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Does Medicaid expansion influence county health spending? A case of New York counties

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Abstract

We investigated the impacts of Medicaid expansion on New York county total health spending and specifics of health spending, including health services, public health facilities and public health administration. Little research considered the financial effect of Medicaid expansion on local governments while well reported are its influences on uninsured rates and health services utilization. New York counties have contributed to health in their boundaries by providing or funding public health services, and supporting a part of the non-federal share of Medicaid expenditures and uncompensated care. Medicaid expansion can reduce the size of county expenditures for health by enrolling more previously uninsured population in the program and offering more generous federal funding for the expanded Medicaid. We offer empirical evidence that Medicaid expansion was associated with reduced county health spending.

Keywords: Health spending; local government; Medicaid expansion

1. Introduction

Medicaid expansion has been reported to reduce the levels of uninsured rates and increase health services utilization among low-income people. Another important aspect of the program is its financial effect on localities. Local governments have been deeply involved in providing and financing public health services and programs related to uninsured and insured populations. Meanwhile, the federal government mostly pays costs for the newly enrolled Medicaid beneficiaries. We investigated how expanded Medicaid coverage shapes overall levels of county health spending and the extent of specified health-spending areas, including public health services, mental health services, health facilities and health administration.

Several reasons allow us to emphasize counties among the levels of localities in the context of New York State. First, New York counties have been fiscally constrained by Medicaid as well as dealing with indigent populations' health. The state has the second largest Medicaid enrollment next to California with total Medicaid spending amounting to \$74 billion in 2018 (KFF, 2020a). New York county contribution mandate has required counties to fund the non-federal share of Medicaid expenditures while other localities in over 20 states did not contribute to the share in 2012 (GAO, 2014; NACo, 2020). It is no surprise that financing Medicaid is one of the most conflictual intergovernmental issues in the state. New York state government had capped the increase of county Medicaid contribution at 3 points between 2006 and 2014 and has frozen the local share since 2015, which was enacted in 2012 (Hammond, 2018). Recently, the state has pushed counties to take more fiscal responsibility for Medicaid (McKinley and Ferré-Sadurní, 2020). The ACA Medicaid expansion has shifted state fiscal responsibility for the program to the federal government, to be addressed below, which will possibly affect New York county health spending.

Moreover, New York counties are cutting-edge entities in financing health services, as well as being front-line entities in delivering public health services (Lobao and Kraybill, 2005; Lobao *et al.*, 2012), compared to cities in the state. Table 1 indicates trends in local government spending on health in all counties, compared to all cities¹ in the state of New York. Between 2008 and 2019, on average, all counties have expended \$1735 million, 7.17% of total expenditures, while all cities have put in \$1.99 million, 0.04% of total expenditures. In FY 2019, which is the last year of our time span, all counties have spent \$1624 million, 6.22% of total all county expenditures. Thus, we focus on New York counties in the investigation of the relationship between Medicaid expansion and local spending on health.

2. Medicaid expansion and county health spending

Medicaid is a public insurance program for low-income individuals and families, jointly funded by the federal and state governments. The ACA extended Medicaid coverage to all adults under 65 years with incomes of 138% or less of the federal poverty line (MACPAC, 2019). The Supreme Court's decision on *NFIB v. Sebelius* has given states an optional choice for the expanded Medicaid. New York has begun implementing Medicaid expansion in 2014. Recent research approves the effects of Medicaid expansion on reductions in uninsured rates among low-income people and increased health services utilization (KFF, 2019).

Medicaid expansion can reduce the size of county expenditures for health by enrolling more previously uninsured population in the program and providing more generous federal funding for the expanded Medicaid. First, New York Medicaid program has over 1.8 million expansion group enrollment as a result of the ACA Medicaid expansion, over 30% of total Medicaid enrollment (approximately 6 million) in the state as of June 2019 (KFF, 2020b). This coverage means that Medicaid expansion has contributed to a decrease in uninsured people, which has been burdening county governments (KFF, 2013). Second, the federal government covered 100% of Medicaid expenditures for the newly eligible, non-elderly group during 2014–2016 and gradually reduced the funding to 90% by 2020 (HHS, 2013). Medicaid expansion can partly pass county expenditures for previously uninsured people to the federal government (Maclean and Saloner, 2019), which could mitigate the levels of county health spending.

We consider the extent of county health spending because of the empirically significant relationship between county expenditures for health and their residents' health outcomes (e.g. Mays *et al.*, 2009; Meyer *et al.*, 2012; Singh, 2014; Bradley *et al.*, 2016; Leider *et al.*, 2018). In other words, varied levels of public health funding and its allocation will affect organizational capacity, which is an essential determinant of health outcomes (e.g. Mays *et al.*, 2009; Meyer *et al.*, 2012). However, much scholarly scrutiny has not yet been focused on what factors are associated with varied levels of local government expenditures on health. Especially, little research has paid attention to the effects of Medicaid expansion on county health spending while prior research reports that Medicaid expansion would not be related to increases in state expenditures (Sommers and Gruber, 2017) and could offset state and county costs in behavioral health services and others (e.g. Grady *et al.*, 2017; Maclean and Saloner, 2019). We will inform researchers and policymakers at all levels of governments how a state-level decision, Medicaid expansion, would be associated with local governments' contribution to public health, possibly impacting future health outcomes.

Moreover, we consider specifics of local government health spending, including total health spending, public health services, mental health services, miscellaneous public health, public health facilities and public health administration. It is because '(a) better understanding of how public health funds are used and their impact on service delivery and outcomes is needed to allow policymakers to make more informed decisions about the nation-wide investments in public health' (Mays *et al.*, 2009: 260). The six indicators allow researchers (1) to provide an overview of county health spending (total health spending); (2) to investigate how Medicaid

¹We excluded the city of New York which generates an overestimated average of health spending.

Table 1. County vs city spending on health (million, the percent of health spending)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
All counties	2027	2016	1926	1854	1813	1668	1590	1569	1553	1561	1614	1624	1735
Total	23.086	23.089	23.287	23.390	23.797	23.759	24.079	24.378	24.783	25.105	25.536	26.123	24.201
%	8.78	8.73	8.27	7.93	7.62	7.02	6.6	6.44	6.27	6.22	6.32	6.22	7.17
All cities	4.8	4.1	3.1	2.3	1.3	1.1	1.1	1.1	0.8	0.7	1.5		1.99
Total	4397	4477	4581	4609	4647	4853	4972	5162	4993	5234	5193		4829
%	0.11	0.09	0.07	0.05	0.03	0.02	0.02	0.02	0.02	0.01	0.03		0.04

Source: New York Open Book by the Office of the State Comptroller (<http://www.openbooknewyork.com/>).

Note: These data excluded local governments in the New York city due to their particularity.

expansion influences the size of county health services and programs to improve residents' public health and mental health (public health services, mental health services and miscellaneous public health); (3) to test how Medicaid expansion is related to county spending on public health service supervision and administration (public health administration) and (4) to examine the relationship between Medicaid expansion and the amount of county spending on public health facilities.

The Open Book New York defines public health facilities to include hospitals, nursing homes and medical centers. There is no report on New York county variation in public health facilities to our knowledge. To provide in-depth knowledge on the public health facilities in New York, we selected three counties of Erie (Buffalo), Monroe (Rochester) and Onondaga (Syracuse) encompassing the cities with the largest populations in Upstate New York and explored their 2016 budget documents to see public health facilities there. Among the three cities, only Monroe county has a publicly owned hospital (Monroe community hospital), which is also utilized as nursing home facility while Onondaga county has no longer owned Van Duyn Home and Hospital since 2013. In addition, Monroe and Onondaga counties have county clinics for Tuberculosis, STD, immunization, and foster care while Erie county budget report indicates Mental Health Forensic Clinics to provide direct services to the criminal justice system.

3. Methods

3.1 Data and analysis

We use New York open books as primary data sources to extract financial information. The office of the New York state comptroller annually issues an open book that shows financial information pertaining to agency/business unit, fund type, major fund, fund, budgetary program, account and budget year. New York counties self-report this financial information via the Public Authorities Reporting Information System (PARIS), which is a data entry and collection tool. The self-financial reporting embraces municipal monthly cash and annual cash flows, financial condition, Comprehensive Annual Financial Reports (CAFRs) and executive and enacted budget reviews. Among these reports, CAFRs are our data sources for financial information because we try to acquire county health expenditures, revenue structure, intergovernmental revenues and financial condition indicators, in accordance with Generally Accepted Accounting Principles. The open book is paired with the American Community Survey (ACS) which offers socio-demographic and economic variables.

Our model covers 12 years from 2008 to 2019 and 57 counties in the State of New York. The financial data for years before 2007 were not available online because the New York comptroller has adopted the PARIS since 2008 and collected financial information with a paper form before this adoption. A paper form-based data may produce an unexpected error and typos. This possibility allows us to choose a limited period from 2008 to 2019. Furthermore, some counties with a large scale of expenditures and revenues may generate biased results for the relationship between Medicaid expansion and county health expenditures. We excluded New York County (Manhattan), Kings County (Brooklyn), Bronx County (The Bronx), Richmond County (Staten Island) and Queens County (Queens). Thus, the number of samples is 684 (12 years \times 57).

We cannot construct a difference-in-difference model which includes treatment groups and control groups because all New York counties accepted Medicaid expansion in the same year, 2014. Thus, our approach focuses only on the before-and-after effect of Medicaid expansion. An analytical method is the two-way fixed-effects with robust standard errors. Additionally, we adopted the Arellano–Bond dynamic panel analysis to see the robustness of the results as attached in Appendix A. The former way can alleviate a possible issue of heteroskedasticity for some control variables regarding socio-demographic information. In another issue, incrementalism generates an autocorrelation problem where health expenditures in a current year may be over-identified by those in the previous year. Thus, we further run the Arellano–Bond analysis to adjust possible autocorrelation and endogeneity problems (see Arellano and Bond, 1991).

Both models allow us to see the robust results on the relationship between Medicaid expansion and county health spending.

3.2 Variables and measurement

The dependent variables are total health spending, public health, mental health, other health, public health facility and health administration expenditures. Total health spending indicates 'total amount of expenditures related to the conservation and improvement of health'. Public health spending covers 'total amount of expenditures in support of the operation of local public health programs'. Mental health spending indicates 'total amount of expenditures related to the operation of comprehensive psychiatric emergency programs licensed by the commissioner of mental health'. Other health spending is miscellaneous of health services and activities (Open Book New York 2019). Public health facility spending shows 'total amount of expenditures for various public health facilities including hospitals, nursing homes, and medical centers' in a county. Health administration spending denotes 'total amount of expenditures for supervision and administration associated with public health'. All dependent variables are per capita health spending. The key independent variable is Medicaid expansion. Pre-Medicaid expansion years from 2006 to 2013 are coded as '0', whereas post-expansion years from 2014 to 2019 are coded as '1'.

In what called 'fiscal federalism', higher levels of governments can modify the scale of inter-governmental revenues by considering administrative burdens of subnational governments (Oates, 1972, 1999; Barlow, 1977). Medicaid expansion may lead the federal and state governments to increase or decrease intergovernmental revenues, thereby influencing the scale of local public expenditures. Thus, as other independent variables, two interaction terms between Medicaid expansion, and federal and state aids in health are included in the models.

Control variables are fiscal supplies and demands which lead to a variation in public health expenditures. On the side of fiscal supplies, the State of New York has imposed property tax limits on county governments since 2012. Pre-adoption years from 2008 to 2011 are coded as '0', whereas post-adoption years from 2012 to 2019 are coded as '1'. Revenue diversification is indicated by Herfindahl–Hirschman index (HHI). The HHI is composed of property taxes, sales taxes, income tax, other taxes, intergovernmental revenues, service charges, license and permit fees, fines and forfeitures and other miscellaneous revenues. If revenue sources are equally diversified, the HHI is 1; on the contrary, the HHI is 0 if counties rely only on one revenue source. Intergovernmental revenues may fluctuate the level of public spending. We adopt per capita federal and state health aids (hereafter, federal and state aids)² to control for intergovernmental relationship. Governments with a good fiscal state tend to expand the scale of public expenditures (Park *et al.*, 2018). For financial condition, we first employ budget solvency calculated by total general fund revenues as a percentage of total general fund expenditures. The second financial condition indicator is long-run solvency measured by per capita long-term liability regarding general obligation bonds. Finally, per capita full value represents a revenue-raising capacity for counties to increase the level of public expenditures.

Governments may raise public expenditures to fulfill public demands. On the fiscal demand side, drug-poisoning death rate, uninsured rate, total population, young population, elder population, poverty family, racial diversity, unemployment rate, median income and education

²The federal and state aids are composed of formula grants and competitive grants, according to how subnational governments award the funds (GAO, 2012). The scale of formula grants varies depending on the extent to which subnational governments have service recipients, while such subnational governments need matching funds to receive more competitive funds. The primary cost of formula funds is the Medicaid program which offers benefits for low-income people who acquire health insurance, whereas competitive grants are transferred rarely to health services, but mostly to transportation and economic development programs (CBO, 2013). Our interest is only the formula aids as we adopt only federal and state health aids.

attainment are adopted to control for public requests (see Table 2). We consider drug-poisoning death rates and uninsured rates which produce medical costs. Drug-poisoning death rates are calculated by the number of drug-poisoning deaths per 100,000 total residents. The next variable represents uninsured people as a percentage of total population. It is argued that a higher level of population leads governments to spend more financial resources (Park, 2013). Also, young and elder population may generate additional medical costs which impose fiscal burdens on counties. Poverty family and racial diversity are considered parameters to estimate the scale of public spending (Park *et al.*, 2018). These variables are captured by a percentage of families and people below the poverty level and a percentage of non-white population, respectively. It is highly possible that unemployed people do not have a health insurance. We use unemployment rate as another demand variable. Residents with a higher level of median income and education pay more taxes than others in general. These taxpayers want to receive a high quality of public services (Mofidi and Jou, 2011). Thus, median income and education attainment are adopted to control for fiscal demands.

Several questions can merit future research on the effects of Medicaid expansion on county health expenditures. We focus on New York counties, but not on counties at the nation-wide level. A cross-section of counties may show a different aspect of Medicaid expansion effect. This limitation may produce biased results of Medicaid expansion effect. Second, this study could not consider New York State's recent attempt to pass larger public health spending to counties, as reported in McKinley and Ferré-Sadurní (2020) due to the research period. Third, the case of New York counties constrains our methodology. We do not adopt a difference-in-differences research design. New York state has begun to implement Medicaid expansion across all New York counties in 2014 so that we cannot classify treatment and control groups. Furthermore, our data may be biased as each county may inconsistently code financial information and also, may have different criteria as to what budget items are included in health spending (e.g. jail costs for health care). Finally, the models may not embrace all possible control variables due to data availability.

4. Findings

We found the differences in per capita public health spending between the pre- and post-Medicaid expansion, showing that most health items decreased by \$4,924 (public health), \$15.95 (other health), \$9.525 (health facility) and \$12.795 (health administration), respectively, but mental health spending increased by \$8,052. Furthermore, Table 3 illustrates that, compared to the pre-Medicaid expansion, per capita federal aids decreased by \$8,537, but state aids increased by \$16,952 in the post-Medicaid expansion. New York counties lost financial resources from federal aids and also, cut public health expenditures from 2014 to 2019. However, uninsured rate decreased by 7% at the same period. A driving force behind this result might be Medicaid expansion.

We have two equations for the health-spending models. The fixed-effects estimator in Table 4 shows that Medicaid expansion has significantly negative effects on all types of public spending regarding health administration, general health, mental health, health facility and other health costs. The Arellano–Bond estimator is employed to see the robustness of these results. Medicaid expansion has significantly negative associations with all public health spending (see Appendix A).

The fixed-effects estimator in Table 4 shows that Medicaid expansion led to reductions in all types of public health expenditures, particularly for total health spending, and public health, mental health, other health, public health facility and health administration expenditures. We found that Medicaid expansion led to a 5.68% decrease in per capita health facility spending, followed by public health (3.06%), health administration (1.526%), other health (0.466%) and mental health (0.389%).

The results show that the relationships between property tax cap, and other health and health facility expenditures are negative and statistically significant, but this association is reversed in

Table 2. Variables, measures, and expected signs

Variables	Description	Expected sign	Data sources
Dependent variables			
Per capita public health spending	Total health expenditures/population	N/A	New York open book
	Public health expenditures/population		
	Mental health expenditures/population		
	Other health expenditures/population		
	Health administration expenditures/population		
Independent variable			
Medicaid expansion	Medicaid expansion since 2014 (1: Medicaid expansion adoption from 2014 to 2019)	–	New York open book
Control variables			
Property tax cap	Property tax cap since 2012 (1: Property tax cap adoption from 2012 to 2019)	±	
Revenue diversification of nontax revenue sources	Herfindahl–Hirschman index (HHI) ranging from 0 to 1 – property taxes, sales taxes, income tax, other taxes, intergovernmental revenues, service charges, license and permit fees, fines and forfeitures and other miscellaneous revenues) (1: The identical share of general revenues)	+	New York open book
Per capita federal aid	Federal aid for health services/population	+	
Per capita state aid	State aid for health services/population	+	
Budget solvency	Total revenues/total expenditures	+	
Long-run solvency	Long-term liability/population	–	
Per capita full value	Full value/population	+	
Form of government	Non-elected leader based form and elected leader based form (1: County administrator, county manager, board chair, 0: County executive)	±	New York State Association of Counties
Drug-poisoning death rate	The number of drug-poisoning deaths per 100,000 total population	+	ACS
Uninsured rate	% of uninsured population	+	
Population	Total population	+	
Young population	Total population under 18	+	
Elder population	Total population over 65	+	
Poverty family	% of families and people below the poverty level	+	
Racial diversity	% of non-white population	+	
Unemployment rate	% of unemployment over 16 years old	+	
Median income	Median income	–	
Education attainment	% of high school graduates	–	

Note: The financial variables are considered constant dollars using Consumer Price Indexes by the Bureau of Labors (Baseline year 2009 = 100).

Table 3. Averages of public health spending and health demands between the pre-Medicaid expansion, 2008–2013 and post-Medicaid expansion, 2014–2019

Categories	Pre-Medicaid expansion	Post-Medicaid expansion
Total health spending ^a	234.847	215.256
Public health	32.047	27.123
Mental health	56.797	64.849
Other health	129.474	113.524
Health facility	105.372	95.847
Health administration	40.629	27.834
State aid	60.764	77.716
Federal aid	20.527	11.990
Uninsured rate	0.157	0.087

^aAll financial variables are per capita spending.

mental health spending. In the post-property tax cap, New York counties reduce 0.427 and 0.091% in health facility spending and other health spending, respectively, but increase a 0.048% in mental health spending. As another control variable, revenue diversification has a significantly positive effect on other health spending. New York counties with a diversified revenue structure increase a 0.186% in other health spending. Per capita federal and state aids are positively associated with mental health spending. We found that, in the two-way fixed effects model, each additional 1% in federal and state aids generated 0.009 and 0.022% increases in mental health spending, respectively, in New York counties. The association between budget solvency and mental health spending is positive and statistically significant. Each 1% budget surplus generated a 0.055% increase in mental health spending.

With respect to the demand variables, population has a significantly positive connection with health administration spending. Each additional 1% in total population produces a 4.551% increase in health administration. The relationships between young population and family poverty, and mental health and other health spending are positive and statistically significant. New York counties with each 1% increase in young population and family poverty ratios spend more mental health spending (1.242 and 0.247%, respectively) and other health spending (1.283 and 0.209%, respectively). Also, elder population has significantly a positive effect on other health spending. Each 1% elder population ratio generated a 2.011% increase in other health spending. Racial diversity is negatively associated with health facility spending. This association is statistically significant. New York counties with each 1% non-white population reduce health facility spending (5.698%). Although unemployment rate has a significantly negative association with public health spending, this association is positive and statistically significant in health facility spending. Each 1% unemployment rate generated a 3.573% in public health spending, but a 7.041% increase in health facility spending. Median income has a significantly positive effect on all types of public health spending. New York counties with each additional 1% median income increase public health (2.925%), mental health (0.261%), other health (0.409%), health facility (3.973%) and health administration (1.008%). Finally, the relationships between education attainment, and other health and health facility spending are positive and statistically significant. Each 1% high school graduation generated a 0.701 and 8.019% increases in other health and health facility spending, respectively.

As shown in Table 5, we adopted the fixed-effects estimator with interaction terms between Medicaid expansion, and federal and state aids. The interaction term between Medicaid expansion and federal aids has a significantly negative effect on health facility spending, but this relationship is reversed in health administration spending. The result indicates that federal aids

Table 4. Fixed effects regression results of Medicaid expansion effects on health expenditures

Variables	Total health spending		Public health		Mental health		Other health		Health facility		Health administration	
	Coef.	Robust SE	Coef.	Robust SE	Coef.	Robust SE	Coef.	Robust SE	Coef.	Robust SE	Coef.	Robust SE
Lagged dependent variable	0.628***	0.105	0.254	0.217	0.742***	0.085	0.780***	0.050	0.871***	0.072	0.604***	0.078
Medicaid expansion	-0.903**	0.406	-3.060**	1.536	-0.389**	0.167	-0.466**	0.225	-5.68**	2.809	-1.526**	0.677
Property tax cap	-0.037	0.028	-0.128	0.091	0.048**	0.021	-0.091**	0.036	-0.427*	0.234	-0.076	0.085
Revenue diversification	-0.230	0.239	-0.466	0.484	0.038	0.082	0.186**	0.079	1.780	1.150	0.422	0.486
Per capita federal aid	-0.000	0.004	0.006	0.010	0.009**	0.003	0.005	0.004	-0.038	0.025	-0.002	0.008
Per capita state aid	0.021**	0.009	0.039	0.028	0.022**	0.008	-0.004	0.008	-0.033	0.040	0.013	0.020
Budget solvency	-0.004	0.039	-0.029	0.127	0.055**	0.016	0.023	0.036	0.278	0.536	0.042	0.069
Long-run solvency	-0.000	0.000	-0.020	0.018	-0.000	0.000	-0.000*	0.000	-0.008	0.006	0.001	0.001
Per capita full value	0.262	0.186	0.337	0.535	-0.021	0.079	0.055	0.097	0.067	1.055	0.278	0.244
Drug-poisoning death rate	0.002	0.003	0.020	0.014	-0.000	0.002	-0.002	0.002	-0.008	0.021	-0.007	0.004
Uninsured rate	0.528	0.362	1.449	1.839	0.261	0.211	-0.086	0.269	3.565	3.006	0.228	0.783
Population	-1.672	1.772	4.474	3.496	-0.585	0.453	0.423	0.489	-2.173	4.977	4.551*	2.705
Young population	0.201	1.178	0.350	4.411	1.242*	0.630	1.283*	0.742	-0.611	8.336	1.394	2.586
Elder population	0.558	1.155	1.884	3.807	0.675	0.509	2.011**	0.581	1.950	10.568	3.049	2.913
Poverty family	-0.390	0.416	0.960	0.893	0.247**	0.112	0.209*	0.114	0.293	1.208	-0.229	0.437
Racial diversity	0.951	0.670	2.226	1.739	-0.053	0.170	0.178	0.198	-5.689*	3.086	1.444	1.528
Unemployment rate	0.652	0.479	-3.573**	1.185	-0.283	0.197	0.045	0.237	7.041**	2.984	-0.532	0.902
Median income	0.478*	0.265	2.925**	1.216	0.261**	0.126	0.409**	0.179	3.973*	2.105	1.008*	0.536
Education attainment	1.336**	0.639	-1.539	1.573	-0.041	0.314	0.701*	0.356	8.019**	3.265	0.621	1.331
Constant	4.303	9.092	-36.042	22.469	1.709	2.496	-5.204**	2.471	-17.029	35.544	-29.824**	14.302
Year effects	Yes		Yes		Yes		Yes		Yes		Yes	
Hausman test	98.97***		187.37***		92.88***		63.88***		44.70***		54.96***	
R ² (within)	0.611		0.293		0.729		0.938		0.737		0.625	
F	95.27***		19.14***		65.58***		2082.32***		65.18***		50.16***	

***p < 0.01, **p < 0.05, *p < 0.10.

Table 5. Fixed effects regression results of Medicaid expansion effects on health expenditures with interaction terms

Variables	Total health spending		Public health		Mental health		Other health		Health facility		Health administration	
	Coef.	Robust SE	Coef.	Robust SE	Coef.	Robust SE	Coef.	Robust SE	Coef.	Robust SE	Coef.	Robust SE
Lagged dependent variable	0.622***	0.104	0.255	0.218	0.726***	0.077	0.777***	0.050	0.853***	0.073	0.599***	0.078
Medicaid expansion	-0.966**	0.402	-3.203**	1.467	-0.482**	0.184	-0.479**	0.228	-5.515**	2.684	-1.702**	0.660
Property tax cap	-0.044	0.027	-0.147	0.094	0.034	0.021	-0.098**	0.037	-0.443*	0.239	-0.091	0.088
Revenue diversification	-0.245	0.247	-0.391	0.483	0.033	0.084	0.179**	0.080	1.768	1.114	0.492	0.487
Per capita federal aid	0.002	0.004	-0.002	0.013	0.009**	0.003	0.006	0.005	0.001	0.026	-0.012	0.008
Per capita state aid	0.016	0.012	0.033	0.039	0.014*	0.008	-0.008	0.010	-0.067	0.073	0.004	0.024
Medicaid × Federal aid	-0.007	0.008	0.023	0.021	-0.000	0.003	-0.001	0.004	-0.093*	0.054	0.027*	0.014
Medicaid × State aid	0.014	0.013	0.002	0.045	0.019*	0.010	0.008	0.008	0.113	0.138	0.016	0.027
Budget solvency	-0.000	0.040	-0.025	0.122	0.062**	0.018	0.026	0.036	0.315	0.549	0.047	0.074
Long-run solvency	-0.000	0.000	-0.020	0.019	-0.000	0.000	-0.000*	0.000	-0.009	0.006	0.002**	0.001
Per capita full value	0.274	187	0.308	0.533	-0.010	0.080	0.055	0.098	0.112	1.004	0.301	0.259
Drug-poisoning death rate	0.002	0.003	0.020	0.014	-0.000	0.002	-0.002	0.002	-0.014	0.020	-0.006	0.005
Uninsured rate	0.551	0.379	1.620	1.893	0.351*	0.204	-0.067	0.281	3.232	2.701	0.465	0.806
Population	-1.503	1.766	4.715	3.842	-0.336	0.422	0.547	0.460	-0.240	4.880	4.363	2.741
Young population	-0.004	1.189	0.037	4.458	0.972	0.623	1.159	0.724	-3.230	8.285	1.089	2.385
Elder population	0.502	1.143	1.478	3.931	0.472	0.592	1.932**	0.580	0.557	10.952	2.180	2.669
Poverty family	-0.394	0.412	0.988	0.875	0.238**	0.114	0.198*	0.110	0.031	1.134	-0.255	0.427
Racial diversity	1.007	0.693	1.958	1.787	-0.038	0.180	0.182	0.207	-5.590*	3.163	1.234	1.498
Unemployment rate	0.630	0.507	-3.630**	1.175	-0.366*	0.191	-0.000	0.244	7.094**	3.163	-0.780	0.924
Median income	0.497*	0.266	3.049**	1.169	0.311**	0.138	0.406**	0.179	3.641*	2.044	1.153**	0.513
Education attainment	1.392**	0.643	-1.487	1.601	-0.035	0.302	0.702*	0.362	8.591**	3.537	0.556	1.255
Constant	3.345	9.096	-37.625	23.606	0.313	2.355	-5.740**	2.465	-24.908	34.269	-29.422**	14.620
Year effects	Yes		Yes		Yes		Yes		Yes		Yes	
Hausman test	99.96***		179.78***		106.40***		56.62***		46.09***		64.08***	
R ² (within)	0.613		0.296		0.733		0.939		0.742		0.629	
F	89.53***		20.43***		74.34***		2425.41***		113.07***		51.13***	

***p < 0.01, **p < 0.05, *p < 0.10.

undermine the negative relationship between Medicaid expansion and health facility spending, but strengthen the negative effect of Medicaid expansion on health administration spending. We also adopt another interaction term between Medicaid expansion and state aids. An increase in state aids led New York counties to reduce more mental health spending.

5. Discussion

The scale of public health spending can be a barometer to determine health outputs and outcomes (Mays *et al.*, 2009; Meyer *et al.*, 2012; Singh, 2014; Bradley *et al.*, 2016; Leider *et al.*, 2018). Especially, local governments are important financiers of public insurance and health programs and important health service providers through public hospitals and clinics. However, little scholarly research has been devoted to what factors are associated with the extent of local health spending. We consider Medicaid expansion as a factor affecting levels of local health spending because of the reduced size of uninsured people and generous federal funding for the program, which could be related to decreased levels of local health spending. The findings show that Medicaid expansion negatively impacted county health spending.

We investigated factors influencing, as well as total health spending, levels of specific health-spending items related to providing health services, operating public health facilities and overseeing and administering public health between 2008 and 2019. Medicaid expansion was negatively associated with overall extent of county health spending and also with specifics of public health spending. It is remarkable that public health administration spending to oversee and administer public health was negatively associated with Medicaid expansion. Since the Great Recession in 2008, state and local governments have reduced their public health workforces by one-quarter (Association of State and Territorial Health Officers, 2014; Krisberg, 2020). Our research indicates that county governments in New York considered also Medicaid expansion in the decision for the levels of public officials devoted to public health. As reported in Table 3, New York counties have slashed county expenditures for public health administration by 30% after Medicaid expansion, possibly negatively affecting health outputs and outcomes in their boundaries. County health departments in New York have been frontline entities to battle critical public health issues including COVID-19 and opioid addiction. Future research may want to investigate how reduced county public health capacity would be related to local responses to the public health emergencies as well as health outputs and outcomes.

In the investigation of the relationship between Medicaid expansion and county health spending, this study also tested the roles of fiscal supplies and demands. It is notable that the percent of budget solvency and revenue diversification, among the indicators of fiscal supplies, influenced mental health spending, not other expenditures. This means that counties considered Medicaid expansion as a decision factor to influence the levels of health spending, but this is not the case for some fiscal supplies such as long-run solvency and per capita full value. As fiscal demands, population, young population, elder population, poverty family, unemployment rate, median income and education attainment led New York counties to increase their health spending. The findings indicate that counties may sustain the levels of public health services by conserving the demands of service recipients. Surprisingly, New York counties with a diversified community and a higher level of unemployment rate decreased their spending on health facilities and public health, respectively. These counties may not have enough tax levies due to higher levels of racial diversity and unemployment rates, thereby reducing health program and infrastructure costs.

Oates (1972) argues that, in fiscal federalism, local spending is determined by the federal and state government decision on the scale of intergovernmental revenues. There are competitive views on this argument. On the one hand, fiscally decentralized governments have a lower level of public expenditures by achieving service efficiency (Tiebout, 1956; Ostrom and Ostrom, 1971). On the other hand, fiscal decentralization generates the flypaper effect where

localities with a higher level of intergovernmental revenues increase public expenditures to expand their administrative power (Turnbull, 1998). We adopt interaction terms between Medicaid expansion and federal and state aids in order to see the competitive views on fiscal federalism. There is a different aspect of fiscal federalism between federal and state aids in health. In the case of the interaction term between Medicaid expansion and federal aids, the results support both views on the fiscal decentralization and flypaper effect in fiscal federalism. If the federal government covers the costs of Medicaid, counties may have a room to reduce more health administration spending, but this is not the case for health facilities. Meanwhile, we found that a higher level of state aids may produce a room for counties to reduce more mental health spending. This result support the argument that fiscally decentralized governments can achieve service efficiency, reducing public expenditures.

This study suggests a shift of New York counties' fiscal responsibility for public health to New York State after the ACA Medicaid expansion. Followed by the shift of state fiscal responsibility for Medicaid expansion to the federal government (MACPAC, 2017), the downward-spending trend, as reported in this research, shows diminishing county health spending. Our in-depth analysis using the Open Book New York shows that the portion of state aids in health in county health spending has increased after the ACA Medicaid expansion. The state aids have accounted for, on average, 38.1% of total county health spending between 2014 and 2019, compared to 32.2% between 2008 and 2013. However, federal aids in health have explained 7.8% of county health spending after Medicaid expansion set in, compared to 11.5% before it. When local governments have less own-source revenues, they may have difficulty in addressing public health issues in a more timely and effective manner due to state budget cycle and politics. Along with counties' dwindling fiscal responsibility for public health, it has been observed that New York Department of Health has taken an increased role in enrolling Medicaid beneficiaries with 0.5 million (9.7%) in 2014 and over 3.4 million (56.5%) in 2020 signing up for the program through the New York State of Health in 2020 (Hammond, 2020), which is the health insurance marketplace created under the ACA. Thus, the ACA Medicaid expansion has made changes in how to finance New York county health spending and where to enroll Medicaid, as well as the extent of county health spending. Future research may want to track changes in the role of counties in Medicaid after the ACA Medicaid expansion across the U.S. states.

6. Conclusion

We delve into central issues related to county health policy and administration. First, our research introduced how local governments can contribute to ensuring residents' health. County governments are frontline entities in providing public health services, even though they have been regarded as 'forgotten governments'. Moreover, we offer empirical evidence that state decisions for the ACA Medicaid expansion can influence the extent of county health spending. In addition, the empirical evidence shows that this ACA Medicaid expansion effect may vary depending on the scale of federal and state health aids. This research invites future research to consider fiscal supplies and demands as factors affecting county health spending.

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Appendix A

Table A1. Arellano–Bond estimation results of Medicaid expansion effects on health expenditures

Variables	Total health spending		Public health		Mental health		Other health		Health facility		Health administration	
	Coef.	Robust SE	Coef.	Robust SE	Coef.	Robust SE	Coef.	Robust SE	Coef.	Robust SE	Coef.	Robust SE
Lagged dependent variable	0.427***	0.091	-0.435***	0.057	-0.275***	0.054	0.029	0.025	0.366***	0.060	0.030	0.056
Medicaid expansion	-0.048**	0.021	-0.164**	0.049	-0.040**	0.019	-0.040***	0.011	-0.244**	0.124	-0.072**	0.031
Property tax cap	-0.021	0.016	-0.035	0.033	-0.007	0.013	-0.031***	0.008	-0.001	0.082	-0.054**	0.021
Revenue diversification	-0.450**	0.204	-0.964*	0.575	-0.054	0.177	0.060	0.108	-1.391	0.988	0.714**	0.291
Per capita federal aid	0.002	0.007	-0.000	0.013	0.016**	0.006	0.006*	0.003	-0.020	0.032	-0.009	0.009
Per capita state aid	0.008	0.006	0.051***	0.014	0.019**	0.006	0.011**	0.003	0.008	0.035	0.002	0.009
Budget solvency	0.054	0.070	0.201	0.147	0.169**	0.063	0.119**	0.037	-0.281	0.359	0.111	0.082
Long-run solvency	0.000	0.000	-0.042	0.036	-0.000	0.000	-0.000	0.000	-0.001	0.003	0.002*	0.001
Per capita full value	-0.093	0.293	0.184	0.745	0.146	0.225	0.055	0.137	0.124	1.500	-0.089	0.400
Drug-poisoning death rate	-0.002	0.006	-0.012	0.013	-0.004	0.005	-0.005*	0.003	-0.076**	0.031	-0.019**	0.008
Uninsured rate	-0.143	0.453	-0.349	1.018	-0.111	0.406	-0.024	0.244	0.753	2.440	-0.954	0.694
Population	-4.552**	1.548	4.664	3.679	-2.834**	1.367	-0.196	0.801	1.492	8.572	3.413	2.151
Young population	-3.065	2.172	-6.924	4.816	2.475	1.792	4.278***	1.050	14.839	11.479	-1.889	2.682

Elder population	−3.213*	1.832	−7.224	4.652	1.571	1.461	2.956**	0.865	16.293	11.088	−5.959**	2.439
Poverty family	−0.480	0.406	−0.914	1.013	0.436	0.347	−0.231	0.210	3.603	2.349	0.454	0.510
Racial diversity	0.923	0.714	2.149	1.915	−1.898**	0.626	−0.028	0.401	9.067**	4.296	−0.697	1.045
Unemployment rate	0.066	0.185	0.054	0.420	0.051	0.157	0.098	0.094	0.767	0.924	−0.484**	0.241
Median income	0.391	0.264	1.597**	0.582	−0.211	0.216	0.158	0.129	−0.973	1.457	0.216	0.325
Education attainment	−0.641	0.891	−5.167**	2.020	0.603	0.761	−0.202	0.459	−1.94	5.465	0.707	1.160
Constant	24.780**	8.370	−22.014	19.546	15.461**	7.140	0.728	4.184	−6.862	45.836	−15.614	11.485
Year effects	No		No		No		No		No		No	
Wald	250.28***		144.71***		109.49***		5668.38***		103.77***		223.94***	

***p < 0.01, **p < 0.05, *p < 0.10.