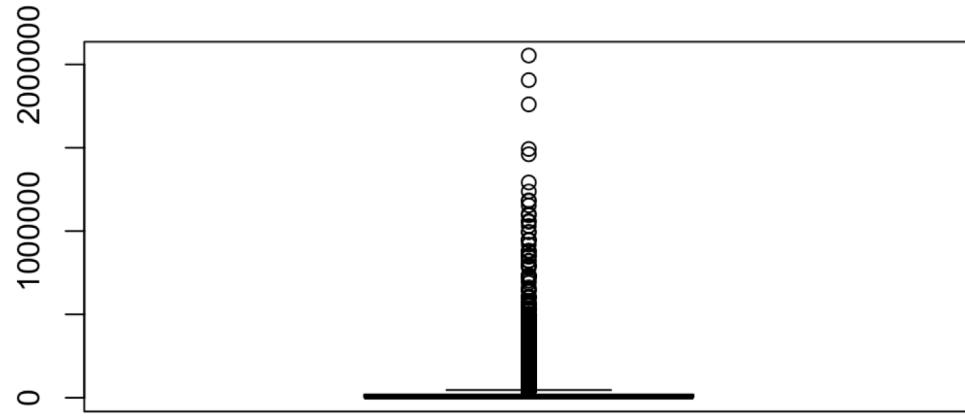
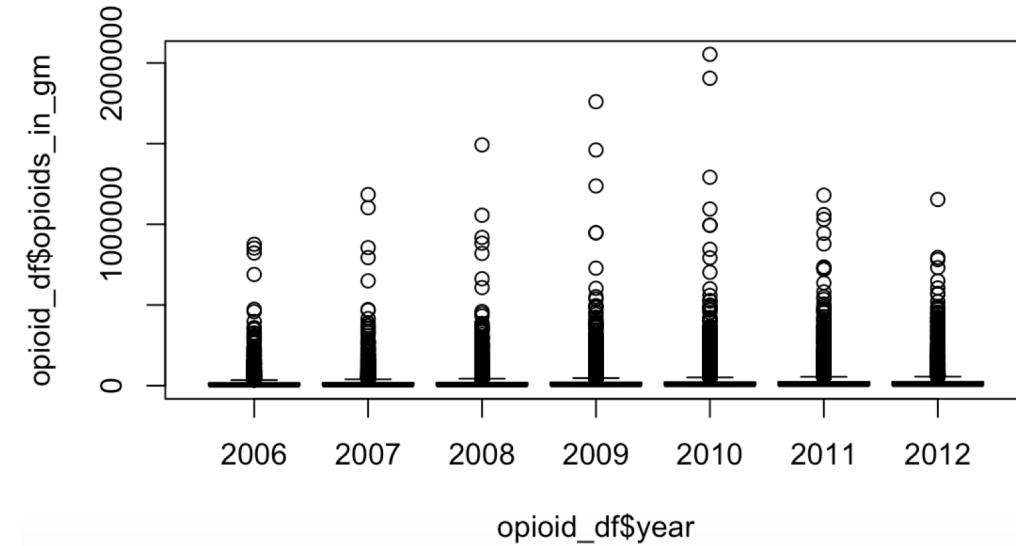


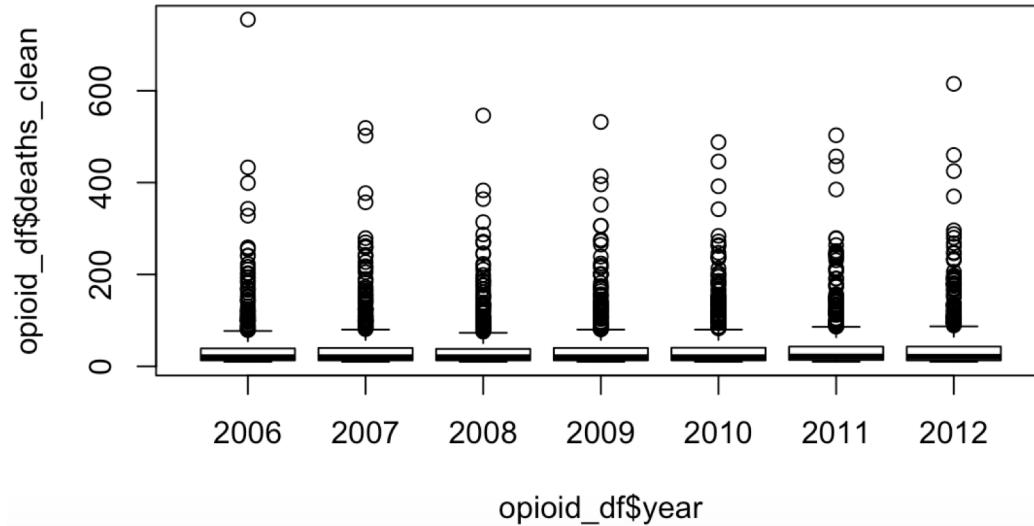
opioids_in_gm



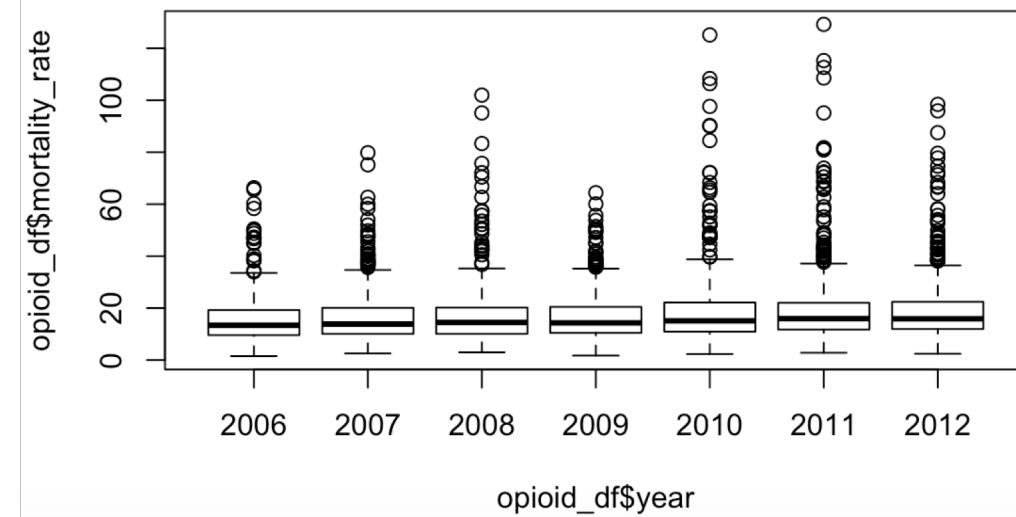
opioids_in_gm~opioid_df\$year



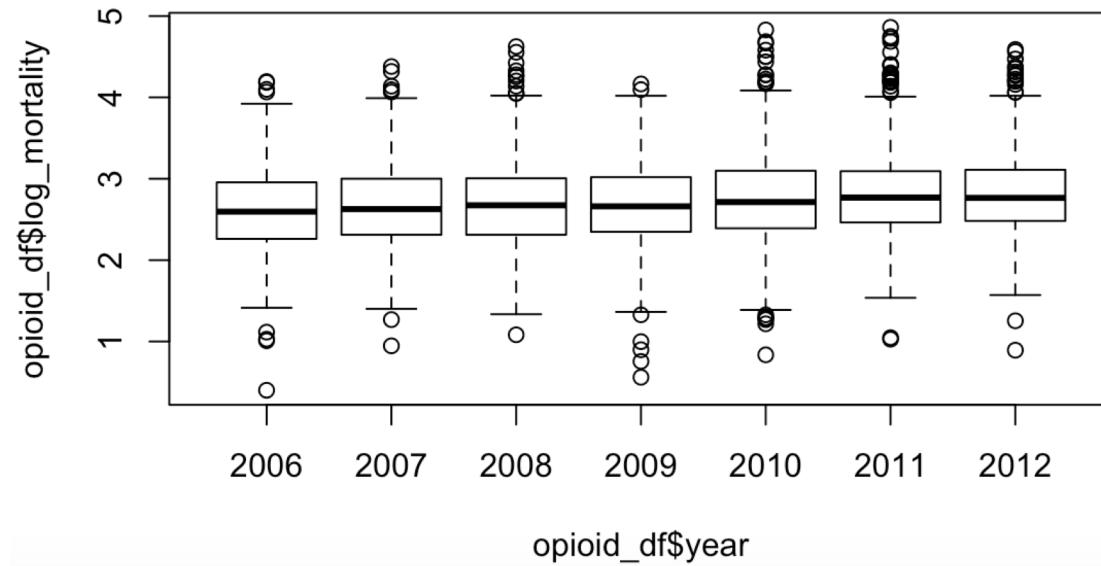
deaths_clean~opioid_df\$year



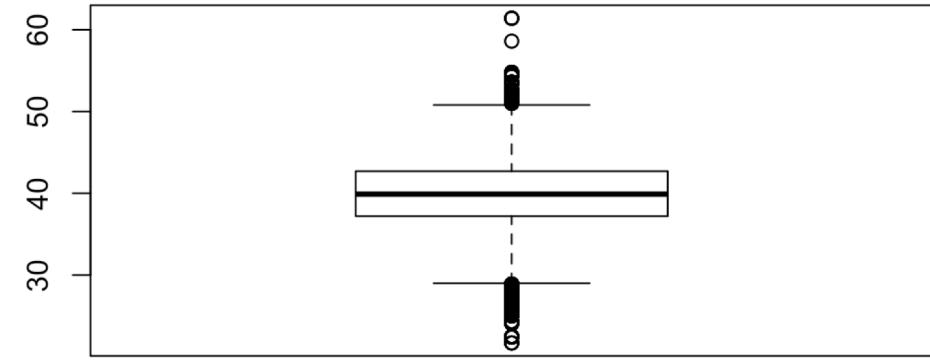
mortality_rate~opioid_df\$year



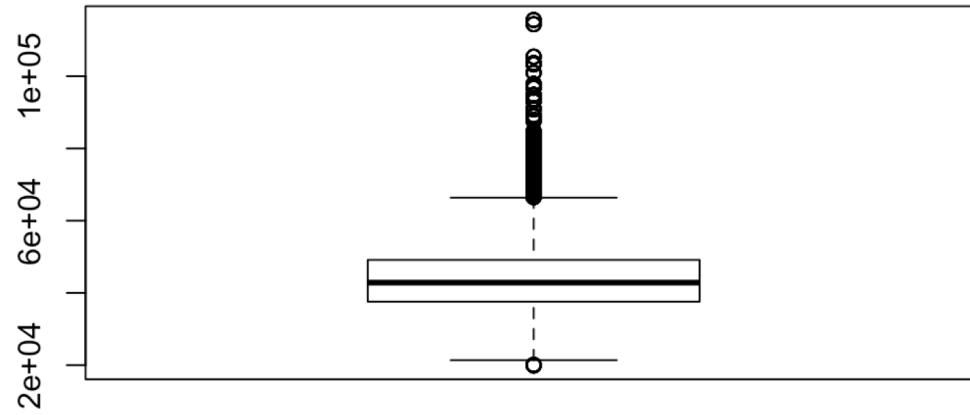
log_mortality~opiod_df\$year



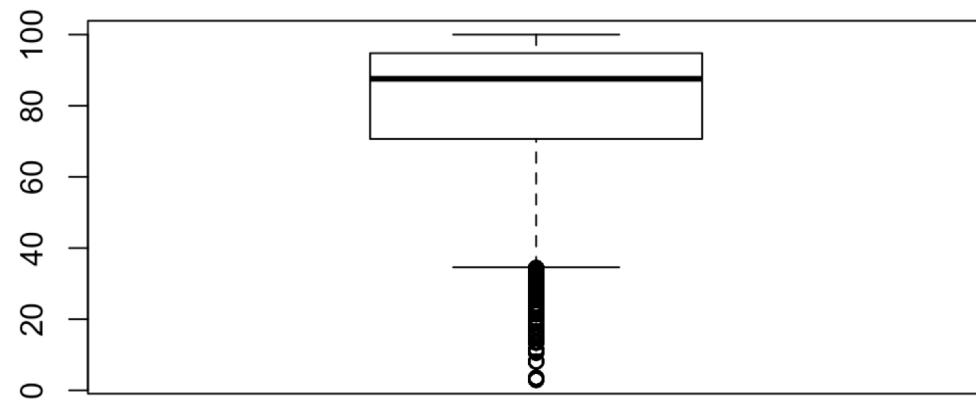
age_clean



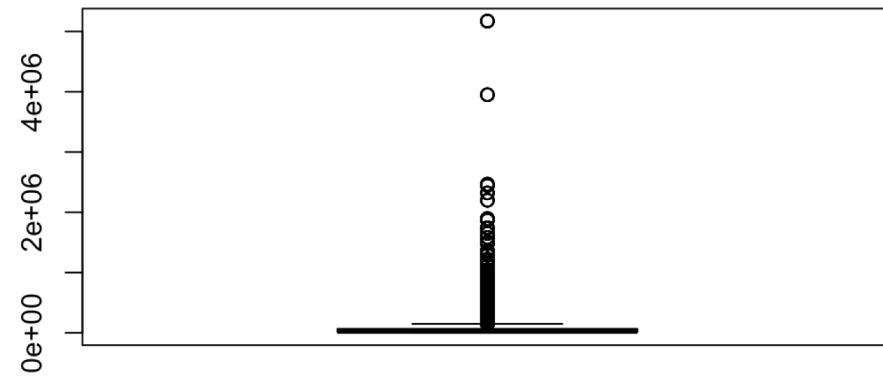
hhincome_clean



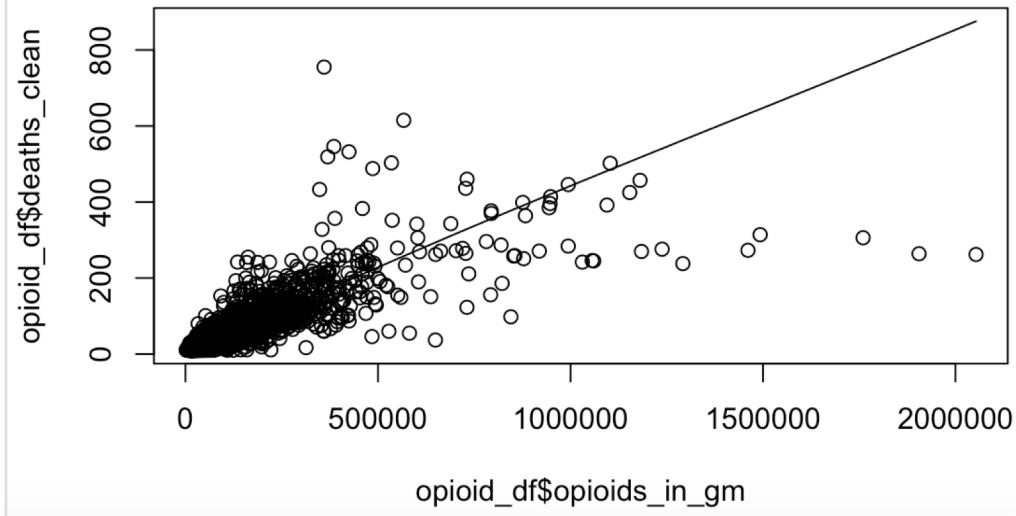
percent_white



pop_clean



opioid_df\$opioids_in_gm, opioid_df\$deaths_clean



```

Call:
lm(formula = log_mortality ~ opioids_in_gm + hhincome_clean +
    age_clean + pop_clean + percent_white, data = opioid_df)

Residuals:
    Min      1Q  Median      3Q     Max 
-1.8244 -0.2693 -0.0105  0.2616  1.8737 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept) 2.265e+00  6.596e-02   34.34 <2e-16 ***
opioids_in_gm 8.868e-07  6.999e-08   12.67 <2e-16 ***
hhincome_clean -1.778e-05 4.892e-07  -36.35 <2e-16 ***
age_clean      2.294e-02  1.743e-03   13.16 <2e-16 ***
pop_clean      -2.536e-07 2.314e-08  -10.96 <2e-16 ***
percent_white  6.367e-03  4.213e-04   15.11 <2e-16 ***

---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.4154 on 4500 degrees of freedom
(14409 observations deleted due to missingness)
Multiple R-squared:  0.3885,    Adjusted R-squared:  0.3878 
F-statistic: 571.7 on 5 and 4500 DF,  p-value: < 2.2e-16

> summary(opioid_df$deaths_clean)
    Min. 1st Qu. Median Mean 3rd Qu. Max. NA's
    10.00 13.00 20.00 39.64 40.00 755.00 14401
> summary(opioid_df$deaths)
    Min. 1st Qu. Median Mean 3rd Qu. Max.
    -1.000 -1.000 -1.000 8.699 -1.000 755.000
> summary(opioid_df$opioids_in_gm)
    Min. 1st Qu. Median Mean 3rd Qu. Max.
    0.1 2042.1 6658.2 24906.1 19668.2 2053409.0

```

```
*****
*          Package    GWmodel           *
*****
```

Program starts at: 2019-11-18 21:21:52

Call:

```
gtwr(formula = log_mortality ~ opioids_in_gm + hhincome_clean +
  age_clean + pop_clean + percent_white, data = analysis_data,
  obs.tv = analysis_data$year, st.bw = fixedgaussian_bw, kernel = "gaussian",
  adaptive = FALSE, p = 2, theta = 0, longlat = F, lamda = 0.05,
  t.units = "year", ksi = 0)
```

Dependent (y) variable: log_mortality

Independent variables: opioids_in_gm hhincome_clean age_clean pop_clean per

Number of data points: 4487

```
*****
*          Results of Global Regression           *
*****
```

Significance stars

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

Residual standard error: 0.4152 on 4481 degrees of freedom

Multiple R-squared: 0.3899

Adjusted R-squared: 0.3893

F-statistic: 572.9 on 5 and 4481 DF, p-value: < 2.2e-16

***Extra Diagnostic information

Residual sum of squares: 772.4968

Sigma(hat): 0.4150182

AIC: 4853.522

AICc: 4853.547

```
*****
*          Results of Geographically and Temporally Weighted Regression   *
*****
```

*****Model calibration information*****

Kernel function for geographically and temporally weighting: gaussian

Fixed bandwidth for geographically and temporally weighting: 3690.834

Regression points: the same locations as observations are used.

Distance metric for geographically and temporally weighting: A distance model calibration.

Call:

```
lm(formula = formula, data = data)
```

Residuals:

Min	1Q	Median	3Q	Max
.81269	-0.26844	-0.00965	0.26255	1.89279

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	2.271e+00	6.597e-02	34.43	<2e-16 ***
opioids_in_gm	8.949e-07	7.006e-08	12.77	<2e-16 ***
hhincome_clean	-1.792e-05	4.906e-07	-36.53	<2e-16 ***
age_clean	2.232e-02	1.756e-03	12.71	<2e-16 ***
pop_clean	-2.521e-07	2.319e-08	-10.87	<2e-16 ***
percent_white	6.653e-03	4.317e-04	15.41	<2e-16 ***

*****Summary of GTWR coefficient estimates:*****

	Min.	1st Qu.	Median	3rd Qu.	Max.
Intercept	-6.7912e+01	1.0570e+00	2.1025e+00	3.2023e+00	190.8024
opioids_in_gm	-2.5100e-04	9.2997e-07	2.2201e-06	4.0134e-06	0.0003
hhincome_clean	-3.8667e-04	-2.5021e-05	-1.7247e-05	-1.1363e-05	0.0005
age_clean	-1.0294e+00	-3.9957e-03	1.9942e-02	4.3622e-02	1.2690
pop_clean	-1.5734e-04	-1.2648e-06	-5.2029e-07	-1.2202e-07	0.0001
percent_white	-2.4397e+00	8.3185e-04	9.8049e-03	1.8865e-02	0.3927

*****Diagnostic information*****

Number of data points: 4487

Effective number of parameters (2trace(S) - trace(S'S)): 1037.746

Effective degrees of freedom (n-2trace(S) + trace(S'S)): 3449.254

AICc (GWR book, Fotheringham, et al. 2002, p. 61, eq 2.33): 2283.722

AIC (GWR book, Fotheringham, et al. 2002, GWR p. 96, eq. 4.22): 1019.532

Residual sum of squares: 272.4364

R-square value: 0.7848529

Adjusted R-square value: 0.7201047