Florida (Non-Spatial Analysis) Results

2022-08-25

Associated RData file (fl_results.RData) can be downloaded at: https://mega.nz/folder/yBpA0IpA#jUZw1qrXeGQioN3bImE-Wg

Models 1-3: 77 timepoints

- Model 1: Unconstrained growth; no interventions
- Model 2: Baseline intensity plus linear time component beginning on first intervention date (school closure)
- Model 3: Baseline intensity plus two linear time components, beginning on respective intervention dates (school closure and state mandated stay-at-home-order)

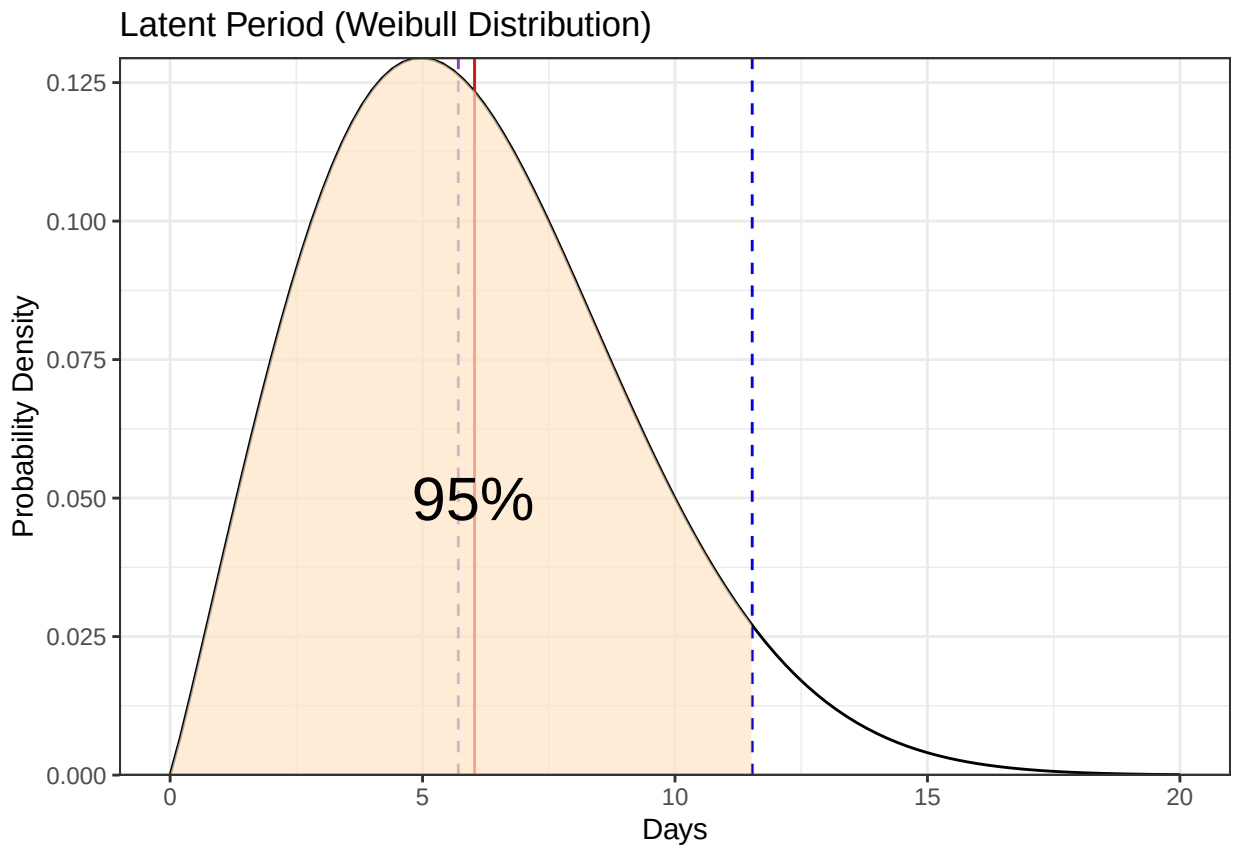
Models 4-14: 184 timepoints

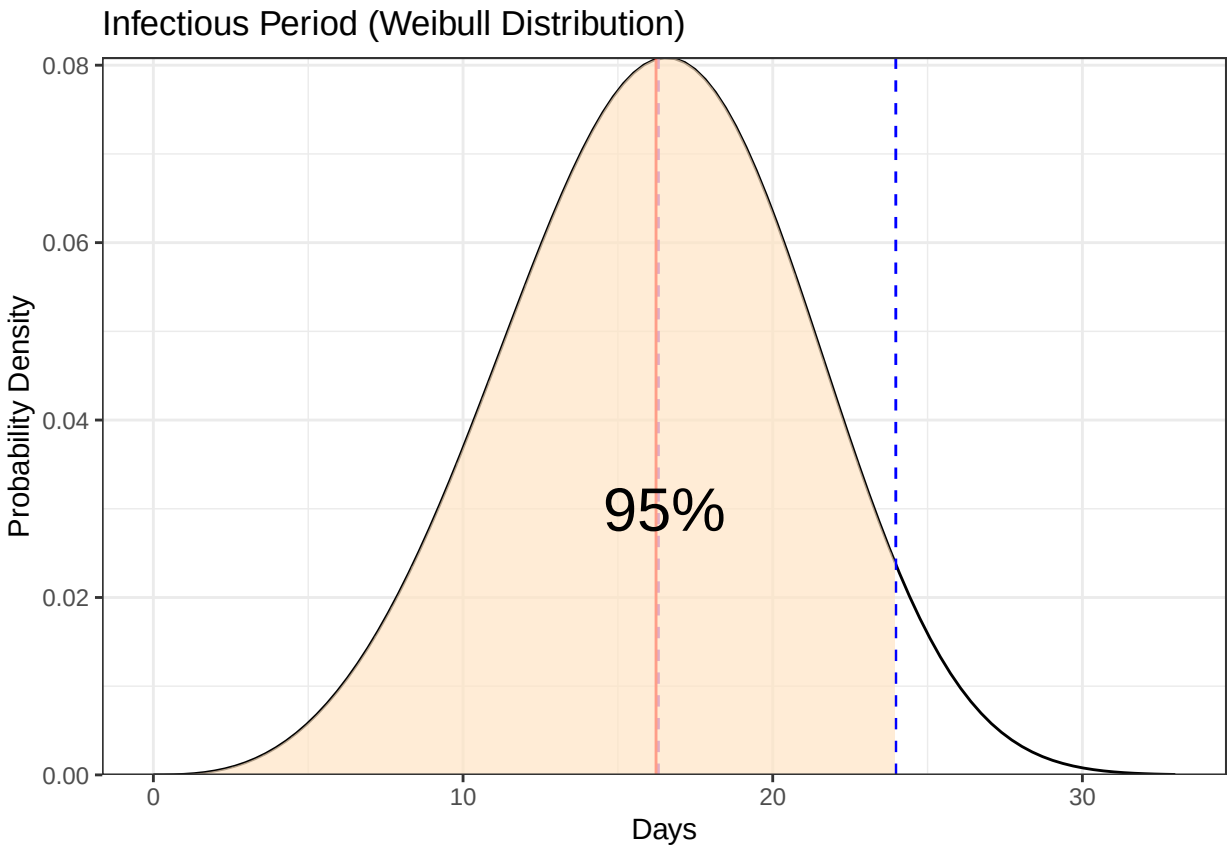
- Model 4: Baseline intensity plus two linear time components, beginning on respective intervention dates (school closure and state mandated stay-at-home-order)
- Model 5: Baseline intensity plus two linear time components, beginning on respective intervention dates (school closure and state mandated stay-at-home-order) and temporal basis splines of 3 degrees of freedom
- Model 6: Baseline intensity plus two linear time components, beginning on respective intervention dates (school closure and state mandated stay-at-home-order) and temporal basis splines of 4 degrees of freedom
- Model 7: Baseline intensity plus two linear time components, beginning on respective intervention dates (school closure and state mandated stay-at-home-order) and temporal basis splines of 5 degrees of freedom
- Model 8: Baseline intensity plus two linear time components, beginning on respective intervention dates (school closure and state mandated stay-at-home-order) and temporal basis splines of 6 degrees of freedom
- Model 9: Baseline intensity plus three linear time components, two beginning on respective intervention dates (school closure and state mandated stay-at-home-order) and one beginning on the end of the stay-at-home order
- Model 10: Baseline intensity plus three linear time components, two beginning on respective intervention dates (school closure and state mandated stay-at-home-order), one beginning on the end of the stay-at-home order and temporal basis splines of 3 degrees of freedom
- Model 11: Baseline intensity plus three linear time components, two beginning on respective intervention dates (school closure and state mandated stay-at-home-order), one beginning on the end of the stay-at-home order and temporal basis splines of 4 degrees of freedom
- Model 12: Baseline intensity plus three linear time components, two beginning on respective intervention dates (school closure and state mandated stay-at-home-order), one beginning on the end of the stay-at-home order and temporal basis splines of 5 degrees of freedom
- Model 13: Baseline intensity plus three linear time components, two beginning on respective intervention dates (school closure and state mandated stay-at-home-order), one beginning on the end of the stay-at-home order and temporal basis splines of 6 degrees of freedom

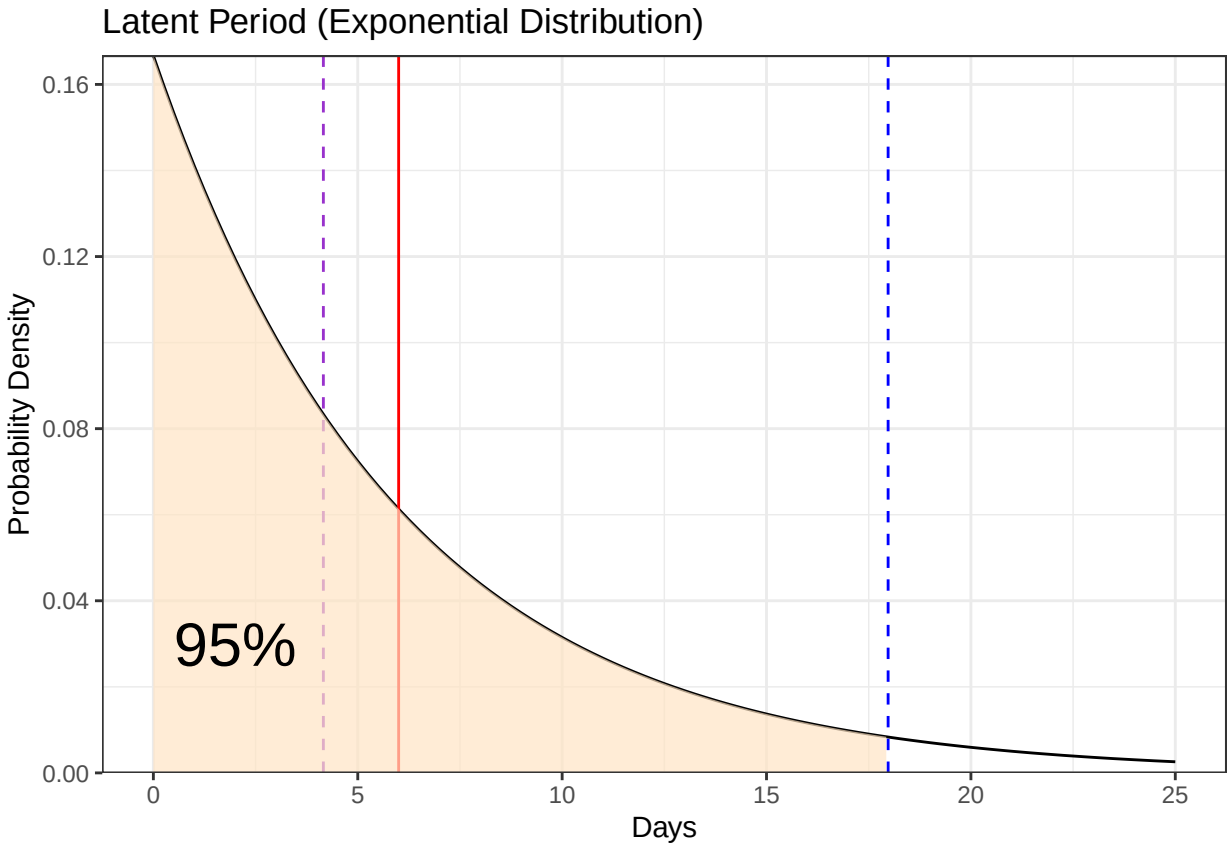
- Model 14: Baseline intensity plus three linear time components, two beginning on respective intervention dates (school closure and state mandated stay-at-home-order), one beginning on the end of the stay-at-home order and a temporal trigonometric term

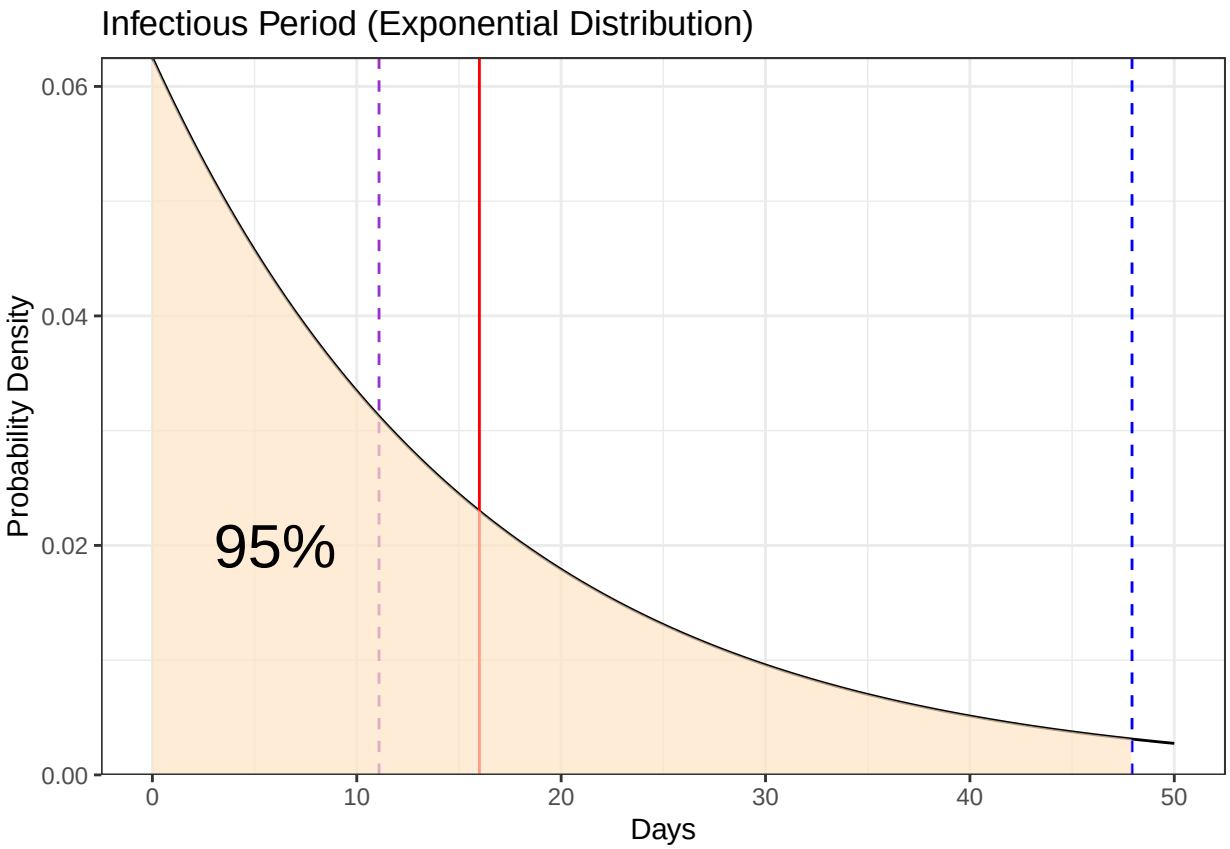
Models 15: 121 timepoints

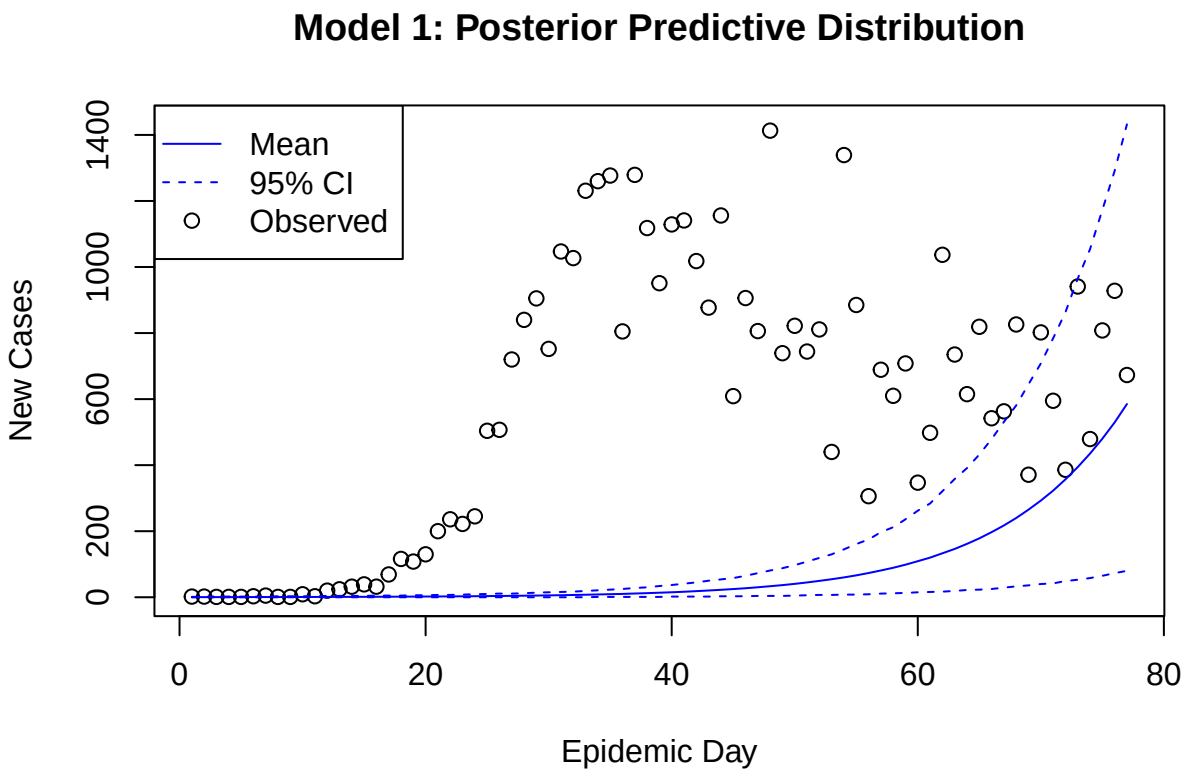
- Model 15: Baseline intensity, a temporal trigonometric term and proportion of population vaccinated (at least one vaccine shot) and proportion fully vaccinated (all doses prescribed by the initial vaccination protocol)

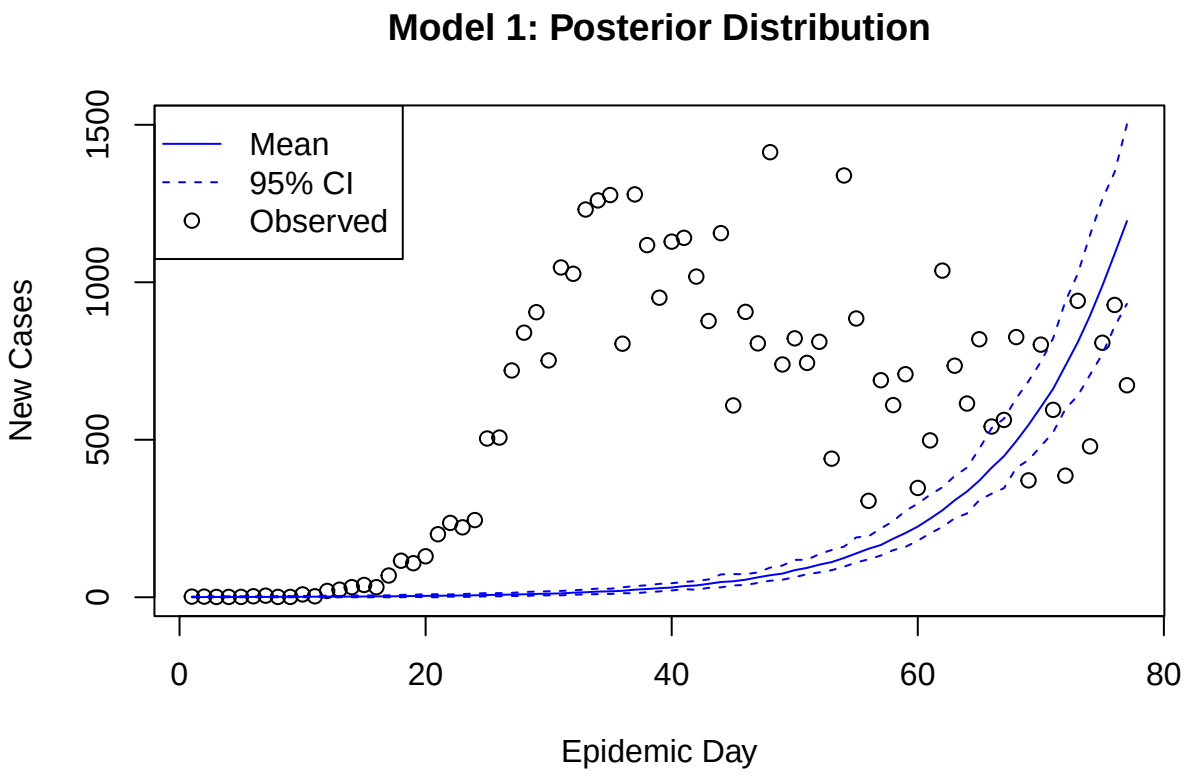


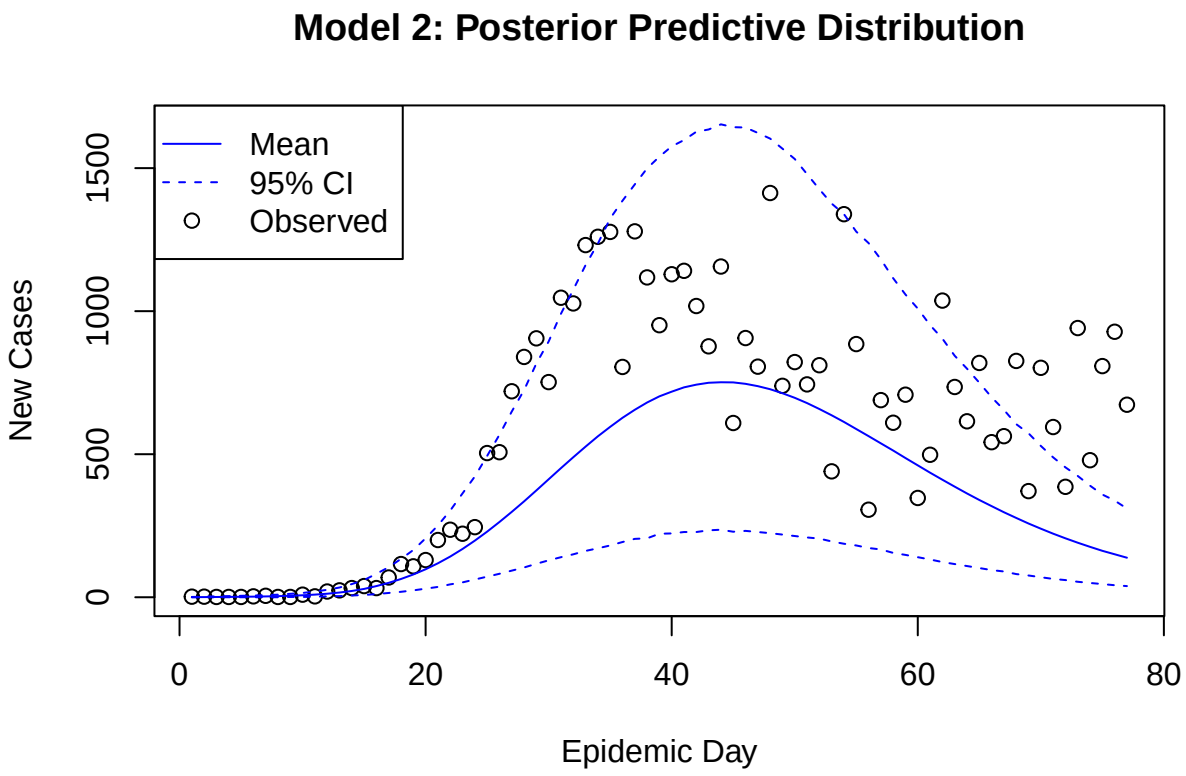

Infectious Period (Weibull Distribution)
Probability Density
0.08
0.06
0.04
0.02
0.00
95%
0
10
20
30
Days

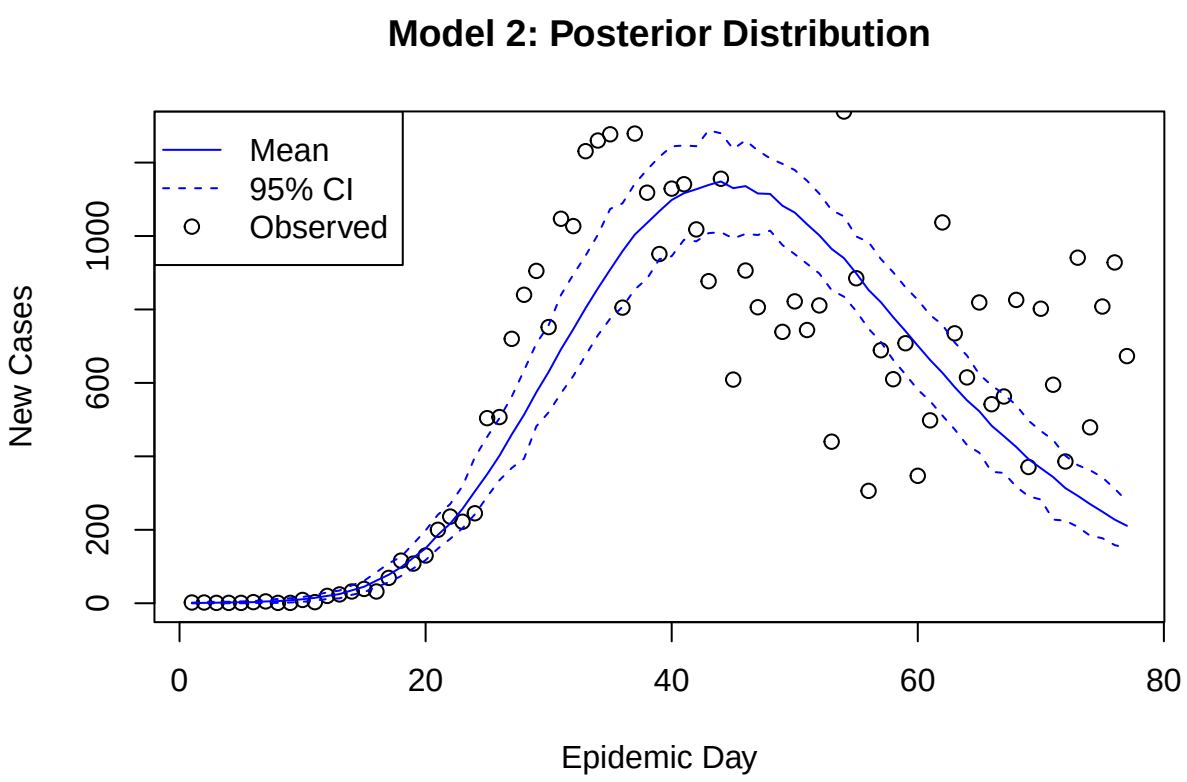

Latent Period (Exponential Distribution)
Probability Density
0.16
0.12
0.08
0.04
0.00
95%
0
5
10
15
20
25
Days

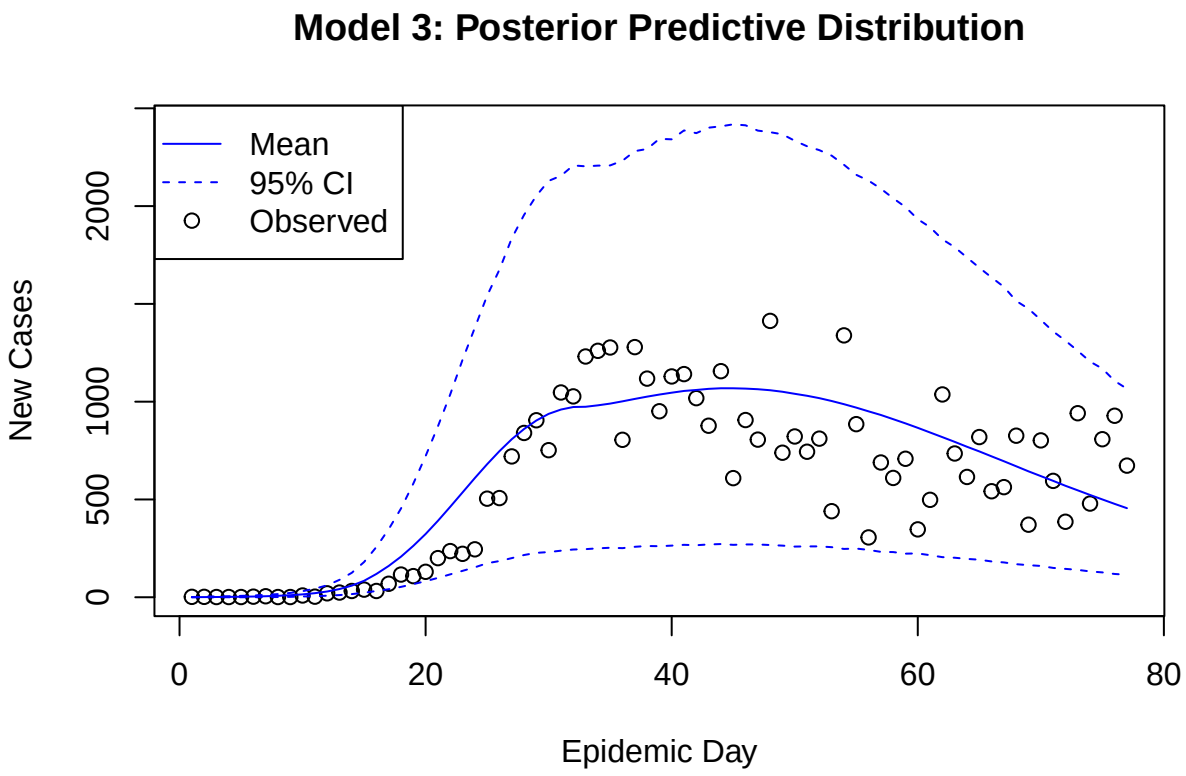

Infectious Period (Exponential Distribution)
Probability Density
0.06
0.04
0.02
0.00
95%
0
10
20
30
40
50
Days

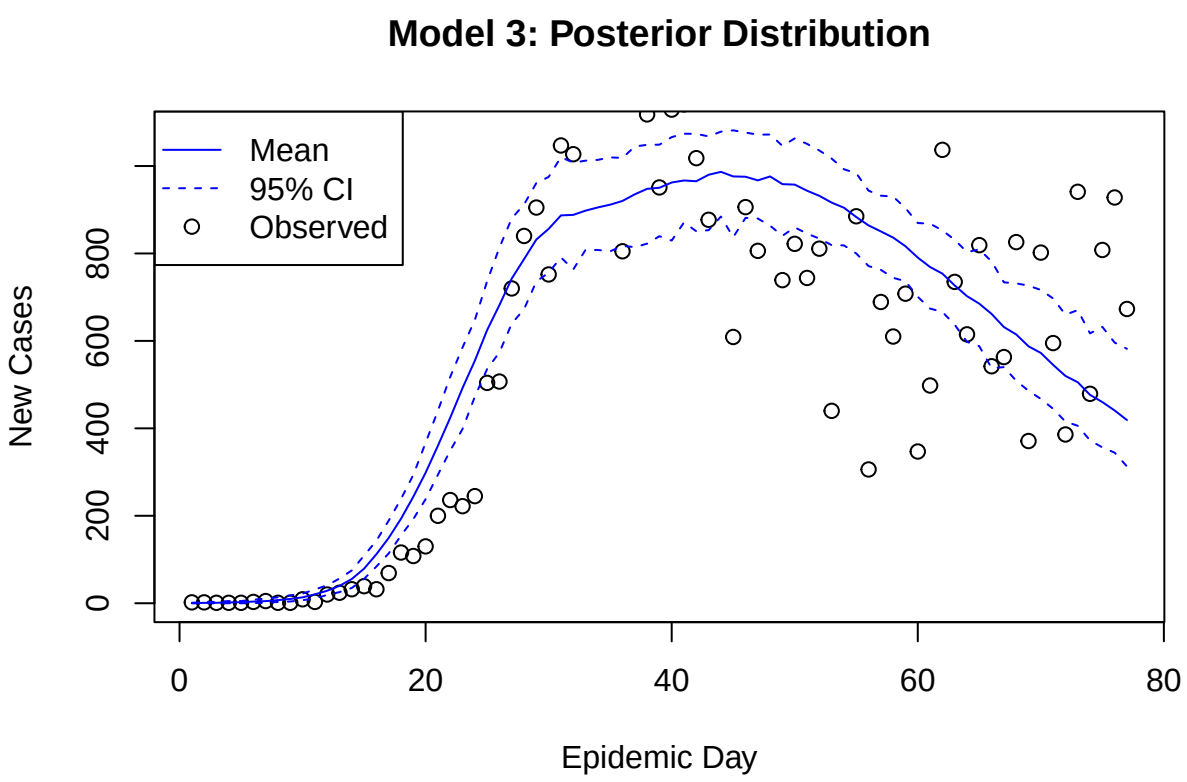

Model 1: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
200
600
1000
1400
0
20
40
60
80
Epidemic Day

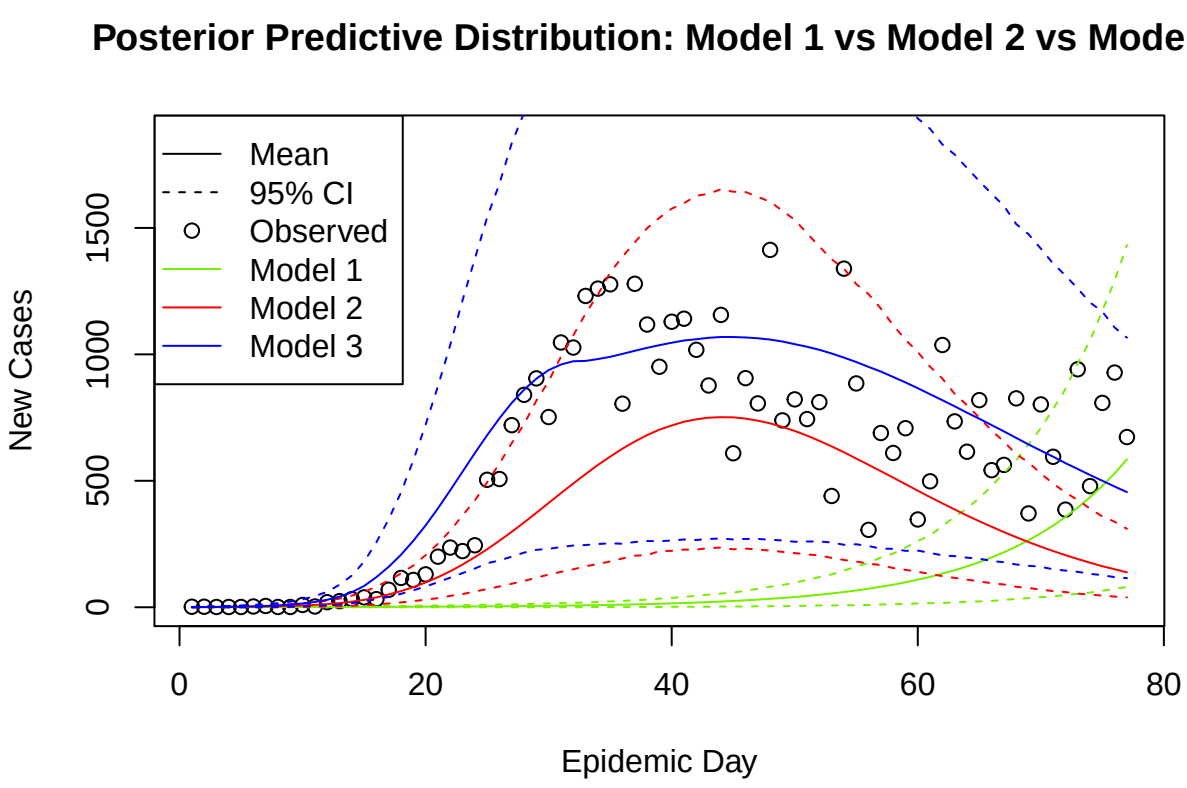

Model 1: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
500
1000
1500
0
20
40
60
80
Epidemic Day

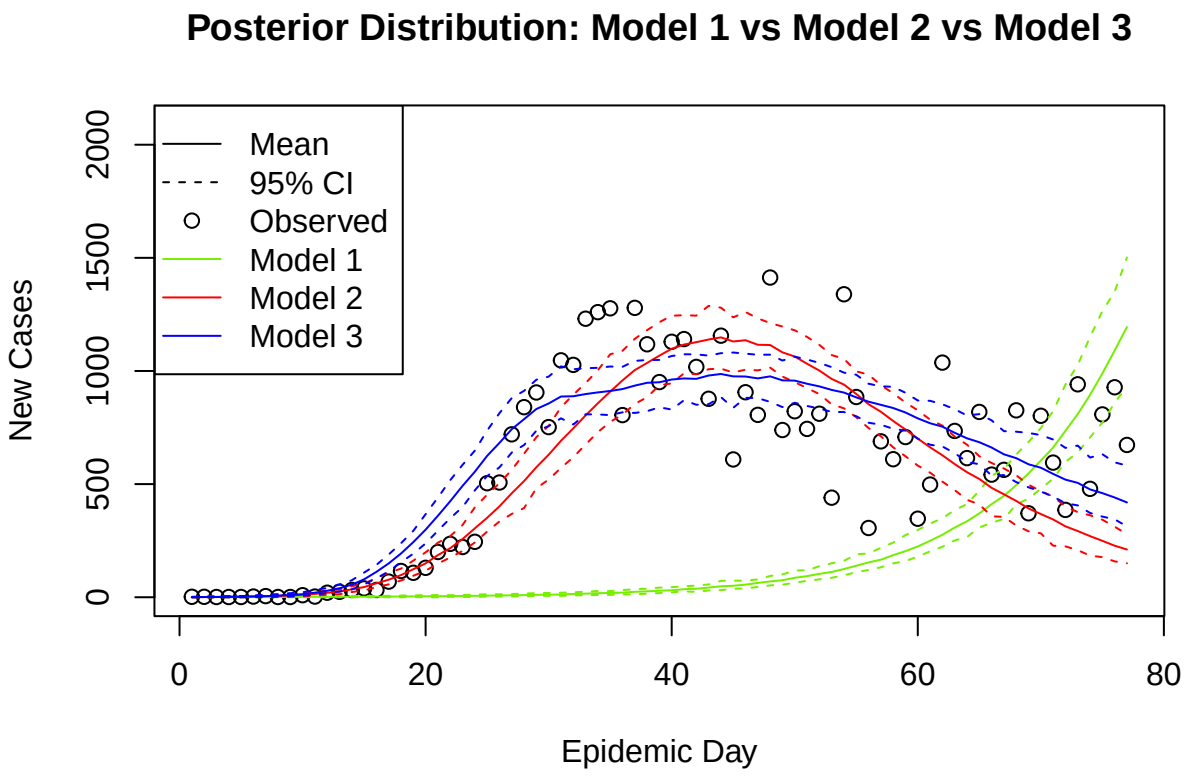

Model 2: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
500
1000
1500
0
20
40
60
80
Epidemic Day

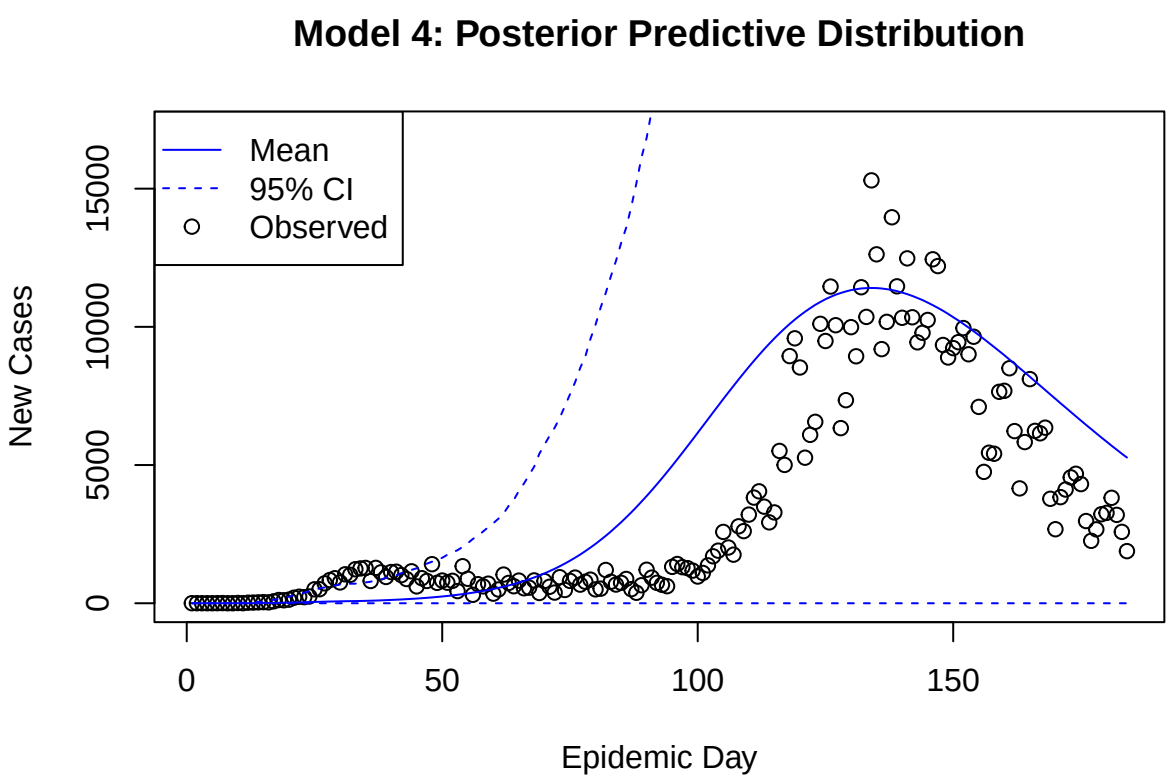

Model 2: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
200
600
1000
0
20
40
60
80
Epidemic Day

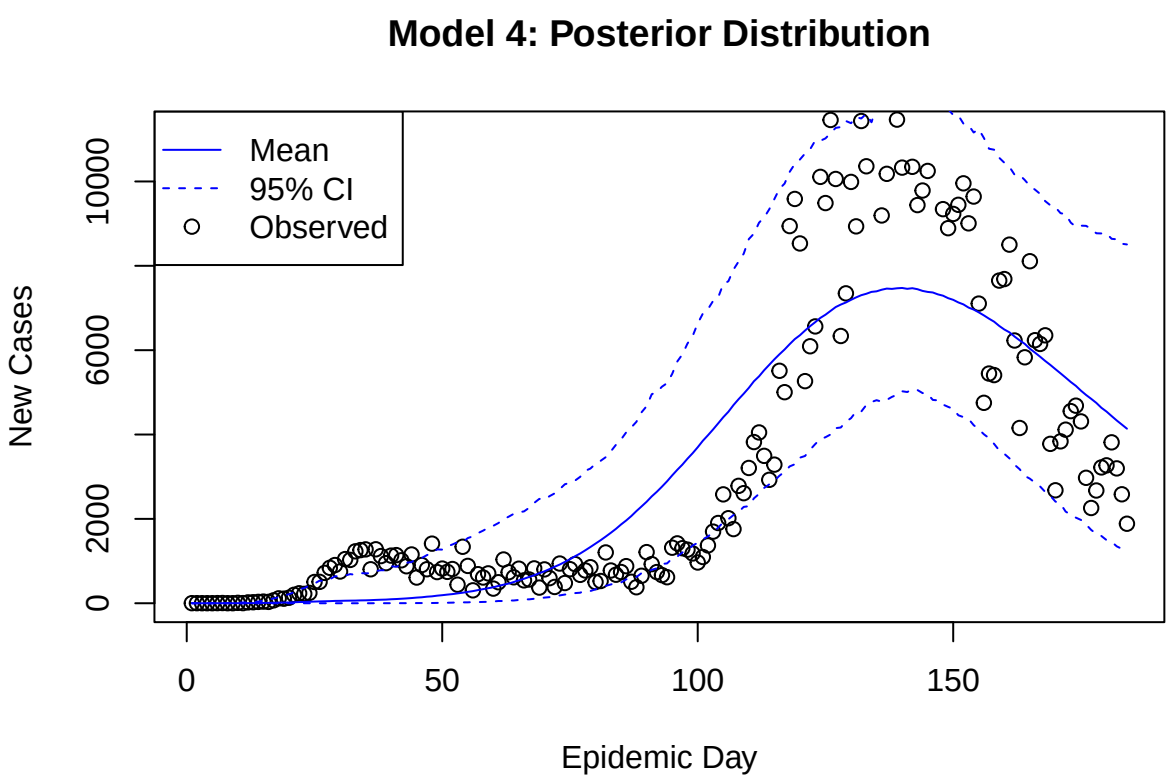

Model 3: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
500
1000
2000
0
20
40
60
80
Epidemic Day

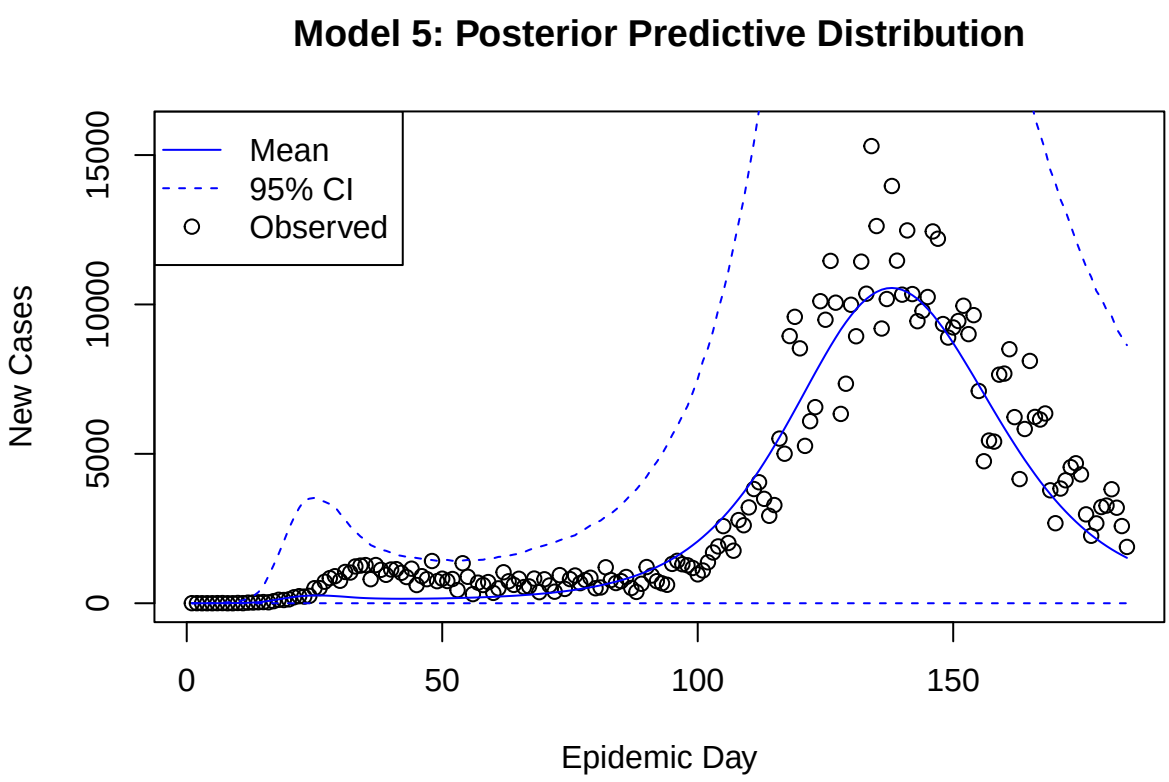

Model 3: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
200
400
600
800
0
20
40
60
80
Epidemic Day

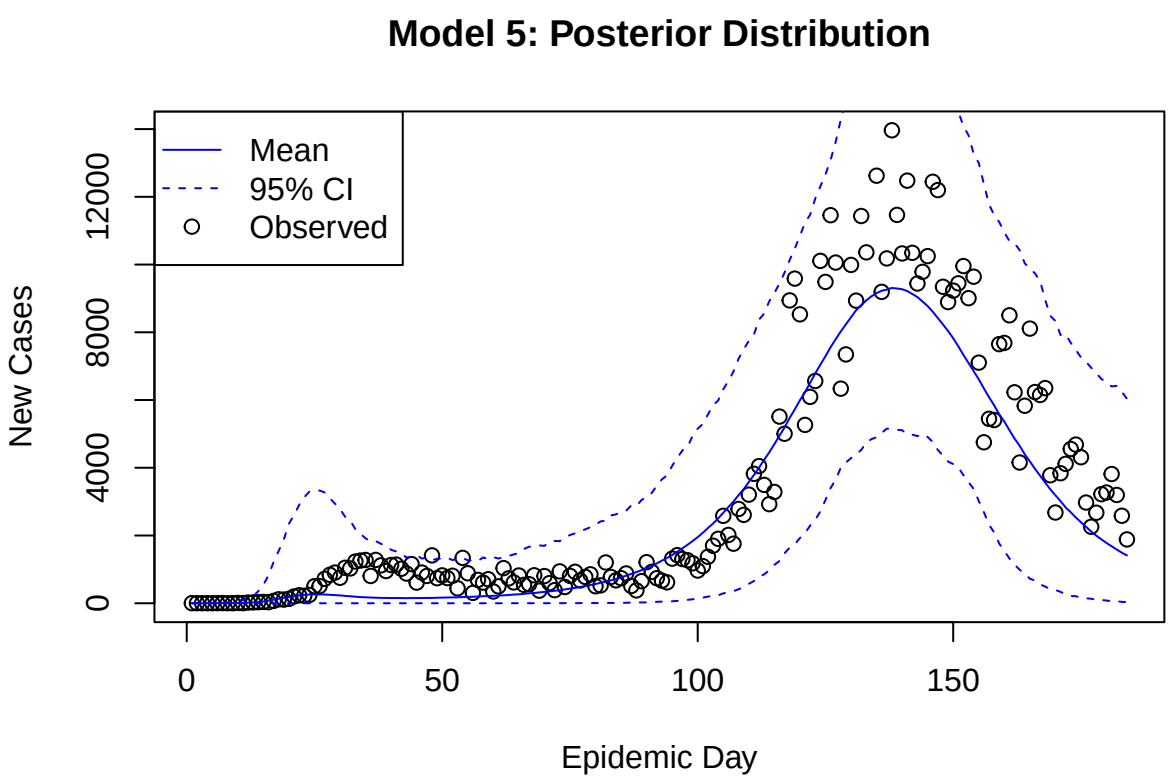

Posterior Predictive Distribution: Model 1 vs Model 2 vs Model 3
Mean
95% CI
Observed
Model 1
Model 2
Model 3
New Cases
0
500
1000
1500
0
20
40
60
80
Epidemic Day

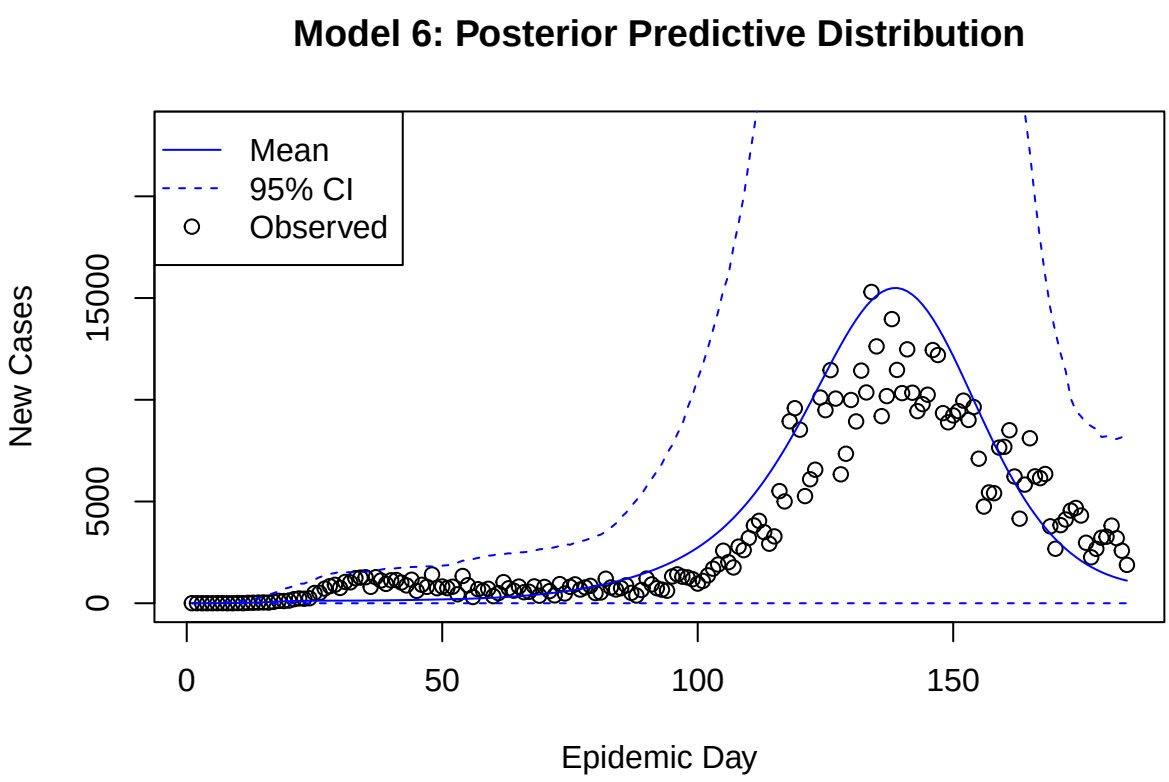

Posterior Distribution: Model 1 vs Model 2 vs Model 3
Mean
95% CI
Observed
Model 1
Model 2
Model 3
New Cases
0
500
1000
1500
2000
0
20
40
60
80
Epidemic Day

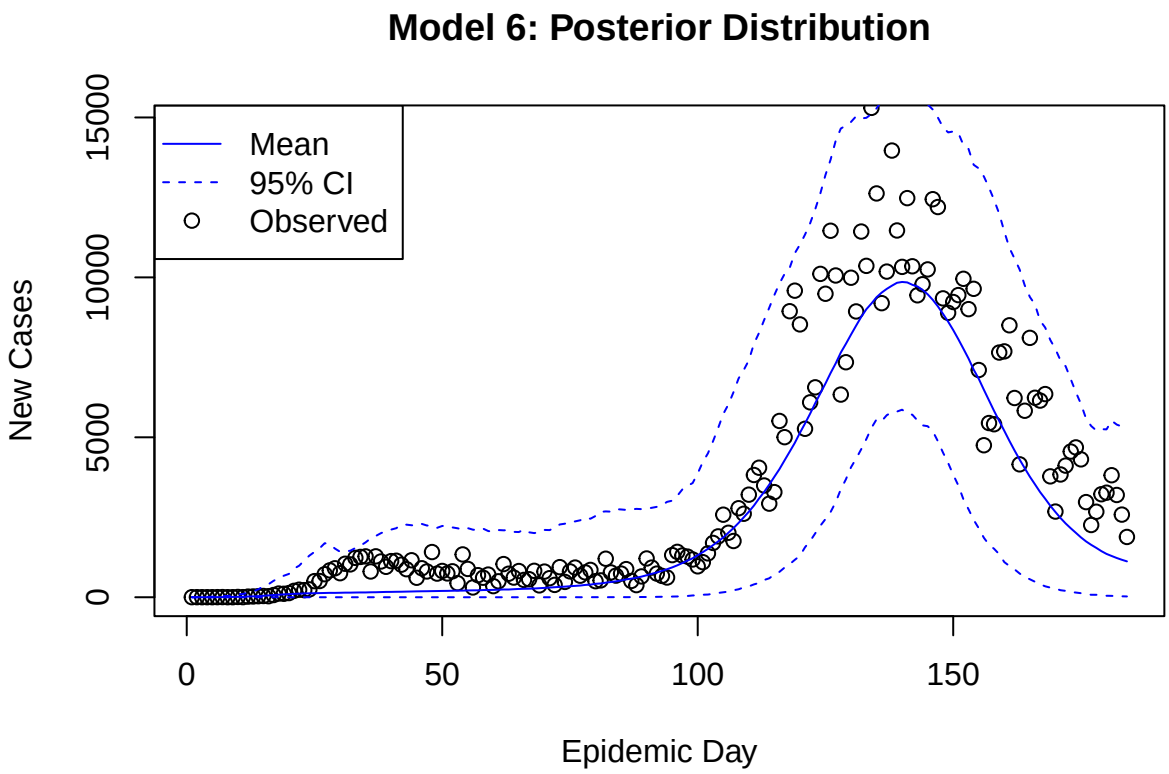

Model 4: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
5000
10000
15000
0
50
100
150
Epidemic Day

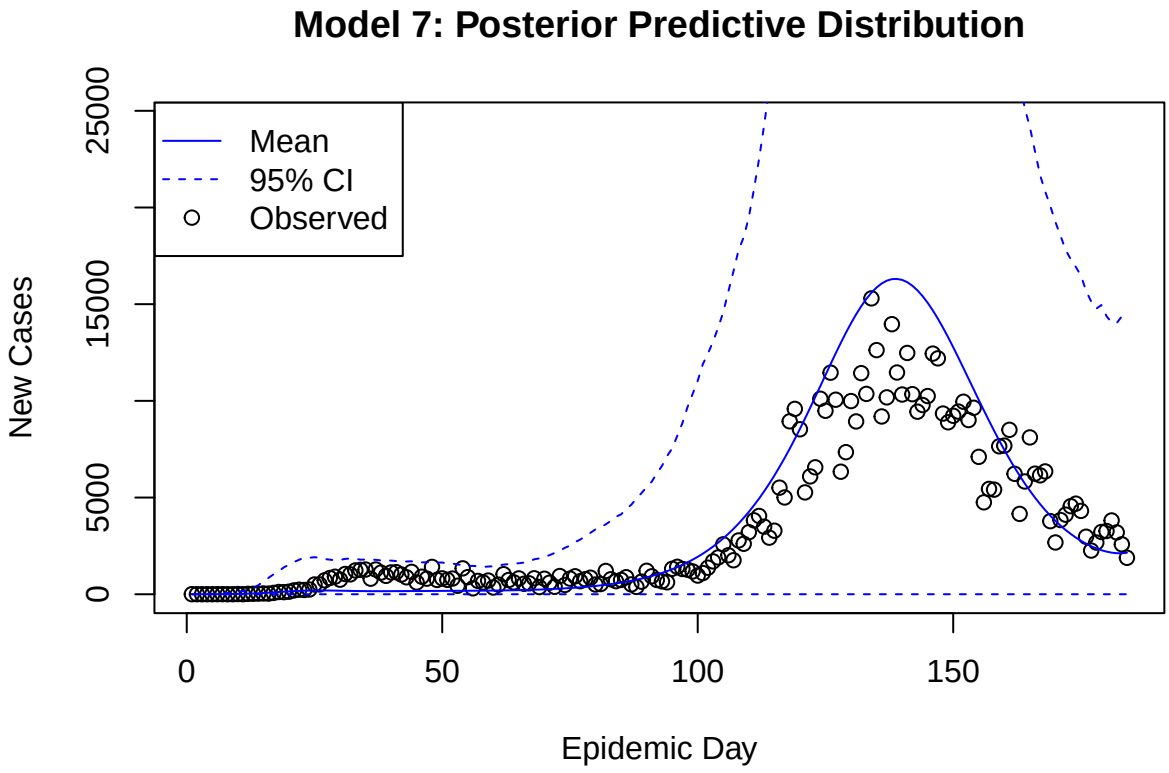

Model 4: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
2000
6000
10000
0
50
100
150
Epidemic Day

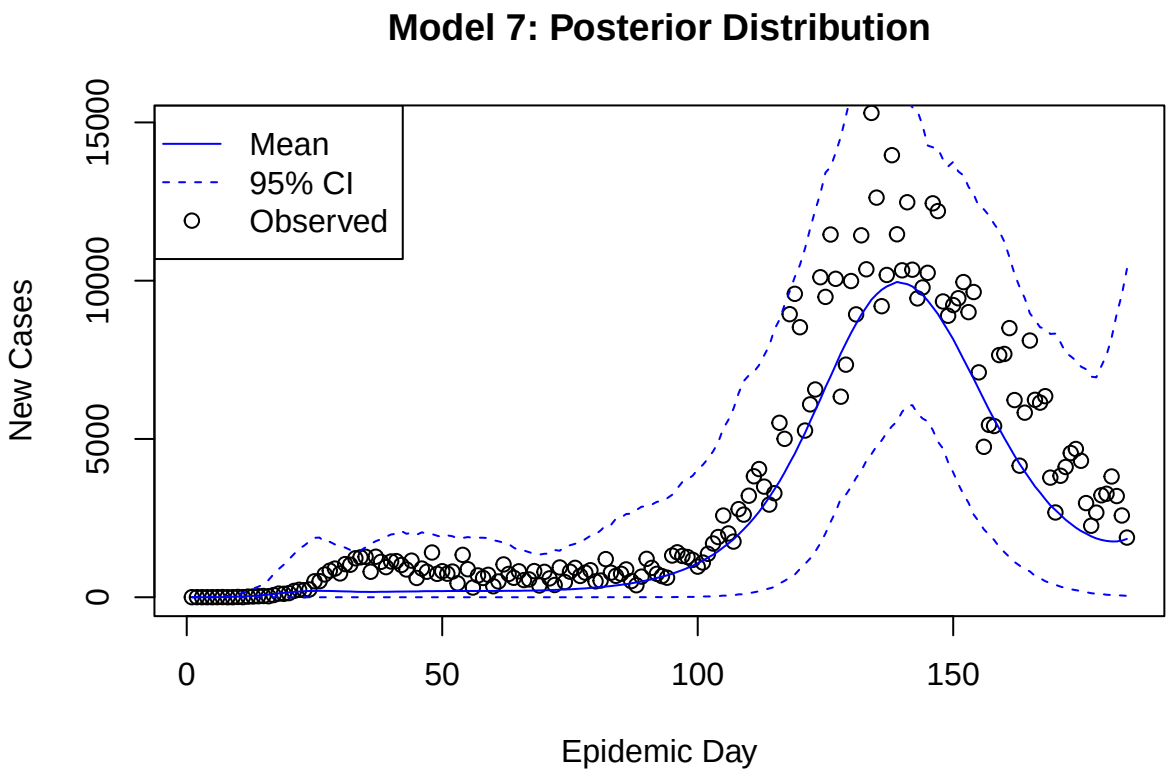

Model 5: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
5000
10000
15000
0
50
100
150
Epidemic Day

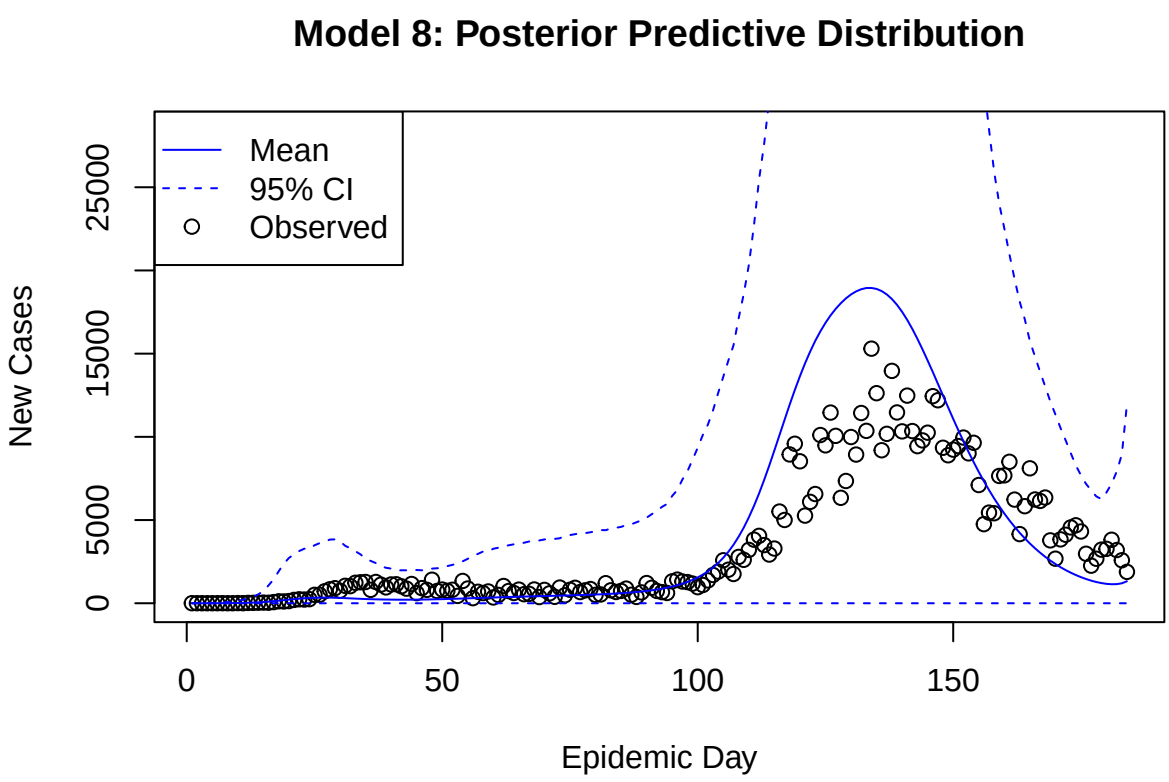

Model 5: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
4000
8000
12000
0
50
100
150
Epidemic Day

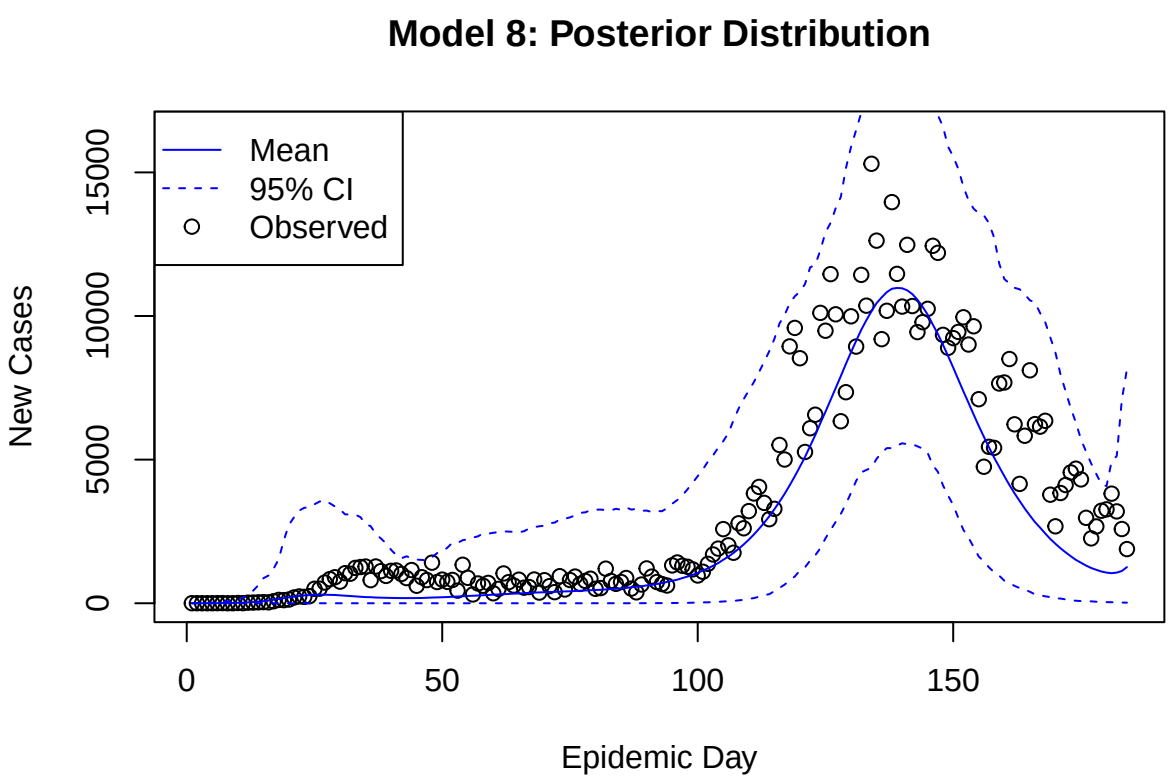

Model 6: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
5000
15000
0
50
100
150
Epidemic Day

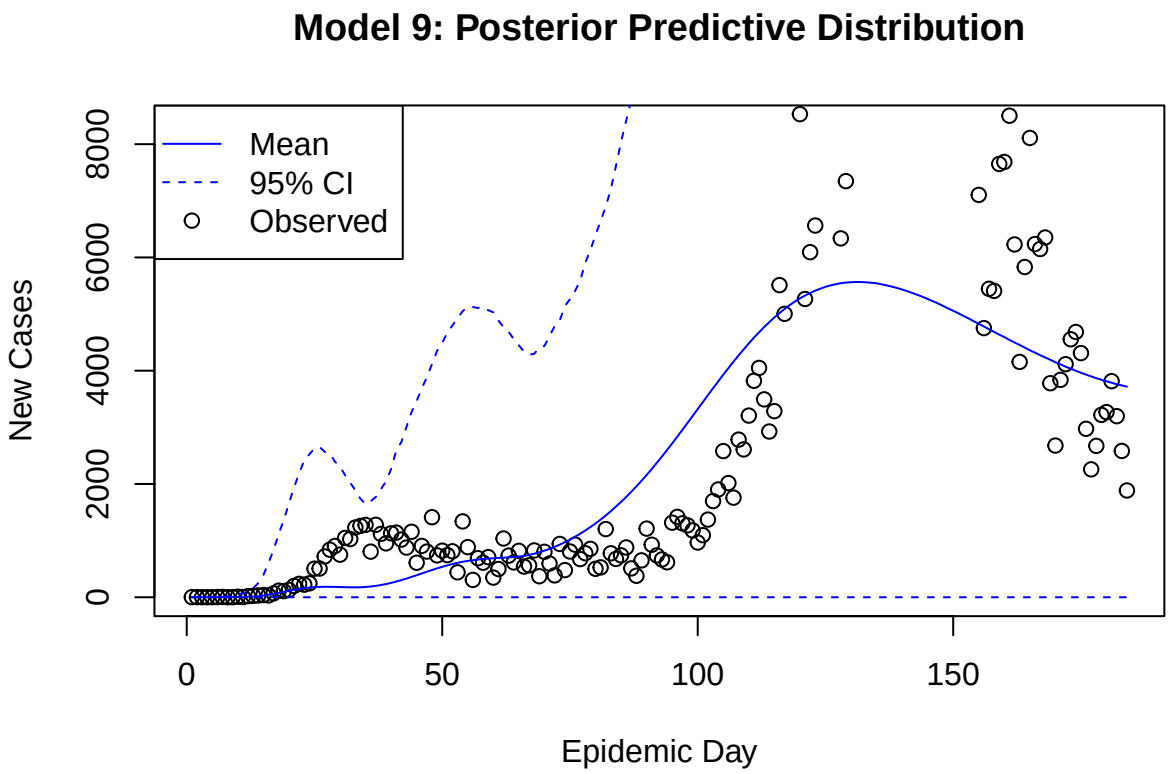

Model 6: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
5000
10000
15000
0
50
100
150
Epidemic Day

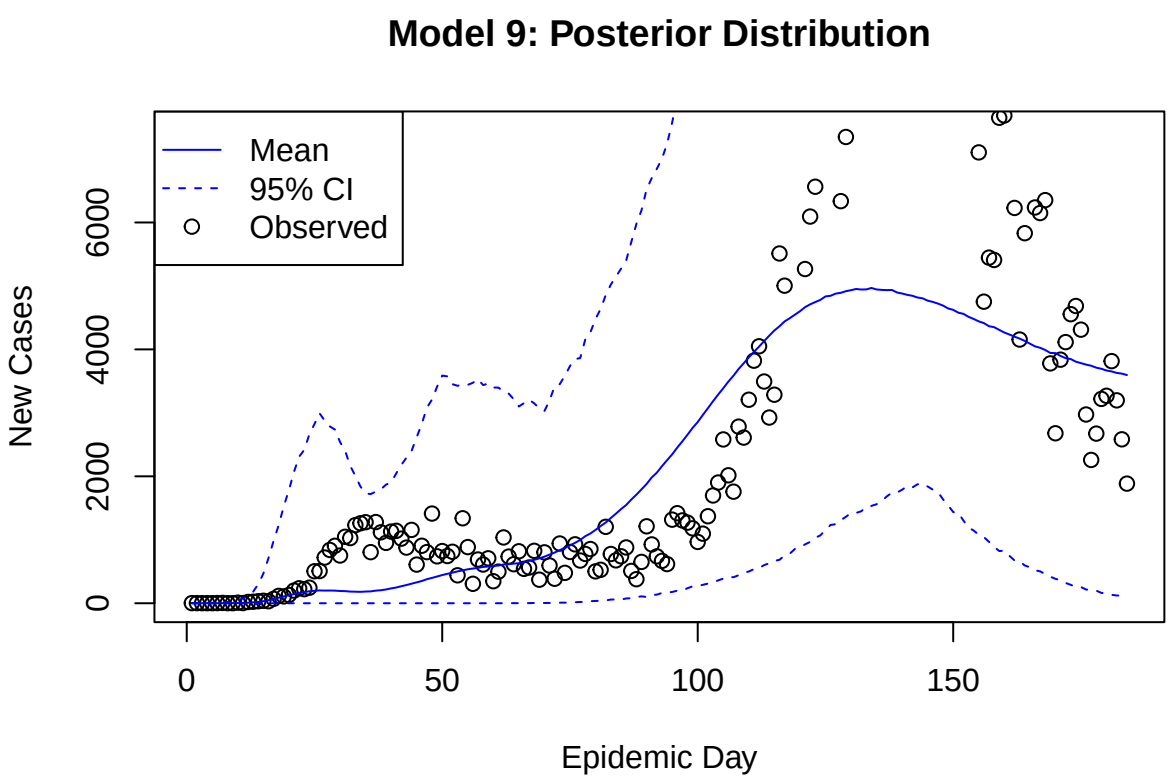

Model 7: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
5000
15000
25000
0
50
100
150
Epidemic Day

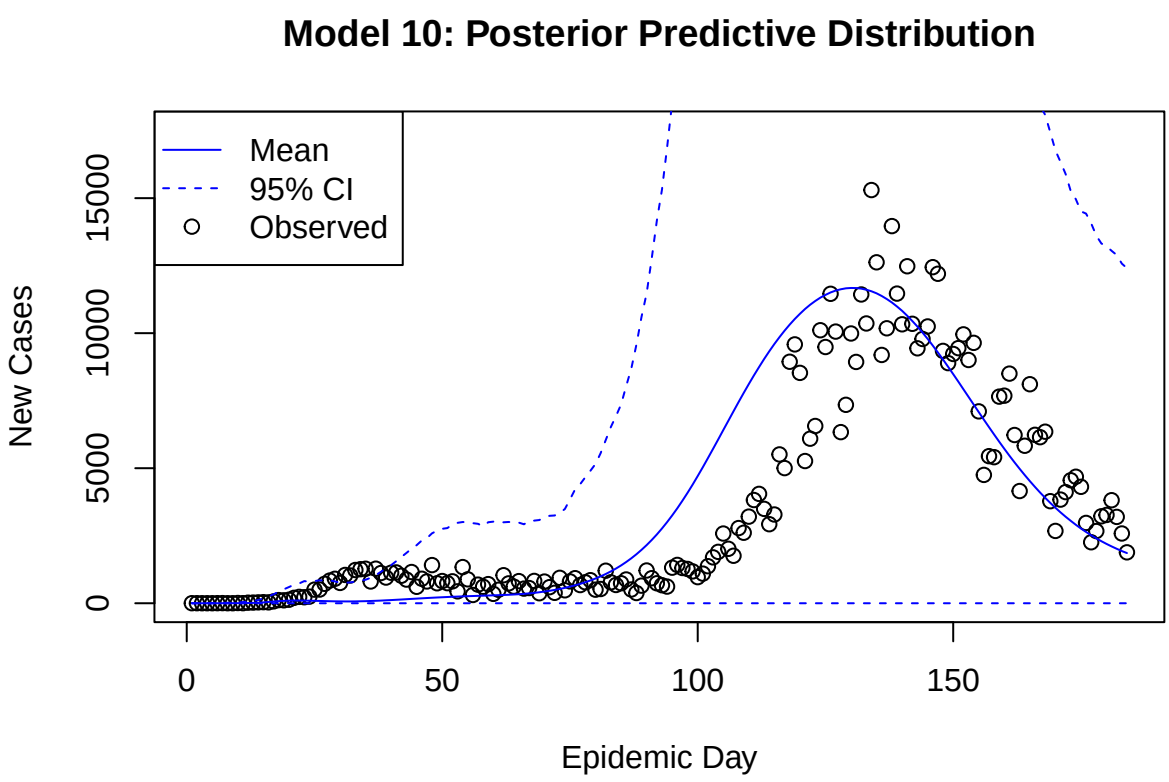

Model 7: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
5000
10000
15000
0
50
100
150
Epidemic Day

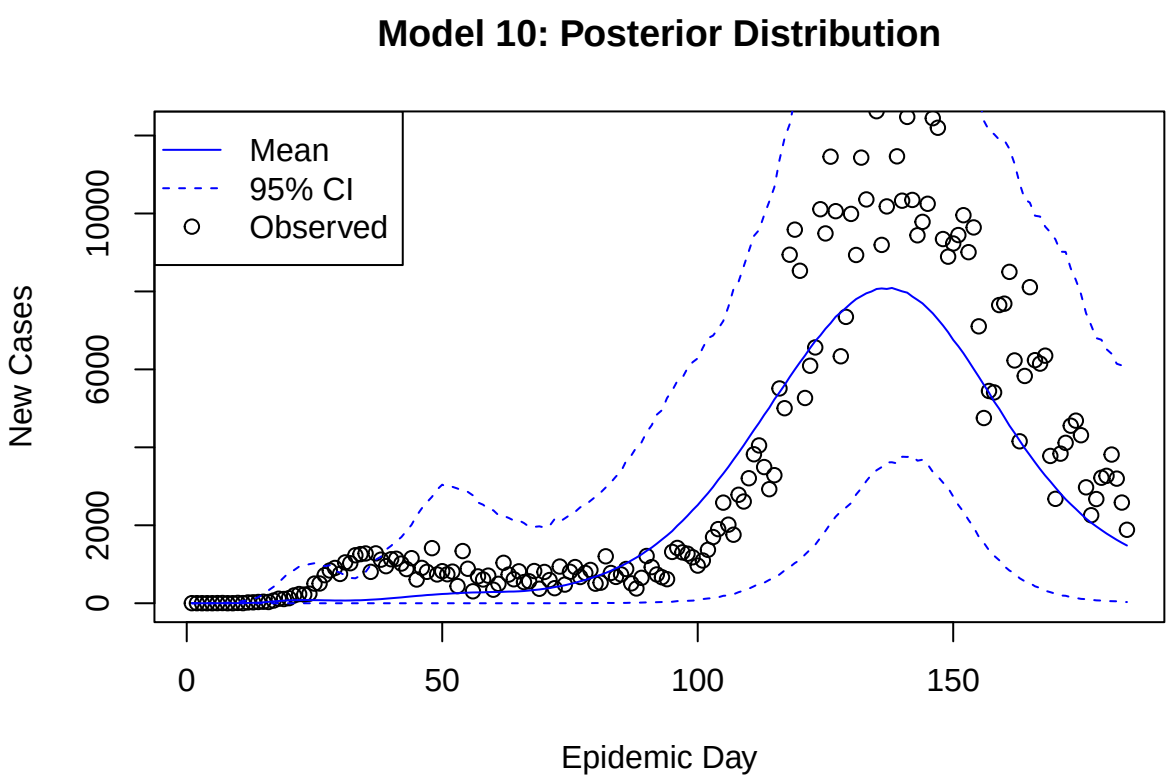

Model 8: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
5000
15000
25000
0
50
100
150
Epidemic Day

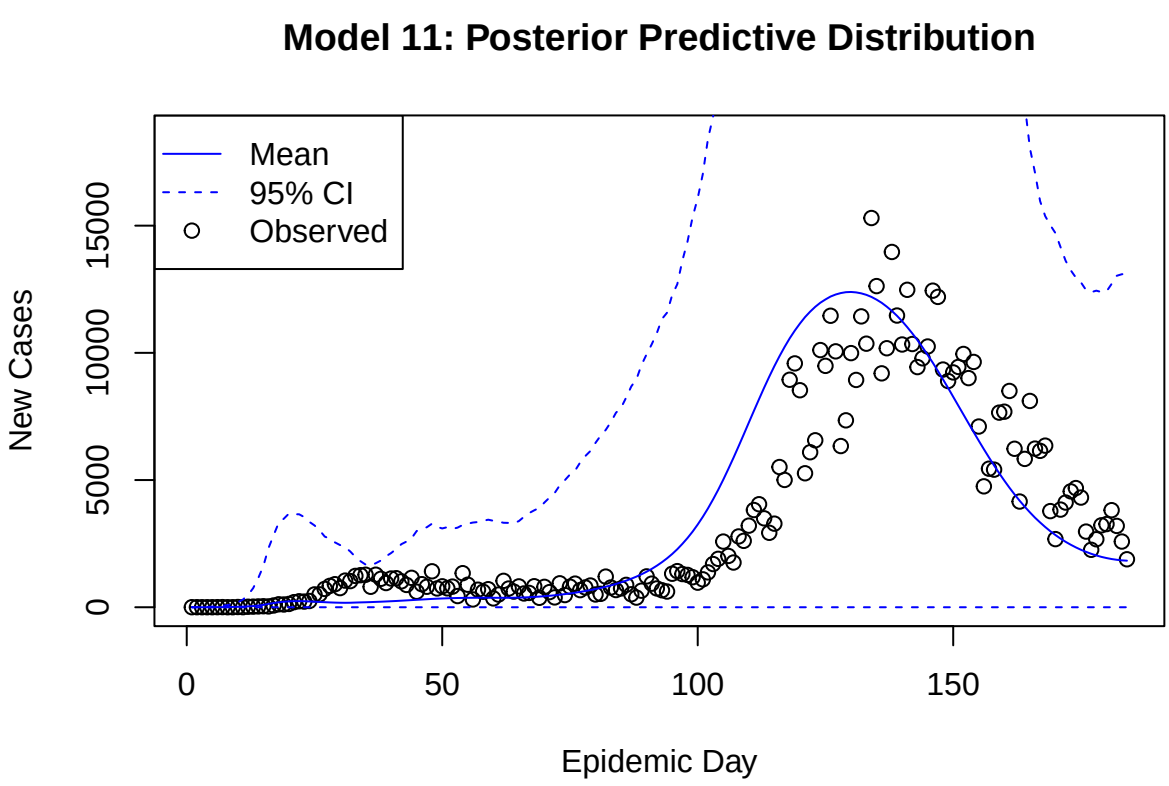

Model 8: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
5000
10000
15000
0
50
100
150
Epidemic Day

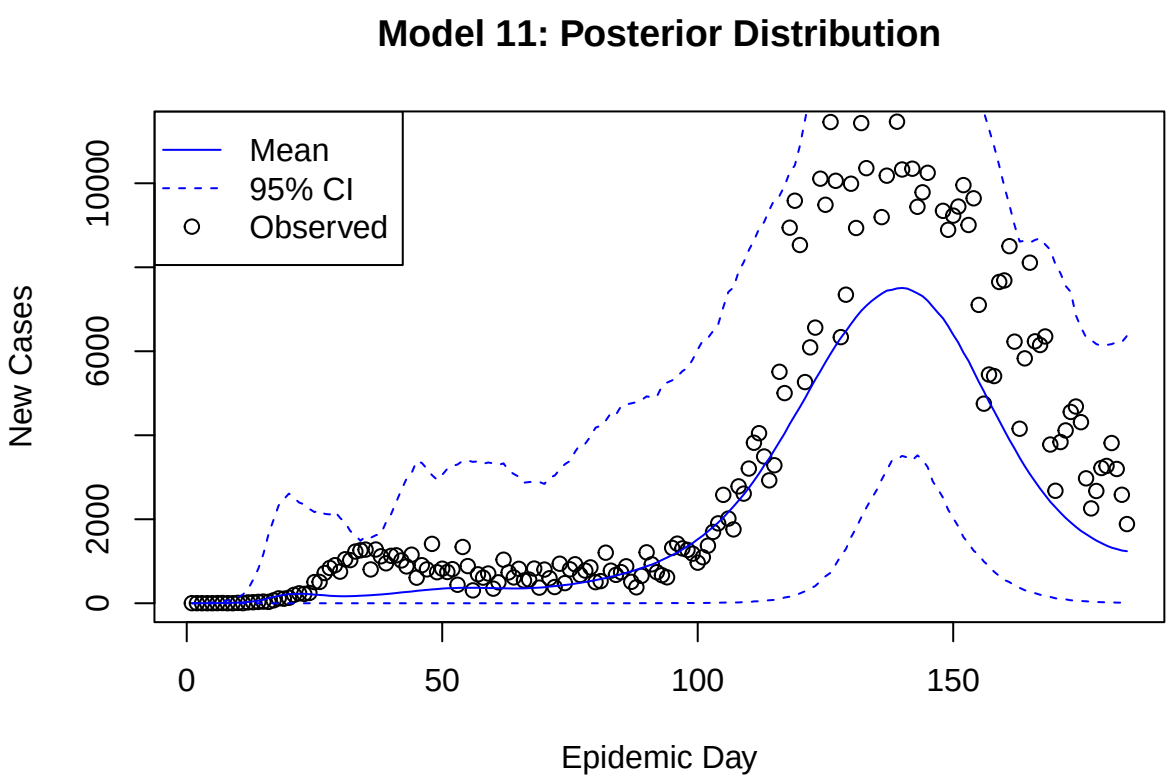

Model 9: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
2000
4000
6000
8000
0
50
100
150
Epidemic Day

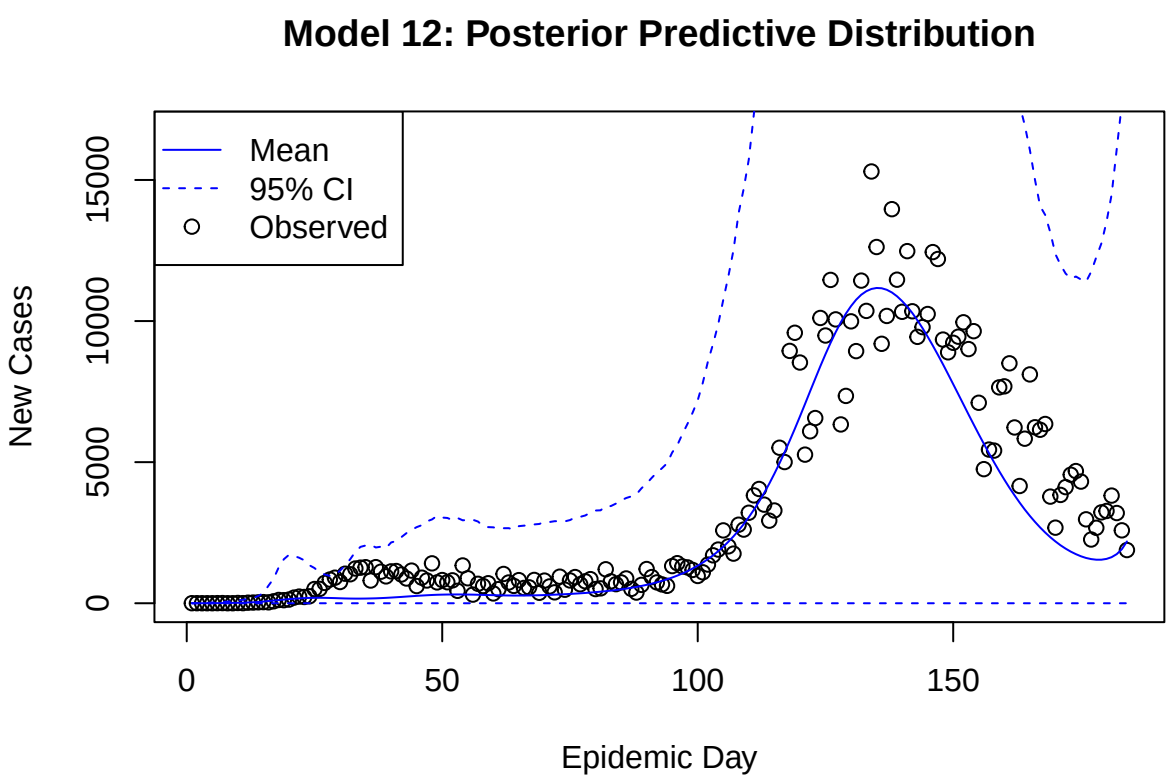

Model 9: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
2000
4000
6000
0
50
100
150
Epidemic Day

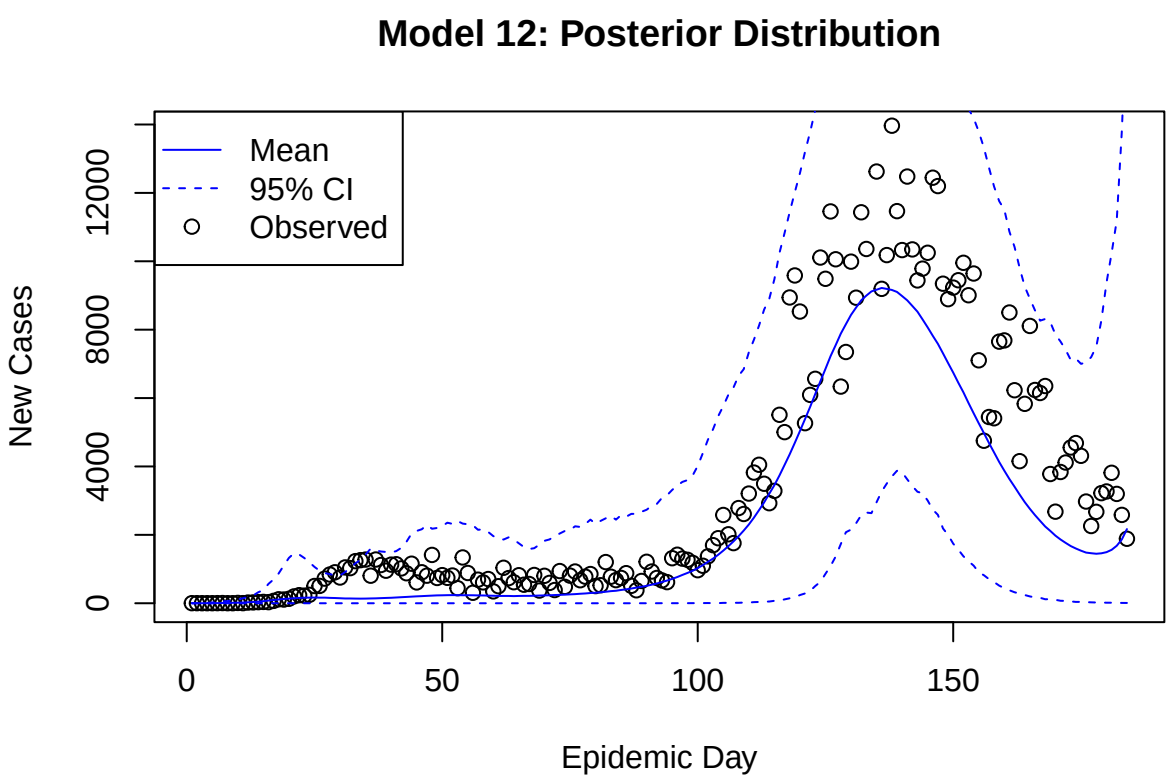

Model 10: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
5000
10000
15000
0
50
100
150
Epidemic Day

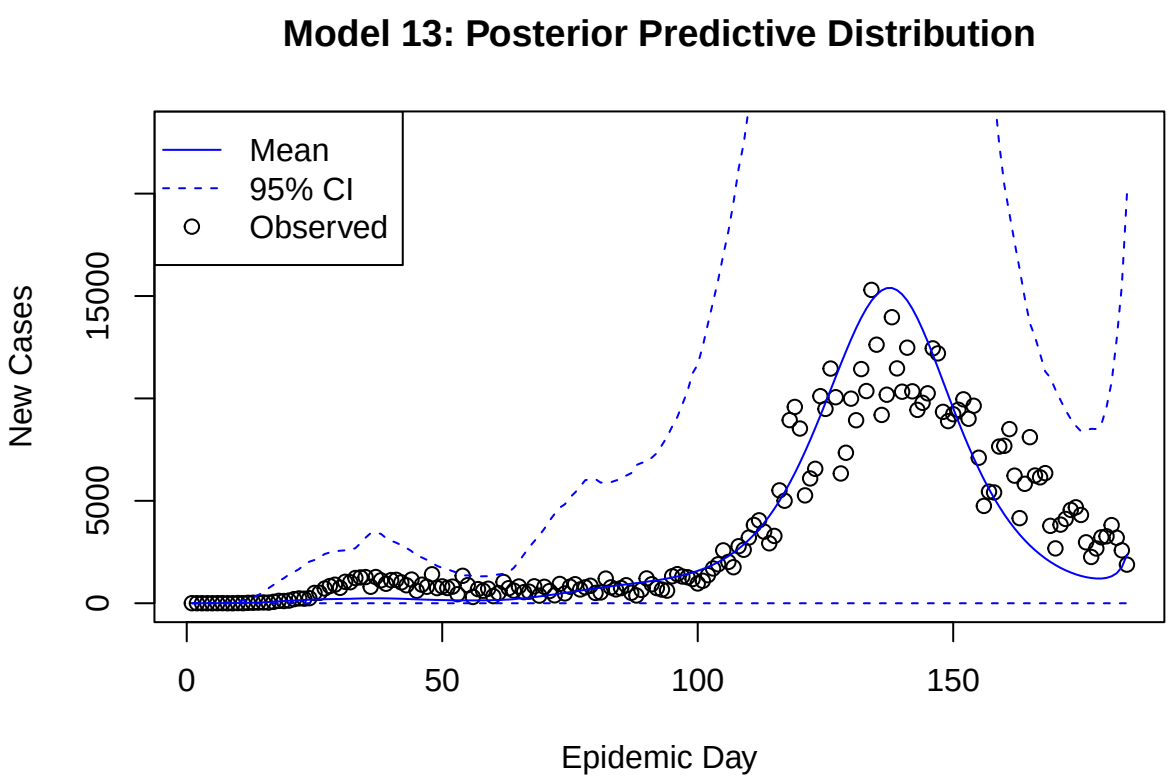

Model 10: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
2000
6000
10000
0
50
100
150
Epidemic Day

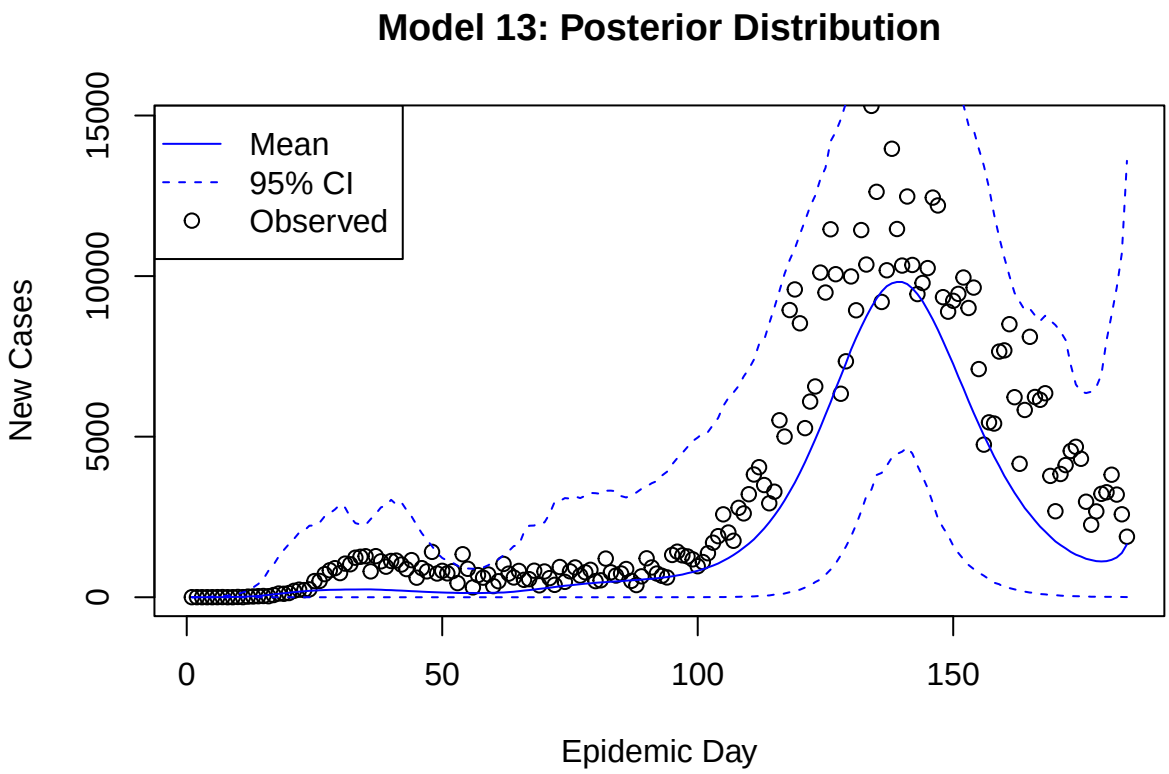

Model 11: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
5000
10000
15000
0
50
100
150
Epidemic Day

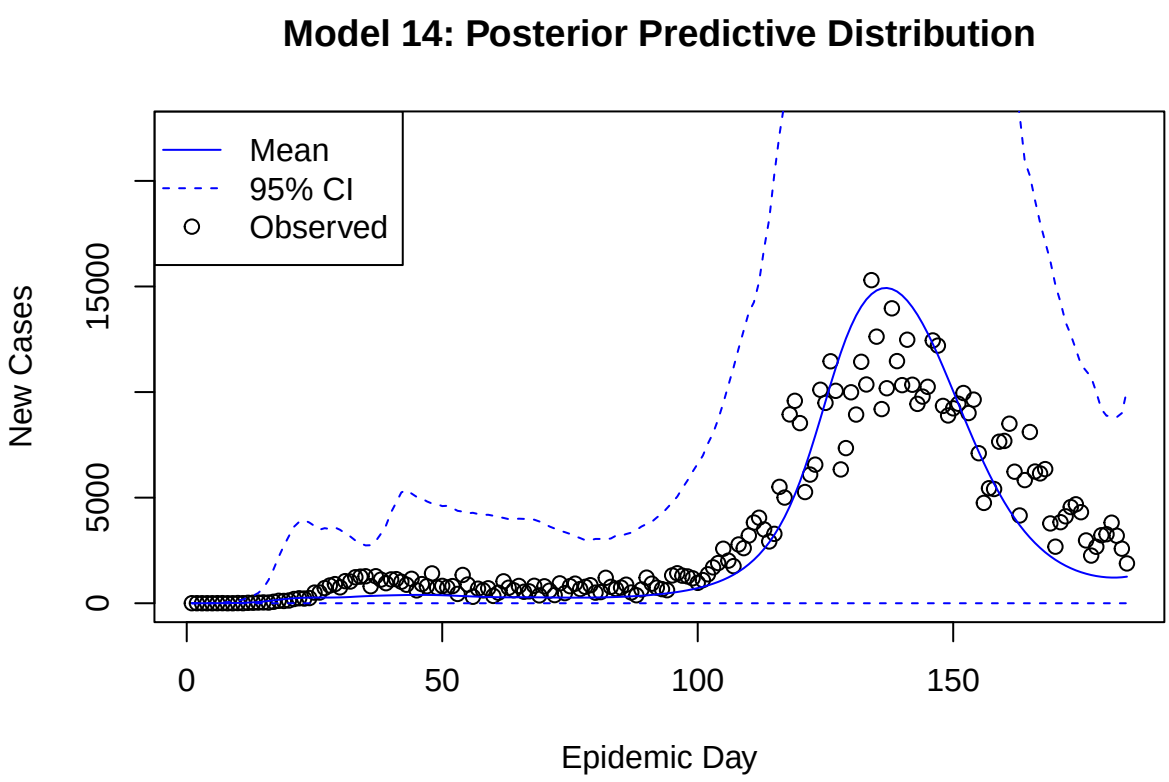

Model 11: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
2000
6000
10000
0
50
100
150
Epidemic Day

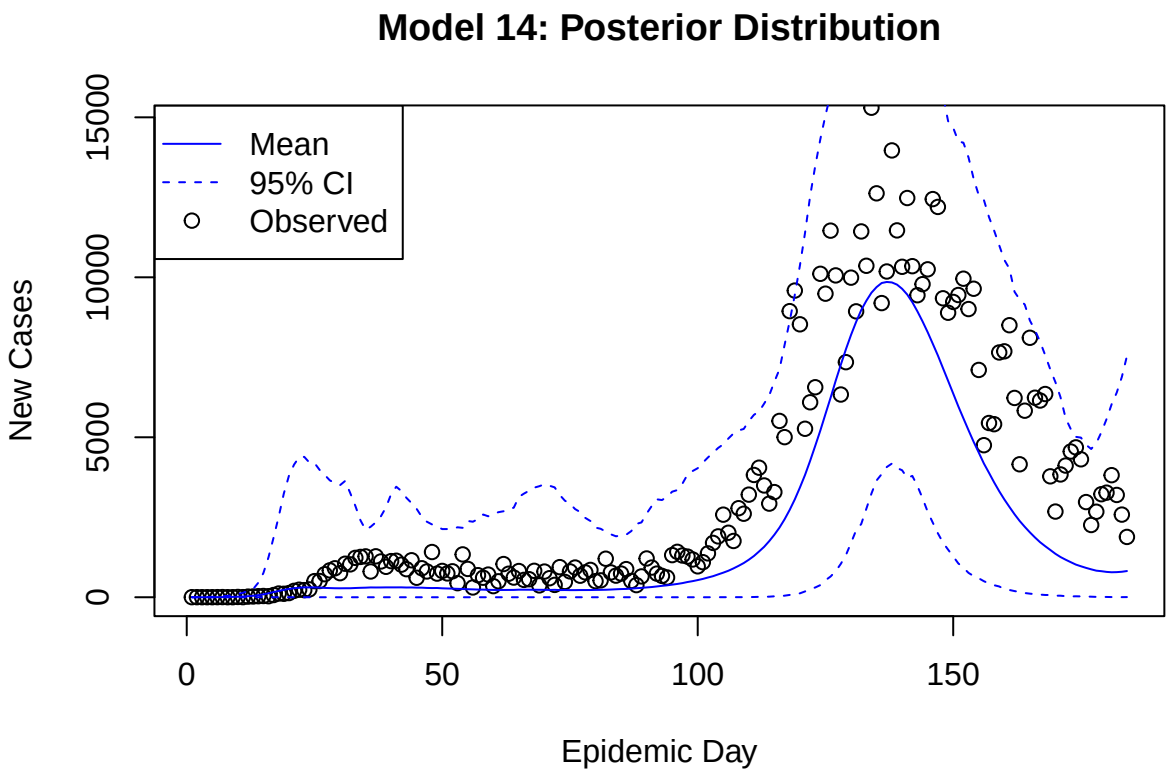

Model 12: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
5000
10000
15000
0
50
100
150
Epidemic Day

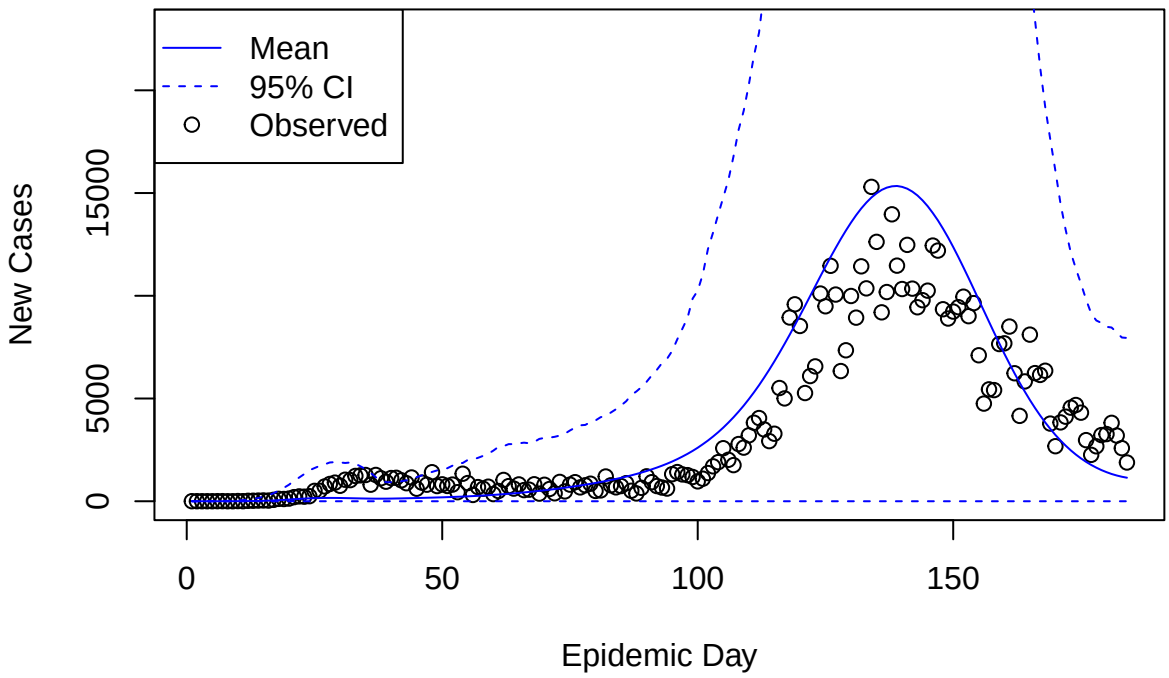

Model 12: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
4000
8000
12000
0
50
100
150
Epidemic Day

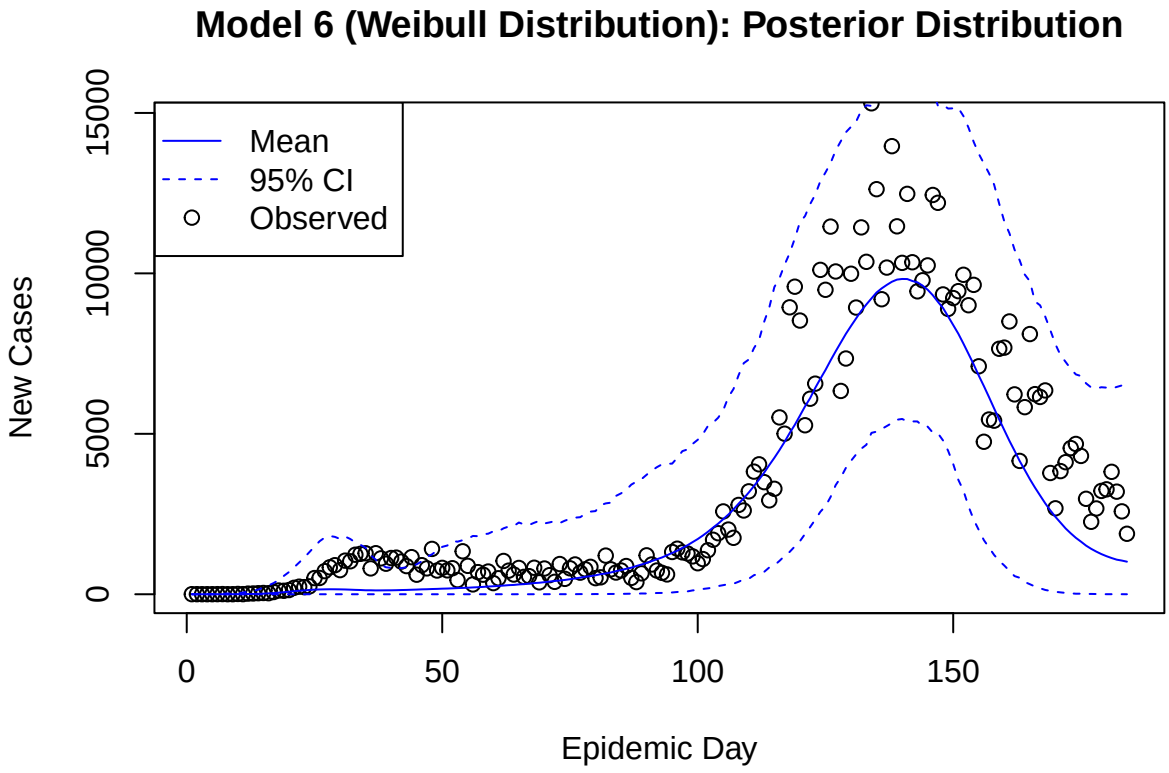

Model 13: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
5000
15000
0
50
100
150
Epidemic Day

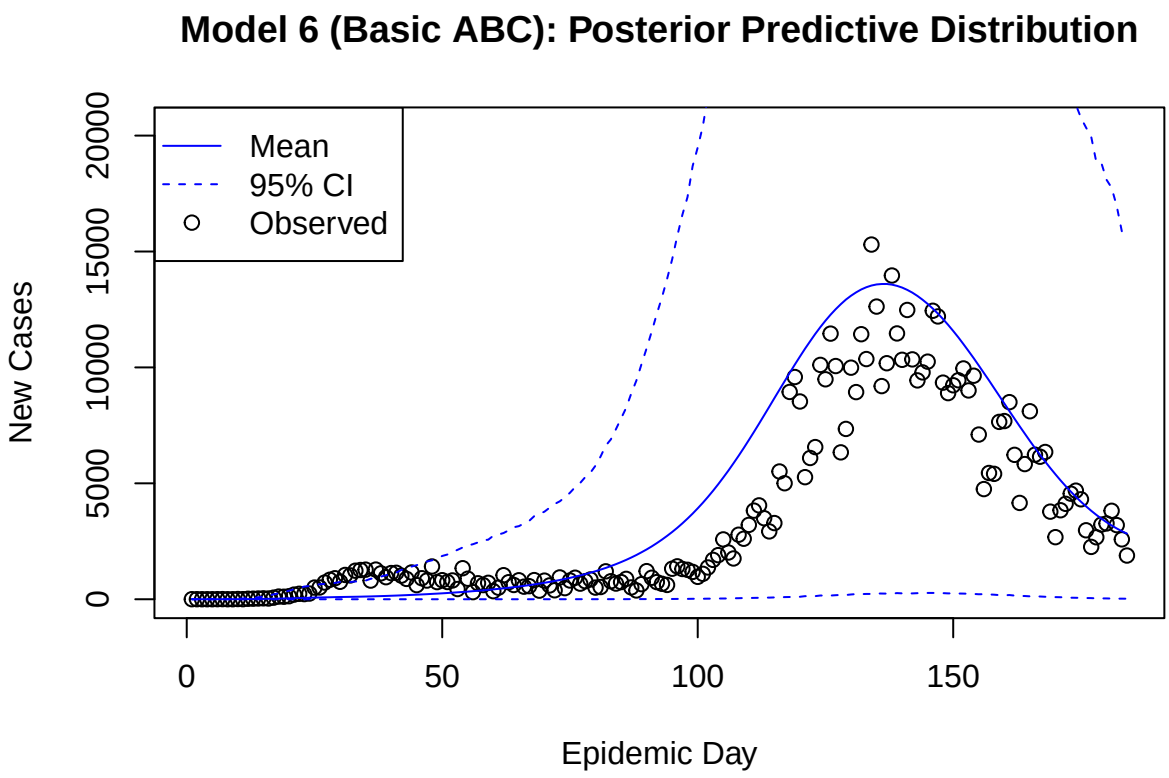

Model 13: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
5000
10000
15000
0
50
100
150
Epidemic Day

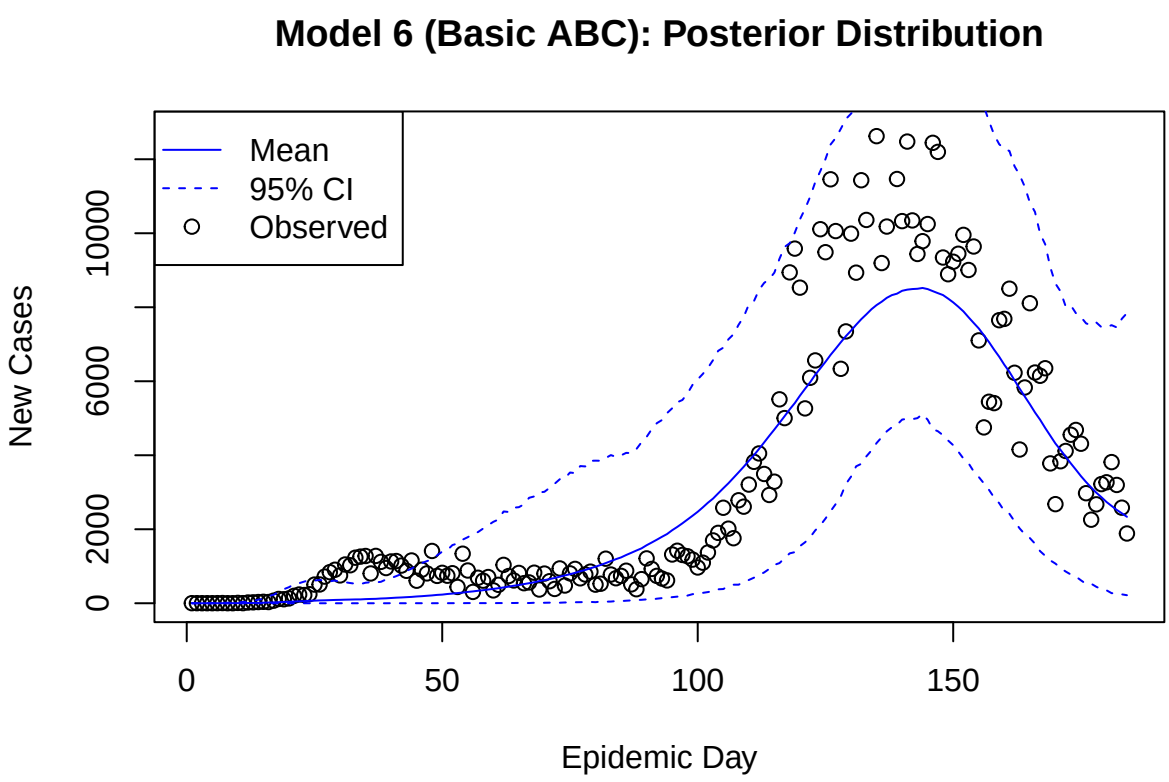

Model 14: Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
5000
15000
0
50
100
150
Epidemic Day

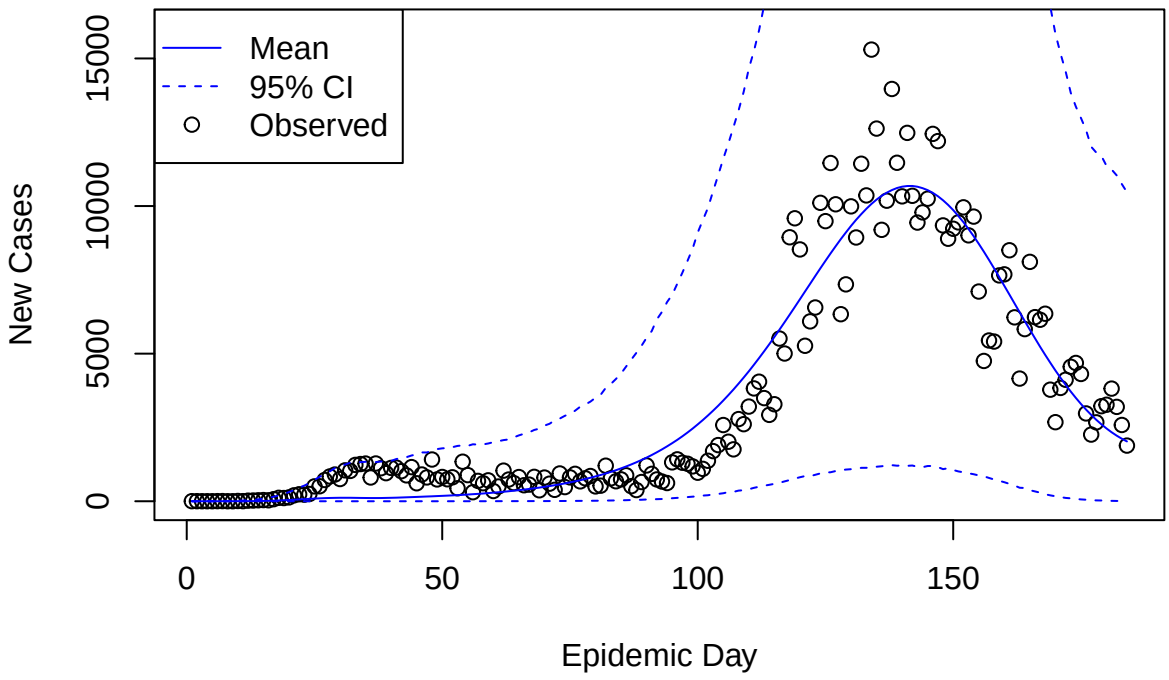

Model 14: Posterior Distribution
Mean
95% CI
Observed
New Cases
0
5000
10000
15000
0
50
100
150
Epidemic Day

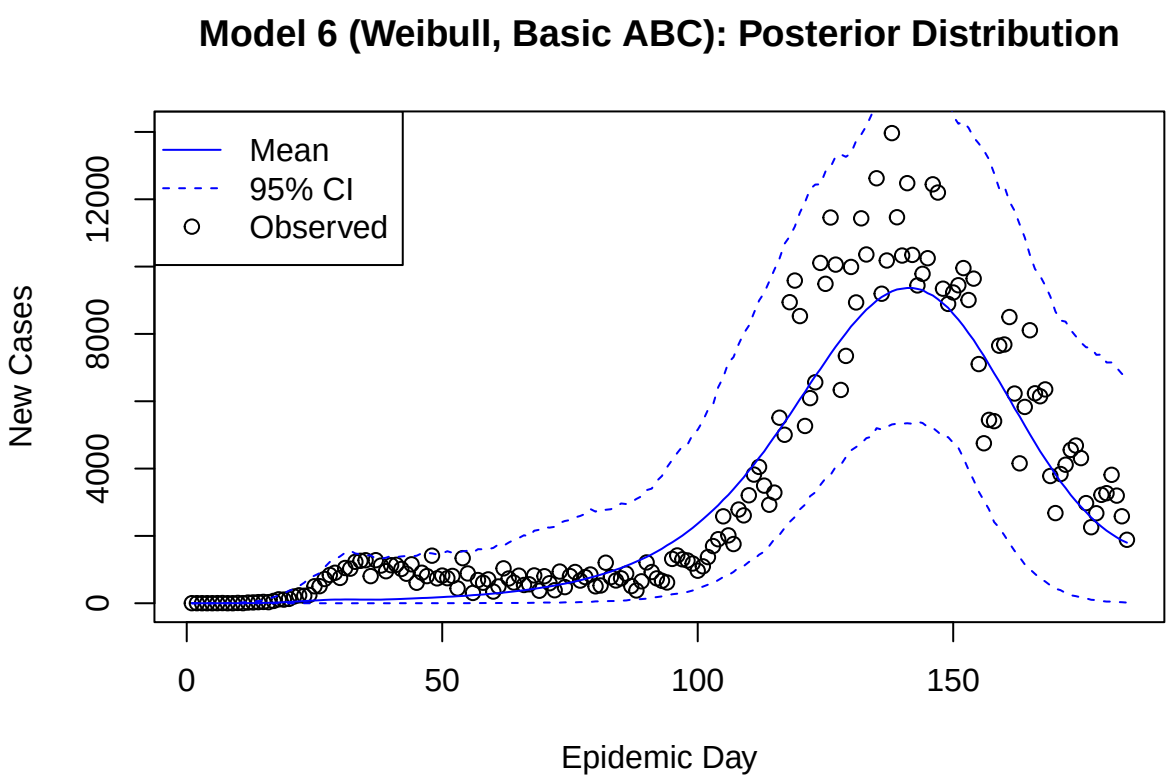

Model 6 (Weibull Distribution): Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
5000
15000
0
50
100
150
Epidemic Day

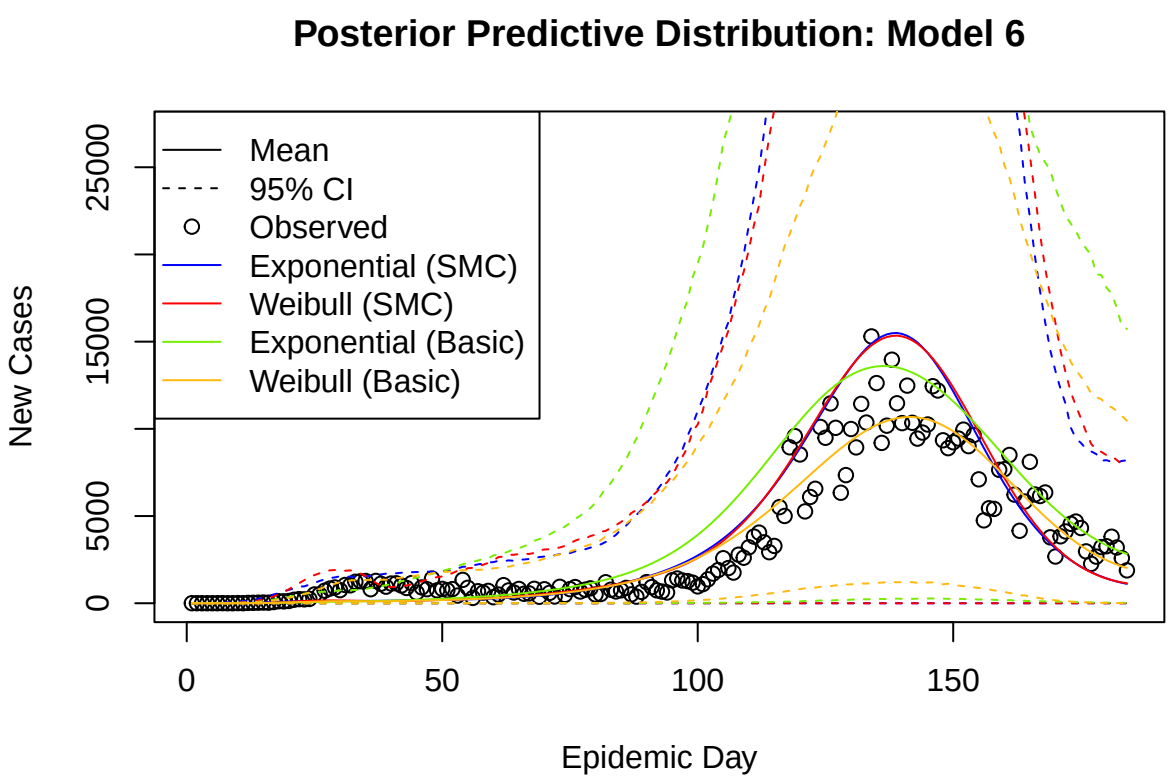

Model 6 (Weibull Distribution): Posterior Distribution
Mean
95% CI
Observed
New Cases
0
5000
10000
15000
0
50
100
150
Epidemic Day

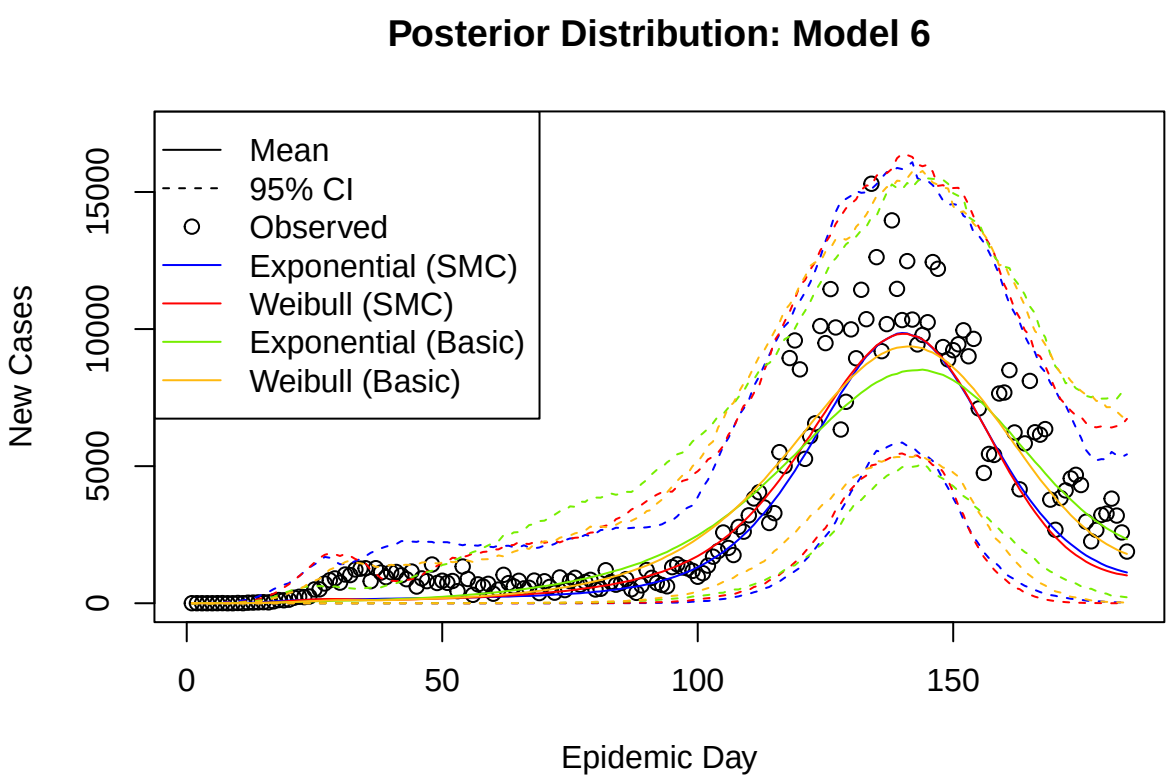

Model 6 (Basic ABC): Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
5000
10000
15000
20000
0
50
100
150
Epidemic Day

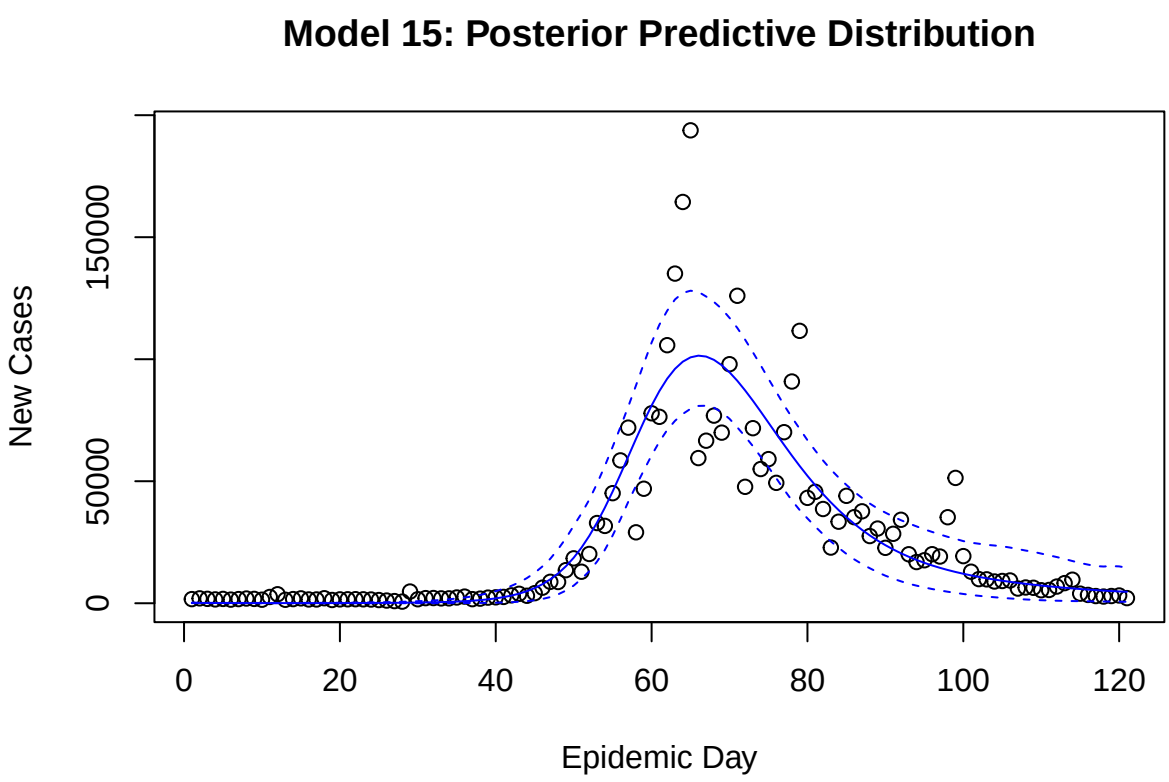

Model 6 (Basic ABC): Posterior Distribution
Mean
95% CI
Observed
New Cases
0
2000
6000
10000
0
50
100
150
Epidemic Day

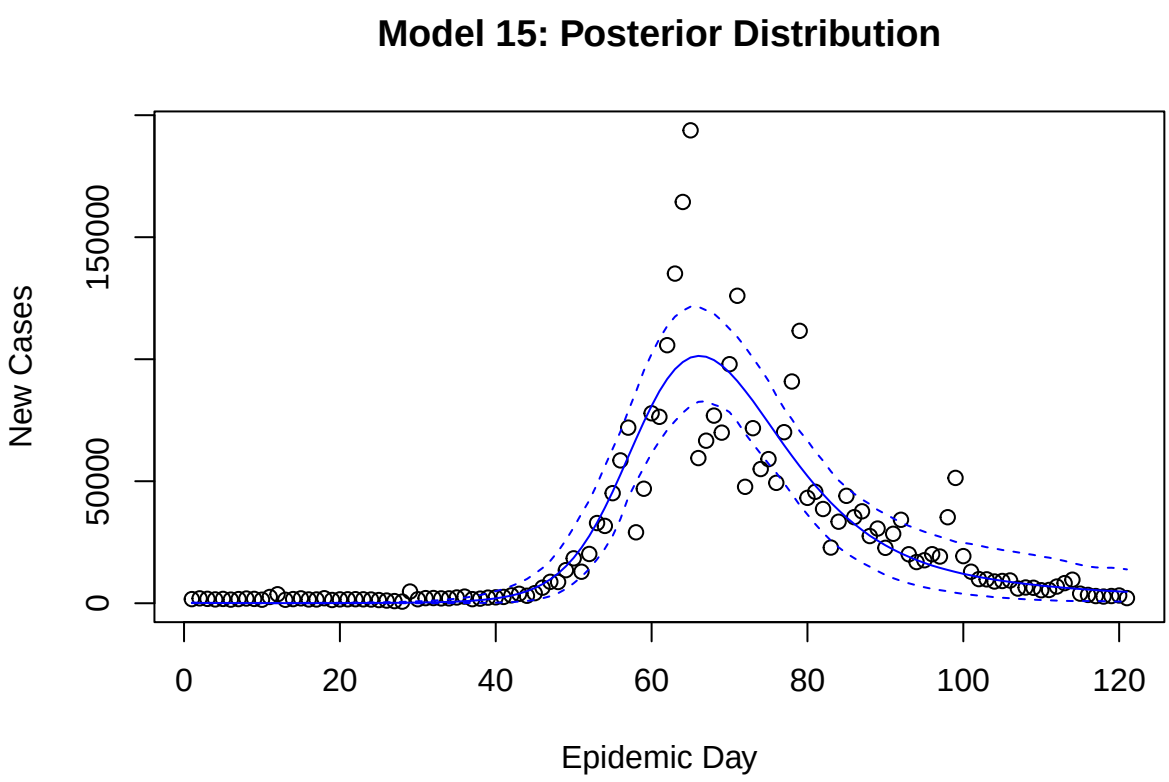

Model 6 (Weibull, Basic ABC): Posterior Predictive Distribution
Mean
95% CI
Observed
New Cases
0
5000
10000
15000
0
50
100
150
Epidemic Day

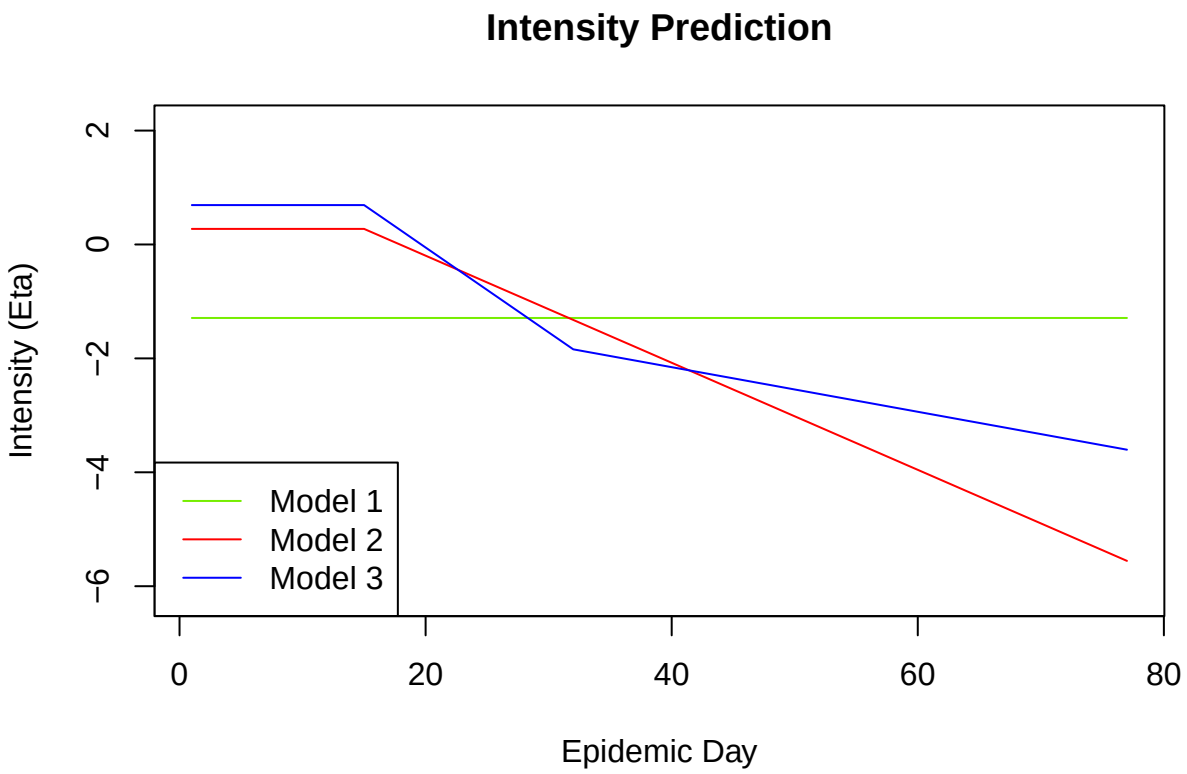

Model 6 (Weibull, Basic ABC): Posterior Distribution
Mean
95% CI
Observed
New Cases
0
4000
8000
12000
0
50
100
150
Epidemic Day

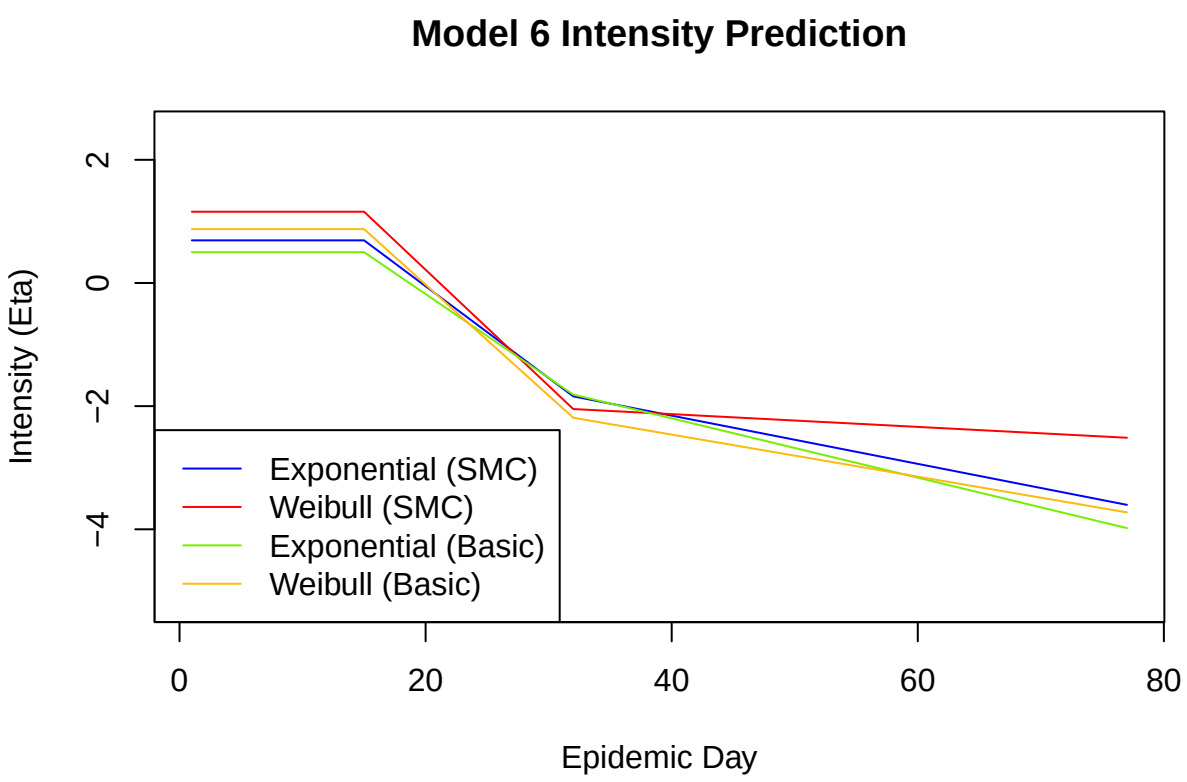

Posterior Predictive Distribution: Model 6
Mean
95% CI
Observed
Exponential (SMC)
Weibull (SMC)
Exponential (Basic)
Weibull (Basic)
New Cases
0
5000
15000
25000
0
50
100
150
Epidemic Day

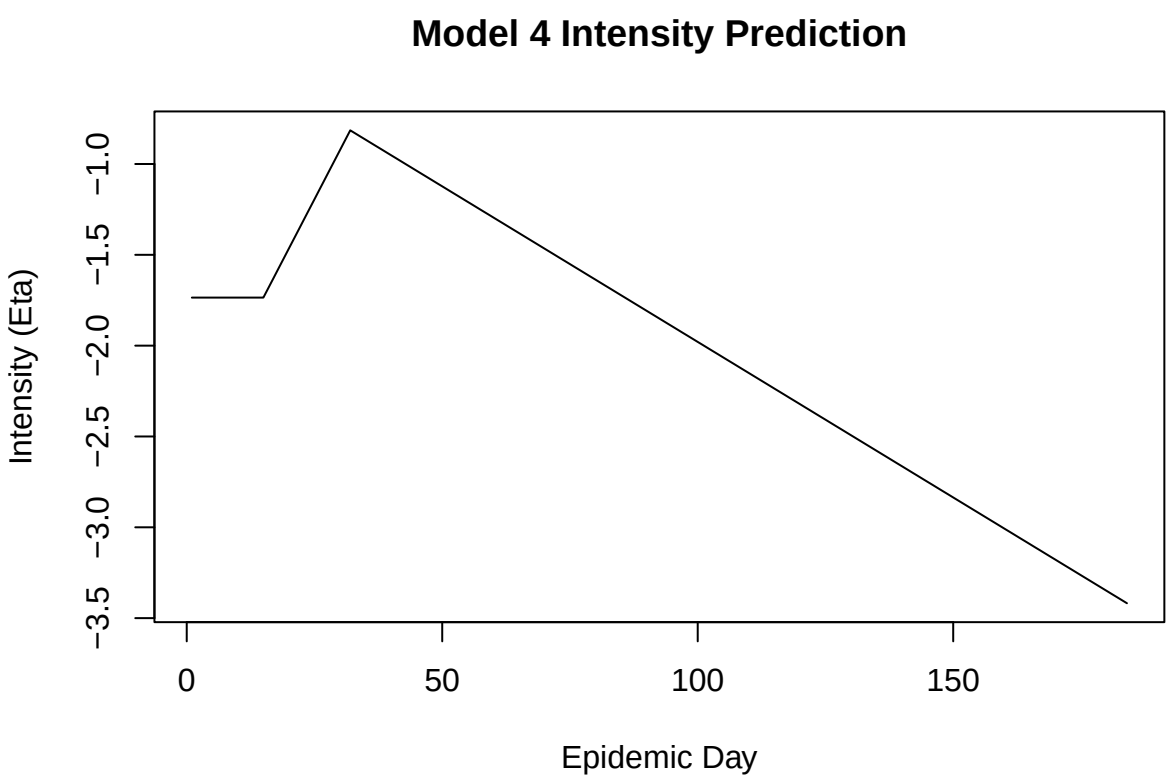

Posterior Distribution: Model 6
Mean
95% CI
Observed
Exponential (SMC)
Weibull (SMC)
Exponential (Basic)
Weibull (Basic)
New Cases
0
5000
10000
15000
0
50
100
150
Epidemic Day

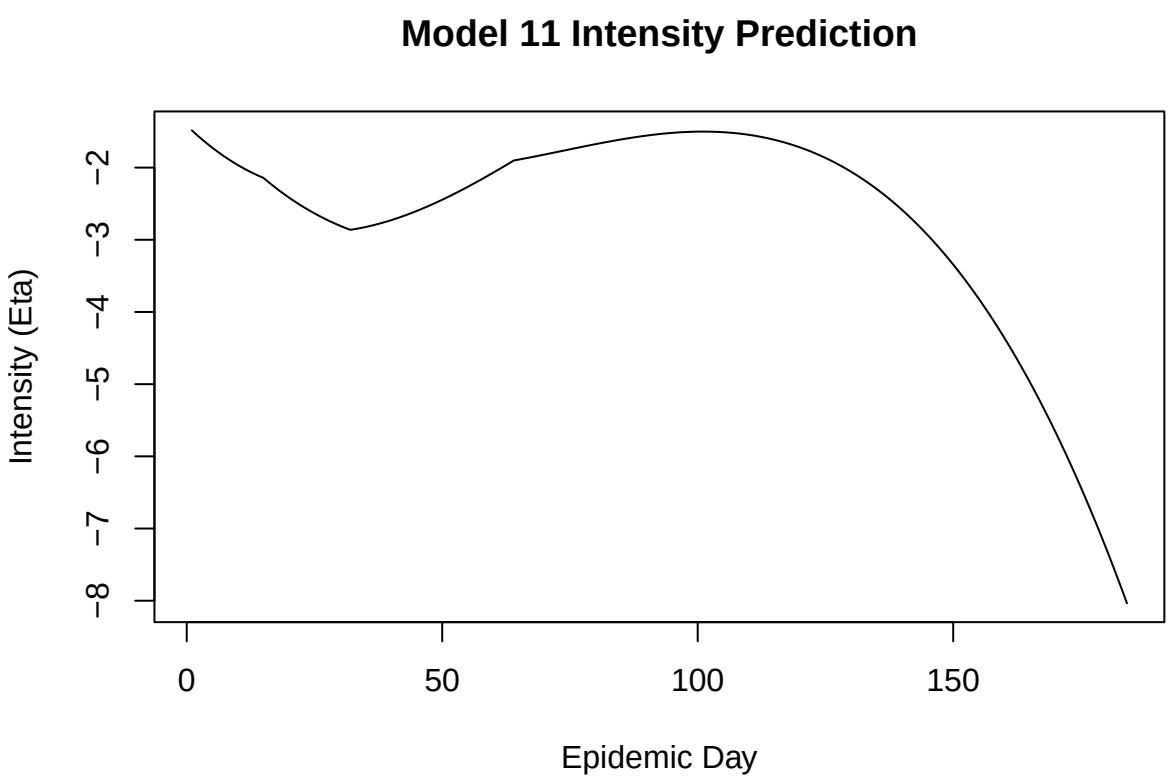

Model 15: Posterior Predictive Distribution
New Cases
0
50000
150000
0
20
40
60
80
100
120
Epidemic Day


Model 15: Posterior Distribution
New Cases
0
50000
150000
0
20
40
60
80
100
120
Epidemic Day


Intensity Prediction
Intensity (Eta)
2
0
−2
−4
−6
0
20
40
60
80
Epidemic Day
Model 1
Model 2
Model 3


Model 6 Intensity Prediction
Intensity (Eta)
2
0
−2
−4
0
20
40
60
80
Epidemic Day
Exponential (SMC)
Weibull (SMC)
Exponential (Basic)
Weibull (Basic)


Model 4 Intensity Prediction
Intensity (Eta)
−1.0
−1.5
−2.0
−2.5
−3.0
−3.5
0
50
100
150
Epidemic Day



Model 1

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 77
## Data Model Parameters: 0
## Exposure Process Parameters: 1
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                   Mean    SD       95% LB       95% UB
## Beta_SE_1       -1.290 0.052       -1.404       -1.200
## gamma_EI         0.170 0.009        0.152        0.191
## gamma_IR         0.064 0.009        0.050        0.081
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1             2.000 0.000        2.000        2.000
## I0_1             2.000 0.000        2.000        2.000
## R0_1             0.000 0.000        0.000        0.000
```

Model 2

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 77
## Data Model Parameters: 0
## Exposure Process Parameters: 2
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                   Mean    SD       95% LB       95% UB
## Beta_SE_1        0.274 0.224       -0.129        0.659
## Beta_SE_2       -0.940 0.050       -1.023       -0.826
## gamma_EI         0.143 0.042        0.095        0.259
## gamma_IR         0.034 0.028        0.001        0.099
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1             2.000 0.000        2.000        2.000
## I0_1             2.000 0.000        2.000        2.000
## R0_1             0.000 0.000        0.000        0.000
```

Model 3

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 77
## Data Model Parameters: 0
## Exposure Process Parameters: 3
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                   Mean    SD       95% LB       95% UB
## Beta_SE_1        0.692 0.218        0.309        1.132
## Beta_SE_2       -1.490 0.141       -1.741       -1.207
## Beta_SE_3        1.098 0.134        0.850        1.349
## gamma_EI         0.151 0.039        0.073        0.224
## gamma_IR         0.085 0.056        0.009        0.212
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1             2.000 0.000        2.000        2.000
## I0_1             2.000 0.000        2.000        2.000
## R0_1             0.000 0.000        0.000        0.000
```

Model 3 (Weibull)

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 77
## Data Model Parameters: 0
## Exposure Process Parameters: 3
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 4
##
##
## Parameter Estimates:
##                          Mean    SD       95% LB       95% UB
## Beta_SE_1               1.157 0.197        0.830        1.574
## Beta_SE_2              -1.885 0.141       -2.166       -1.618
## Beta_SE_3               1.781 0.148        1.555        2.094
## latent_shape            2.619 0.747        1.304        4.285
## latent_scale            7.296 1.131        5.352        9.286
## infectious_shape        8.738 4.780        2.084       20.911
## infectious_scale        8.636 2.407        4.354       13.117
## S0_1             21477737.000 0.000 21477737.000 21477737.000
## E0_1                    2.000 0.000        2.000        2.000
## I0_1                    2.000 0.000        2.000        2.000
## R0_1                    0.000 0.000        0.000        0.000
```

Model 3 (Weibull, Basic)

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 77
## Data Model Parameters: 0
## Exposure Process Parameters: 3
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 4
##
##
## Parameter Estimates:
##                          Mean    SD       95% LB       95% UB
## Beta_SE_1               0.874 0.160        0.617        1.172
## Beta_SE_2              -1.802 0.264       -2.310       -1.391
## Beta_SE_3               1.461 0.434        0.817        2.319
## latent_shape            2.193 0.082        2.044        2.357
## latent_scale            6.546 0.223        6.148        7.003
## infectious_shape        4.379 0.481        3.601        5.309
## infectious_scale       15.779 1.621       12.673       18.212
## S0_1             21477737.000 0.000 21477737.000 21477737.000
## E0_1                    2.000 0.000        2.000        2.000
## I0_1                    2.000 0.000        2.000        2.000
```

```
## R0_1                    0.000 0.000        0.000        0.000
```

Model 3 (Exp, Basic)

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 77
## Data Model Parameters: 0
## Exposure Process Parameters: 3
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                   Mean    SD       95% LB       95% UB
## Beta_SE_1        0.500 0.161        0.205        0.799
## Beta_SE_2       -1.360 0.242       -1.821       -0.925
## Beta_SE_3        0.878 0.379        0.226        1.673
## gamma_EI         0.166 0.006        0.155        0.177
## gamma_IR         0.062 0.007        0.049        0.075
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1             2.000 0.000        2.000        2.000
## I0_1             2.000 0.000        2.000        2.000
## R0_1             0.000 0.000        0.000        0.000
```

Model 4

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 184
## Data Model Parameters: 0
## Exposure Process Parameters: 3
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                   Mean    SD       95% LB       95% UB
## Beta_SE_1       -1.736 1.302       -3.806        0.389
## Beta_SE_2        0.542 1.027       -1.297        2.169
## Beta_SE_3       -0.713 1.071       -2.416        1.240
## gamma_EI         0.170 0.015        0.138        0.201
## gamma_IR         0.060 0.016        0.032        0.088
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1             2.000 0.000        2.000        2.000
## I0_1             2.000 0.000        2.000        2.000
## R0_1             0.000 0.000        0.000        0.000
```

Model 5

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 184
## Data Model Parameters: 0
## Exposure Process Parameters: 6
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                    Mean    SD       95% LB       95% UB
## Beta_SE_1        -1.251 1.658       -4.671        1.361
## Beta_SE_2        -0.745 1.195       -3.124        1.189
## Beta_SE_3         0.728 1.235       -1.397        3.314
## Beta_SE_4         0.244 3.593       -6.002        7.776
## Beta_SE_5         3.764 4.789       -5.715       13.239
## Beta_SE_6        -3.450 5.064      -12.215        5.996
## gamma_EI          0.165 0.025        0.119        0.204
## gamma_IR          0.057 0.023        0.014        0.104
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1              2.000 0.000        2.000        2.000
## I0_1              2.000 0.000        2.000        2.000
## R0_1              0.000 0.000        0.000        0.000
```

Model 6 (SMC-ABC, Exponential Distribution)

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 184
## Data Model Parameters: 0
## Exposure Process Parameters: 7
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                    Mean    SD       95% LB       95% UB
## Beta_SE_1        -0.989 1.876       -4.418        2.181
## Beta_SE_2        -0.010 1.446       -2.905        2.581
## Beta_SE_3        -0.257 1.624       -3.555        2.918
## Beta_SE_4        -2.238 3.859       -9.918        6.064
## Beta_SE_5         2.332 3.307       -2.575        9.014
## Beta_SE_6         2.177 3.790       -5.730        9.316
## Beta_SE_7        -2.433 3.295       -8.391        4.035
## gamma_EI          0.168 0.011        0.148        0.189
## gamma_IR          0.059 0.015        0.029        0.092
```

```
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1             2.000 0.000        2.000        2.000
## I0_1             2.000 0.000        2.000        2.000
## R0_1             0.000 0.000        0.000        0.000
```

Model 6 (SMC-ABC, Weibull Distribution)

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 184
## Data Model Parameters: 0
## Exposure Process Parameters: 7
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 4
##
##
## Parameter Estimates:
##                           Mean    SD       95% LB       95% UB
## Beta_SE_1               -1.015 1.440       -4.354        1.952
## Beta_SE_2               -0.049 1.163       -2.634        2.319
## Beta_SE_3               -0.165 1.302       -2.573        2.495
## Beta_SE_4               -1.355 2.692       -7.030        3.263
## Beta_SE_5                1.598 2.233       -2.609        5.612
## Beta_SE_6                1.332 2.849       -4.297        5.981
## Beta_SE_7               -2.273 2.900       -8.369        2.238
## latent_shape             2.176 0.136        1.937        2.416
## latent_scale             6.607 0.384        5.857        7.244
## infectious_shape         4.384 0.841        2.946        6.392
## infectious_scale        15.940 1.902       12.019       19.425
## S0_1             21477737.000 0.000 21477737.000 21477737.000
## E0_1                    2.000 0.000        2.000        2.000
## I0_1                    2.000 0.000        2.000        2.000
## R0_1                    0.000 0.000        0.000        0.000
```

Model 6 (Basic ABC, Weibull Distribution)

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 184
## Data Model Parameters: 0
## Exposure Process Parameters: 7
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 4
##
##
## Parameter Estimates:
##                           Mean    SD       95% LB       95% UB
```

```
## Beta_SE_1              -1.065 1.198       -3.323        1.322
## Beta_SE_2               0.113 0.945       -1.895        1.563
## Beta_SE_3              -0.300 1.006       -1.848        1.859
## Beta_SE_4              -1.077 1.701       -4.132        2.463
## Beta_SE_5               0.811 1.723       -2.150        4.048
## Beta_SE_6               0.456 1.717       -2.909        3.516
## Beta_SE_7              -0.966 1.963       -5.071        2.163
## latent_shape            2.198 0.076        2.064        2.368
## latent_scale            6.518 0.197        6.183        6.868
## infectious_shape        4.358 0.450        3.506        5.251
## infectious_scale       15.870 1.500       13.014       18.922
## S0_1             21477737.000 0.000 21477737.000 21477737.000
## E0_1                    2.000 0.000        2.000        2.000
## I0_1                    2.000 0.000        2.000        2.000
## R0_1                    0.000 0.000        0.000        0.000
```

Model 6 (Basic ABC, Exponential Distribution)

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 184
## Data Model Parameters: 0
## Exposure Process Parameters: 7
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                    Mean    SD       95% LB       95% UB
## Beta_SE_1        -0.935 1.255       -3.457        0.976
## Beta_SE_2        -0.049 1.051       -1.814        1.874
## Beta_SE_3        -0.120 1.114       -2.171        1.932
## Beta_SE_4        -0.886 1.675       -4.152        2.331
## Beta_SE_5         0.795 1.707       -2.501        3.910
## Beta_SE_6         0.591 1.991       -2.918        4.523
## Beta_SE_7        -1.095 1.823       -4.630        2.106
## gamma_EI          0.166 0.006        0.155        0.178
## gamma_IR          0.062 0.006        0.052        0.074
## S0_1       21477737.000 0.000 21477737.000 21477737.000
## E0_1              2.000 0.000        2.000        2.000
## I0_1              2.000 0.000        2.000        2.000
## R0_1              0.000 0.000        0.000        0.000
```

Model 7

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 184
```

```
## Data Model Parameters: 0
## Exposure Process Parameters: 8
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                   Mean    SD       95% LB       95% UB
## Beta_SE_1       -0.890 1.742       -4.392        2.124
## Beta_SE_2       -0.203 1.348       -2.957        2.309
## Beta_SE_3        0.017 1.512       -2.901        2.928
## Beta_SE_4       -1.564 2.954       -7.467        4.304
## Beta_SE_5       -0.639 2.636       -5.349        3.361
## Beta_SE_6        2.852 2.323       -1.216        6.911
## Beta_SE_7       -0.712 2.760       -5.063        4.427
## Beta_SE_8       -2.101 2.960       -7.801        2.356
## gamma_EI         0.167 0.009        0.151        0.181
## gamma_IR         0.060 0.009        0.043        0.078
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1             2.000 0.000        2.000        2.000
## I0_1             2.000 0.000        2.000        2.000
## R0_1             0.000 0.000        0.000        0.000
```

Model 8

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 184
## Data Model Parameters: 0
## Exposure Process Parameters: 9
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                   Mean    SD       95% LB       95% UB
## Beta_SE_1       -0.815 1.936       -5.395        2.259
## Beta_SE_2       -0.346 1.534       -2.888        2.626
## Beta_SE_3        0.099 1.699       -3.236        3.025
## Beta_SE_4       -1.565 3.497       -7.432        5.390
## Beta_SE_5       -1.087 3.726       -8.353        5.430
## Beta_SE_6        1.421 2.709       -3.498        5.862
## Beta_SE_7        3.200 3.118       -1.783        9.041
## Beta_SE_8       -1.486 3.253       -7.171        4.567
## Beta_SE_9       -1.716 3.813       -9.435        4.379
## gamma_EI         0.165 0.012        0.143        0.185
## gamma_IR         0.060 0.015        0.029        0.088
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1             2.000 0.000        2.000        2.000
## I0_1             2.000 0.000        2.000        2.000
```

```
## R0_1             0.000 0.000        0.000        0.000
```

Model 9

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 184
## Data Model Parameters: 0
## Exposure Process Parameters: 4
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                    Mean    SD       95% LB       95% UB
## Beta_SE_1        -1.666 1.590       -4.509        1.116
## Beta_SE_2        -0.440 1.548       -2.963        2.627
## Beta_SE_3         0.814 2.178       -3.504        4.319
## Beta_SE_4        -0.597 0.957       -2.223        1.262
## gamma_EI          0.157 0.029        0.092        0.214
## gamma_IR          0.050 0.030        0.003        0.111
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1              2.000 0.000        2.000        2.000
## I0_1              2.000 0.000        2.000        2.000
## R0_1              0.000 0.000        0.000        0.000
```

Model 10

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 184
## Data Model Parameters: 0
## Exposure Process Parameters: 7
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                    Mean    SD       95% LB       95% UB
## Beta_SE_1        -1.802 1.704       -4.762        1.095
## Beta_SE_2        -0.357 1.581       -3.748        2.138
## Beta_SE_3         0.691 2.160       -2.772        4.767
## Beta_SE_4        -0.518 1.086       -2.421        1.681
## Beta_SE_5        -0.875 3.954       -7.736        7.210
## Beta_SE_6         2.708 4.038       -3.236       11.219
## Beta_SE_7        -2.203 4.806      -12.828        5.985
## gamma_EI          0.167 0.014        0.136        0.189
```

```
## gamma_IR         0.059 0.012        0.035        0.081
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1             2.000 0.000        2.000        2.000
## I0_1             2.000 0.000        2.000        2.000
## R0_1             0.000 0.000        0.000        0.000
```

Model 11

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 184
## Data Model Parameters: 0
## Exposure Process Parameters: 8
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                   Mean    SD       95% LB       95% UB
## Beta_SE_1       -1.484 2.007       -5.485        2.378
## Beta_SE_2       -0.304 1.724       -3.472        3.043
## Beta_SE_3        0.371 2.289       -3.651        4.538
## Beta_SE_4       -0.299 1.289       -2.369        2.365
## Beta_SE_5       -2.004 4.343      -10.485        6.024
## Beta_SE_6        1.952 4.373       -6.124       10.076
## Beta_SE_7        1.746 3.825       -5.407        8.348
## Beta_SE_8       -3.468 4.473      -12.774        5.290
## gamma_EI         0.169 0.011        0.148        0.188
## gamma_IR         0.053 0.018        0.021        0.089
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1             2.000 0.000        2.000        2.000
## I0_1             2.000 0.000        2.000        2.000
## R0_1             0.000 0.000        0.000        0.000
```

Model 12

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 184
## Data Model Parameters: 0
## Exposure Process Parameters: 9
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                   Mean    SD       95% LB       95% UB
```

```
## Beta_SE_1       -1.123 2.246       -5.622        2.474
## Beta_SE_2       -0.317 2.110       -4.110        3.589
## Beta_SE_3        0.157 2.776       -5.108        4.894
## Beta_SE_4       -0.141 1.295       -2.701        2.110
## Beta_SE_5       -2.038 4.466      -11.219        5.206
## Beta_SE_6       -1.111 4.544      -10.764        6.783
## Beta_SE_7        4.642 3.544       -1.906       12.060
## Beta_SE_8       -0.271 3.719       -7.281        5.573
## Beta_SE_9       -1.953 3.603       -8.667        4.264
## gamma_EI         0.164 0.014        0.137        0.195
## gamma_IR         0.056 0.017        0.024        0.090
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1             2.000 0.000        2.000        2.000
## I0_1             2.000 0.000        2.000        2.000
## R0_1             0.000 0.000        0.000        0.000
```

Model 13

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 184
## Data Model Parameters: 0
## Exposure Process Parameters: 10
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                     Mean    SD       95% LB       95% UB
## Beta_SE_1        -1.343 2.163       -6.216        1.977
## Beta_SE_2        -0.448 1.579       -3.130        2.612
## Beta_SE_3         0.698 2.270       -4.317        5.102
## Beta_SE_4        -0.618 1.614       -3.677        2.769
## Beta_SE_5        -1.190 4.113       -9.198        5.346
## Beta_SE_6        -2.557 4.555      -11.457        6.550
## Beta_SE_7         0.831 3.718       -5.913        7.435
## Beta_SE_8         3.754 3.208       -2.421        9.498
## Beta_SE_9        -2.175 4.476      -10.814        5.416
## Beta_SE_10       -1.260 4.354       -9.437        6.728
## gamma_EI          0.167 0.014        0.144        0.192
## gamma_IR          0.058 0.014        0.030        0.085
## S0_1       21477737.000 0.000 21477737.000 21477737.000
## E0_1              2.000 0.000        2.000        2.000
## I0_1              2.000 0.000        2.000        2.000
## R0_1              0.000 0.000        0.000        0.000
```

Model 14

```
## Summary: SEIR Model
```

```
##
## Locations: 1
## Time Points: 184
## Data Model Parameters: 0
## Exposure Process Parameters: 7
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                   Mean    SD       95% LB       95% UB
## Beta_SE_1       -0.085 2.194       -4.124        3.661
## Beta_SE_2       -2.692 1.918       -6.532        0.649
## Beta_SE_3       -0.872 2.013       -4.434        2.298
## Beta_SE_4        1.659 2.170       -2.112        6.135
## Beta_SE_5       -0.525 1.593       -4.086        2.207
## Beta_SE_6        0.347 2.137       -3.626        5.024
## Beta_SE_7       -0.297 1.716       -3.574        3.338
## gamma_EI         0.167 0.009        0.151        0.185
## gamma_IR         0.060 0.009        0.041        0.078
## S0_1      21477737.000 0.000 21477737.000 21477737.000
## E0_1             2.000 0.000        2.000        2.000
## I0_1             2.000 0.000        2.000        2.000
## R0_1             0.000 0.000        0.000        0.000
```

Model 15

```
## Summary: SEIR Model
##
## Locations: 1
## Time Points: 121
## Data Model Parameters: 0
## Exposure Process Parameters: 7
## Reinfection Model Parameters: 0
## Spatial Parameters: 0
## Transition Parameters: 2
##
##
## Parameter Estimates:
##                   Mean     SD       95% LB       95% UB
## Beta_SE_1       -0.028  7.756      -13.406       14.014
## Beta_SE_2       -0.290  7.211      -13.941       12.732
## Beta_SE_3        1.682  0.501        0.899        2.771
## Beta_SE_4       -1.697  0.520       -2.612       -0.822
## Beta_SE_5       -0.927  0.830       -2.583        0.568
## Beta_SE_6       -1.884 11.591      -22.361       19.515
## Beta_SE_7       -2.017 10.878      -23.838       18.023
## gamma_EI         0.155  0.054        0.068        0.271
## gamma_IR         0.069  0.036        0.014        0.142
## S0_1      21415373.000  0.000 21415373.000 21415373.000
## E0_1          1000.000  0.000     1000.000     1000.000
## I0_1          1694.000  0.000     1694.000     1694.000
```

```
## R0_1         59670.000  0.000    59670.000    59670.000
```

Bayes Factor (Model 2 vs Model 3 vs Model 3 (Weibull))

```
##      [,1]     [,2]       [,3]
## [1,]  NaN  0.00000 0.00000000
## [2,]  Inf  1.00000 0.05135952
## [3,]  Inf 19.47059 1.00000000
```

Bayes Factor (Comparison Between Models 4-8)

```
##           [,1]      [,2]      [,3]      [,4]     [,5]
## [1,] 1.0000000 0.8010013 0.7748184 0.9116809 1.149013
## [2,] 1.2484375 1.0000000 0.9673123 1.1381766 1.434470
## [3,] 1.2906250 1.0337922 1.0000000 1.1766382 1.482944
## [4,] 1.0968750 0.8785982 0.8498789 1.0000000 1.260323
## [5,] 0.8703125 0.6971214 0.6743341 0.7934473 1.000000
```

Bayes Factor (Comparison Between Models 9-14)

```
##          [,1]      [,2]      [,3]      [,4]      [,5]      [,6]
## [1,] 1.000000 0.7103960 0.6363636 0.6434978 0.7265823 0.7454545
## [2,] 1.407666 1.0000000 0.8957871 0.9058296 1.0227848 1.0493506
## [3,] 1.571429 1.1163366 1.0000000 1.0112108 1.1417722 1.1714286
## [4,] 1.554007 1.1039604 0.9889135 1.0000000 1.1291139 1.1584416
## [5,] 1.376307 0.9777228 0.8758315 0.8856502 1.0000000 1.0259740
## [6,] 1.341463 0.9529703 0.8536585 0.8632287 0.9746835 1.0000000
```

Bayes Factor (Model 6 vs Model 11)

```
##           [,1]     [,2]
## [1,] 1.0000000 1.603945
## [2,] 0.6234626 1.000000
```

Bayes Factor (Model 6: Exponential Distribution vs Weibull Distribution)

```
##          [,1]      [,2]
## [1,] 1.000000 0.9825378
## [2,] 1.017773 1.0000000
```

Coverage, width and bias for model 6 with exponential distribution, SMC-ABC (latent and infectious period estimates)

```
## $coverage
```

```
## [1] 1
##
## $width
## [1] 0.03707391
##
## $bias
## [1] -0.8755908

## $coverage
## [1] 1
##
## $width
## [1] 0.06515869
##
## $bias
## [1] 4.894005
```

Coverage, width and bias for model 3 with exponential distribution, SMC ABC (latent and infectious period estimates)

```
## $coverage
## [1] 1
##
## $width
## [1] 0.1346494
##
## $bias
## [1] 8.871666

## $coverage
## [1] 1
##
## $width
## [1] 0.1888418
##
## $bias
## [1] -32.46989
```

Coverage, width and bias for model 3 with weibull distribution, SMC-ABC (latent and infectious period estimates (shape and scale))

```
## $coverage
## [1] 1
##
## $width
## [1] 3.014257
##
## $bias
## [1] 25.80351
```

```
## $coverage
## [1] 1
##
## $width
## [1] 4.082446
##
## $bias
## [1] 7.189631
```

```
## $coverage
## [1] 1
##
## $width
## [1] 20.6226
##
## $bias
## [1] 129.9974
```

```
## $coverage
## [1] 0
##
## $width
## [1] 9.088431
##
## $bias
## [1] -51.91855
```

Coverage, width and bias for model 6 with exponential distribution, basic ABC (latent and infectious period estimates)

```
## $coverage
## [1] 1
##
## $width
## [1] 0.01989488
##
## $bias
## [1] 0.1114783
```

```
## $coverage
## [1] 1
##
## $width
## [1] 0.02191821
##
## $bias
## [1] 0.4101989
```

Coverage, width and bias for model 11 (latent and infectious period estimates)

```
## $coverage
## [1] 1
##
## $width
## [1] 0.03474615
##
## $bias
## [1] -1.033315

## $coverage
## [1] 1
##
## $width
## [1] 0.0653197
##
## $bias
## [1] 14.28755
```

Coverage, width and bias for model 6 with weibull distribution, SMC-ABC (latent and infectious period estimates (shape and scale))

```
## $coverage
## [1] 1
##
## $width
## [1] 0.488165
##
## $bias
## [1] 4.520094

## $coverage
## [1] 1
##
## $width
## [1] 1.461511
##
## $bias
## [1] -2.941719

## $coverage
## [1] 1
##
## $width
## [1] 3.616202
##
## $bias
## [1] 15.38377
```

```
## $coverage
## [1] 1
##
## $width
## [1] 7.557618
##
## $bias
## [1] -11.25038
```

Coverage, width and bias for model 6 with weibull distribution, Basic ABC (latent and infectious period estimates (shape and scale))

```
## $coverage
## [1] 1
##
## $width
## [1] 0.3256474
##
## $bias
## [1] 5.566533

## $coverage
## [1] 1
##
## $width
## [1] 0.6912316
##
## $bias
## [1] -4.248362

## $coverage
## [1] 1
##
## $width
## [1] 1.819829
##
## $bias
## [1] 14.71174

## $coverage
## [1] 1
##
## $width
## [1] 6.040971
##
## $bias
## [1] -11.63822
```

Runtimes

```
##          user.self sys.self elapsed
```

```
## model 1    375.599    6.037  54.145
## model 2    511.774    9.676  76.667
## model 3    579.565   10.708 198.104
## model 4   4702.412   51.270 683.723
## model 5    331.219   13.731  52.107
## model 6   1239.052   22.674 182.847
## model 7   1298.063   16.737 195.776
## model 8   1135.537   16.896 178.343
## model 9   1349.993   18.055 210.122
## model 10  1275.806   16.836 198.717
## model 11   897.741   12.775 135.069
## model 12  1742.396   23.287 270.864
## model 13  1248.183   20.035 202.015
## model 14  1283.735   20.784 209.601
## model 15  1184.804   20.033 195.820
## model 16  1267.504   19.162 203.757
## model 17  1005.582   15.906 158.613
## model 18  1227.843   18.600 195.543
## model 19  3119.865   47.148 524.453
## model 20   520.705   26.133  92.888
## model 21  1555.317   34.943 242.690
```