Figures, Tables, and Important Values

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Data Editing

Important Values

Quartile Values

Spearman Rank Correlation Cases and Prop. Black Residentd

```
#race
cor(x=all_the_data_pull_cutoff$`total cases`,
    y=all_the_data_pull_cutoff$Total_Black/
      all_the_data_pull_cutoff$Total_Pop,
    method="spearman")
```

```
## [1] 0.4493985
```

```
cor.test(x=all_the_data_pull_cutoff$`total cases`,
    y=all_the_data_pull_cutoff$Total_Black/
      all_the_data_pull_cutoff$Total_Pop,
    method="spearman")
```

```
##
##  Spearman's rank correlation rho
##
## data:  all_the_data_pull_cutoff$‘total cases‘ and all_the_data_pull_cutoff$Total_Black/all_the_data_p
## S = 2779051013, p-value < 2.2e-16
## alternative hypothesis: true rho is not equal to 0
## sample estimates:
##       rho
## 0.4493985
```

Spearman Rank Correlation Cases and Prop. Households in Poverty

```r
#poverty
x_case <- all_the_data_pull_cutoff$`total cases`
y_pov <- all_the_data_pull_cutoff$Total_Households_Below_Poverty/
      (all_the_data_pull_cutoff$Total_Households_Above_Poverty+
         all_the_data_pull_cutoff$Total_Households_Below_Poverty)

cor(x=x_case[-c(1814)],
    y=y_pov[-c(1814)],
    method="spearman")
```

```
## [1] -0.04914091
```

```r
cor.test(x=x_case[-c(1814)],
    y=y_pov[-c(1814)],
    method="spearman")
```

```
##
##  Spearman's rank correlation rho
##
## data:  x_case[-c(1814)] and y_pov[-c(1814)]
## S = 5290233922, p-value = 0.006076
## alternative hypothesis: true rho is not equal to 0
## sample estimates:
##         rho
## -0.04914091
```

MAE Wilcoxon Tests

Wilcoxon rank sum between proportion of black constituent quartiles

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  quart_1_mae and quart_2_mae
## W = 173277, p-value < 2.2e-16
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  quart_1_mae and quart_3_mae
## W = 101894, p-value < 2.2e-16
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  quart_1_mae and quart_4_mae
## W = 108750, p-value < 2.2e-16
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  quart_3_mae and quart_4_mae
## W = 306424, p-value = 0.7352
## alternative hypothesis: true location shift is not equal to 0
```

Within Covid Case Quartile 1 Compare Across Race Quartiles

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_1_race_quart_1 and case_quart_1_race_quart_2
## W = 30054, p-value = 0.001876
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_1_race_quart_1 and case_quart_1_race_quart_3
## W = 14052, p-value = 2.005e-06
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_1_race_quart_1 and case_quart_1_race_quart_4
## W = 11432, p-value = 1.595e-10
## alternative hypothesis: true location shift is not equal to 0
```

Within Covid Case Quartile 2 Compare Across Race Quartiles

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_2_race_quart_1 and case_quart_2_race_quart_2
## W = 22173, p-value = 0.02819
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_2_race_quart_1 and case_quart_2_race_quart_3
## W = 10671, p-value = 3.572e-07
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_2_race_quart_1 and case_quart_2_race_quart_4
## W = 16340, p-value = 0.0002577
## alternative hypothesis: true location shift is not equal to 0
```

Within Covid Case Quartile 3 Compare Across Race Quartiles

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_3_race_quart_1 and case_quart_3_race_quart_2
## W = 11556, p-value = 0.009097
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_3_race_quart_1 and case_quart_3_race_quart_3
## W = 8962, p-value = 4.621e-07
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_3_race_quart_1 and case_quart_3_race_quart_4
## W = 8308, p-value = 1.754e-05
## alternative hypothesis: true location shift is not equal to 0
```

Within Covid Case Quartile 4 Compare Across Race Quartiles

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_4_race_quart_1 and case_quart_4_race_quart_2
## W = 2478, p-value = 0.3154
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_4_race_quart_1 and case_quart_4_race_quart_3
## W = 4146, p-value = 0.1204
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_4_race_quart_1 and case_quart_4_race_quart_4
## W = 3000, p-value = 0.0006125
## alternative hypothesis: true location shift is not equal to 0
```

RMAE Wilcoxon Tests

Wilcoxon rank sum between proportion of black constituent quartiles

```
##
```

```
##  Wilcoxon rank sum test with continuity correction
##
## data:  quart_1_rmae and quart_2_rmae
## W = 293350, p-value = 0.2393
## alternative hypothesis: true location shift is not equal to 0

##
##  Wilcoxon rank sum test with continuity correction
##
## data:  quart_1_rmae and quart_3_rmae
## W = 290569, p-value = 0.1363
## alternative hypothesis: true location shift is not equal to 0

##
##  Wilcoxon rank sum test with continuity correction
##
## data:  quart_1_rmae and quart_4_rmae
## W = 222676, p-value < 2.2e-16
## alternative hypothesis: true location shift is not equal to 0

##
##  Wilcoxon rank sum test with continuity correction
##
## data:  quart_3_rmae and quart_4_rmae
## W = 230807, p-value = 2.887e-16
## alternative hypothesis: true location shift is not equal to 0
```

Within Covid Case Quartile 1 Compare Across Race Quartiles

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_1_race_quart_1 and case_quart_1_race_quart_2
## W = 34835, p-value = 0.5787
## alternative hypothesis: true location shift is not equal to 0

##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_1_race_quart_1 and case_quart_1_race_quart_3
## W = 21029, p-value = 0.5765
## alternative hypothesis: true location shift is not equal to 0

##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_1_race_quart_1 and case_quart_1_race_quart_4
## W = 12860, p-value = 1.232e-07
## alternative hypothesis: true location shift is not equal to 0
```

Within Covid Case Quartile 2 Compare Across Race Quartiles

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_2_race_quart_1 and case_quart_2_race_quart_2
## W = 26228, p-value = 0.4504
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_2_race_quart_1 and case_quart_2_race_quart_3
## W = 16610, p-value = 0.3087
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_2_race_quart_1 and case_quart_2_race_quart_4
## W = 16328, p-value = 0.0002473
## alternative hypothesis: true location shift is not equal to 0
```

Within Covid Case Quartile 3 Compare Across Race Quartiles

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_3_race_quart_1 and case_quart_3_race_quart_2
## W = 14352, p-value = 0.6376
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_3_race_quart_1 and case_quart_3_race_quart_3
## W = 13443, p-value = 0.9551
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_3_race_quart_1 and case_quart_3_race_quart_4
## W = 8858, p-value = 0.0003257
## alternative hypothesis: true location shift is not equal to 0
```

Within Covid Case Quartile 4 Compare Across Race Quartiles

```
##
##  Wilcoxon rank sum test with continuity correction
##
```

```
## data:  case_quart_4_race_quart_1 and case_quart_4_race_quart_2
## W = 2616, p-value = 0.121
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_4_race_quart_1 and case_quart_4_race_quart_3
## W = 5553, p-value = 0.2804
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  case_quart_4_race_quart_1 and case_quart_4_race_quart_4
## W = 4364, p-value = 0.4485
## alternative hypothesis: true location shift is not equal to 0
```

Summary Statistics Case Quartile

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.271   4.763   8.144   8.474  11.987  23.814
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   53.32  104.81  159.10  289.31  298.12 6227.05
```

Summary Statistics By Race Quartile

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.271   6.373  13.941  24.617  27.390 671.542
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
##    2.068   24.559   51.458  157.423  152.212 4675.458
```

Regression Equations

```
regressionData<-data.frame(all_the_data_pull_cutoff$FIPS_CODE,
                           all_the_data_pull_cutoff$Total_Pop,
                 all_the_data_pull_cutoff$Total_Black/all_the_data_pull_cutoff$Total_Pop,
                 all_the_data_pull_cutoff$`total cases`,
                 all_the_data_pull_cutoff$Total_Households_Below_Poverty/
                   (all_the_data_pull_cutoff$Total_Households_Below_Poverty+
                      all_the_data_pull_cutoff$Total_Households_Above_Poverty),
                    (all_the_data_pull_cutoff$`total cases`/
                       all_the_data_pull_cutoff$Total_Pop)*1,
                 all_the_data_pull_cutoff$`1 week ahead MAE`,
                 all_the_data_pull_cutoff$`4 week ahead MAE`
                 ) %>%
  rename("Tot_Pop"=2) %>%
```

```r
  rename("Tot_Cases" = 4) %>%
  rename("Prop_Black" = 3) %>%
  rename("Prop_Pov" = 5) %>%
  rename("Prop_Cases" = 6) %>%
  rename("One_Week_MAE" = 7) %>%
  rename("Four_Week_MAE" = 8)




summary(lm(One_Week_MAE~Tot_Cases,data = regressionData))
```

```
##
## Call:
## lm(formula = One_Week_MAE ~ Tot_Cases, data = regressionData)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1421.30   -14.82    -8.90     1.95  1639.73
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 1.972e+01  1.163e+00   16.95   <2e-16 ***
## Tot_Cases   3.914e-03  1.799e-05  217.55   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 62.16 on 3115 degrees of freedom
## Multiple R-squared:  0.9382, Adjusted R-squared:  0.9382
## F-statistic: 4.733e+04 on 1 and 3115 DF,  p-value: < 2.2e-16
```

```r
summary(lm(One_Week_MAE~Tot_Cases+Prop_Black*Prop_Pov,
           data = regressionData))
```

```
##
## Call:
## lm(formula = One_Week_MAE ~ Tot_Cases + Prop_Black * Prop_Pov,
##     data = regressionData)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1385.83   -13.01    -8.07     2.38  1645.45
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)          1.158e+01  3.530e+00   3.279  0.00105 **
## Tot_Cases            3.895e-03  1.827e-05 213.148  < 2e-16 ***
## Prop_Black           1.422e+02  2.428e+01   5.855 5.28e-09 ***
## Prop_Pov             3.261e+01  2.271e+01   1.436  0.15107
## Prop_Black:Prop_Pov -5.279e+02  1.018e+02  -5.184 2.32e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 61.85 on 3111 degrees of freedom
##   (1 observation deleted due to missingness)
## Multiple R-squared:  0.9389, Adjusted R-squared:  0.9389
## F-statistic: 1.196e+04 on 4 and 3111 DF,  p-value: < 2.2e-16
```

Figures

Figure 1

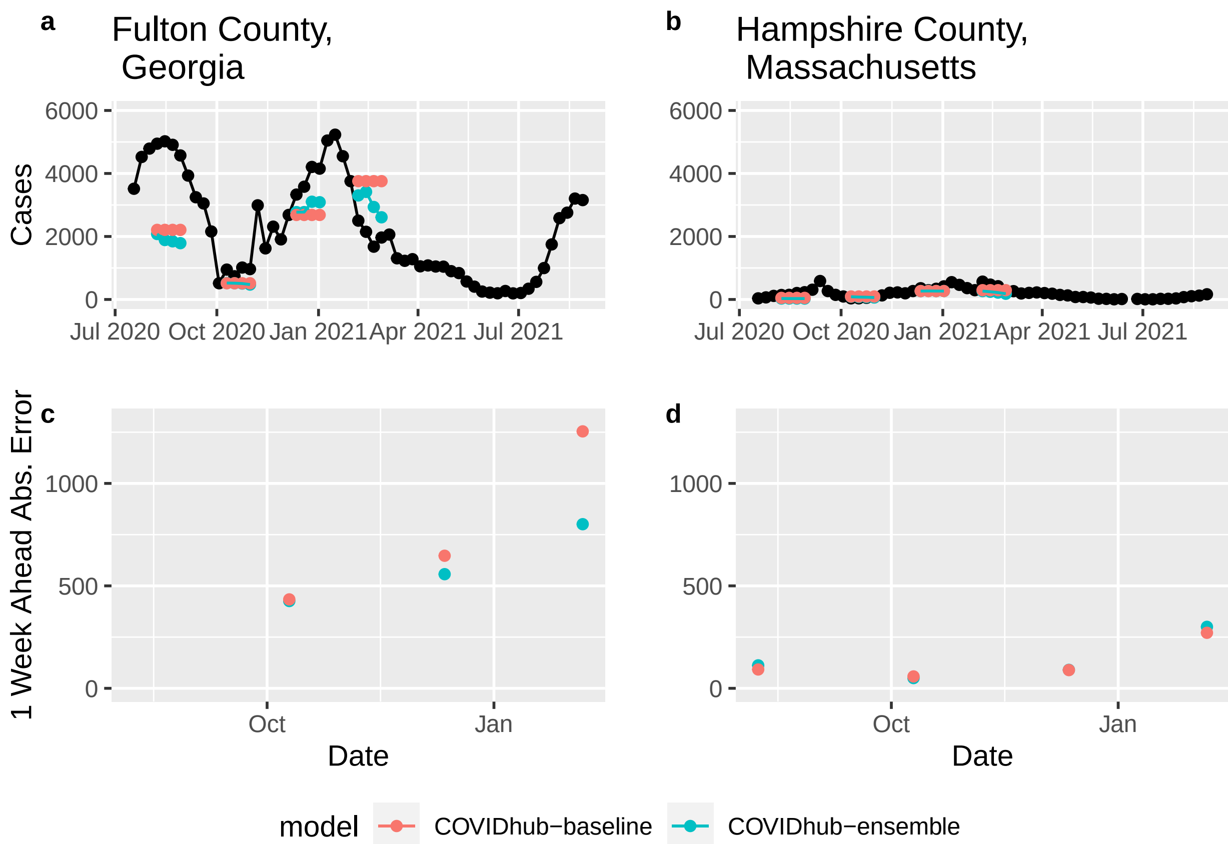


Figure 2

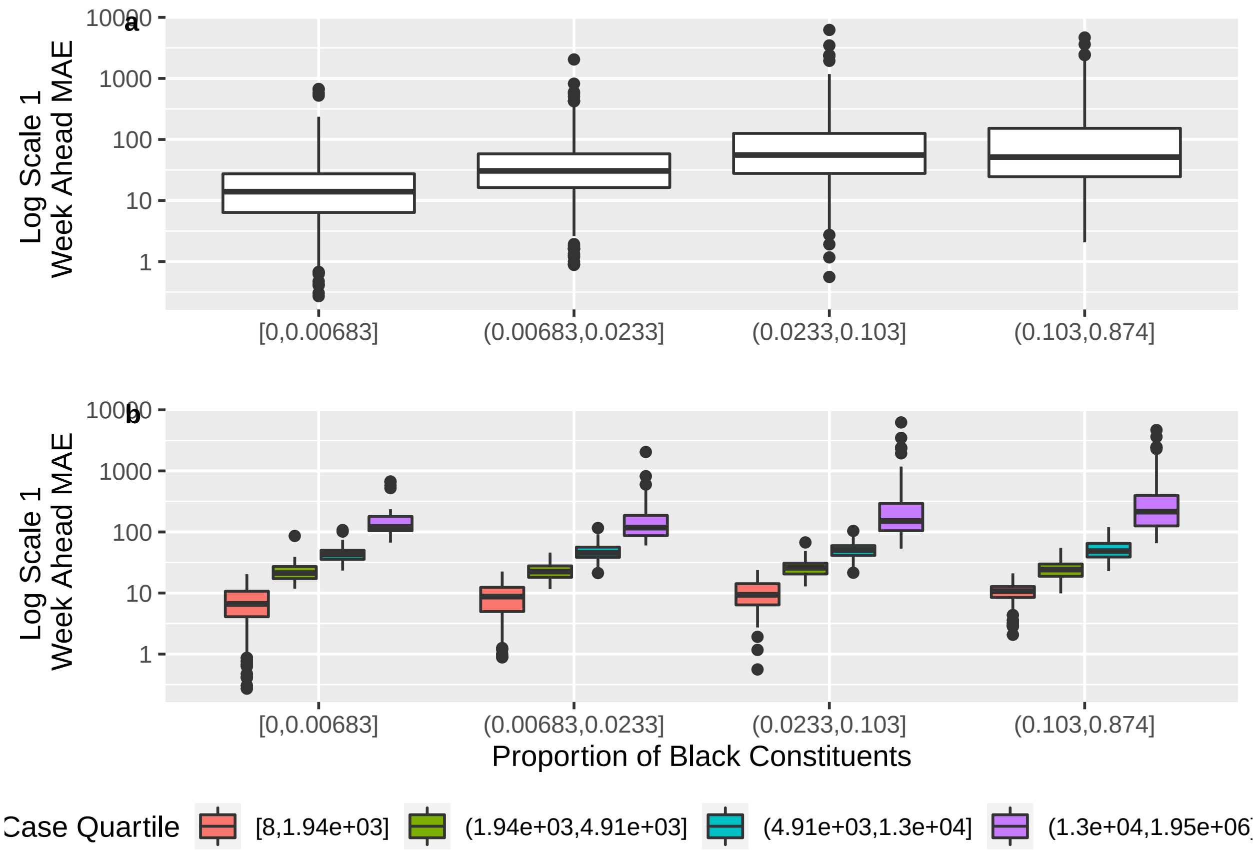

a
b
Log Scale 1
Week Ahead MAE
10000
1000
100
10
1
[0,0.00683]
(0.00683,0.0233]
(0.0233,0.103]
(0.103,0.874]
Proportion of Black Constituents
Case Quartile
[8,1.94e+03]
(1.94e+03,4.91e+03]
(4.91e+03,1.3e+04]
(1.3e+04,1.95e+06]

Figure 3: 1 and 4 week MAE and RMAE for Racial Demographics

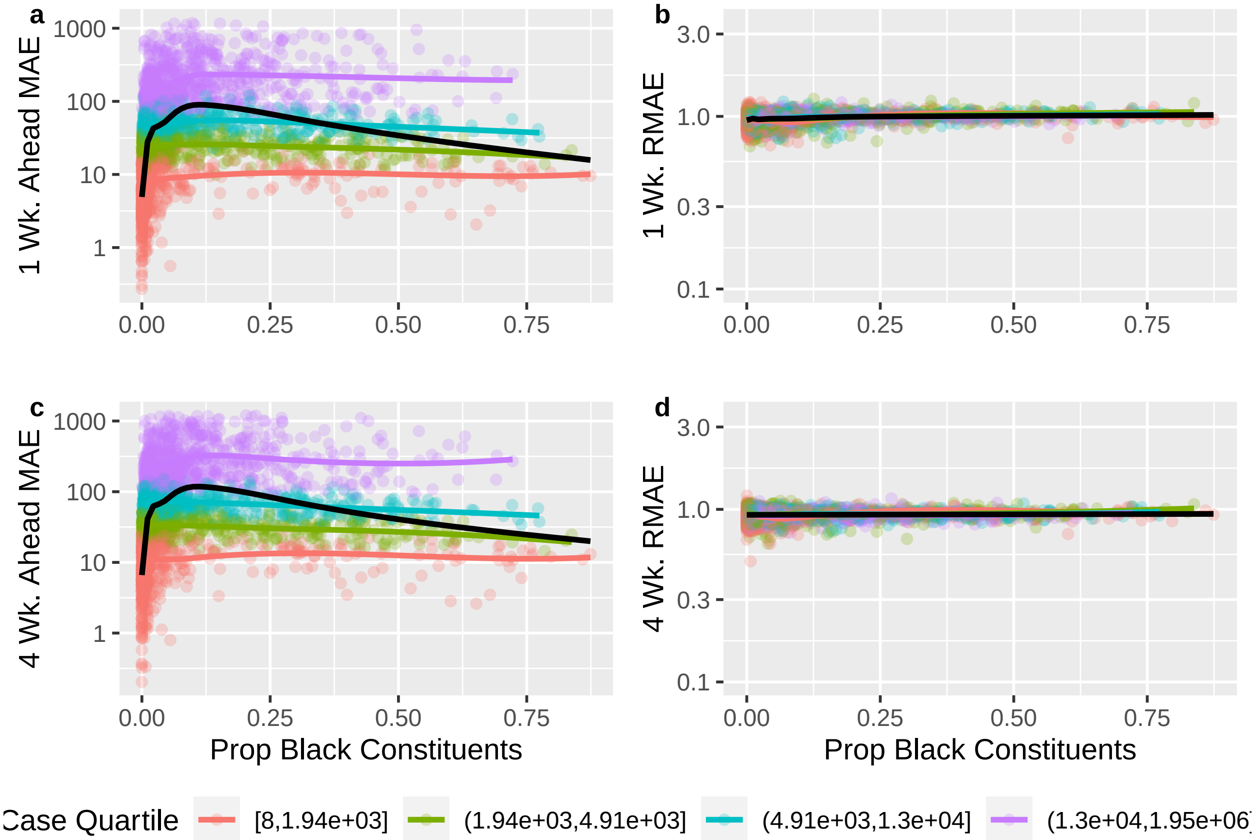
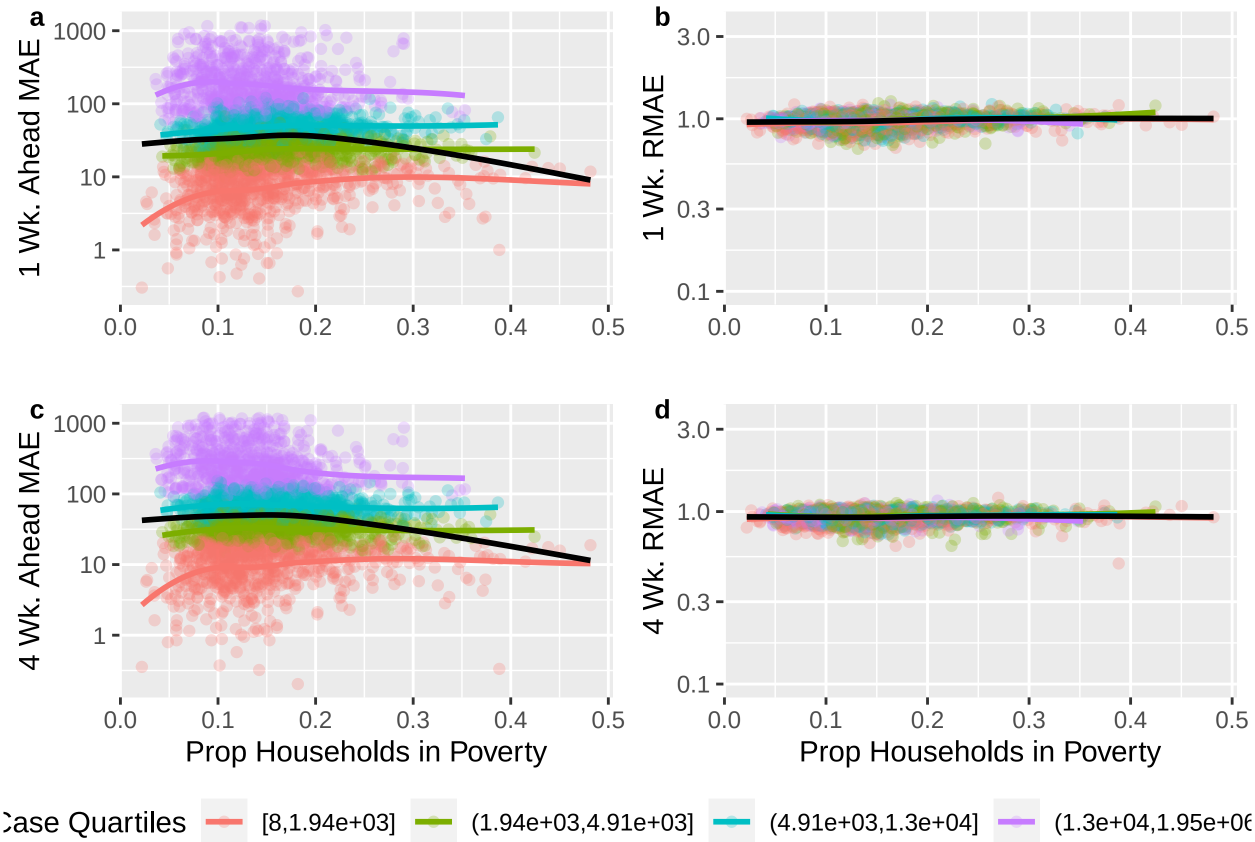


Figure 4: 1 and 4 week MAE and RMAE for Poverty



Tables

Table 1

	R Squared	Adj. R Squared
1 wk Ahead MAE as a funct. of Prop. Black and Prop. Pov	0.0472	0.0463
1 wk Ahead MAE as a funct. of Total Population	0.8711	0.8711
1 wk Ahead MAE as a funct. of Total Cases	0.9382	0.9382
1 wk Ahead MAE as a funct. of Cases and Minority Prop.	0.9389	0.9389
4 wk Ahead MAE as a funct. of Prop. Black and Prop. Pov	0.0405	0.0396
4 wk Ahead MAE as a funct. of Total Population	0.9437	0.9437
4 wk Ahead MAE as a funct. of Total Cases	0.9767	0.9767
4 wk Ahead MAE as a funct. of Cases and Minority Prop.	0.9768	0.9768

Table 2 - code

```
##              Prop. Black Quartile
## Case Quartile range                  lowest 25% Q2       Q3       highest 25%
##   lowest 25%  "[8,1.94e+03]"         "6.61"     "8.746"  "9.339"  "10.72"
##   Q2          "(1.94e+03,4.91e+03]" "21.229"   "22.424" "25.89"  "24.22"
```

```
##   Q3           "(4.91e+03,1.3e+04]"  "42.822"   "45.61"   "50.542"  "48.551"
##   highest 25% "(1.3e+04,1.95e+06]"  "120.915"  "117.847" "151.203" "215.237"
##   Overall      ""                    "13.941"   "30.542"  "55.695"  "51.458"
##               Prop. Black Quartile
## Case Quartile Overall
##   lowest 25%  "8.144"
##   Q2          "22.966"
##   Q3          "47.373"
##   highest 25% "159.102"
##   Overall     "32.746"
```

Table 2 - LaTex

		Prop. Black Quartile				
Case Quartile	Range	lowest 25%	Q2	Q3	highest 25%	Overall
lowest 25%	[2, 1.09e3]	6.059	6.559	7.794	7.632	6.647
Q2	(1.09e3, 2.64e3]	14.103	14.882	17.706	15.147	14.912
Q3	(2.64e3, 6.82e3]	25.853	29.088	29.603	28.912	28.515
highest 25%	(6.82e3, 1.25e6]	79.059	73.368	91.324	111.779	93.353
Overall		10.279	19.588	35.618	29.5	20.735

Table 2: Pink for statistically significant at $\alpha = 0.05$ and red for statistically significant at $\alpha = 0.00333$ (from the Bonferroni Correction over 15 tests) when comparing to Quartile 1 of Prop. Black. across the case quartiles and overall

Table 3 - code

```
##               Prop. Black Quartile
## Case Quartile range                 lowest 25% Q2      Q3      highest 25%
##   lowest 25%  "[8,1.94e+03]"        "0.956"    "0.96"  "0.941" "0.994"
##   Q2          "(1.94e+03,4.91e+03]" "0.992"    "0.987" "0.986" "1.009"
##   Q3          "(4.91e+03,1.3e+04]"  "0.986"    "0.982" "0.984" "1.003"
##   highest 25% "(1.3e+04,1.95e+06]"  "0.987"    "0.972" "0.971" "0.99"
##   Overall     ""                    "0.974"    "0.979" "0.977" "0.997"
##               Prop. Black Quartile
## Case Quartile Overall
##   lowest 25%  "0.961"
##   Q2          "0.992"
##   Q3          "0.99"
##   highest 25% "0.979"
##   Overall     "32.746"
```

Table 3 - LaTex

Potential Supplementary Materials

Counts by Quartile Quartile Breakdown

```
##               Prop. Black Quartile
## Case Quartile lowest 25%  Q2  Q3 highest 25% Overall
```

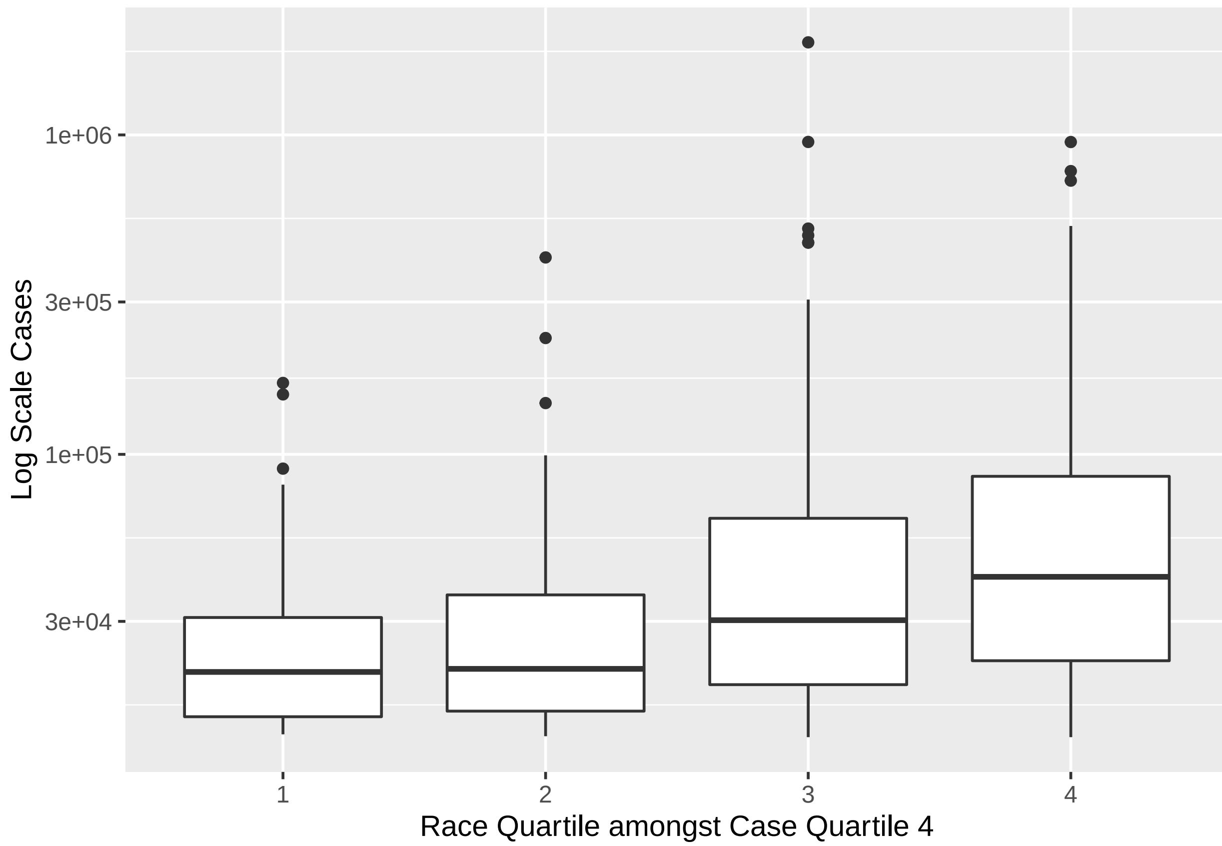
		Prop. Black Quartile				
Case Quartile	Range	lowest 25%	Q2	Q3	highest 25%	Overall
lowest 25%	[2, 1.09e3]	0.898	0.901	0.910	0.885	0.898
Q2	(1.09e3, 2.64e3]	0.906	0.887	0.902	0.887	0.897
Q3	(2.64e3, 6.82e3]	0.911	0.899	0.905	0.879	0.898
highest 25%	(6.82e3, 1.25e6]	0.923	0.890	0.889	0.894	0.891
Overall		0.903	0.896	0.897	0.887	0.896

Table 3: Pink for statistically significant at $\alpha = 0.05$ and red for statistically significant at $\alpha = 0.00333$ (from the Bonferroni Correction over 15 tests) when comparing to Quartile 1 of Prop. Black. across the case quartiles and overall

```
##   lowest 25%          410 175  99          96      780
##   Q2                  220 229 142         188      779
##   Q3                  118 236 227         198      779
##   highest 25%          32 139 311         297      779
##   Overall             780 779 779         779     3117
```

Figure 2 just 4th case quartile

```
all_the_data_pull_cutoff %>%
  filter(`Case Quartile`==4) %>%
  ggplot()+
  geom_boxplot(aes(x=as.factor(`black_prop_quart`),
      y=`total cases`)) +
  xlab("Race Quartile amongst Case Quartile 4") +
  ylab("Log Scale Cases") +
  scale_y_log10()
```


Log Scale Cases
1e+06
3e+05
1e+05
3e+04
1
2
3
4
Race Quartile amongst Case Quartile 4