Supplement: COVID-19 covariables Mark Godlberg Dec 14, 2021 Negative binomial models for covariables for cumulative deaths from COVID-19 until the end of April 2021 across all counties in the continental An offset is included of the natural logarithm of the county-spcific population Plots displayed are marginal fitted functions for each covariable fitted as a natural cubic spline function on 3 degrees of freedom Univariate covariates - Neg binom Covid-19 death counts (3 df) until April 2021 150 Covid-19 mortality counts (3df) 50 0.0 0.2 0.4 0.6 8.0 Smoke rate Univariate covariates - Neg binom Covid-19 death counts (3 df) until April 2021 1000 (3df) 750 Covid-19 mortality counts 250 40000 Population density 20000 60000 80000 Univariate covariates - Neg binom Covid-19 death counts (3 df) until April 2021 300 Covid-19 mortality counts (3df) 10000 20000 30000 Beds Univariate covariates - Neg binom Covid-19 death counts (3 df) until April 2021 Covid-19 mortality counts (3df) 40000 120000 Median household income Univariate covariates - Neg binom Covid-19 death counts (3 df) until April 2021 Covid-19 mortality counts (3df) 0 -0.6 0.2 0.0 Percent under poverty line Univariate covariates - Neg binom Covid-19 death counts (3 df) until April 2021 125 Covid-19 mortality counts (3df) 50 **1818 81 - 118**11 - 1 8 1 - 11 11 1 <mark>1</mark>18 11 1 - 1 8 1 - - 1 1 0.50 Percent black 0.75 0.25 0.00 Univariate covariates - Neg binom Covid-19 death counts (3 df) until April 2021 400 Covid-19 mortality counts (3df) 295 300 290 305 315 310 Mean summer temperature Univariate covariates - Neg binom Covid-19 death counts (3 df) until April 2021 250 Covid-19 mortality counts (3df) 50 35 25 Mean BMI Univariate covariates - Neg binom Covid-19 death counts (3 df) until April 2021 125 Covid-19 mortality counts (3df) 50 0.2 0.4 0.6 Percent owner occ 0.8 Univariate covariates - Neg binom Covid-19 death counts (3 df) until April 2021 80 Covid-19 mortality counts (3df) 20 0.50 Percent Hispanic 0.00 0.75 0.25 1.00 Univariate covariates - Neg binom Covid-19 death counts (3 df) until April 2021 Covid-19 mortality counts (3df) 0.2 Percent Asian 0.4 0.3 0.0 0.1 Univariate covariates - Neg binom Covid-19 death counts (3 df) until April 2021 100 Covid-19 mortality counts (3df) 60 0.75 0.00 0.25 0.50 1.00 Percent White Univariate covariates - Neg binom Covid-19 death counts (3 df) until end of April 2021 80 Covid-19 mortality counts (3df) 25 Percent fully vaccinated 75 0 100 Neg binom Covid-19 death counts (3 df) fully adjusted 150 Covid-19 mortality counts (3df) 75 12 16 4 Avg PM2.5 Residuals vs Fitted 15 1100 10 01566 Residuals 27130 2 2 10 8 6 Predicted values $glm.nb(cov_d0421 \sim ns(mean_pm25, df = 3) + ns(smoke_rate, df = 3) + ns(popd \dots$ Normal Q-Q 15 1100 Std. Pearson resid. 10 01566 2 0 2 -3 -2 3 -1 0 **Theoretical Quantiles** $glm.nb(cov_d0421 \sim ns(mean_pm25, df = 3) + ns(smoke_rate, df = 3) + ns(popd \dots$ Scale-Location 1100 $^{\circ}$ 01566 √|Std. Pearson resid.| 27130 7 0 0 2 8 10 6 Predicted values $glm.nb(cov_d0421 \sim ns(mean_pm25, df = 3) + ns(smoke_rate, df = 3) + ns(popd ...$ Residuals vs Leverage 15 Std. Pearson resid. 10 2 0 0 0 0 0 Cook's distance

0.0

0.4

Leverage glm.nb(cov_d0421 ~ ns(mean_pm25, df = 3) + ns(smoke_rate, df = 3) + ns(popd ...

0.2

0.6

8.0