

Data supplement for Olfson et al., Opioid Prescribing and Suicide Risk in the United States. Am J Psychiatry (doi: 10.1176/appi.ajp.22020102)

TABLE S1. Mean rates of opioid prescribing and opioid-related deaths total and by sex in 886 commuting zones, 2009 and 2017									
	Total			Males			Females		
Opioid Prescribing	2009 Mean Rate per 100	2017 Mean Rate per 100	Difference (95% CI)	2009 Mean Rate per 100	2017 Mean Rate per 100	Difference (95% CI)	2009 Mean Rate per 100	2017 Mean Rate per 100	Difference (95% CI)
Opioid prescriptions per capita	70.19	61.63	-8.56 (-10.67, -6.45)	58.22	52.28	-5.93 (-7.73, -4.14)	81.96	70.77	-11.20 (-13.64, -8.75)
Percent with an opioid prescription	26.40	20.27	-6.12 (-6.70, -5.54)	22.60	17.58	-5.01 (-5.52, -4.51)	30.13	22.90	-7.23 (-7.89, -6.57)
Percent with high-dose prescription	2.01	1.60	-0.42 (-0.49, -0.34)	1.73	1.45	-0.28 (-0.36, -0.21)	2.29	1.74	-0.55 (-0.63, -0.46)
Percent with long-term prescription	1.24	0.96	-0.28 (-0.33, -0.23)	0.83	0.64	-0.19 (-0.23, -0.16)	1.65	1.28	-0.37 (-0.44, -0.31)
Percent with ≥3 prescribers	3.18	2.26	-0.92 (-1.02, -0.83)	2.50	1.84	-0.66 (-0.74, -0.59)	3.85	2.67	-1.18 (-1.30, -1.06)
Mortality ^A	2009 Rate per 100,000 Person-Yr	2017 Rate per 100,000 Person-Yr	Difference (95% CI)	2009 Rate per 100,000 Person-Yr	2017 Rate per 100,000 Person-Yr	Difference (95% CI)	2009 Rate per 100,000 Person-Yr	2017 Rate per 100,000 Person-Yr	Difference (95% CI)
Suicide, total	13.80	16.36	2.56 (2.05, 3.07)	21.82	25.63	3.82 (2.99, 4.64)	5.91	7.29	1.38 (1.09, 1.68)
Suicide, opioid-related	0.64	0.66	0.02 (-0.04, 0.08)	0.62	0.58	-0.04 (-0.10, 0.03)	0.67	0.74	0.07 (-0.004, 0.15)
Unintentional, opioid-related	6.56	15.62	9.05 (8.18, 9.92)	8.81	21.87	13.05 (11.80, 14.30)	4.35	9.50	5.15 (4.59, 5.71)
Undetermined, opioid-related	0.73	0.93	0.20 (-0.14, 0.54)	0.87	1.22	0.35 (-0.15, 0.85)	0.58	0.64	0.57 (-0.13, 0.25)

^A Deaths with underlying ICD-10-CM cause of total suicide (X60-X84, Y87.0, U03) with opioid-related deaths defined as X40-44 (unintentional), X60-64 (suicide), or Y10-Y14 (undetermined) and including opioids (T40.0-T40.4, T40.6). Opioid prescribing and mortality results are weighted to commuting zone population. Data from US Census Bureau and IQVIA Real World Prescription Data 2009-2017.

TABLE S2. Mean rates of opioid prescribing and opioid-related deaths by age group in 886 commuting zones, 2009 and 2017

	10-24 Years			25-44 Years			45-64 Years			65+ Years		
Opioid Prescribing	2009 Mean Rate per 100	2017 Mean Rate per 100	Difference (95% CI)	2009 Mean Rate per 100	2017 Mean Rate per 100	Difference (95% CI)	2009 Mean Rate per 100	2017 Mean Rate per 100	Difference (95% CI)	2009 Mean Rate per 100	2017 Mean Rate per 100	Difference (95% CI)
Opioid prescriptions per capita	19.95	12.29	-7.66 (-8.2, -7.11)	61.53	42.55	-18.98 (-20.84, -17.13)	96.34	89.46	-6.88 (-9.93, -3.84)	132.64	123.74	-8.89 (-12.68, -5.11)
Percent with an opioid prescription	13.80	8.53	-5.27 (-5.61, -4.93)	25.88	18.23	-7.65 (-8.25, -7.05)	29.64	23.36	-6.29 (-6.94, -5.63)	46.29	37.13	-9.16 (-10.12, -8.19)
Percent with high-dose prescription	0.09	0.03	-0.06 (-0.06, -0.06)	1.30	0.73	-0.57 (-0.62, -0.52)	3.29	2.73	-0.57 (-0.69, -0.44)	4.71	3.59	-1.12 (-1.28, -0.96)
Percent with long-term prescription	0.07	0.02	-0.04 (-0.05, -0.04)	0.84	0.45	-0.39 (-0.43, -0.35)	1.92	1.48	-0.43 (-0.51, -0.36)	3.12	2.49	-0.63 (-0.74, -0.52)
Percent with ≥3 prescribers	0.84	0.27	-0.57 (-0.6, -0.54)	3.26	1.73	-1.54 (-1.65, -1.43)	4.15	3.18	-0.97 (-1.1, -0.84)	5.37	4.64	-0.72 (-0.88, -0.56)
Mortality ^A	2009 Mean Rate per 100,000 Pers-Yr	2017 Mean Rate per 100,000 Pers-Yr	Difference (95% CI)	2009 Mean Rate per 100,000 Pers-Yr	2017 Mean Rate per 100,000 Pers-Yr	Difference (95% CI)	2009 Mean Rate per 100,000 Pers-Yr	2017 Mean Rate per 100,000 Pers-Yr	Difference (95% CI)	2009 Mean Rate per 100,000 Pers-Yr	2017 Mean Rate per 100,000 Pers-Yr	Difference (95% CI)
Suicide, total	7.28	10.48	3.21 (2.67, 3.75)	14.44	17.73	3.29 (2.56, 4.01)	18.16	19.62	1.46 (0.75, 2.17)	14.32	16.00	1.69 (0.89, 2.48)
Suicide, opioid-related	0.12	0.17	0.05 (0.003, 0.09)	0.63	0.51	-0.12 (-0.20, -0.04)	1.15	1.13	-0.02 (-0.15, 0.10)	0.43	0.79	0.36 (0.24, 0.48)
Unintentional, opioid-related	3.08	5.91	2.82 (2.47, 3.17)	9.35	26.28	16.93 (15.27, 18.59)	8.50	18.17	9.67 (8.63, 10.72)	1.02	2.91	1.89 (1.66, 2.13)
Undetermined, opioid-related	0.31	0.30	-0.01 (-0.13, 0.11)	0.92	1.37	0.46 (-0.06, 0.98)	1.06	1.26	0.20 (-0.26, 0.67)	0.20	0.28	0.09 (-0.01, 0.18)

^A Deaths with underlying ICD-10-CM cause of total suicide (X60-X84, Y87.0, U03) with opioid-related deaths defined as X40-44 (unintentional), X60-64 (suicide), or Y10-Y14 (undetermined) and including opioids (T40.0-T40.4, T40.6). Pers-Yr denotes Person-Years. Opioid prescribing and mortality results are weighted to commuting zone population. Data from US Census Bureau and IQVIA Real World Prescription Data 2009-2017.

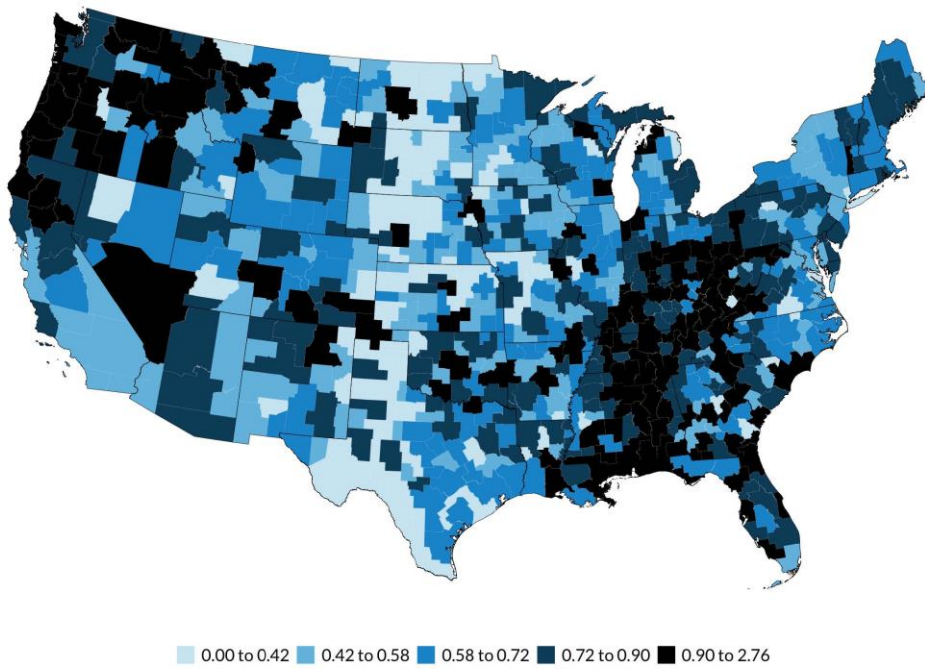
TABLE S3. Associations of regional change in opioid prescriptions per capita with all suicide deaths and with suicide deaths involving opioids

	All Deaths by Suicide													
	US Geographic Regions								Tests of Equality Between Regional Coefficients					
Opioid Metric	East		South		Midwest		West		East South	East Midwest	East West	South Midwest	South West	Midwest West
	β	p	β	p	β	p	β	p	p	p	p	p	p	p
Prescription per capita	-.008	.732	.048	<.001	.022	.009	.087	<.001	.012	.183	<.001	.011	.032	<.001
Percent ≥ 1 prescription	.030	.041	.072	<.001	.026	.014	.143	<.001	.002	.797	<.001	<.001	.003	<.001
Percent high dose	.016	.072	.020	.001	.025	.002	.053	<.001	.711	.450	.018	.610	.030	.083
Percent long-term	-.028	.339	.028	<.001	.027	.001	.058	<.001	.051	.052	.002	.899	.025	.027
Percent multiple prescriber	.017	.047	.049	<.001	.009	.225	.114	<.001	.002	.407	<.001	<.001	<.001	<.001
	Deaths by Suicide involving Opioid Overdose													
Prescription per capita	.028	.153	.035	<.001	.020	.046	.084	<.001	.739	.706	.024	.207	.005	<.001
Percent ≥ 1 prescription	.001	.973	.038	<.001	.020	.093	.098	<.001	.089	.397	<.001	.219	<.001	<.001
Percent high dose	.036	.028	.023	<.001	.023	.027	.070	<.001	.424	.489	.116	.949	.002	.007
Percent long-term	.038	.158	.027	<.001	.022	.042	.098	<.001	.695	.572	.058	.681	<.001	<.001
Percent multiple prescriber	.014	.390	.034	<.001	.026	.005	.122	<.001	.251	.493	<.001	.490	<.001	<.001

Deaths with underlying ICD-10-CM all causes of suicide (X40-X84, Y87.0, U03) above and intentional overdose (X60-X64) also involving opioids (T40.0-T40.4, T40.6) below.

FIGURE S1. Opioid prescriptions per capita by quintiles in 882 commuting zones, United States 2009 and 2017

2009



2017

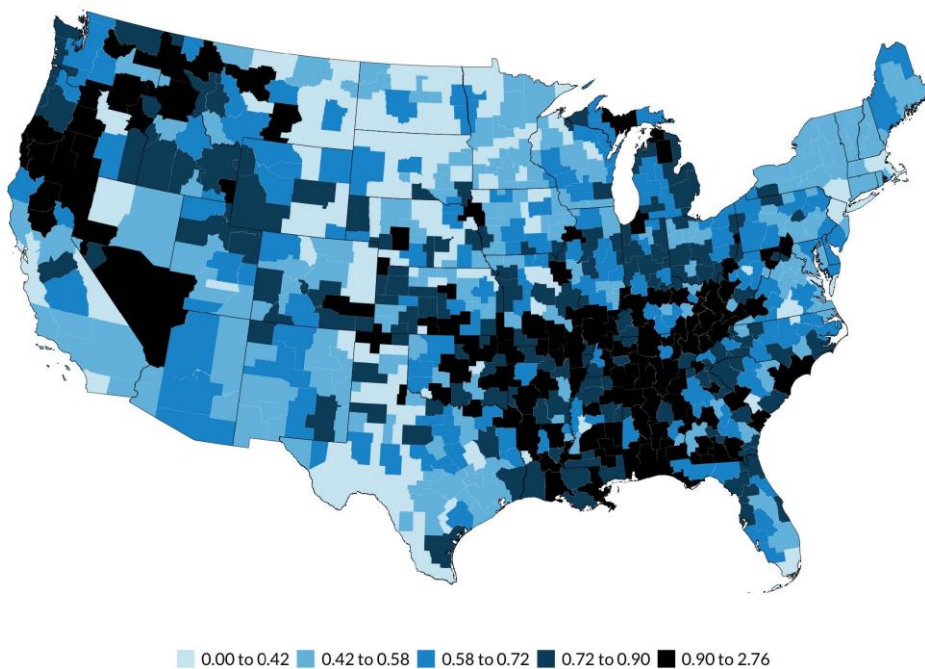
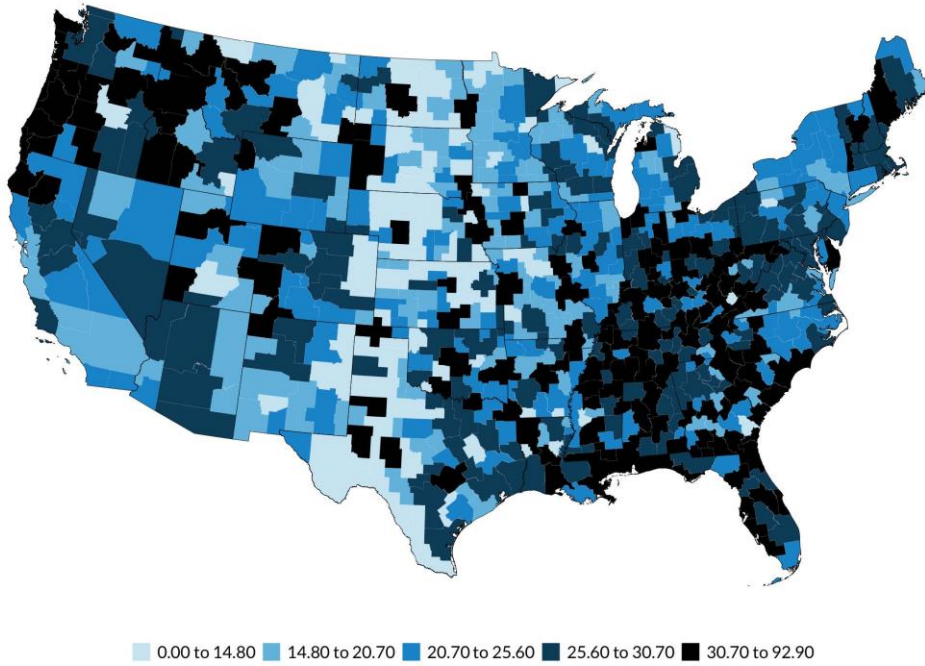


FIGURE S2. Percent with an opioid prescription by quintiles in 882 commuting zones, United States 2009 and 2017

2009



2017

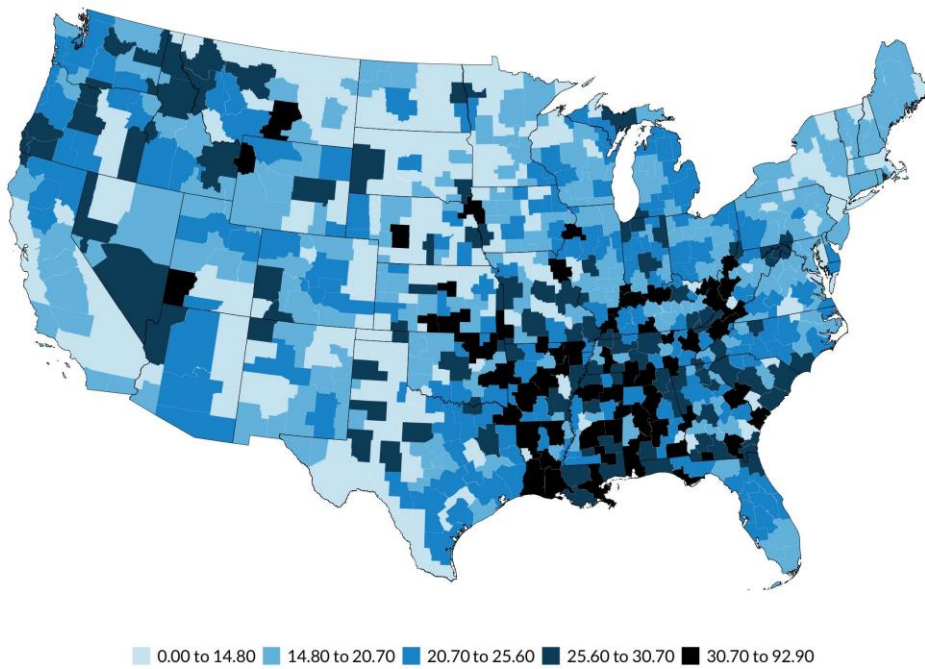
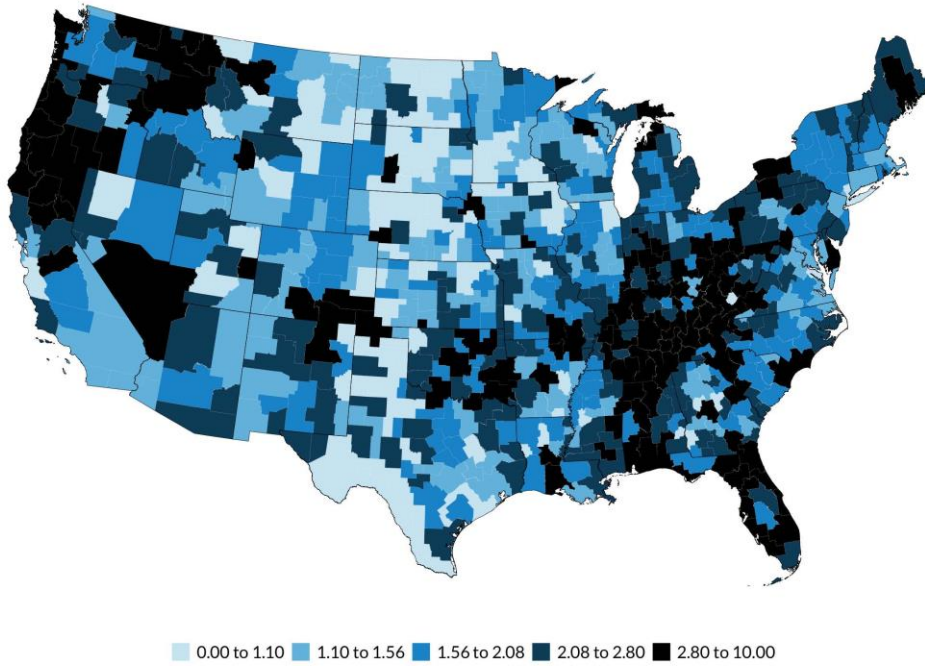


FIGURE S3. Percent with high-dose opioid prescription by quintiles in 882 commuting zones, United States 2009 and 2017

2009



2017

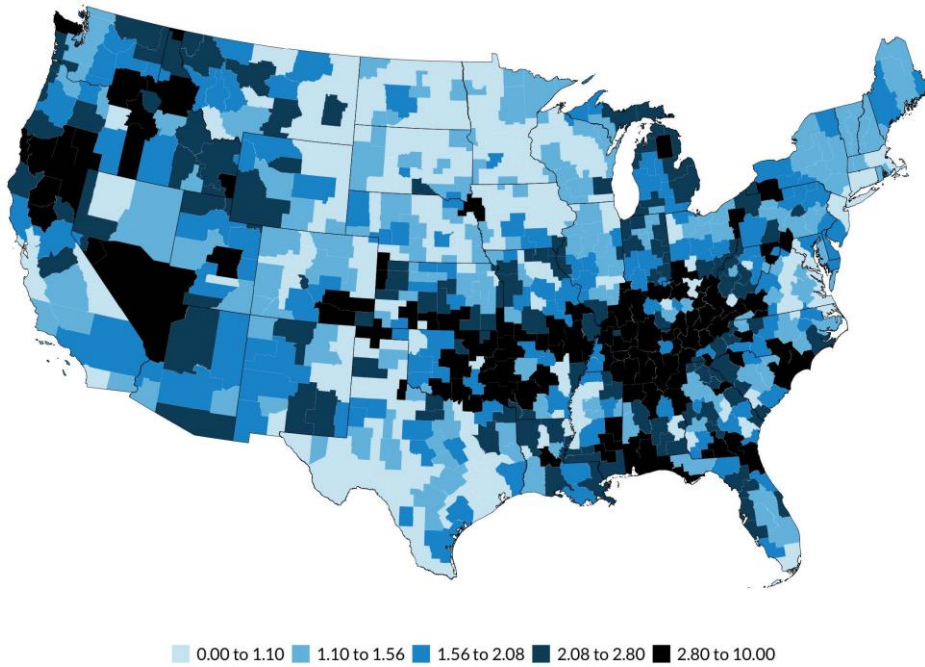


FIGURE S4. Scatterplot of the change in opioid prescriptions per capita and change in the rate of suicide deaths per 100,000 persons in 886 commuting zones, United States 2009 to 2017

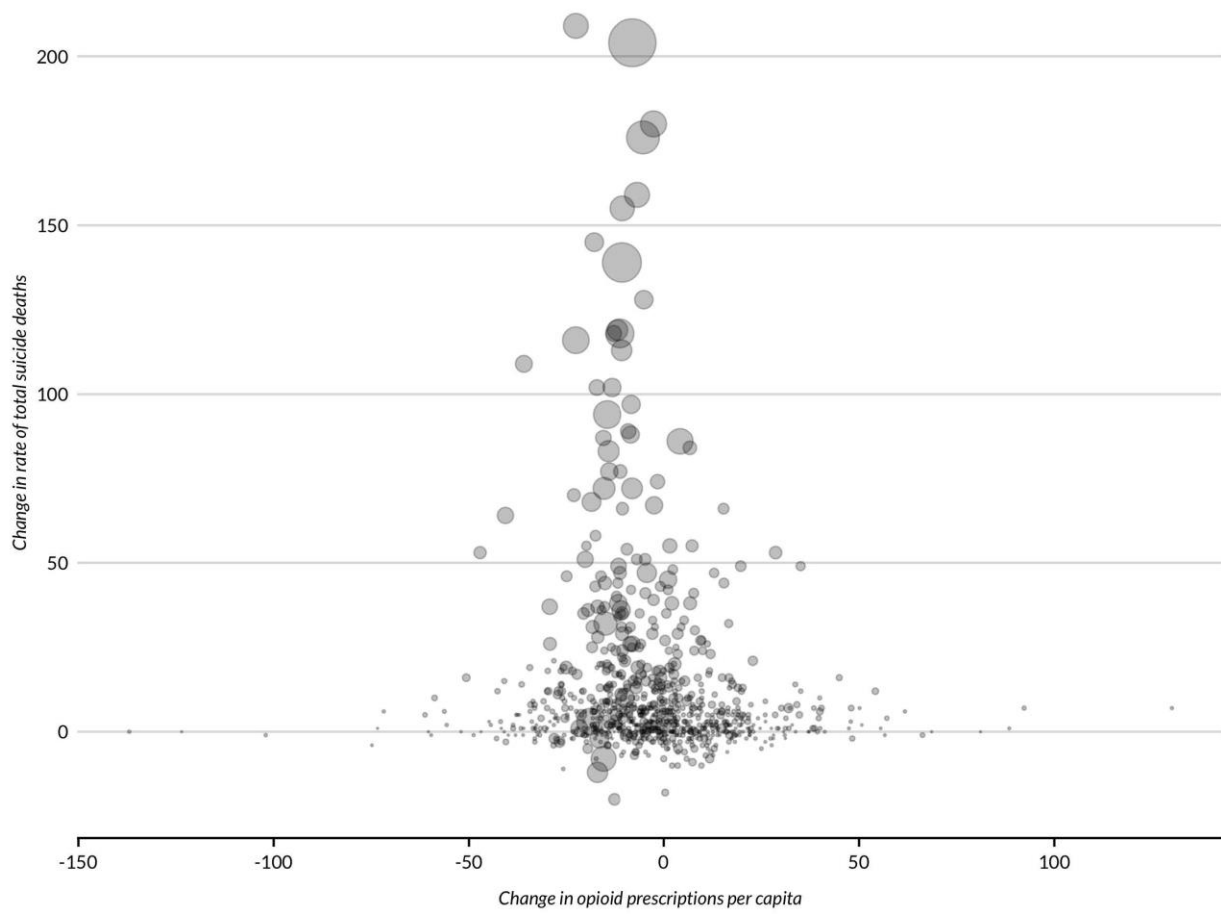


FIGURE S5. Scatterplot of the change in opioid prescriptions per capita and change in the rate of suicide deaths involving opioids per 100,000 persons in 886 commuting zones, United States 2009 to 2017

