Medicaid Expansion and Opioid Deaths

Susan L. Averett
Department of Economics
Lafayette College
Easton, PA 18042
USA
Email: averetts@lafayette.edu
Phone: 610-330-5307

Julie K. Smith
Department of Economics
Lafayette College
Easton PA 18042
Phone: 610-330-5301
Email: smithjk@lafayette.edu

Yang Wang
La Follette School of Public Affairs
University of Wisconsin - Madison
1225 Observatory Drive
Madison, WI 53706
Phone: 608-263-1802
Email: yang.wang@lafollette.wisc.edu

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Abstract:

The US is in the midst of an opioid epidemic and drug overdose deaths are becoming a leading cause of death. Meanwhile, in 2010, the US passed comprehensive health care reform providing access to care for millions of individuals who previously lacked care. Part of the new access came from expanding Medicaid, the insurance program for low-income individuals. Expanding Medicaid was optional for states. Those individuals living in expansion states gained prescription drug coverage and hence more access to opioid pain-relievers that are known to be addictive. However, they also gained access to medication-assisted treatment for addiction. This paper uses a difference-in-differences approach and state-level data from 2010 to 2017 to compare opioid death rates in expansion and non-expansion states to determine if Medicaid expansion was a potential cause of rising opioid deaths. We find no evidence that Medicaid expansion is related to opioid deaths.

1. INTRODUCTION

The US is in the midst of an opioid death epidemic. Since 2000, opioid death rates have increased by over 200 percent (authors' calculation using CDC data). Politicians have differing viewpoints regarding whether the expansion of Medicaid as part of the 2010 Affordable Care Act (ACA) is the cause of increased opioid deaths (see Goodman-Bacon and Sandoe, 2017 for a discussion of this debate). The effect of expanded Medicaid access on opioid deaths is theoretically ambiguous. Medicaid coverage provides individuals access to opioids through prescriptions and it could also increase opioid abuse through a moral hazard effect. However, it also provides access to treatment for those who are addicted (Wettstein, 2019). In fact, Ohio Governor John Kasich argues in favor of Medicaid expansion claiming it is necessary to fight rising opioid death rates by providing treatment for addicts.[1]

Our goal is to determine if the ACA Medicaid expansion was a potential cause of the increase in opioid deaths. To this end, we estimate state-level difference-in-differences (DD) models where states who expanded Medicaid are the treated states and states who declined to expand are the control states.

2. METHODS

2.1 Literature

While space limitations prohibit a complete review of this literature, to provide context, we note that there is a rich literature examining the effects of Medicaid expansion on the probability of having health insurance (e.g. Courtemanche et al., 2017; Kaestner et al., 2017) and a number of studies that examine factors that might be responsible for rising opioid deaths (e.g. Ruhm, 2018). Several studies examine the effect of Medicaid expansion on opioid-related outcomes. Saloner et al. (2018) and Sharp et al. (2018) examine opioid and opioid-treatment prescribing patterns in expansion and non-expansion states and find no effect on the prescribing pattern of opioids (although more individuals have access) and increases in the prescribing of medication-assisted treatments. Some authors have found that other policies such as increased access to naloxone have no impact on opioid deaths (e.g. Doleac and Mukherjee, 2018).

2.2 Data and Methods

We combine data from several sources to address this research question. We obtain state-level data for the rate of opioid-related mortality from the Centers for Disease Control Wide-Ranging Online Data for Epidemiologic Research (CDC WONDER). We define opioid-related mortality from codes T40.2-T40.4 from the deaths recorded in X40-X44, X60-X64 and Y10-Y14 using the International Classification of Diseases (ICD-10). These classifications include opioid overdose deaths of any intent. Our data span 2010-2017 and are collected from the death certificates from all US states.[2]

We combine CDC data with data from the UKCPR National Welfare Data to obtain state-level covariates (see Table 2 for definitions). We also control for whether a state has passed a Medical Marijuana Law[3], a Must Access Prescription Drug Monitoring Program[4], or a Naloxone Access Law.

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[1] See Governor Kasich's remarks: https://www.cbpp.org/blog/medicaid-expansion-essential-to-address-opioid-epidemic.

[2] Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2017 on CDC WONDER Online Database, released 2018. Data are from the Multiple Cause of Death Files, 1999-2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. http://wonder.cdc.gov/mcd-icd10.html and https://www.cdc.gov/nchs/icd/icd10.htm (see appendix for description of codes).

[3] Data from MMLs: https://medicalmarijuana.procon.org/view.resource.php?resourceID=000881.

[4] The authors thank Anita Mukherjee for sharing her data on must access PDMP laws which they updated.

We estimate the following model as our main specification:

$$(1) \quad y_{st} = \alpha + \gamma_1 ME_{st} + \gamma_2 Z_{st} + \theta_s + \tau_t + \varepsilon_{st},$$

where y_{st} is the log of the age-adjusted opioid overdose death rate per 100,000 population for state *s* in year *t*. ME is a binary variable equal to one if state *s* expanded Medicaid at year *t* and remains 1 for all years post Medicaid expansion, Z_{st} is a set of state-level covariates while Θ_s and τ_t are state and year fixed effects. ε_{st} is a random error term.

States expanded Medicaid at different times and some did so earlier than the ACA based on waivers. Thus, in the literature several definitions of expansion are used. We construct four different treatment groups based on expansion definitions from Kaestner et al. (2017) and Sharp et al. (2018) and defined in Table 1. We also use the percent of the state's population enrolled in Medicaid as an alternative definition of Medicaid expansion.

The key assumption in the DD model is that the death rates in the control states would have trended the same way as the treated states in the absence of Medicaid expansion. To test this assumption, we perform an event study analysis by estimating:

$$(2) \quad y_{st} = \beta_0 + \sum_{j=-m}^{3} \beta_t D_{st}(t = k + j) + \delta Z_{st} + \theta_s + \tau_t + \varepsilon_{st},$$

where *m* is the number of "leads" in the model. We have three after periods so the summation ends with a 3 while *k* represents the time at which state *s* was first treated. The reference category is the year before a state enacted the expansion. The other variables are as described above for equation 1. If the coefficients on the before period are statistically significant then we have evidence of a differential trend and our DD results would be suspect. We test the hypothesis that $\beta_j=0$ for all $j<0$ and report results in figure 1.

3. RESULTS

The results from estimating equation 1 are presented in table 2 along with sample means. Standard errors are clustered by state. We do not find a significant effect of Medicaid expansion on opioid deaths. We note that in all but one case our standard errors are larger than our coefficients. Therefore, although our coefficients are positive we cannot rule out the possibility of a negative effect.[5]

Figure 1 plots the coefficients on the leads estimated from equation 2 to test the primary assumption of our DD strategy for each of our treatment groups. The F-tests on the leads are all insignificant confirming that differential trends are not driving our results. This is corroborated by figure 2a which plots opioid death rates by state Medicaid expansion status and figure 2b which plots these rates centered on the expansion date for treatment states and centered on 2014 for non-expansion states. In figure 2b, the x-axis year is not the same for all states, e.g. PA expanded in 2015 so 4 years before is 2011.

We consider different definitions of drug deaths including adding the sum of opioid and heroin deaths, heroin deaths and other drug related deaths. We find no significant effect of Medicaid expansion on these alternative definitions of drug deaths. We further conduct a falsification test where we randomly assign states to be "treated" and again find no significant effect. Additionally, our results are qualitatively similar when adding two potentially endogenous control variables (unemployment rate, poverty rate).

[5] Given that we use state level data, there may be concerns about the ability to detect an effect. Therefore, we conduct a power analysis as recommended by Black et al. (2019). The results of this analysis indicate sufficient power. See Appendix B for details.

Finally, as Medicaid expanded in some states, other states without an expansion also saw Medicaid enrollment growth from eligible individuals who had previously not signed up. In the literature, this is termed "the woodwork effect". The inclusion of these states could confound our results. Hence, we drop from our analysis those non-expansion states with the largest increases in the fraction enrolled in Medicaid (which we define as growth greater than 10 percent). Our results are similar to those presented in table 2.

4. CONCLUSION

Medicaid expansion can have a nuanced effect on opioid related mortality. There is increased access to treatment but also increased access to prescriptions. Thus, the size and sign of any effect of Medicaid expansion on opioid deaths is an empirical question. While it is tempting to assume that Medicaid might be responsible for the opioid death crisis given that some individuals who did not have access to prescription drugs now do, our results based on different definitions of Medicaid expansion and data through 2017, a time frame that captures a period of time when opioid deaths were growing rapidly, suggest that this was not the case. We find no effect of Medicaid expansion on opioid death rates. Our results are robust to a number of specifications and a falsification test. This finding is similar to Sharp et al. (2018) and Saloner et al. (2017) whose analyses of Medicaid prescribing data indicate that there was no effect of Medicaid expansion on prescription opioid use. One possible explanation for these findings is that the two opposing effects (increased access and increased treatment) wash each other out. Finally, we note that while we are using state-level data for our analysis, a more robust analysis would use individual-level data to analyze a causal link between Medicaid expansion and opioid deaths. Such an analysis would allow controlling for individual characteristics such as gender, race, and age which might also be predictors of opioid use. We leave this for future work.

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Table 1: Treatment Groups

2014[6]	Additions post-2014[7]
Arizona**	Alaska
Arkansas*	Indiana
California**[$]	Louisiana
Colorado**	Montana
Connecticut**[$]	Pennsylvania
Delaware	
Hawaii**	
Illinois**	
Iowa**	
Kentucky*	
Maryland**	
Massachusetts	
Michigan*	
Minnesota**[$]	
Nevada*	
New Hampshire*	
New Jersey**[$]	
New Mexico*	
New York	
North Dakota*	
Ohio*	
Oregon**	
Rhode Island**	
Vermont	
Washington**[$]	
Washington, D.C.[$]	
West Virginia*	

Note: Remaining states are in the control group.

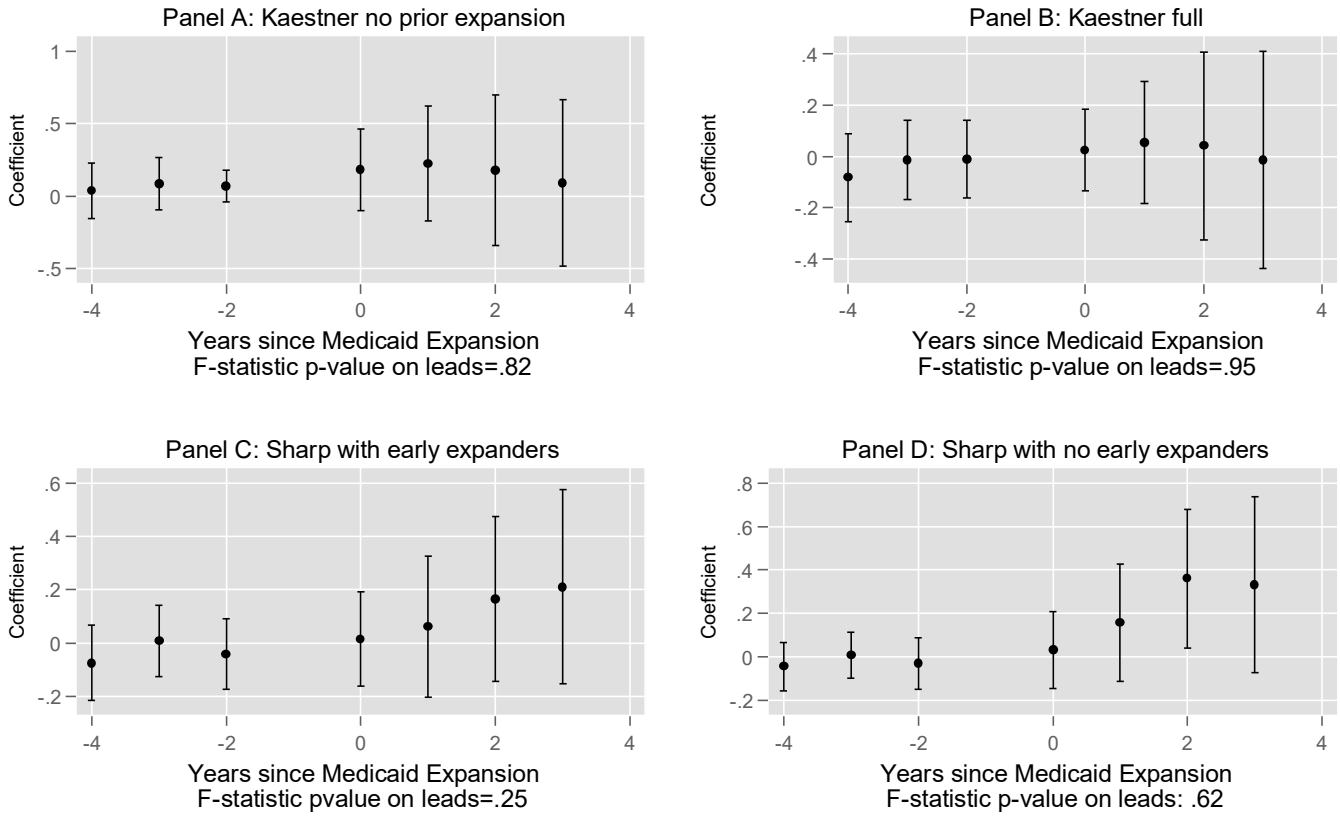
[6] These states were used by Courtemanche et al. (2017).
[$] Early Medicaid expanders: CT and DC 2010; CA, MN, NJ and WA 2011. Based on https://www.cms.gov/mmrr/Downloads/MMRR2013_003_04_a02.pdf (2013).
[7] Expanded after 2014 (in treatment group for those years): PA, IN and AK 2015; LA and MT, 2016. Both of these columns represent the definition of expansion used by Sharp et al. (2018).
* Based on Kaestner et al. (2017), we limit our treatment group to those states who implemented an expansion in 2014 and had no prior expansion.
* & ** Full Kaestner et al. (2017) treatment group.

Table 2: Diff in Diff Results, N=402; Fraction enrolled N=347. Mean log opioid-related mortality = 8.351 (6.5925)

	Measure of Treatment (Medicaid Expansion)					
Y= log opioid-related mortality VARIABLES	Sample Means (Std. dev)	Kaestner No prior expansion	Kaestner full	Sharp with earlier expansions	Sharp with no earlier expansions	Fraction of State Pop. Enrolled in Medicaid
Medicaid expansion		0.095	0.060	0.030	0.137	0.010
		(0.183)	(0.124)	(0.108)	(0.103)	(1.012)
State passed MML (Binary)	.4461 (.4977)	0.334**	0.331**	0.333**	0.303**	0.318**
		(0.111)	(0.111)	(0.117)	(0.111)	(0.107)
State passed MAPDMP (Binary)	.1544 (.3618)	0.100	0.111	0.101	0.083	0.062
		(0.095)	(0.091)	(0.101)	(0.095)	(0.093)
State passed Naloxone access (Binary)	.3946 (.4894)	0.039	0.042	0.040	0.041	0.068
		(0.086)	(0.085)	(0.087)	(0.087)	(0.077)
Food insecure (%)	14.4798 (3.3462)	-0.001	-0.000	-0.000	-0.000	-0.002
		(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
% low-income uninsured children	3.9243 (2.3543)	0.058**	0.058*	0.056**	0.058**	0.046*
		(0.021)	(0.022)	(0.020)	(0.021)	(0.021)
Max. TANF benefit family of 3 ($)	439.7181 (167.7281)	0.000	0.000	0.000	0.000	-0.001
		(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Max. SNAP benefit 3 person family ($)	525.473 (50.7679)	-0.003	-0.003	-0.003	-0.003	-0.006**
		(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
Democrat governor (Binary)	.3995 (.4904)	-0.087	-0.095	-0.097	-0.096	-0.088
		(0.081)	(0.081)	(0.079)	(0.079)	(0.074)
Max. EITC payment 3 person family ($)	6040.5 (231.2462)	0.000	0.000	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
State minimum wage ($)	7.6624 (.9647)	0.037	0.027	0.034	0.009	0.041
		(0.078)	(0.082)	(0.079)	(0.078)	(0.093)
Nonwhite (%)	.2109 (.1375)	-6.154	-6.263	-6.073	-6.646	-2.758
		(4.249)	(4.179)	(4.213)	(4.214)	(3.480)
Age 18 to 24 (%)	.089 (.0099)	-4.566	-4.060	-3.587	-2.621	-0.037
		(7.819)	(7.937)	(7.820)	(7.797)	(6.355)
Hispanic (%)	.0888 (.0876)	9.100	8.574	8.504	8.607	6.541
		(5.901)	(5.812)	(5.872)	(5.627)	(6.072)
Less than high school (%)	.2902 (.0331)	-11.944**	-12.029**	-12.353**	-11.966**	-11.253*
		(3.970)	(3.768)	(4.017)	(3.943)	(4.479)
Constant		6.720	6.953	6.954	7.225	8.233**
		(3.588)	(3.696)	(3.672)	(3.741)	(2.652)
Mean of Medicaid expansion variable		.0882 (.284)	.2157 (.4118)	.3456 (.4761)	.2966 (.4573)	.1943 (.059)

Robust standard errors clustered at the state level in parentheses. All models include state and year fixed-effects. MML=medical marijuana law, MAPDMP=must access prescription drug monitoring program, TANF=Temporary Assistance for Needy Families, SNAP=Supplemental Nutrition Assistance Program, EITC=Earned Income Tax Credit. See Table 1 for full details of treatment groups.
** p<0.01, * p<0.05

Figure 1: Trends in Opioid Fatalities, Differing Treatment Groups



Figures report point estimates and 95% confidence intervals. The year of adoption (0 on above figures) is the year a state elected to expand Medicaid if it did so.

Opioid Death Rates

Figure 2a

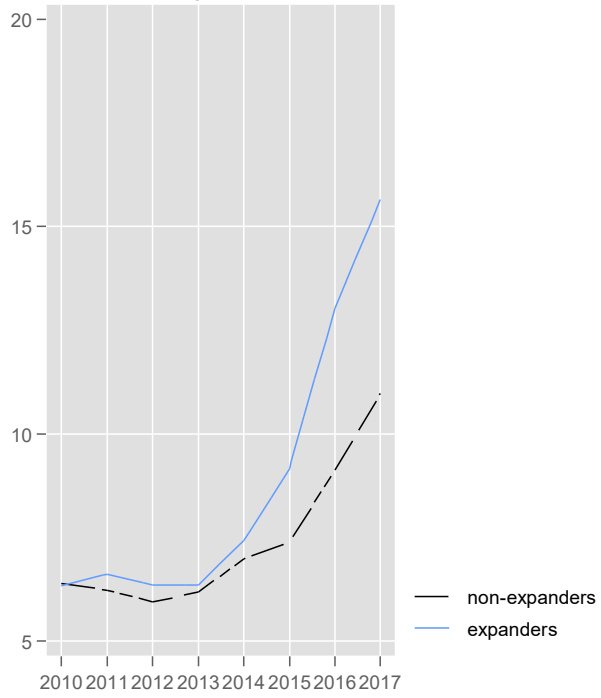
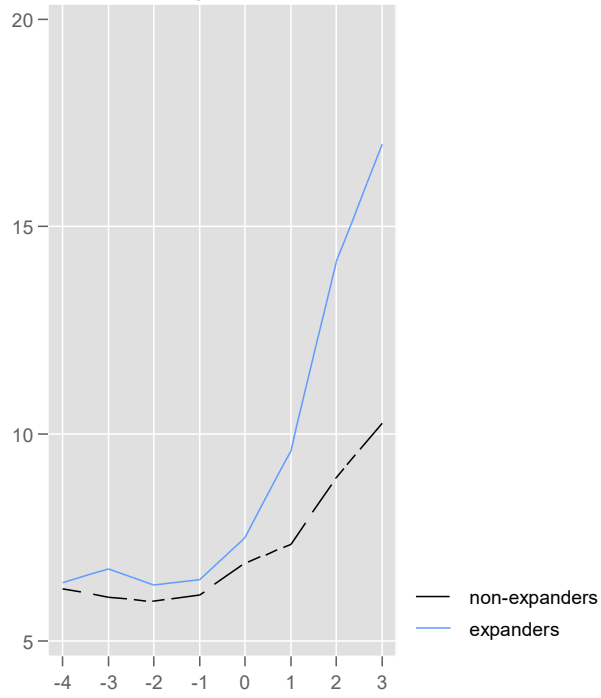


Figure 2b



Both figures depicts time trends in opioid death rates. In Figure 2b, they are centered at 2014 for all states except AL, IN, LA, MT, and PA who expanded after 2014