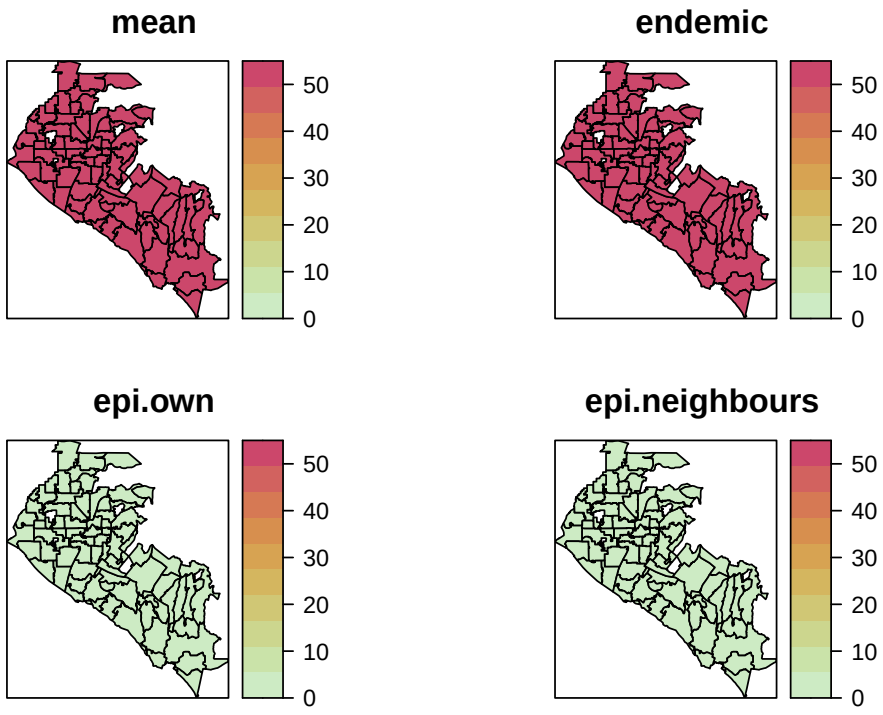
Model 1: no weights

```
fit_noweights <-
  surveillance::hhh4(oc_zip_covid)
```

```
##
## Call:
## surveillance::hhh4(stsObj = oc_zip_covid)
##
## Coefficients:
##        Estimate  Std. Error
## end.1  4.003302  0.002483
##
## Log-likelihood:   -169391.6
## AIC:               338785.3
## BIC:               338791.3
##
## Number of units:        74
## Number of time points:  40
```

Plots for the model:





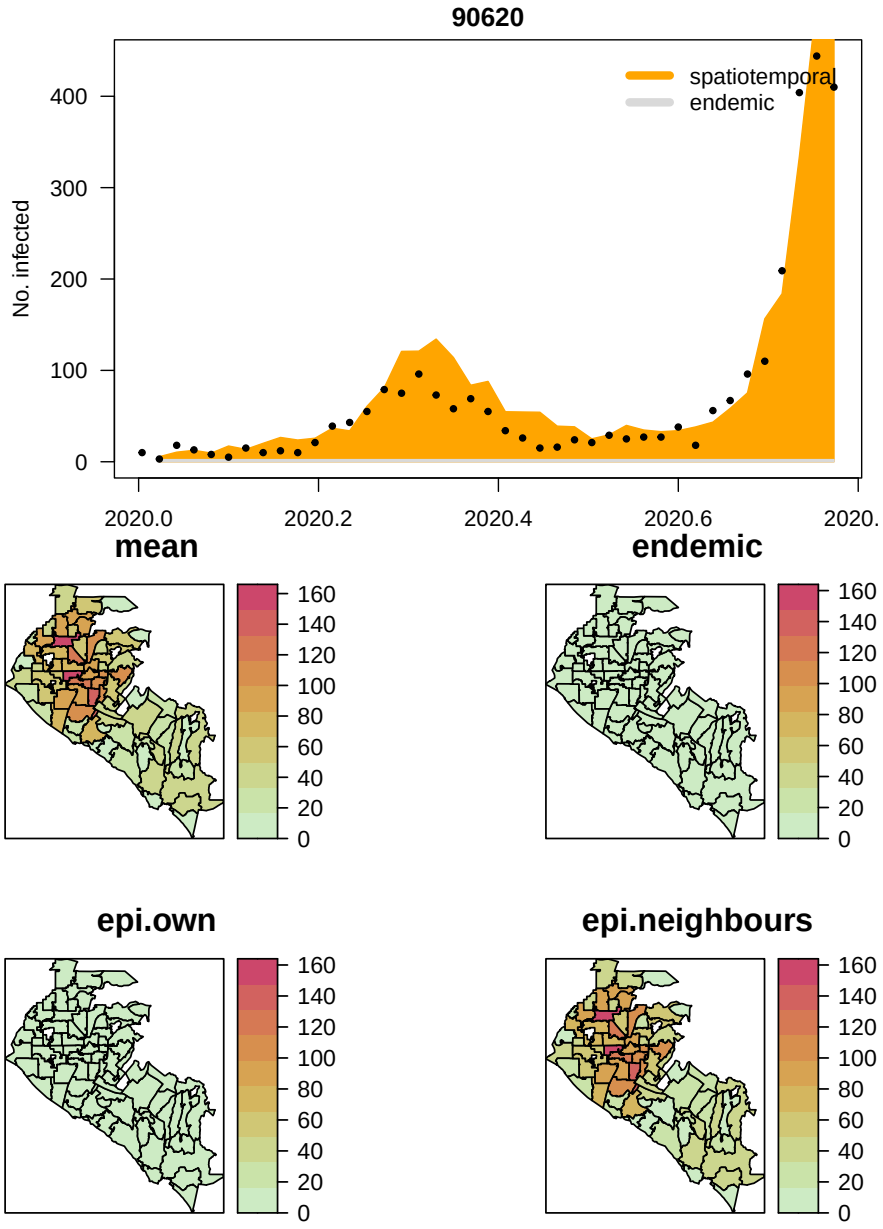
Model 2: Sum Weights of Out Visits from Safegraph

```
sumweights_nb <- surveillance::hhh4(
  oc_zip_covid,
  control = list(
    ne = list(
      f = ~1,
      weights = neighbourhood(oc_zip_covid),
      family = "NegBin1",
      normalize = TRUE
    )
  )
)
```

```
##
## Call:
## surveillance::hhh4(stsObj = oc_zip_covid, control = list(ne = list(f = ~1,
##     weights = neighbourhood(oc_zip_covid), family = "NegBin1",
##     normalize = TRUE)))
##
## Coefficients:
##        Estimate  Std. Error
## ne.1   0.074977  0.002911
## end.1  0.863050  0.033675
##
## Log-likelihood:   -49277.82
## AIC:              98559.64
## BIC:              98571.62
##
```

```
## Number of units:        74
## Number of time points:  40
```

Plots for the model:



Can also specify with Poisson link?

```
##
## Call:
## surveillance::hhh4(stsObj = oc_zip_covid, control = list(f = ~1,
##     ne = list(weights = neighbourhood(oc_zip_covid)), family = "Poisson"))
##
## Coefficients:
##        Estimate  Std. Error
```

```
## end.1  4.003302  0.002483
##
## Log-likelihood:   -169391.6
## AIC:              338785.3
## BIC:              338791.3
##
## Number of units:        74
## Number of time points:  40
```

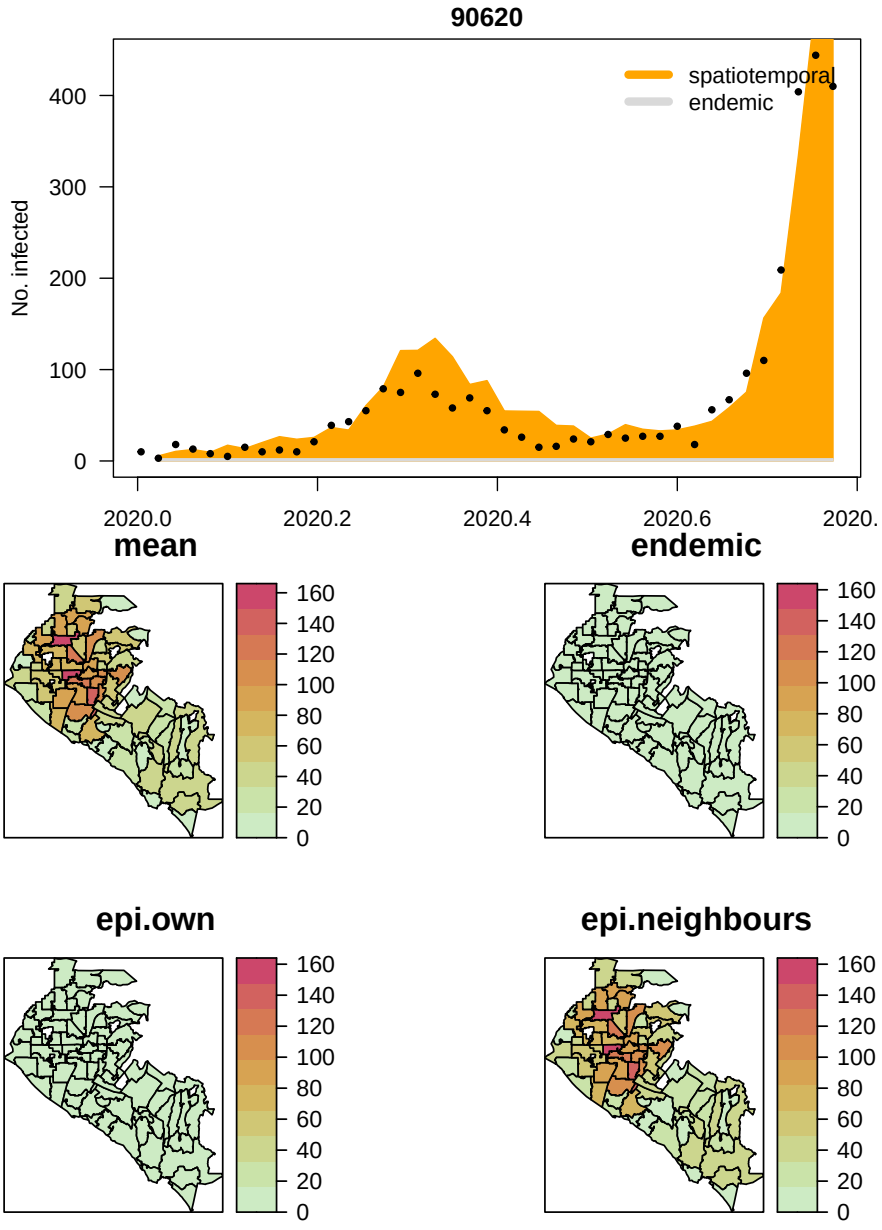
Model 3: Binary Neighbours Weights Matrix

From Zip codes adjacency: 0 (not neighbours). 1 (neighbours).

```
binweights_nb <- surveillance::hhh4(
  oc_zip_covid,
  control = list(
    ne = list(
      f = ~ 1,
      weights = neighbourhood(oc_zip_covid),
      family = "NegBin1",
      normalize = TRUE
    )
  )
)
```

```
##
## Call:
## surveillance::hhh4(stsObj = oc_zip_covid, control = list(ne = list(f = ~1,
##     weights = neighbourhood(oc_zip_covid), family = "NegBin1",
##     normalize = TRUE)))
##
## Coefficients:
##        Estimate  Std. Error
## ne.1   0.074977  0.002911
## end.1  0.863050  0.033675
##
## Log-likelihood:   -49277.82
## AIC:              98559.64
## BIC:              98571.62
##
## Number of units:        74
## Number of time points:  40
```

Plots for the model:




```
##
## Call:
## surveillance::hhh4(stsObj = oc_zip_covid, control = list(ne = list(f = ~1,
##     weights = neighbourhood(oc_zip_covid), family = "Poisson",
##     normalize = TRUE)))
##
## Coefficients:
##        Estimate  Std. Error
## ne.1   0.074977  0.002911
## end.1  0.863050  0.033675
##
## Log-likelihood:   -49277.82
## AIC:              98559.64
## BIC:              98571.62
##
```

```
## Number of units:        74
## Number of time points:  40
```

Notes:

- Having issues with interpretation of the models.
- Not all 85 ZIP Codes due to incongruence between the data files. To be resolved. Currently, these models are based on 74 zip codes.
- Questions:
- Visits from outside ZIP code have not been at all considered
- To do:
- Time varying weights