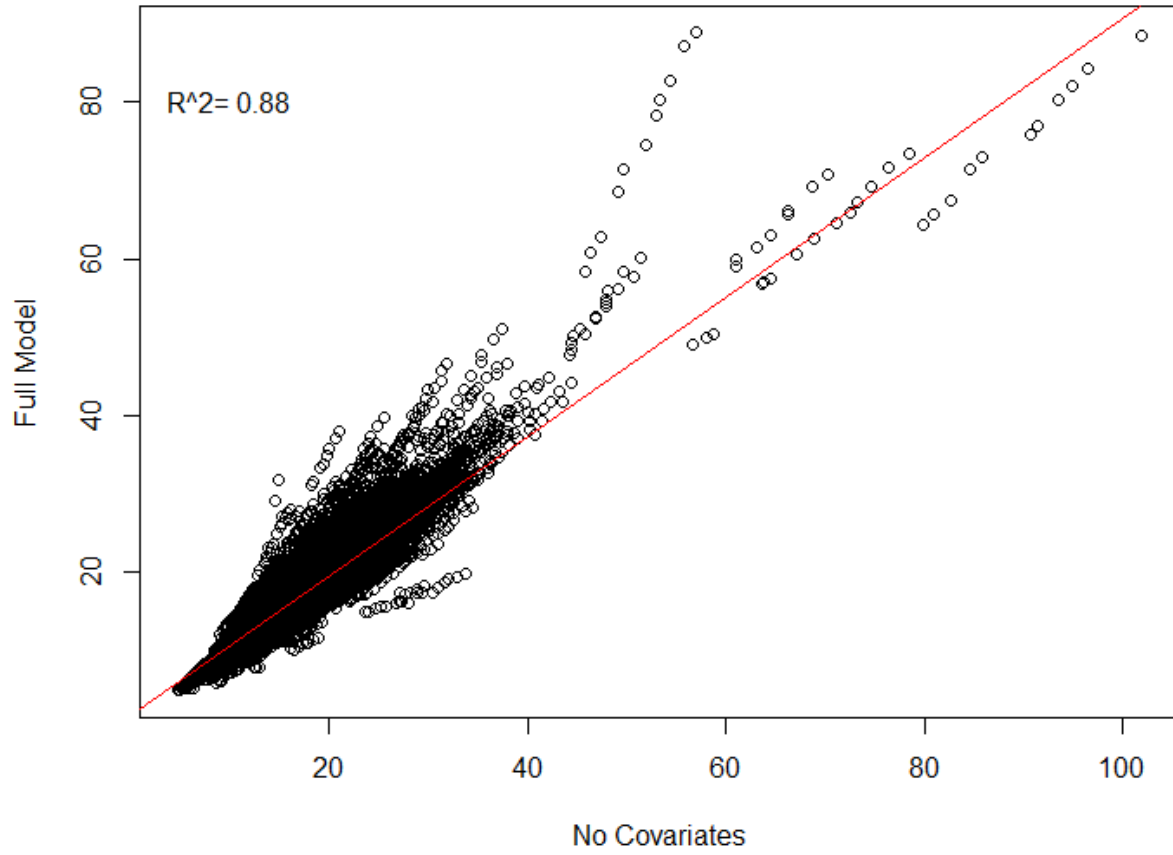# Supplemental Online Information

Figure S1. Scatterplot of posterior estimates of suicide rates, model with no covariates vs. model with all covariates.
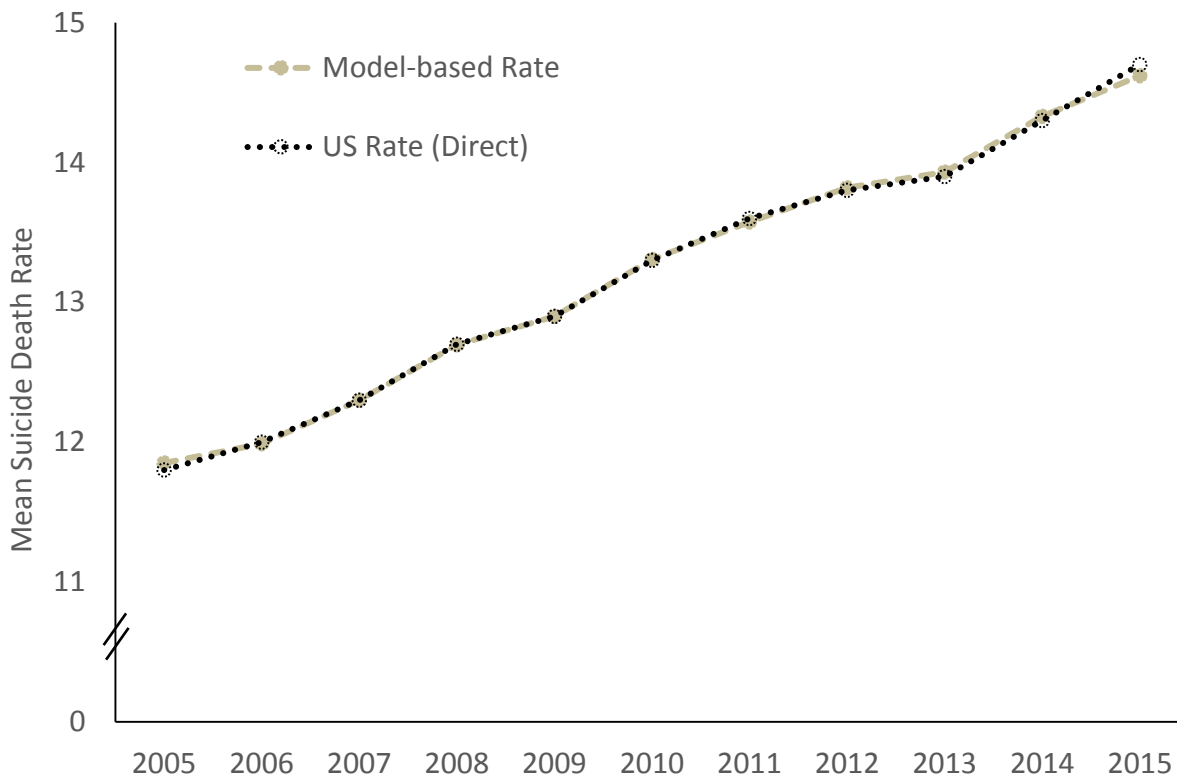
Figure S2. Suicide death rates in the U.S., 2005-2015. Mean county-level model-based estimates and direct

estimates, weighted by county population size.

Table s1. Covariates and data sources.

Land area (sq mi)	Area Resource Files	Decennial Census, 2000, 2010[1]
Mean household size	Area Resource Files	Decennial Census, 2000, 2010
Housing Unit Density per Square Mile	Area Resource Files	Decennial Census, 2000, 2010
Median age	Area Resource Files	Decennial Census, 2000, 2010
Median household income	Area Resource Files	American Community Survey (ACS), 2006-2010, 2009-2013
Median home value	Area Resource Files	ACS, 2006-2010, 2009-2013
Median gross rent	Area Resource Files	ACS, 2006-2010, 2009-2013
% Housing Units with more than 1 person/room	Area Resource Files	ACS, 2006-2010, 2009-2013
Percent American Indian or Alaska Native	Area Resource Files	Decennial Census, 2000, 2010
Median per capita income	Area Resource Files	Regional Economic Information (REIS), 2005,2010,2011,2012,2013[2]

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[1] Estimates between 2000 and 2010 were linearly interpolated for each year.
[2] Values from 2013 were carried forward for 2014 and 2015.

Percent Asian	Area Resource Files	Decennial Census, 2000, 2010
Percent non-Hispanic Black	Area Resource Files	Decennial Census, 2000, 2010
% Persons aged 25+ w/ 4+ Yrs College	Area Resource Files	ACS, 2006-2010, 2009-2013
Percent of females divorced	Area Resource Files	ACS, 2006-2010, 2009-2013
Percent female headed household	Area Resource Files	Decennial Census, 2000, 2010
Percent foreign born	Area Resource Files	ACS, 2006-2010, 2009-2013
Percent Hispanic	Area Resource Files	Decennial Census, 2000, 2010
% Persons aged 25+ w/ High School Diploma	Area Resource Files	ACS, 2006-2010, 2009-2013
% Persons aged 25+ w/ less than High School Diploma	Area Resource Files	ACS, 2006-2010, 2009-2013
Percent in owner-occupied housing	Area Resource Files	Decennial Census, 2000, 2010
Percent below the poverty level	Area Resource Files	Census SAIPE, 2005,2006,2007,2008,2009,2010, 2011,2012,2013[3]
Percent rural population	Area Resource Files	Decennial Census, 2000, 2010
Percent urban population	Area Resource Files	Decennial Census, 2000, 2010
Percent non-Hispanic White	Area Resource Files	Decennial Census, 2000, 2010
Percent workers in agriculture/forestry/fishing/hunting/ mine work	Area Resource Files	ACS, 2006-2010, 2009-2013
Percent workers in construction	Area Resource Files	ACS, 2006-2010, 2009-2013
Percent workers in Education/Healthcare/Social Assistance	Area Resource Files	ACS, 2006-2010, 2009-2013
Percent workers in manufacturing	Area Resource Files	ACS, 2006-2010, 2009-2013
Percent workers in Other Industries	Area Resource Files	ACS, 2006-2010, 2009-2013
Unemployment rate, 16+	Area Resource Files	Bureau of Labor Stats (BLS), 2005,2010,2011,2012,2013,2014[4]
Veteran population estimate	Area Resource Files	Dept of Veteran's Affairs, 2005,2006,2007,2008,2009,2010, 2011,2012,2013,2014,2015
Number of violent crimes	Uniform Crime Reporting Program Data: County-Level	2005,2006,2007,2008,2009,2010,2011,2012,2013,2014[5]

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[3] Values from 2013 were carried forward for 2014 and 2015.

[4] Values from 2014 were carried forward to 2015.

[5] Values from 2014 were carried forward to 2015.

	Detailed Arrest and Offense Data	
Number of property crimes	Uniform Crime Reporting Program Data: County-Level Detailed Arrest and Offense Data	2005,2006,2007,2008,2009,2010,2011,2012,2013,2014
Number of drug abuse violations-total	Uniform Crime Reporting Program Data: County-Level Detailed Arrest and Offense Data	2005,2006,2007,2008,2009,2010,2011,2012,2013,2014
All other offenses except traffic	Uniform Crime Reporting Program Data: County-Level Detailed Arrest and Offense Data	2005,2006,2007,2008,2009,2010,2011,2012,2013,2014
Estimated number of foreclosure starts divided by number of mortgages times 100.	Housing and Urban Development Small Area Foreclosure Rates[6]	2007-2008[7]
United States Postal Service data from June 2008 on residential addresses vacant 90-days or longer	Housing and Urban Development Small Area Foreclosure Rates	2008[7]
Estimated high cost loan rate: percent of loans shown to be high cost according to Home Mortgage Disclosure Act data	Housing and Urban Development Small Area Foreclosure Rates	2004-2006[8]
Illicit drug or alcohol abuse/dependence in past year	National Survey of Drug Use and Health Substate Estimates	2006-2008,2008-2010,2010-2012[9]
Any mental illness in past year	National Survey of Drug Use and Health Substate Estimates	2006-2008,2008-2010,2010-2012

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[6] https://www.huduser.gov/portal/datasets/nsp_foreclosure_data.html
[7] Time-invariant variable.

[8] Time-invariant variable.
[9] Values from the 2010-2012 data were carried forward to 2015.

Nonmedical Use of Pain Relievers in the Past Year among Individuals Aged 12 or Older	National Survey of Drug Use and Health Substate Estimates	2006-2008,2008-2010,2010-2012
Major Depressive Episode in the Past Year among Adults Aged 18 or Older	National Survey of Drug Use and Health Substate Estimates	2006-2008,2008-2010,2010-2012
Marijuana Use in the Past Year among Individuals Aged 12 or Older	National Survey of Drug Use and Health Substate Estimates	2006-2008,2008-2010,2010-2012
Serious Mental Illness in the Past Year among Adults Aged 18 or Older	National Survey of Drug Use and Health Substate Estimates	2006-2008,2008-2010,2010-2012
Had Serious Thoughts of Suicide in the Past Year among Adults Aged 18 or Older	National Survey of Drug Use and Health Substate Estimates	2006-2008,2008-2010,2010-2012
Illicit Drug Use in the Past Month among Individuals Aged 12 or Older	National Survey of Drug Use and Health Substate Estimates	2006-2008,2008-2010,2010-2012
Tobacco Product Use in the Past Month among Individuals Aged 12 or Older	National Survey of Drug Use and Health Substate Estimates	2006-2008,2008-2010,2010-2012
Treatment gap for alcohol - Needing But Not Receiving Treatment for Alcohol Use in the Past Year among Individuals Aged 12 or Older	National Survey of Drug Use and Health Substate Estimates	2006-2008,2008-2010,2010-2012
Treatment gap for drug use - Needing But Not Receiving Treatment for Illicit Drug Use in the Past Year among Individuals Aged 12 or Older	National Survey of Drug Use and Health Substate Estimates	2006-2008,2008-2010,2010-2012
Percent of deaths with underlying cause of R99 code (state-level): ill-defined and unknown cause of mortality	Mortality Data	2005,2006,2007,2008,2009,2010 2011,2012,2013,2014,2015
Percent of deaths pending (state-level)	Mortality Data	2005,2006,2007,2008,2009,2010 2011,2012,2013,2014,2015
Model-based age adjusted death rates due to drug poisoning	Model-Based Drug Poisoning Estimates	2005,2006,2007,2008,2009,2010 2011,2012,2013,2014[10]

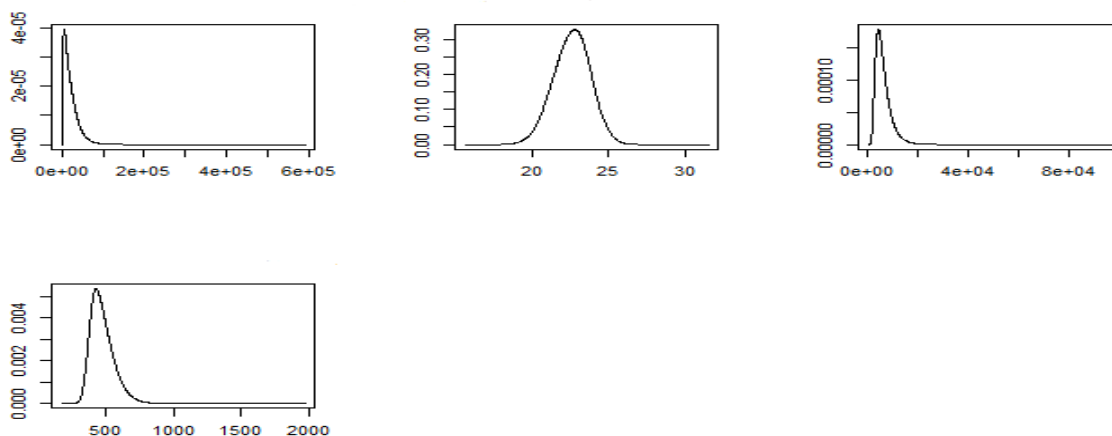[10] Values for 2014 were carried forward to 2015.

Figure S3. Model diagnostics from the best model with all covariates. The above plots for the marginals of the precisions of the prior variances for non-spatial effects, τ_v , spatial effects, τ_u , correlated time effect, $\tau_{\varphi1}$ and iid space time interaction effect, τ_ψ.
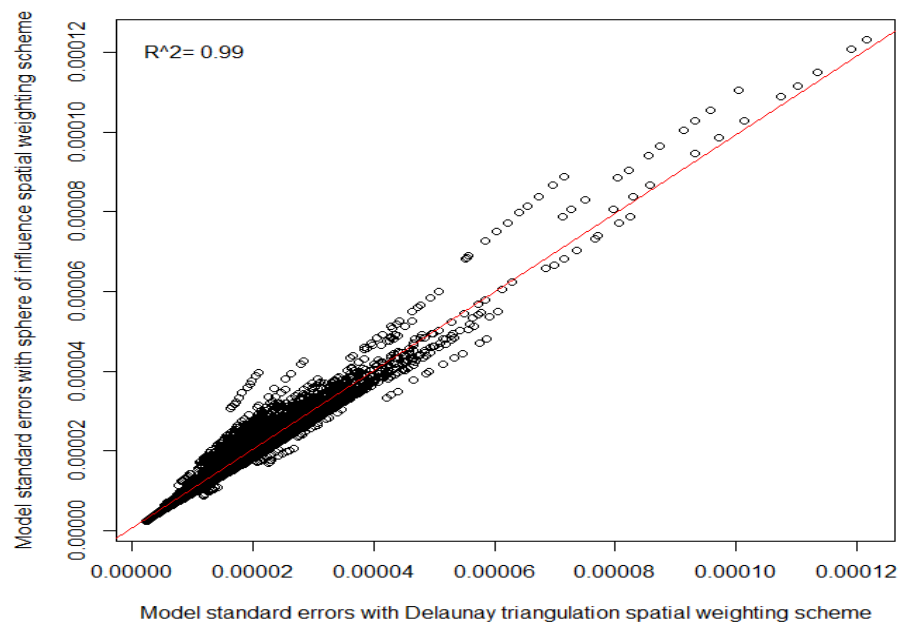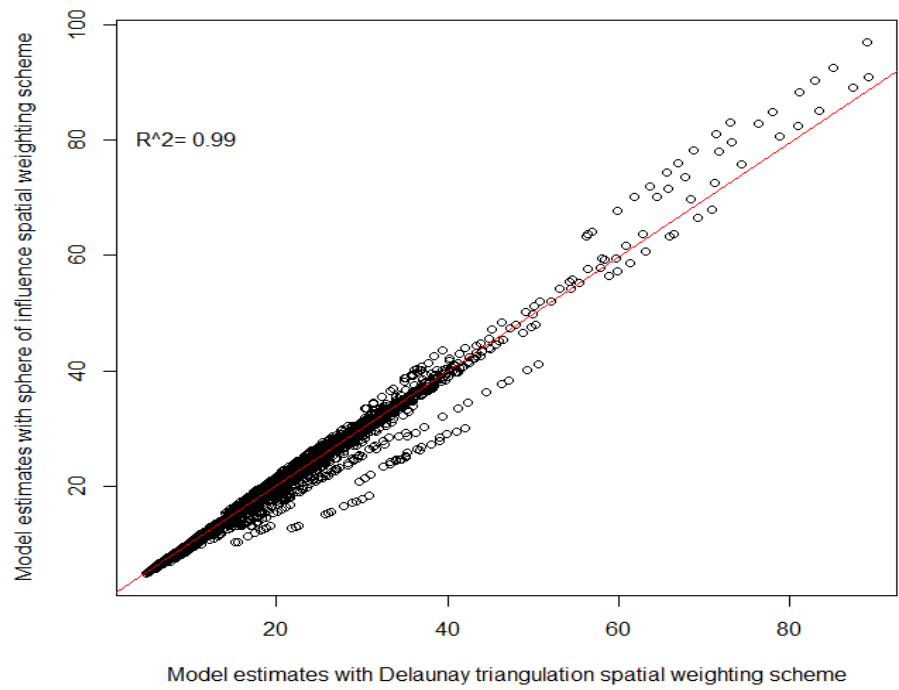
Figure S4. Comparison of the estimated county level SRs (top) and the associated posterior standard deviations (bottom) obtained from the best model with all covariates using the Delaunay triangulation and sphere of influence spatial weighting schemes.
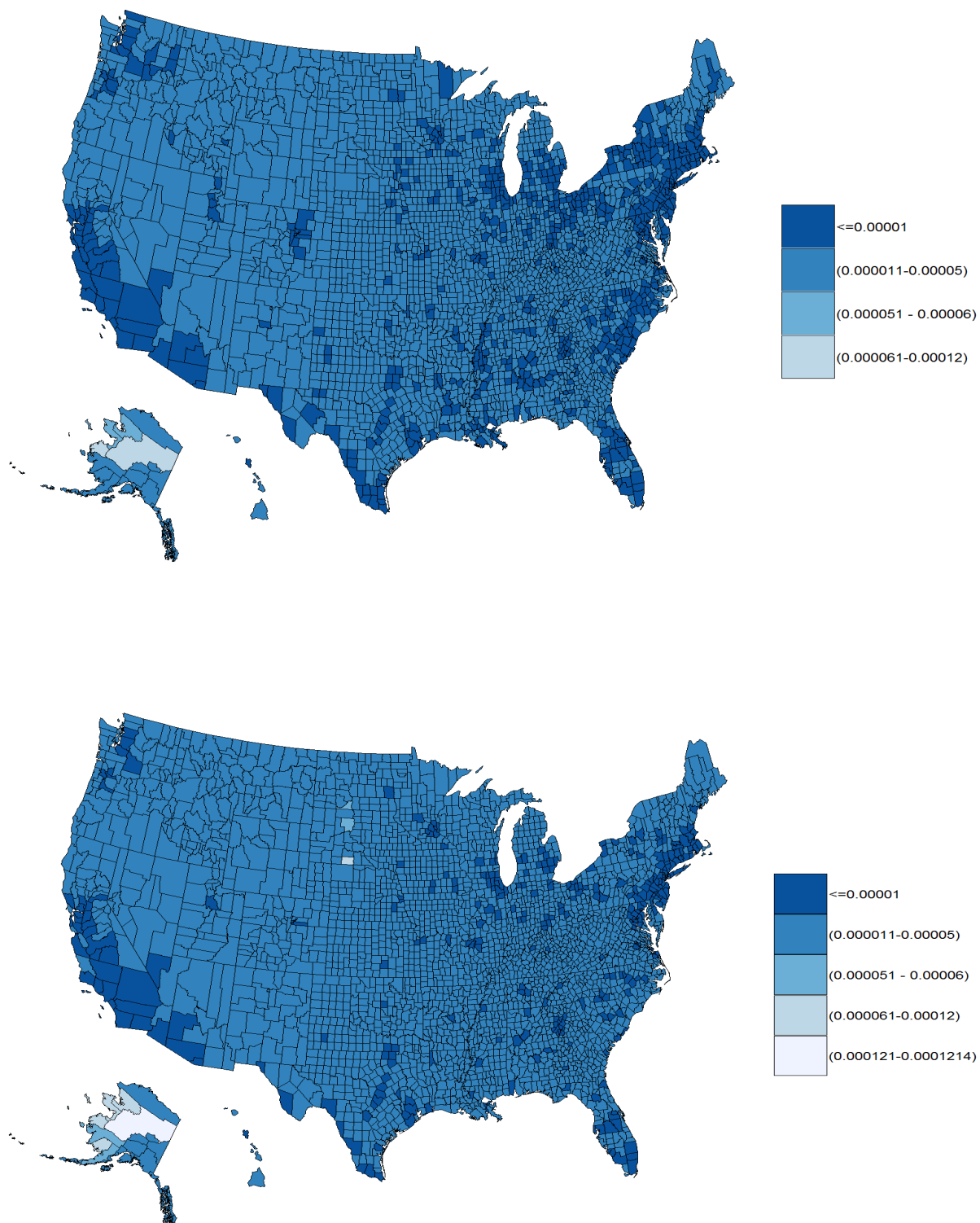
Figure S5. Uncertainty in the county level SRs for the year 2005 (top) and 2015 (bottom) from the best model with
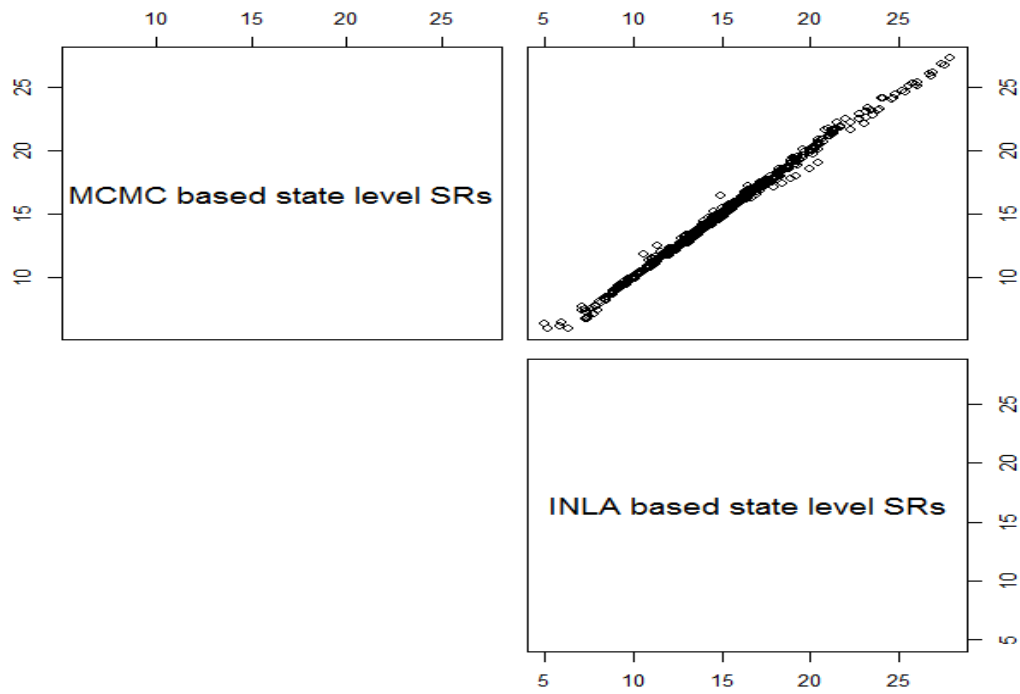
all covariates.

Figure S6. Scatterplot of aggregated state level MCMC simulations based SRs vs aggregated state level INLA based SRs, 2005-2015.

Table s2. Parameter estimates and 95% credible intervals from the best fitting model

Covariate	β	95% Bayesian Credible Interval	
Intercept	-8.76	(-8.76,-8.75)	*
Demographic factors			
Land area (sq mi)	0.01	(-0.002,0.02)	
Mean household size	-0.08	(-0.10,-0.06)	*
Housing Unit Density per Square Mile	-0.002	(-0.01,0.003)	
Median age	0.02	(-0.0002,0.03)	
Percent American Indian or Alaska Native	-0.004	(-0.02,0.015)	
Percent Asian	-0.02	(-0.04,-0.01)	*
Percent non-Hispanic Black	0.05	(0.03,0.06)	*
Percent foreign born	0.04	(0.02,0.05)	*
Percent Hispanic	0.04	(0.01,0.07)	*
Percent non-Hispanic White	0.02	(0.01,0.03)	*
Percent rural population	-0.02	(-0.03,-0.005)	*
Percent urban population	-0.17	(-0.22,-0.12)	*
Veteran population estimate	-0.06	(-0.08,-0.04)	*
Percent of females divorced	0.04	(0.030,0.05)	*
Socioeconomic and housing-related factors			
Median household income	0.06	(0.04,0.1)	*
Median home value	-0.02	(-0.04,-0.0003)	*
Median gross rent	-0.07	(-0.1,-0.04)	*
% Housing Units with more than 1 person/room	-15.2	(-49.36,17.4)	
Median per capita income	-15.2	(-49.38,17.38)	
% Persons aged 25+ w/ High School Diploma	0.02	(0.001,0.04)	*
% Persons aged 25+ w/ less than High School Diploma	-0.01	(-0.03,0.002)	
% Persons aged 25+ w/ 4+ Yrs College	0.0004	(-0.006,0.007)	
Percent in owner-occupied housing	-0.04	(-0.05,-0.02)	*
Percent below the poverty level	-0.046	(-0.09,0.002)	
Percent female headed household	-0.16	(-0.66,0.34)	
Percent workers in agriculture/forestry/fishing/hunting/ mine work	-0.03	(-0.2,0.13)	
Percent workers in construction	-0.1	(-0.41,0.21)	
Percent workers in Education/Healthcare/Social Assistance	-0.15	(-0.64,0.33)	
Percent workers in manufacturing	-0.15	(-0.67,0.37)	
Percent workers in Other Industries	0.008	(-3.9E-05,0.017)	
Unemployment rate, 16+	0.02	(0.005,0.03)	*
Estimated number of foreclosure starts divided by number of mortgages times 100.	0.001	(-0.007,0.009)	
United States Postal Service data from June 2008 on residential addresses vacant 90-days or longer	0.01	(8.93E-05,0.016)	

Estimated high cost loan rate: percent of loans shown to be high cost according to Home Mortgage Disclosure Act data	-0.002	(-0.0073,-0.003)	*
Health and crime-related factors			
Number of violent crimes	-0.003	(-0.01,0.002)	
Number of property crimes	0.031	(0.007,0.06)	*
Number of drug abuse violations-total	-.02	(-0.04,0.001)	
All other offenses except traffic	-0.04	(-0.06,-0.02)	*
Prevalence of illicit drug or alcohol abuse/dependence in past year	0.03	(0.01,0.05)	*
Prevalence of any mental illness in past year	0.01	(-0.003,0.016)	
Prevalence of nonmedical Use of Pain Relievers in the Past Year among Individuals Aged 12 or Older	-0.002	(-0.01,0.005)	
Prevalence of Major Depressive Episode in the Past Year among Adults Aged 18 or Older	0.014	(0.007,0.02)	
Prevalence of Marijuana Use in the Past Year among Individuals Aged 12 or Older	0.003	(-0.012,0.02)	
Prevalence of Serious Mental Illness in the Past Year among Adults Aged 18 or Older	-0.001	(-0.02,0.001)	
Prevalence of Serious Thoughts of Suicide in the Past Year among Adults Aged 18 or Older	-0.003	(-0.01,0.01)	
Prevalence of Illicit Drug Use in the Past Month among Individuals Aged 12 or Older	-.0003	(-0.02,0.02)	
Prevalence of Tobacco Product Use in the Past Month among Individuals Aged 12 or Older	0.007	(-0.002,0.02)	
Treatment gap for alcohol - Prevalence of Needing But Not Receiving Treatment for Alcohol Use in the Past Year among Individuals Aged 12 or Older	-0.03	(-0.05,-0.02)	*
Treatment gap for drug use - Prevalence of Needing But Not Receiving Treatment for Illicit Drug Use in the Past Year among Individuals Aged 12 or Older	-0.02	(-0.03,-0.01)	*
Percent of deaths with underlying cause of R99 code (state-level): ill-defined and unknown cause of mortality	-0.004	(-0.02,-0.004)	*
Percent of deaths pending (state-level)	-0.02	(-0.02,-0.01)	*
Model-based age adjusted death rates due to drug poisoning	0.06	(0.05,0.07)	*

Note: * indicates the 95% CI excludes zero. Coefficients are on the logit scale.