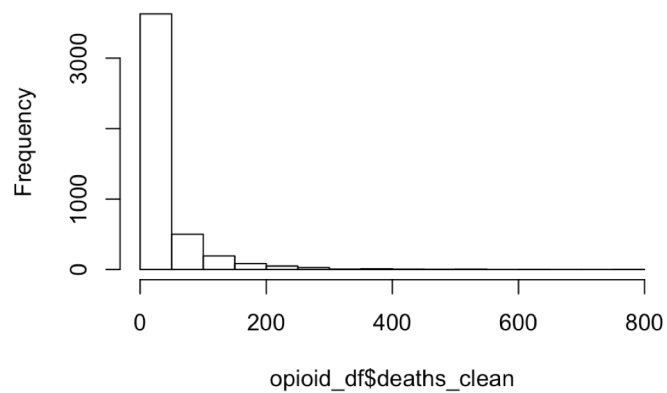
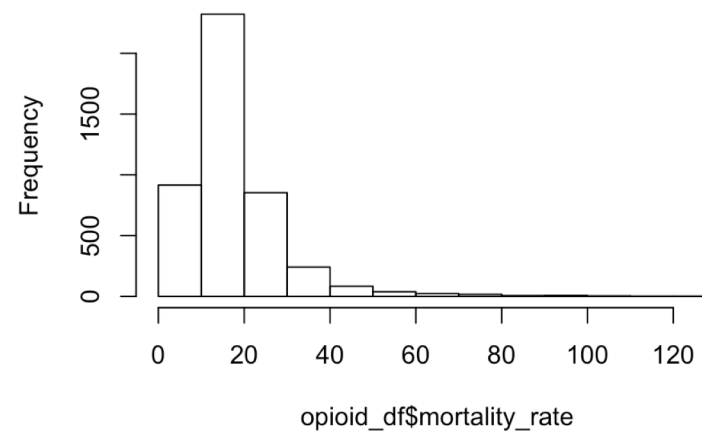


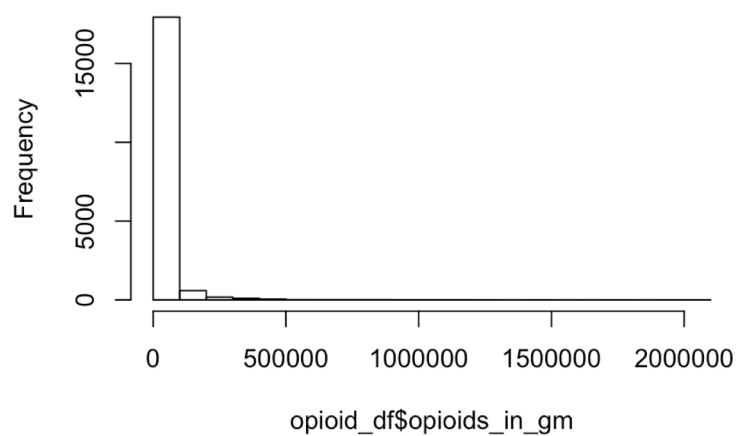
Histogram of opioid_df\$deaths_clean



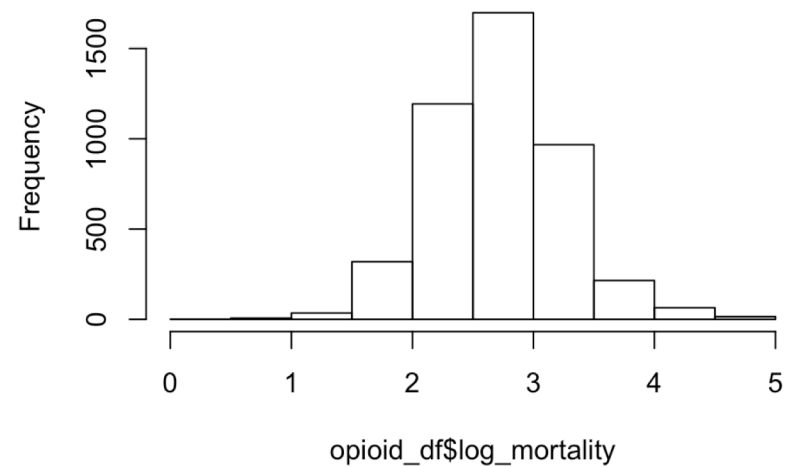
Histogram of opioid_df\$mortality_rate



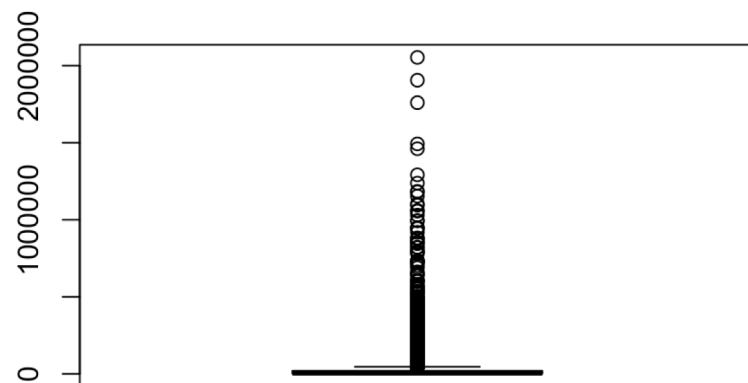
Histogram of opioid_df\$opioids_in_gm



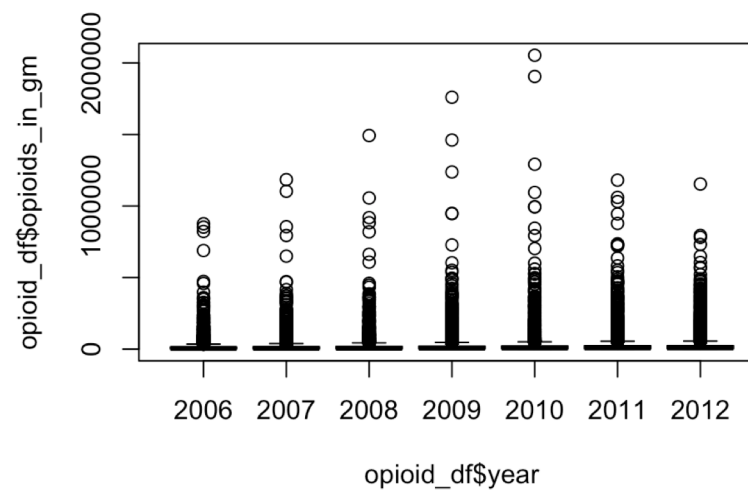
Histogram of opioid_df\$log_mortality



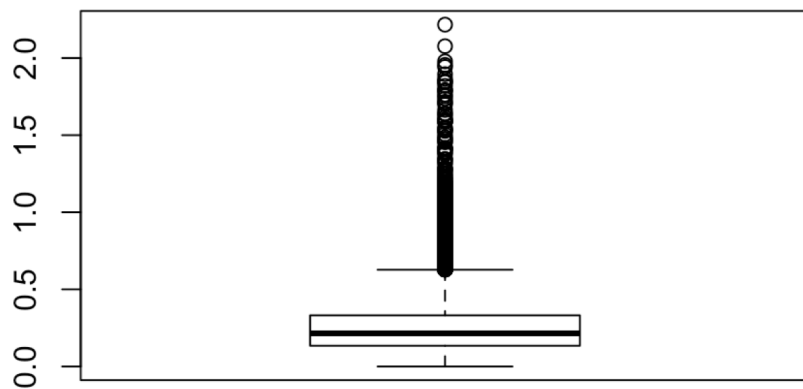
(opioid_df\$opioids_in_gm



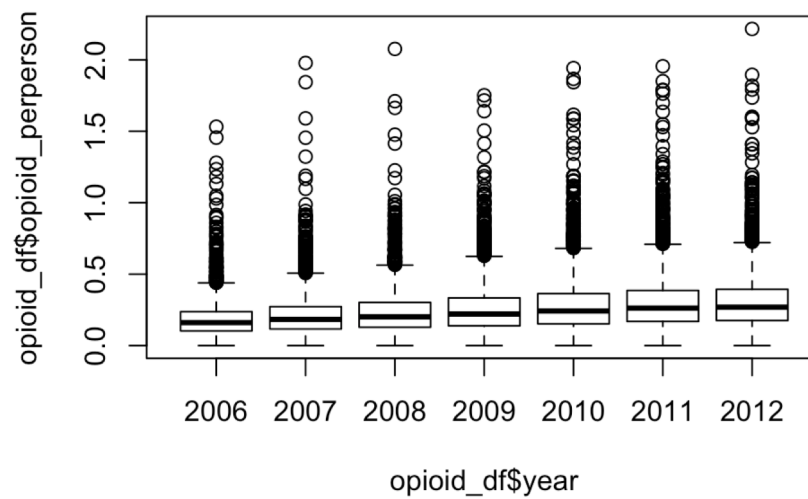
opioids_in_gm~opioid_df\$year



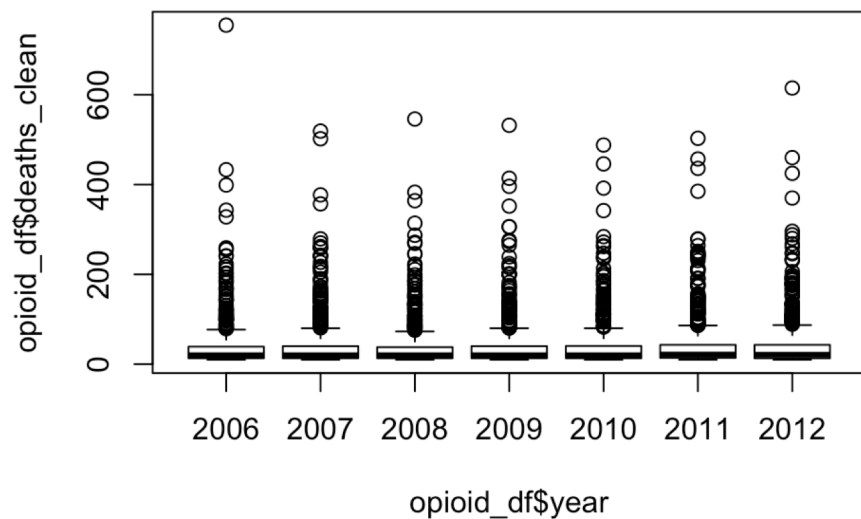
opioid_perperson



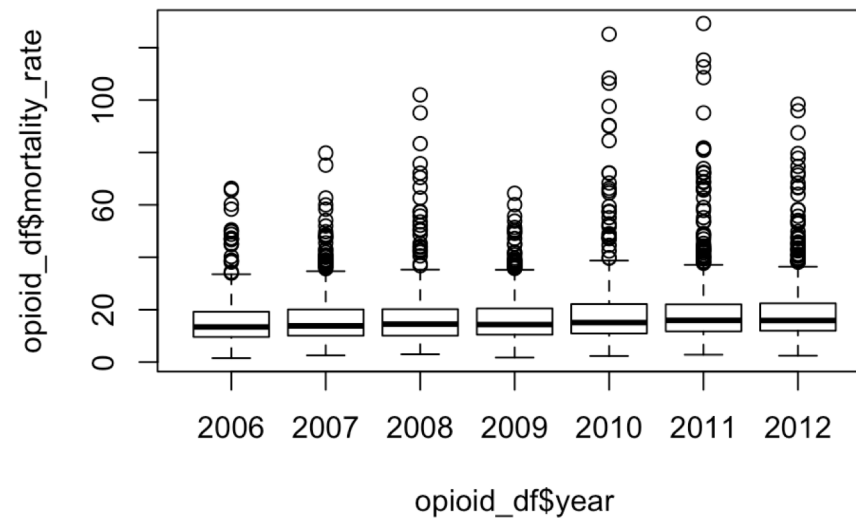
opioid_perperson~opioid_df\$year



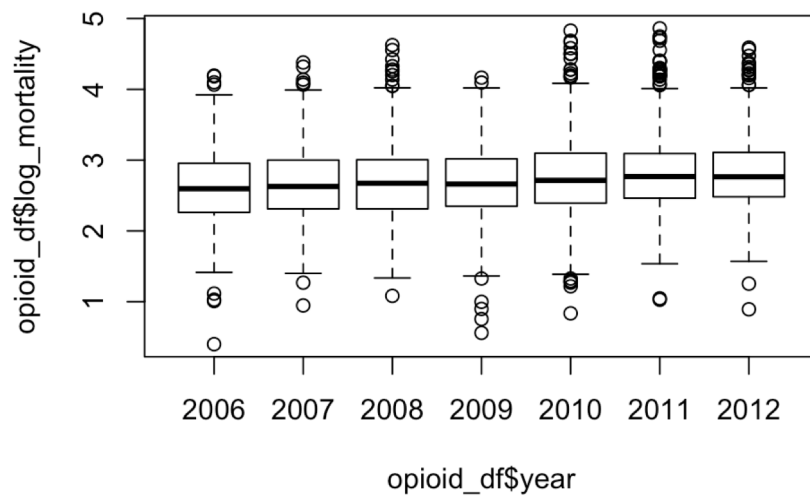
deaths_clean~opioid_df\$year



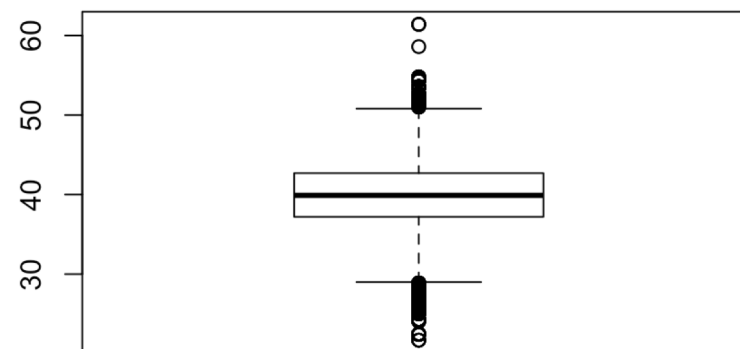
mortality_rate~opioid_df\$year



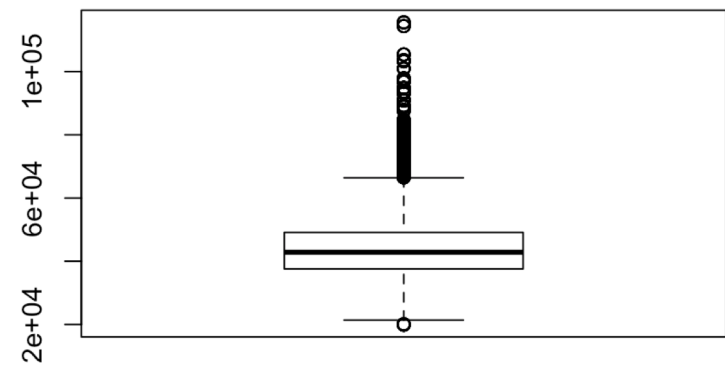
log_mortality~opioid_df\$year



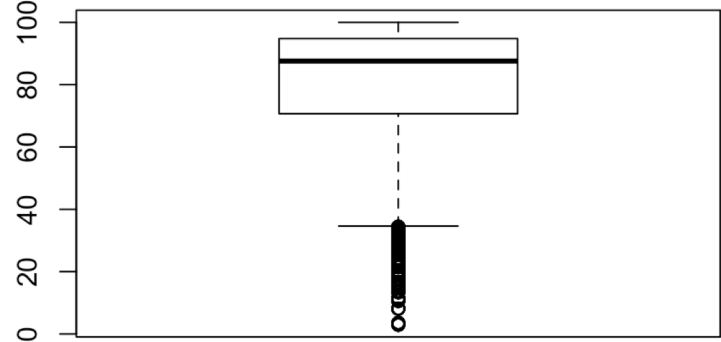
age_clean



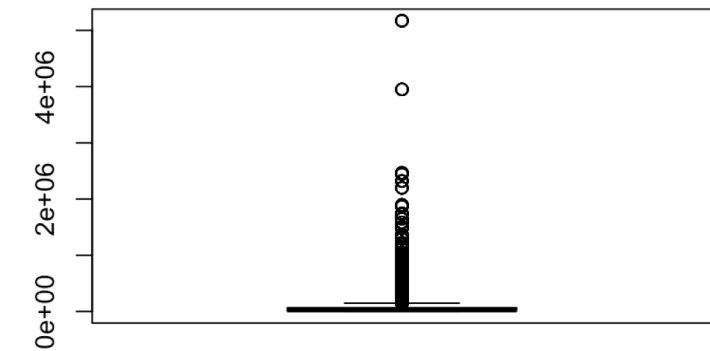
hhincome_clean



percent white



pop clean



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 ***

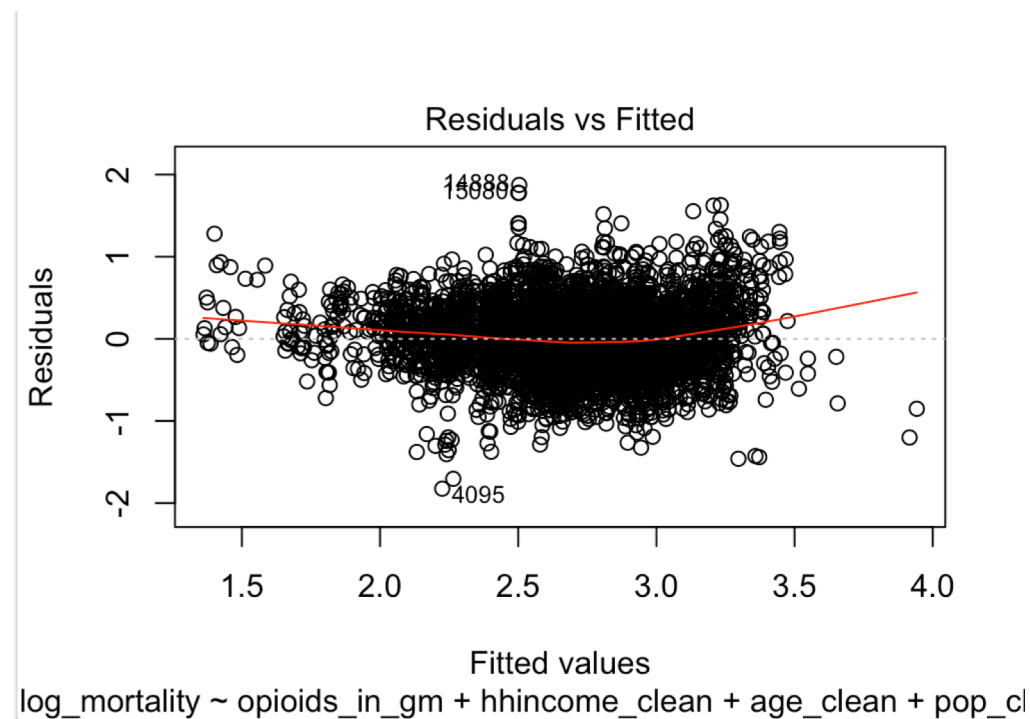
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

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



Residuals:

Min	1Q	Median	3Q	Max
-1.80469	-0.24397	-0.00881	0.24740	1.82780

Coefficients:

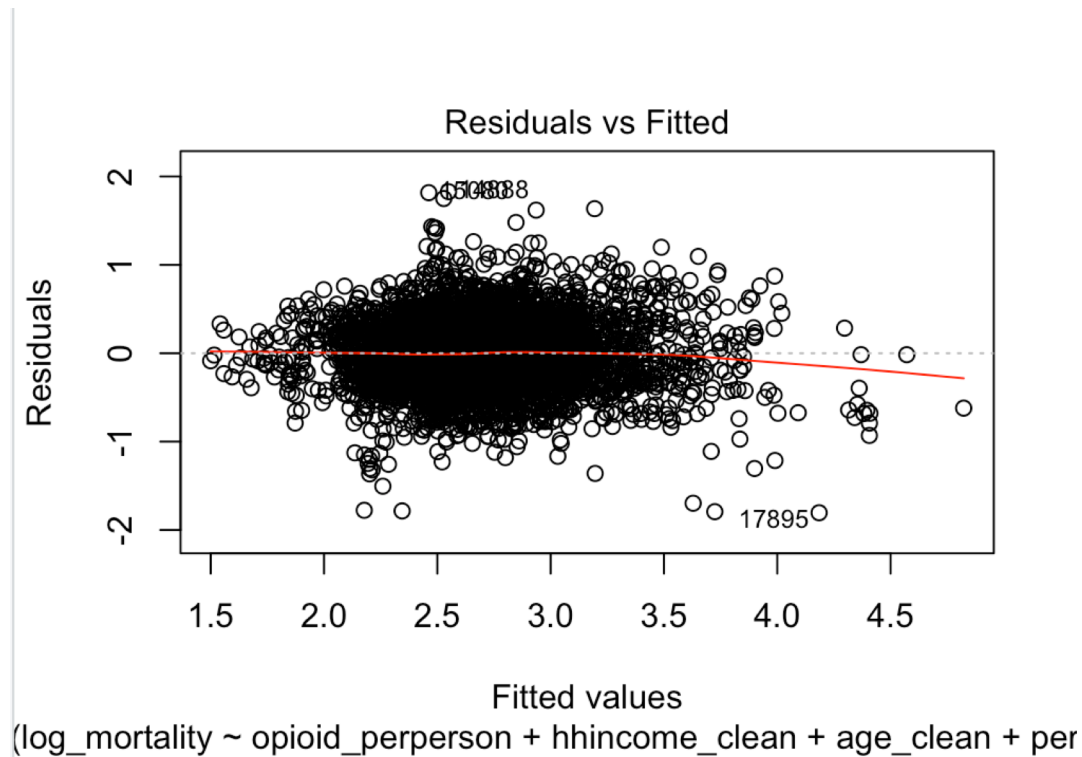
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	2.169e+00	6.014e-02	36.072	< 2e-16 ***
opioid_perperson	9.902e-01	3.176e-02	31.180	< 2e-16 ***
hhincome_clean	-1.361e-05	4.654e-07	-29.238	< 2e-16 ***
age_clean	1.327e-02	1.644e-03	8.072	8.79e-16 ***
percent_white	5.237e-03	3.584e-04	14.614	< 2e-16 ***

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

Residual standard error: 0.3837 on 4501 degrees of freedom
(14409 observations deleted due to missingness)

Multiple R-squared: 0.478, Adjusted R-squared: 0.4776

F-statistic: 1031 on 4 and 4501 DF, p-value: < 2.2e-16



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

Program starts at: 2019-11-25 21:47:13

Call:

```
gtwr(formula = log_mortality ~ opioid_perperson + hhincome_clean +
  age_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: opioid_perperson hhincome_clean age_clean percent_white

Number of data points: 4487

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

Residuals:

Min	1Q	Median	3Q	Max
-1.79792	-0.24424	-0.00863	0.24754	1.84016

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	2.175e+00	6.021e-02	36.126	< 2e-16 ***
opioid_perperson	9.875e-01	3.180e-02	31.049	< 2e-16 ***
hhincome_clean	-1.371e-05	4.668e-07	-29.378	< 2e-16 ***
age_clean	1.287e-02	1.655e-03	7.777	9.12e-15 ***
percent_white	5.431e-03	3.664e-04	14.825	< 2e-16 ***

---Significance stars

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

Residual standard error: 0.3838 on 4482 degrees of freedom

Multiple R-squared: 0.4787

Adjusted R-squared: 0.4782

F-statistic: 1029 on 4 and 4482 DF, p-value: < 2.2e-16

***Extra Diagnostic information

Residual sum of squares: 660.1344

Sigma(hat): 0.3836498

AIC: 4146.236

AICc: 4146.255

* 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: 3734.072

Regression points: the same locations as observations are used.

Distance metric for geographically and temporally weighting: A distance matrix is specified for this model calibration.

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

	Min.	1st Qu.	Median	3rd Qu.	Max.
Intercept	-6.0356e+01	1.2034e+00	2.0903e+00	3.0433e+00	112.2937
opioid_perperson	-2.4559e+01	4.3107e-01	9.5157e-01	1.6023e+00	24.1497
hhincome_clean	-3.3024e-04	-2.1859e-05	-1.4622e-05	-9.0784e-06	0.0003
age_clean	-5.8991e-01	-1.1242e-02	1.3359e-02	3.5819e-02	1.0401
percent_white	-1.3711e+00	1.1061e-03	7.9403e-03	1.3688e-02	0.3506

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

Number of data points: 4487

Effective number of parameters ($2\text{trace}(\mathbf{S}) - \text{trace}(\mathbf{S}'\mathbf{S})$): 973.4239

Effective degrees of freedom ($n - 2\text{trace}(\mathbf{S}) + \text{trace}(\mathbf{S}'\mathbf{S})$): 3513.576

AICc (GWR book, Fotheringham, et al. 2002, p. 61, eq 2.33): 1993.705

AIC (GWR book, Fotheringham, et al. 2002, GWR p. 96, eq. 4.22): 866.5168

Residual sum of squares: 267.351

R-square value: 0.7888689

Adjusted R-square value: 0.7303591

Program stops at: 2019-11-25 21:49:11