Medicaid Expansion in Social Context: Examining Relationships Between Medicaid Enrollment and County-Level Food Insecurity

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Abbreviations
ACA = Affordable Care Act
ACS  = American Community Survey
FMAP = Federal Medical Assistance Percentage
FPL  = Federal Poverty Level
SNAP = Supplemental Nutrition Assistance Program
Abstract: **Objective.** To evaluate the relationship between states’ expansion of Medicaid and county-level food insecurity, testing for the moderating effects of social multipliers. **Methods.** We estimated the effect of county/state Medicaid characteristics (baseline enrollment, enrollment changes, and expansion timing) on county-level food insecurity during two expansion periods (2009-2012; 2012-2014) using a pre-post design among expansion states to control for political culture. **Results.** Increased county Medicaid enrollment in early expansion states was associated with lower food insecurity in 2012 ($b=-0.10\%$, $p=.02$). The impact of early expansion persisted into 2014 ($b=-0.06\%$, $p=.01$), suggesting a social learning effect. Focusing on a single state (California) to control more fully for socio-political norms revealed larger social multiplier effects. **Conclusions.** Medicaid expansion was associated with reduced food insecurity, the most pronounced associations evident in counties with the largest Medicaid expansions. Cross-county variation may reflect both social learning and social norms, though evidence for the latter is inconsistent.

Key words: Food security, Affordable Care Act, Medicaid, expansion, social multipliers.
Medicaid, the largest public health insurance program in the U.S., is designed to improve access to health care by eliminating or reducing out-of-pocket medical costs for its recipients. Medicaid’s uneven expansion under the Affordable Care Act has been a focal point for political debate and partisan dispute. Typically, health services research examines measures of utilization and health outcomes when evaluating this public insurance program. For example, recent studies that have explored the effects of Medicaid expansions have primarily focused on access, utilization, and outcomes of health care services.1–3

However, Medicaid enrollment provides potentially broader, indirect benefits to lower-income and financially insecure families in the form of enhanced financial protections. These protections increase the capacity to pay for other basic needs, including shelter, utilities and food.4,5 The financial effects themselves are already well-documented. The Oregon Medicaid Experiment, for example, examined the effects of coverage on several indirect outcomes (such as out-of-pocket cost burdens and medical debt) in addition to more traditional direct health and utilization outcomes (such as emergency department utilization).1 Indeed, evidence of these indirect benefits is represented in prior calculations suggesting that Medicaid’s financial protections make it the third largest anti-poverty program in the country.6

While some evidence does exist that expanding Medicaid coverage can affect indirect non-health outcomes, the literature is limited thus far. It is important to understand these broader social benefits, especially at a time when politicians and voters debate the viability and future of Medicaid expansion. To assess their impact, however, it is essential to recognize that social benefits emerge from a social context (i.e., the immediate and local setting that individuals reside in). This context must be carefully measured in order to appropriately assess the broader social impact of Medicaid expansions.
In this paper, we explore several aspects of Medicaid’s social context that may magnify the impact of expanded enrollment on the broader well-being of affected households. We test these effects using counties as the contextual environment and county-level measures of food insecurity as the outcome. This approach allows us to account for the moderating effects of social contextual factors of social norms (stigma), social learning (awareness), and broader political culture on Medicaid expansion and food insecurity.

**Conceptual framework.** First, we begin by considering the ways in which social context moderates how eligibility expansions in state-administered programs translate into enhanced financial protection for individual households. Next, we describe why food insecurity offers a useful litmus test for the social benefits that can emerge from Medicaid-enhanced financial security for low-income households.

**Social moderators of the impact of Medicaid expansion.** Expanding Medicaid is associated with impacts at the individual beneficiary and broader social levels. The expansion of eligibility magnifies the program’s direct social benefits of getting more people enrolled in the Medicaid program by delivering two spillover benefits. First, by providing enrollees with protection against out-of-pocket medical expenses, Medicaid preserves limited incomes for use on other basic needs and reduces the need for precautionary savings in anticipation of unexpected future medical bills.\(^1\) Second, when individuals enroll (or simply seek enrollment, even if they are ultimately deemed ineligible for benefits) they are often identified as eligible for other means-tested programs.\(^8\) In this way, communication and interactions among safety net programs can improve a variety of non-health outcomes.\(^9\) For example, previous Medicaid expansions during the first decade of the 2000s were shown to have increased participation in the Supplemental Nutrition Assistance Program (SNAP).\(^10\)
The literature has identified a variety of contextual factors that promote or inhibit take-up of Medicaid. These manifest in several distinctive social processes, related to stigma and learning. Although Medicaid is less stigmatized than most other means-tested public benefits in the U.S., it still engenders stigma for some users. This stigma is most notable in more conservative political jurisdictions which implement the program in ways that may feel demeaning to applicants or signal a question of deservingness for those seeking benefits. Take-up is also inhibited by limited public awareness of the program, a barrier that is likely to be most pronounced in areas where past participation has been limited.

The social variables of stigma and learning suggest two ways by which favorable local context can magnify the impact of eligibility expansions, factors that in the literature are referred to as “social multipliers.” The first is normative. Those who live in communities in which some potentially stigmatized behavior is more common experience less stigma than those who live in communities where that same behavior is rare. A comparable normative effect has been observed for Medicaid: unenrolled individuals who know enrolled community members are half as likely to report stigma associated with Medicaid participation as those who know no one who is utilizing the program.

A second form of multiplier involves social learning or awareness. The longer a program is in place, the more people will have been exposed to it and the greater the probability that any one member of the community will know others who have had past exposure. Social learning has been demonstrated to affect choices related to insurance enrollment in employer settings, but has not yet been studied for Medicaid. The impact of time on social awareness/learning is particularly relevant for Medicaid, since in any given two-year period, there is a 50% turnover rate in the eligible population. In other words, two years after an expansion of eligibility, the number of community residents who have been enrolled at some
point over the previous two years is 50% larger than the current enrollment count.
Consequently, the capacity for the community to learn about the program and collectively retain
information about that exposure dramatically increases over time.

Finally, Medicaid take-up will also be affected by the political culture of any given state. In politically conservative states, means-tested programs are viewed more skeptically. Recipients who use these programs are more subject to stigma. These attitudes shape the ways in which means-tested programs are administered, both making it more challenging for eligible individuals to sign up for Medicaid and, once they have done so, to access other means-tested programs that help with other basic needs.

The implementation of the Affordable Care Act (ACA) created a rich natural experiment for assessing the impact of Medicaid expansion and studying the moderating effects by social multipliers. The ACA’s original provisions established a minimum Medicaid income eligibility level across the country, set at 138% of the federal poverty level (FPL), to be implemented nationwide in 2014. The primary populations gaining eligibility included childless adults and low-income parents, whose eligibility had historically been set far less generously compared with coverage for children. However, the 2012 Supreme Court ruling in National Federation of Independent Business (NFIB) v. Sebelius replaced this federal mandate with a state option for eligibility expansion, adopted by 26 states as of January 2014.

This uneven geographic implementation created a natural comparison for examining the effects of Medicaid expansion. It was not the only source of geographic variation, however: there were two others. First, as part of the ACA’s original provisions, states were allowed to expand the Medicaid eligibility in advance of the 2014 target date for national expansion, with matched federal funding to support the expansion. Five states (California, Connecticut, New Jersey, Minnesota, and Washington) pursued this early expansion, covering almost 600,000
low-income residents in the process. Second, within states Medicaid is administered at the county-level, which introduces additional variation in the enrollment process reflecting counties’ varying administrative capabilities.11,20

This geographical variation allows for testing some of the social multipliers potentially moderating the impact of Medicaid expansion, providing a fuller and more careful assessment of the impact. Because the more conservative states that had not chosen to expand Medicaid by 2014 administered means-tested programs in a stricter manner, an appropriate approach to assessing the impact of Medicaid expansion on social benefits involves comparing the 2012 experiences in the early expanding states with those of states which expanded by 2014. We can assess the impacts of stigma by including variables and interactions in our models for counties in the expansion states with the highest levels of previous Medicaid enrollment and counties with the largest increases in Medicaid enrollment. We can also identify the potential impact of social learning by using similar models on the same set of states in 2014. Residents in the early expanding states will be substantially more likely to know others who have enrolled under the expanded eligibility, and thus to have learned from their experiences.

**Food security as a marker for the social benefits of Medicaid expansion.** Food insecurity, the primary outcome in our analysis, is a major hardship that affects nearly 50 million people annually (14.3%) in the United States.21 The experience of being food insecure is characterized by limited/uncertain availability and ability to obtain nutritionally adequate and safe food. There are different severity levels of food insecurity which can range from marginal food security (anxiety over acquiring food) to extreme food deprivation (very low food security).22

Experiencing inadequacies in food due to lack of financial resources is negatively associated with many health conditions in addition to being associated with hunger. Children
who are food insecure have elevated rates of asthma, lower nutrient intake, and behavioral problems. In adults, food insecurity has been linked to diet-sensitive chronic diseases such as hypertension, hyperlipidemia, and diabetes due to limitations placed on the diet from having restricted access to food.

Across the country, the prevalence of food insecurity varies substantially, ranging from 4% in Virginia to 38% in Mississippi. Research suggests that the context—including public policies that affect financial resources for lower-income families (such as low-cost health insurance), the availability of nutrition programs and their utilization, and state-level social and economic characteristics—reduces food insecurity.

Past studies have demonstrated that Medicaid expansion can affect both food choices in lower-income households and participation in public-benefit programs such as SNAP. We therefore postulate that evidence of reduced food insecurity will be more strongly associated with Medicaid expansion in the early-expanding states (expanded by 2012) compared with their counterparts that expanded enrollment in 2014. We anticipate that the impact of expansion will be particularly pronounced in areas that benefit from two social multipliers: high baseline Medicaid enrollment and larger increases in enrollment. If early expansion associates with improved social learning as we believe, food insecurity will decrease more in the five states that got an early start on Medicaid expansion. This will remain the case even after the comparison states expand their own eligibility in 2014. Normative multipliers would be evident from a larger impact of Medicaid expansion on food insecurity in those counties that prior to 2010 had the highest baseline enrollment and the largest increases in enrollment, since these ought to be areas with diminished stigma associated with means-tested programs.

We therefore hypothesize four associations between Medicaid expansion and county-level food insecurity: 1) that overall, counties in early expansion states will exhibit significant
improvement in food insecurity rates; 2) that the counties of early expansion states with the highest previous participation in Medicaid will experience the greatest improvement in food insecurity after the expansion of Medicaid; 3) that counties in the early expansion states will retain an advantage in terms of improved food insecurity, compared with otherwise similar counties in states that expanded eligibility later; and 4) that counties with the highest increase in Medicaid enrollment during expansion periods (post-pre) will be associated with the largest improvements in food insecurity.

**Methods**

We estimate a set of five regression models (two cross-sectional, three longitudinal) to evaluate the post-period effects of Medicaid expansion and enrollment on food insecurity rates and test our hypotheses.

**Data.** We derive data from three main sources: the American Community Survey (ACS),\(^ {29}\) Feeding America’s *Map the Meal Gap* project,\(^ {30}\) and from the Kaiser Family Foundation.\(^ {19,31,32}\) The ACS is an on-going national statistical survey conducted by the U.S. Census Bureau, surveying approximately three million individuals a year. Sommers et al.\(^ {33}\) used the ACS to generate county-level measures for Medicaid enrollment in examining county-level coverage changes during California’s early expansion. American Community Survey data are also utilized by the federal government to evaluate health insurance coverage.

Our analyses use data from calendar years 2009, 2012, and 2014 in order to capture changes between baseline (2009) and the first period (2012) for the early expansion analysis, and between 2012 and 2014 to analyze the persistence of an advantage in early expansion states once other states expanded Medicaid as well. Data from these years allow us to evaluate
relationships between time-varying Medicaid characteristics, staggered expansions, and variations in food insecurity rates.

We abstracted the proportion of individuals enrolled in Medicaid in each county of the U.S. by using public-use ACS files of each calendar year. We linked these county-level estimates of Medicaid coverage to post-ACA state level Medicaid expansion status based on information from the Kaiser Family Foundation\textsuperscript{31} and county-level estimates of food insecurity calculated by Feeding America’s \textit{Map the Meal Gap} project.\textsuperscript{30} Feeding America, a nonprofit organization of more than 200 food banks nationwide, created the \textit{Map the Meal Gap} project to address the need for county-level estimates of food insecurity and other food-related issues. Feeding America estimated the percentage of the county population who did not have access to reliable food sources. This estimate was modeled using data from the Current Population Survey (CPS), American Community Survey (ACS), and Bureau of Labor Statistics (BLS). County rates were based on sociodemographic determinants of food insecurity found in prior research (race, ethnicity, home ownership, unemployment, and poverty rate).\textsuperscript{34,35} Since county food insecurity rates have already been adjusted for these sociodemographic factors, it is not appropriate to include the same variables in our models estimating the relationship between Medicaid expansion and food insecurity. Inclusion of such variables in our models would lead to spurious correlations with the outcome variable, since it has already been adjusted for them previously.

\textbf{Variables.} \textit{County-level Medicaid.} We created two county-level Medicaid measures for use as independent variables in our planned regression models. The first measure, referred to as \textit{High Medicaid Enrollment}, was a dichotomized indicator for the county being in the top decile in proportion of individuals in the county enrolled in Medicaid (with a sensitivity analysis to test top half and top quartile as alternatives). The second measure determined recent changes in the county’s proportion of Medicaid enrollees as a continuous variable. (The change
in Medicaid enrollees from 2009 to 2012 was used for the Early regression model, and the change from 2012 to 2014 was used for the 2014 model; see below on expansion status.)

Expansion status. We created a binary indicator to identify states that indicated expanded Medicaid under the ACA in 2010-2011. These states are referred to as Early expansion states, while states that expanded for the first time in 2014 are referred to as 2014 Expansion states.

Interaction effects. We created two interaction terms: Early*High Medicaid Enrollment and Early*Change in Medicaid Enrollment to estimate the multiplicative effects of early expansion and Medicaid enrollment. As part of our analyses, we tested whether early expansion had a differential effect on a given county based on its Medicaid enrollment level and the change in that level.

Covariates. Most importantly, all models control for baseline (2009) levels of food insecurity. This insures that the estimated impact of Medicaid expansion does not misleadingly correlate high-need counties (that is, those with substantial baseline food insecurity) with high-impact counties. All regression analyses also included controls for county-level sociodemographics from the ACS (female proportion, child dependency ratio, elderly dependency ratio, proportion with high school graduate as highest education) that were not included in the Feeding America models which predicted food insecurity.

At the state level, we included the following characteristics: policy history with Medicaid (Federal Medical Assistance Percentage (FMAP); previous coverage of childless adults; a measure of Medicaid generosity (average spending per enrollee); income inequality (as measured by the Gini Index); and health status in the state (average life expectancy).

Analysis. For this retrospective study, we identified all U.S. expansion counties as of the end of 2014 (N=361; 100 counties expanded early, 261 expanded for the first time in 2014)
and created two analytic datasets: a cross-sectional sample based on county status and characteristics as of the end of 2012, and a longitudinal sample providing county characteristics and their recent changes in 2012 and 2014, respectively (two observations per county for a total of N=722). For these samples, we estimated five multivariate regression models to test the effects of our measures of early expansion, Medicaid enrollment, and their interactions with food insecurity.

Our first and second cross-sectional regression models (Model 1 and 2) studied the differential effects of the early roll-out of Medicaid expansion among counties with high Medicaid enrollment or among counties which changed their Medicaid enrollment in the recent past (between 2009 to 2012). The regression model provided these estimates through two interactions: \textit{Early*High Medicaid Enrollment} and \textit{Early*Change in Medicaid Enrollment}, respectively. Our longitudinal models (Models 3-5) relied on the same two sets of counties, the early expansion counties and counties that had begun expansion by 2014, but included observations for periods ending at two separate time periods, 2012 and 2015. These analyses provided information on whether the early start in expansion by counties provided a lasting effect, or just a temporary one which the later expansion counties were able to match in the later time period.

These analyses also incorporated state-fixed effects to account for state policy environments and to address any issues with repeated measure bias. The data analysis for this paper was generated using SAS software, Version 9.4 of the SAS System for Windows.\textsuperscript{36} As a sensitivity analysis, we also conducted a subgroup analysis on counties in California over time, which allowed for the political environment to remain constant.

\textbf{Results}
Table 1 presents summary statistics for baseline characteristics, comparing the set of counties in early expansion states (n=100) and counties in later expansion states (n=261). For comparison, we also included a set of counties in states that never expanded as of 2016 (n=341). Early expansion and later expansion counties did not differ with regard to FMAP, Medicaid enrollment, and food insecurity rates and other characteristics.

### Table 1. Summary Statistics for Early and 2014 Expansion Counties

<table>
<thead>
<tr>
<th></th>
<th>Early Expanders</th>
<th>2014 Only Expanders</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N (Counties)</strong></td>
<td>100</td>
<td>261</td>
</tr>
<tr>
<td><strong>Mean SD</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Insecurity Rate (2009)</td>
<td>14.4 4.7</td>
<td>14.2 4.3</td>
</tr>
<tr>
<td>Food Insecurity Rate (2012)</td>
<td>13.7 3.3</td>
<td>13.8 3.3</td>
</tr>
<tr>
<td>Medicaid Rate Under 150% FPL (2009)</td>
<td>33.2 8.6</td>
<td>33.1 12.2</td>
</tr>
<tr>
<td>Medicaid Rate Under 150% FPL (2012)</td>
<td>34.3 9.1</td>
<td>35.8 12.5</td>
</tr>
<tr>
<td>Previous Coverage of Childless Adults</td>
<td>.4 .5</td>
<td>.6 .5</td>
</tr>
<tr>
<td>FMAP (state)</td>
<td>50.2 .4</td>
<td>58.1 7.9</td>
</tr>
<tr>
<td>Female (%)</td>
<td>50.2 1.2</td>
<td>50.8 1.0</td>
</tr>
<tr>
<td>Child Dependency Ratio</td>
<td>40.0 6.7</td>
<td>37.8 5.2</td>
</tr>
<tr>
<td>Elderly Dependency Ratio</td>
<td>19.6 5.0</td>
<td>20.8 5.0</td>
</tr>
<tr>
<td>Highest Education, High School (%)</td>
<td>26.6 5.3</td>
<td>31.6 6.5</td>
</tr>
<tr>
<td>Medicaid Enrollee Spending (state, $)</td>
<td>5979 1650</td>
<td>6552 1459</td>
</tr>
<tr>
<td>Gini Index</td>
<td>.5 .0</td>
<td>.5 .0</td>
</tr>
<tr>
<td>Life Expectancy (state, years)</td>
<td>80.6 .4</td>
<td>78.8 .4</td>
</tr>
</tbody>
</table>

*Notes:*
- All characteristics are county level, unless otherwise indicated.

*Sources: American Community Survey; Map the Meal Gap Data (Feeding America); Kaiser Family Foundation*

Results from the cross-sectional and longitudinal regression analyses are presented in Tables 2 and 3, respectively. The cross-sectional model examining food insecurity rates in 2012
(sample n=361) found a significant negative interaction between the change in a county’s
Medicaid enrollment rate and being in an early expansion state (-0.10, p=.02). In other words,
for every percentage point increase in Medicaid enrollment from 2009 to 2012 at the county-
level in an early expansion state, we see declines of food insecurity by 0.10 percentage points
in 2012. There is, however, no evidence of a normative social multiplier effect, since there was
no significant interaction between a county having a large baseline participation in Medicaid and
early expansion.

The longitudinal model (sample n=722) allows us to test for the sustained effects of
early expansion. These findings suggest that there was a social learning multiplier effect, since
the impact on food insecurity from increases in Medicaid enrollment from 2012 to 2014 was
significantly larger in those states that had expanded Medicaid earlier (-0.06, p=.03). Here
again, there is no evidence of a normative multiplier effect.

**TABLE 2.**

**CHANGES IN FOOD INSECURITY RATES ASSOCIATED WITH EARLY EXPANSION AND
MEDICAID ENROLLMENT (CROSS-SECTIONAL)**

<table>
<thead>
<tr>
<th>N (Expansion Counties)</th>
<th>Cross-Sectional Estimate</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 1: Prior High Medicaid</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>County in Early Expansion State</td>
<td>.94</td>
<td>.06</td>
</tr>
<tr>
<td>High Medicaid Enrollment</td>
<td>.05</td>
<td>.01</td>
</tr>
<tr>
<td>Early*[High MCD Enrollment]</td>
<td>2.35</td>
<td>.09</td>
</tr>
<tr>
<td><strong>Model 2: Medicaid Enrollment during Expansion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>County in Early Expansion State</td>
<td>.68</td>
<td>.09</td>
</tr>
<tr>
<td>Change in Medicaid Enrollment</td>
<td>.05</td>
<td>.02</td>
</tr>
<tr>
<td>Early*[Medicaid Enrollment Change]</td>
<td>-.10</td>
<td>.02</td>
</tr>
</tbody>
</table>

Notes:
Counties were identified as "High Medicaid Enrollment" based on top decile of Medicaid rates in
the sample for populations under 150% FPL.
All analyses control for baseline characteristics at county level (age, education, gender, food
insecurity) and state-level (FMAP, MCD coverage of childless adults, income inequality, life
expectancy, MCD spending per enrollee).
Table 4 presents results from our analysis of the 2014 expansion utilizing food insecurity data from 2012 and 2014 in the state of California (n=40). These analyses are designed to test for the impact of Medicaid expansion and social multipliers within a single state with a consistent political culture between the beginning and end of the expansion period. In contrast to the previous results, within this more uniform political context, we observe evidence of normative social multipliers. As with previous models, counties with the largest increase in Medicaid enrollment rates during expansion were associated with lower food insecurity rates in
2014 compared with pre-expansion (-0.24, p=.05). These declines in food insecurity were most pronounced in counties that had previously had high rates of Medicaid participation, prior to expansion (-3.17, p=.05). In other words, the counties in which the norms that stigmatized participation in means-tested programs were likely to be the least pronounced.

### Table 4.

<table>
<thead>
<tr>
<th>Time</th>
<th>Estimate</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 Expansion Year</td>
<td>.11</td>
<td>.92</td>
</tr>
<tr>
<td>Prior High Medicaid</td>
<td>4.93</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>[2014 Year]*[High MCD Enrollment]</td>
<td>-3.17</td>
<td>.05</td>
</tr>
<tr>
<td>Medicaid Enrollment during Expansion</td>
<td>.13</td>
<td>.1</td>
</tr>
<tr>
<td>[2014 Year]*[Medicaid Enrollment Change]</td>
<td>-.24</td>
<td>.05</td>
</tr>
</tbody>
</table>

**Notes:**
- Counties were identified as "High Medicaid Enrollment" based on top decile of Medicaid rates in the sample for populations under 200% FPL.
- Controlling for baseline characteristics at county level (age, education, gender) and state-level (FMAP, MCD coverage of childless adults, income inequality, life expectancy, MCD spending per enrollee, and food insecurity)
- Sources: American Community Survey; Map the Meal Gap Data (Feeding America); Kaiser Family Foundation

**Discussion**

In this study, we evaluated experiences among Medicaid expansion states to identify a significant association between expanding Medicaid under the ACA and population-level measures of food insecurity. Enhanced food security is obviously only one of many social benefits that Medicaid expansion could generate in low-income households. It seems a particularly relevant one, given the importance of adequate nutrition and healthy food
consumption on long-term health status. To be clear, the associations between food insecurity and health could run in both directions. There is ample evidence supporting the impacts of food insecurity on health. However, evidence for the reciprocal relationship, specifically the impact of health policy on food insecurity, is not as abundant or clear. Our hypothesis, however, is that access to and enrollment in the Medicaid program confers financial protection which affects food insecurity as well. We should also note that in these presented analyses, we are looking at the impact of a health protective program (Medicaid), not health status per se. Medicaid addresses the burden of health care expenses for low-income families, but unfortunately, such families often face other social hardships which Medicaid is not set up to address in any way.

The study used a pre-post design with comparison counties belonging to states which had not expanded by 2012, but had done so by 2014. Such states were selected to provide comparisons because they were assumed to be similarly inclined in terms of political culture and social program attitude. Because these models include both state-fixed effects and baseline levels of food insecurity, they account for other longer-standing features of particular counties or states that might be affecting access to food. In our cross-sectional analysis, we also found evidence to suggest that early Medicaid expansion had its most positive impact on counties with the largest increases in Medicaid enrollment during expansion. For 2012, such counties had rates of food insecurity -0.10% lower on average than might otherwise be expected. Analysis of counties in California, the largest early expansion state, supported this result, and in addition found a beneficial food security impact among counties with a high Medicaid enrollment prior to expansion.

Our longitudinal analysis examined the impact of delaying Medicaid expansion. A notable finding of this analysis was that counties in early expansion states continued to have lower
rates of food insecurity in 2014, by -0.06% on average, compared with counties that expanded more recently. In the longitudinal model, there are two key features of early expansion counties: they were expanding eligibility to 138% FPL at the same time as the other 2014 expanders and they were “exposed” to rolling-out expansion for a longer period of time than the other counties, allowing for more social learning related to Medicaid benefits.

Our work aligns with prior research and provides new insights into potential spillover effects of Medicaid expansions on food insecurity. First, our results show that the county context, not just individual and household characteristics (which are typically studied when predicting food insecurity), are relevant for assessing the impact of public policies. Additionally, analyzing the effects of nutritional assistance programs (e.g., SNAP) on food insecurity is difficult to use due to issues of self-selection (food-insecure individuals are more likely to participate in food stamps). Our study presents another pathway that can be utilized by researchers to study the effects of other welfare programs on food insecurity.

Specifically related to health policy, prior research has found that household food insecurity is associated with higher health care costs. Results from our study suggest that investments in public health insurance programs may be an alternative method of lowering food insecurity and reducing expenditures nationally.

Limitations. Our study involved several limitations. First, our analyses only focused on states that have expanded Medicaid, therefore one should not simplistically extrapolate our findings to all states. One might anticipate that the impact of expanded Medicaid enrollment in more conservative states (which has been gradually taking place after 2014) might have a dampened impact with regard to food insecurity, simply because there is heightened stigma in these states that can deter participation in both Medicaid and other means-tested programs (such as SNAP). However, we anticipate some expansion benefits would still accrue. Second,
the declines in food insecurity attributed here to Medicaid expansion may in truth be derived from other influences during the periods studied, including an improving economy. However, because we observe evidence of both forms of social multipliers, clearly a substantial part of this reduction in food insecurity is a product of Medicaid expansion itself. Finally, this study only allows for ecological inference to be made given the county-level unit of analysis. More can and should be learned by examining these same relationships using individual level data.

**Public health implications.** These findings are relevant for social policymakers because the effectiveness and fate of these means-tested programs are being intensely contested in an increasingly partisan political setting. It is a time of ongoing relevant policy changes. Debates range from challenges to the implementation of particular features of the ACA to potential repeal of the entire act, and also include debates over restrictions on SNAP eligibility for some highly vulnerable families, such as immigrants.

Being uninsured and underinsured is certainly one of the worst hardships a lower-income family can face. As a result, health services research often focuses on insurance status and out-of-pocket medical spending as a key outcome of health policy. Our study adds to the literature by illustrating how the full benefits of Medicaid expansion are not just related to eligibility for insurance. Rather, they are also very much related to the contextual environment as well (e.g., learning, awareness). Properly interpreted, our work should inform local and regional agencies (as well as advocacy groups) that support strategies for vulnerable families, and help them to better connect such families with all of their eligible benefits.
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