**Summary**

**Analysis: Linear regression**

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| --- | --- | --- | --- |
| Description | **Variable Name** |  |  |
| **All Firearm Mortality - Age Adjusted Rate (per 100,000)** | **AllMortAdj** | **Outcome** | **Y** |
| ATF Registered Weapons | **ATFRegWeapon** | Exposure 1 | X |
| % Poverty | **Poverty** | **Covariates** |  |
| % Unemployment | **Unemploy** |  |
| % Poor mental health (0 days) | **PoorMH0** |  |
| % Poor mental health (1-14 days) | **PoorMH14ls** |  |
| % Poor mental health (> 14 days) | **PoorMH14gt** |  |
| Statewide population | **StPoP** |  |

1. **Crude model: Mort=f(ATFRegWeapon)**

**Graph**

1. **Adjusted model: Mort=f (ATFRegWeapon, Poverty, Unemploy, PoorMH0, PoorMH14ls, PoorMH14gt, StPoP)**

|  |
| --- |
|  |
| Residuals: |
|  | Min 1Q Median 3Q Max |
|  | -7.1602 -1.4565 -0.0834 0.9936 10.1491 |
|  |  |
|  | Coefficients: |
|  | Estimate Std. Error t value Pr(>|t|) |
|  | (Intercept) -7.498e+03 8.313e+03 -0.902 0.372207 |
|  | ATFRegWeapon 3.471e-05 1.047e-05 3.315 0.001894 \*\* |
|  | Poverty 8.438e-01 2.000e-01 4.220 0.000128 \*\*\* |
|  | Unemploy 7.654e-02 4.168e-01 0.184 0.855184 |
|  | PoorMH0 7.493e+01 8.312e+01 0.901 0.372465 |
|  | PoorMH14ls 7.513e+01 8.317e+01 0.903 0.371533 |
|  | PoorMH14gt 7.500e+01 8.312e+01 0.902 0.372058 |
|  | StPoP -4.724e-07 1.115e-07 -4.236 0.000121 \*\*\* |
|  | --- |
|  | Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1 |
|  |  |
|  | Residual standard error: 2.805 on 42 degrees of freedom |
|  | Multiple R-squared: 0.5815, Adjusted R-squared: 0.5118 |
|  | F-statistic: 8.339 on 7 and 42 DF, p-value: 2.356e-06 |
|  |  |

**Global Null Hypothesis**

**When testing the null hypothesis that there is linear association between All Firearm Mortality, ATF Registered Weapons, poverty, unemployment, Poor Mental Health 0 days, poor mental health 1-14 days, poor mental health >14 days, statewide population.**

**Explained 58.15% of the variability in All Firearm Mortality.**

**Significant p-value: ATFRegWeapon (p-value = 0.189), Poverty (p-value = 0.013), StPop (p-value = 0.012)**

1. **Reduced model:**

|  |
| --- |
| Residuals: |
|  | Min 1Q Median 3Q Max |
|  | -6.7416 -1.4802 -0.2369 1.1582 10.4254 |
|  |  |
|  | Coefficients: |
|  | Estimate Std. Error t value Pr(>|t|) |
|  | (Intercept) -7.856e-02 1.867e+00 -0.042 0.96662 |
|  | ATFRegWeapon 3.324e-05 9.762e-06 3.405 0.00138 \*\* |
|  | Poverty 8.287e-01 1.304e-01 6.357 8.44e-08 \*\*\* |
|  | StPoP -4.457e-07 9.709e-08 -4.590 3.42e-05 \*\*\* |
|  | --- |
|  | Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1 |
|  |  |
|  | Residual standard error: 2.723 on 46 degrees of freedom |
|  | Multiple R-squared: 0.568, Adjusted R-squared: 0.5398 |
|  | F-statistic: 20.16 on 3 and 46 DF, p-value: 1.74e-08 |
|  |  |

**Global Null Hypothesis**

**When testing the null hypothesis that there is linear association between All Firearm Mortality, ATF Registered Weapons, Poverty, and statewide population. ATF Registered weapons, poverty, and statewide polulation explain 56.8% of the variability in All Firearm Mortality.**

**Main Effects Hypothesis**

**When testing the null hypothesis that there is linear association between All Firearm Morality and ATF Registered Weapons after adjusting for poverty and statewide population, we reject the null hypothesis (t = 3.405, df = 46, p-value = 0.00138).**

**For a one unit change in ATF Registered Weapons, on average, the All Firearm Mortality increases by 3.3e-05, after adjusting for poverty and statewide population.**

**……**

|  |  |  |  |
| --- | --- | --- | --- |
| Description | **Variable Name** |  |  |
| **All Firearm Mortality - Age Adjusted Rate (per 100,000)** | **AllMortAdj** | **Outcome** | **Y** |
| ATF Federal Firearm Licensees | **ATFFirearmLicense** | Exposure 2 | X |
| % Poverty | **Poverty** | **Covariates** |  |
| % Unemployment | **Unemploy** |  |
| % Poor mental health (0 days) | **PoorMH0** |  |
| % Poor mental health (1-14 days) | **PoorMH14ls** |  |
| % Poor mental health (> 14 days) | **PoorMH14gt** |  |
| Statewide population | **StPoP** |  |

1. **Crude model: Mort=f(ATFFirearmLicense)**

**Graph**

1. **Adjusted model: Mort=f (ATFFirearmLicense, Poverty, Unemploy, PoorMH0, PoorMH14ls, PoorMH14gt, StPoP)**

|  |
| --- |
|  |

1. **Reduced model:**

|  |  |  |  |
| --- | --- | --- | --- |
| Description | **Variable Name** |  |  |
| **All Firearm Mortality - Age Adjusted Rate (per 100,000)** | **AllMortAdj** | **Outcome** | **Y** |
| Giffords Center Rankings | **GiffordsRank** | Exposure 3 | X |
| % Poverty | **Poverty** | **Covariates** |  |
| % Unemployment | **Unemploy** |  |
| % Poor mental health (0 days) | **PoorMH0** |  |
| % Poor mental health (1-14 days) | **PoorMH14ls** |  |
| % Poor mental health (> 14 days) | **PoorMH14gt** |  |
| Statewide population | **StPoP** |  |

1. **Crude model: Mort=f(GiffordsRank)**

**Graph**

1. **Adjusted model: Mort=f (GiffordsRank, Poverty, Unemploy, PoorMH0, PoorMH14ls, PoorMH14gt, StPoP)**
2. **Reduced model:**

|  |  |  |  |
| --- | --- | --- | --- |
| Description | **Variable Name** |  |  |
| **All Firearm Mortality - Age Adjusted Rate (per 100,000)** | **AllMortAdj** | **Outcome** | **Y** |
| Gun Ownership Rates | **GOwnerRates** | Exposure 4 | X |
| % Poverty | **Poverty** | **Covariates** |  |
| % Unemployment | **Unemploy** |  |
| % Poor mental health (0 days) | **PoorMH0** |  |
| % Poor mental health (1-14 days) | **PoorMH14ls** |  |
| % Poor mental health (> 14 days) | **PoorMH14gt** |  |
| Statewide population | **StPoP** |  |

1. **Crude model: Mort=f(GOwnerRates)**

**Graph**

1. **Adjusted model: Mort=f (GOwnerRates, Poverty, Unemploy, PoorMH0, PoorMH14ls, PoorMH14gt, StPoP)**
2. **Reduced model:**

**Overview of the data**

|  |  |  |
| --- | --- | --- |
| Description | **Variable Name** |  |
| All firearm mortality | AllMortN | **Y=Outcomes;** multiple years with some missings |
| All Firearm Mortality - Crude Rate (per 100,000) | AllMortCrd |
| **All Firearm Mortality - Age Adjusted Rate (per 100,000)** | **AllMortAdj** |
| Age 0-24 Firearm Mortality | MortN24ls |
| Age 0-24 Mortality Crude Rate (per 100,000) | Mort24lsCrd |
| **Age 0-24 Mortality Age Adjusted Rate (per 100,000)** | **Mort24lsAdj** |
| ATF Registered Weapons | **ATFRegWeapon** | Multiple years |
| ATF Federal Firearm Licensees | **ATFFirearmLicense** |
| Giffords Center Rankings | **GiffordsRank** | 2018 data only |
| Gun Ownership Rates | **GOwnerRates** | 2013 data only |
| Handguns Carry Permit required (0 = No, 1 = Yes) | **HGCPermReq** | 2018 data only |
| Handguns Magazine size restriction (0 = No, 1 = Yes) | **HGMagRestrict** |
| Handguns Open carry allowed (0 = No, 1 = Yes) | **HGOCAllow** |
| Handguns Permit required (0 = No, 1 = Yes) | **HGPermReq** |
| Handguns Purchase permit required (0 = No, 1 = Yes) | **HGPurchPermReq** |
| Handguns Registration of firearm (0 = No, 1 = Yes) | **HGRegFirearm** |
| Background checks on private gun sales required (0 = No, 1 = Yes) | **CheckPGSReq** |
| Long guns Carry Permit required (0 = No, 1 = Yes) | **LGCPermReq** |
| Long guns Magazine size restriction (0 = No, 1 = Yes) | **LGMagRestrict** |
| Long guns Open carry allowed (0 = No, 1 = Yes) | **LGOCAllow** |
| Long guns Permit required (0 = No, 1 = Yes) | **LGPermReq** |
| Long guns Purchase permit required (0 = No, 1 = Yes) | **LGPurchPermReq** |
| Long guns Registration of firearm (0 = No, 1 = Yes) | **LGRegFirearm** |
| % Poverty | **Poverty** | **SES** |
| % Unemployment | **Unemploy** |
| % Poor mental health (0 days) | **PoorMH0** |
| % Poor mental health (1-14 days) | **PoorMH14ls** |
| % Poor mental health (> 14 days) | **PoorMH14gt** |
| Statewide population | **StPoP** |
| % population (age 0-24 years) | **PoP24ls** |
| State | **State** | **50 states** |
| Timeframe | **Year** | **1997-2018** |

**Check on missing data (red=have data; black=missing)**