Effect of the Affordable Care Act's Medicaid Expansions on Food Security, 2010–2016

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Objectives. To examine whether the expansion of Medicaid under the Affordable Care Act (ACA) decreased the prevalence of severe food insecurity.

Methods. With data on adult respondents to the Food Security Supplement to the Current Population Survey in US states for the years 2010 to 2013 and 2015 to 2016, I used a difference-in-difference design to compare trends in very low food security (VLFS) among low-income childless adults in states that did and did not expand Medicaid in 2014 under the ACA.

Results. Among low-income, nonelderly childless adults, VLFS rose from 17.4% before ACA to 17.5% after ACA in nonexpansion states, and fell from 17.6% to 15.9% in expansion states. In difference-in-difference analysis, Medicaid expansion was associated with a significant adjusted 2.2-percentage-point decline in rates of VLFS, equivalent to a 12.5% relative reduction.

Conclusions. The improvement in food security after the ACA's health insurance expansion suggests that health insurance provision has spillover effects that reduce other dimensions of poverty.

Public Health Implications. Providing free or low-cost health insurance coverage may free up household funds, reducing food insecurity and improving this important social determinant of health. (*Am J Public Health.* 2019;109:1243–1248. doi:10.2105/AJPH.2019.305168)

See also Sonik, p. 1163; and Galea and Vaughan, p. 1169.

The 2010 Affordable Care Act (ACA; Pub L No. 111-148) represented a historic expansion of the social safety net in the United States. While the ACA, as passed, required all states to expand Medicaid, a 2012 Supreme Court decision allowed states to opt out of the expansion,[1] providing a natural experiment permitting examination of the downstream effects of health insurance on health, health care, and social well-being.

Studies indicate that the ACA improved metrics of financial well-being—reducing out-of-pocket health care spending,[2] the number of unpaid bills, and the amount of debt sent to collections agencies.[3] Other analyses suggest that the ACA may have improved social determinants of health such as low income,[4] generalized social trust,[5] and volunteerism.[6]

These findings are concordant with a sociological view of poverty as multidimensional, correlated disadvantage (i.e., not merely the absence of income and assets but also deprivation across multiple areas, including access to health care and nutrition).[7] In particular, low-income people often suffer from health care poverty, defined as uninsurance or underinsurance attributable to lack of funds, reducing their access to care.[8] Poverty is thus not isolated to the social and economic spheres but also occurs in the health sphere, suggesting that health insurance coverage may be an important component of holistic antipoverty policies.

One significant dimension of poverty is food insecurity, which the US Department of Agriculture monitors with a scale (Appendix A, available as a supplement to the online version of this article at http://www.ajph.org) that is applied annually in the December supplement to the Census Bureau's Current Population Survey (CPS). Food insecurity is an important social determinant of health, linked to obesity,[9] diabetes,[10] worse self-reported health and well-being,[11] higher rates of depression,[12] and other negative health outcomes.[13] Some suggest that ameliorating food insecurity should be a policy priority in reducing health disparities.[14] Although government programs such as the Supplemental Nutrition Assistance Program (SNAP) have partially ameliorated food insecurity,[15–17] approximately 11.8% of US households experienced some degree of food insecurity during 2017, and 4.5% experienced very low food security (VLFS).[18]

Could the provision of health insurance further reduce the prevalence of food insecurity? Medicaid coverage (which carries no or minimal copayments or deductibles) may decrease out-of-pocket health care spending, leaving more funds available for the purchase of food. The ACA was associated with an 11.2% reduction in out-of-pocket spending nationally, with larger reductions for the lowest income groups.[2] Survey data indicate that many people in the United States make trade-offs between paying medical bills and buying food. A 2008 report found that 41% of working-aged US persons struggled with medical bills and medical debt.[19] Of those, 29% reported that medical bills caused difficulty paying for basic needs, such as food, heat, or rent; 16% of fully insured persons reported such difficulty versus 42% of those who had been uninsured in the past year.[19] A 2014 Feeding America study found that half of foodbank clients had unpaid medical bills,

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and 66% reported having to choose between buying food and medications.[20] Research has shown that the probability of food insecurity increases as out-of-pocket medical expenditures increase.[21]

Given these findings, the ACA-facilitated Medicaid expansion may have reduced overall demands on household spending, increasing the household resources available for other needs, such as food. However, to our knowledge, no previous research has explored this possibility. The current study uses the natural experiment of nonuniform Medicaid expansion under the ACA to examine whether providing free or nearly free insurance coverage ameliorates food insecurity.

METHODS

I used a difference-in-differences (DiD) natural experiment design and person-level data on food insecurity before and after the 2014 Medicaid expansion to compare trends in expansion and nonexpansion states. Because the data do not allow for identification of whether individuals were affected or unaffected by Medicaid expansion, I used residence in an expansion state as a proxy for acquisition of insurance.

For the purpose of this analysis, I defined expansion states as those states that expanded Medicaid to cover persons up to 138% of the federal poverty level (FPL, according to the Department of Health and Human Services [https://aspe.hhs.gov/prior-hhs-poverty-guidelines-and-federal-register-references]) before January 1, 2015. For this analysis, I defined nonexpansion states as those that did not expand Medicaid eligibility by January 1, 2017. There are 28 expansion states (plus the District of Columbia) and 18 nonexpansion states (see Appendix B, available as a supplement to the online version of this article at http://www.ajph.org, for lists of expansion and nonexpansion states). I excluded 4 states (Alaska, Indiana, Louisiana, and Montana) from the analysis because they expanded Medicaid during 2015 or 2016. Data for the years before Medicaid expansion were pooled, as were data from years following the expansion. I defined the preexpansion period as 2010 to 2013, and the postexpansion period as 2015 to 2016; I excluded 2014 as a transition year because many expansion states had ongoing enrollment increases throughout that year.

Before 2014, 5 states (California, Connecticut, Minnesota, New Jersey, and Washington) and the District of Columbia took advantage of the ACA's "early expansion" option and Medicaid 1115 waivers to expand health insurance coverage to low-income adults.[22] However, many of these expansions were modest or shifted insurance costs from the county or state to the federal government.[22] Most other states covered specific groups, including low-income children and their custodial parents, under Medicaid or their State Children's Health Insurance Program. Hence, families with children were much less likely to newly acquire Medicaid under the ACA expansion than were childless adults. Furthermore, most poor adults aged 65 years or older already had coverage (through Medicare) before the expansion, and so were also less likely to benefit from the expansion. For these reasons, I limited analyses to low-income childless adults aged 19 to 64 years, the group most likely to newly acquire Medicaid coverage under the expansion. Following previous research that examined the downstream effects of the ACA Medicaid expansions,[23] I conducted a falsification test by examining outcomes for adults aged 65 years or older, a group unlikely to benefit from the Medicaid expansions.

I obtained data on food security status and demographic characteristics from the Current Population Survey (CPS) 2010–2016 December Food Security Supplements (FSS) conducted jointly by the US Census Bureau and the Bureau of Labor Statistics. The CPS-FSS is the source of national estimates of food security by the US Department of Agriculture. The CPS utilizes a unique 4-8-4 design; residents living at a given address are included in the survey for 4 consecutive months, exit the survey for 8 months, then rejoin the survey for an additional 4 months.[24] This results in half of addresses being resampled in consecutive years. However, because the residents of the addresses may change throughout the year, often less than 40% of the original individuals are included in the subsequent year's sample.[25] For this reason, treating the data as longitudinal would considerably reduce sample size; thus, I treated the data as repeated cross-sections, which are pooled into pre- and postexpansion periods.

The FSS is asked of all December CPS households with household incomes up to 185% of the FPL, and all households with higher incomes who answer yes to either of 2 screening questions about running short of money for food or lacking enough of the kinds of food they wanted to eat in the past year. Based on the FSS, the CPS classifies all adults and children on a spectrum from high food security to VLFS. The intermediate categories, moderate and low food security, are characterized by anxiety about food and decreased variety of food, respectively. The current analysis focuses on VLFS, which is characterized by actual reduction of food intake because of unaffordability. Food insecurity generally has a monotonic, inverse relationship with health, with more severe food insecurity associated with worse metrics of chronic disease.[26] Thus, VLFS represents the category of food insecurity likely to act most strongly as a social determinant of health.

Although the December CPS-FSS does not include detailed income information that would allow identification of individuals at or below 138% of the FPL—the ACA threshold for Medicaid eligibility—it does indicate whether individuals fall at or below 185% of the FPL. I thus defined those with household incomes at or below 185% of the FPL as "low-income."

I performed adjusted and unadjusted DiD analyses, comparing the probability of VLFS among childless, nonelderly, low-income adults in expansion versus nonexpansion states before and after the ACA expansions.

The DiD analyses incorporated an untestable assumption that trends in food insecurity in expansion and nonexpansion states would not have differed in the absence of Medicaid expansion (a so-called "parallel trends" assumption). I examined this assumption in several ways. I graphed the trends in rates of VLFS over the time period in question, comparing states that expanded or did not expand Medicaid (Figure 1) in the pre- and posttreatment periods (as denoted by the dotted lines). Because this graph was visually inconclusive, I explored the parallel trends assumption statistically by using the event study method detailed by Simon et al.[23] I compared preexpansion trends in a

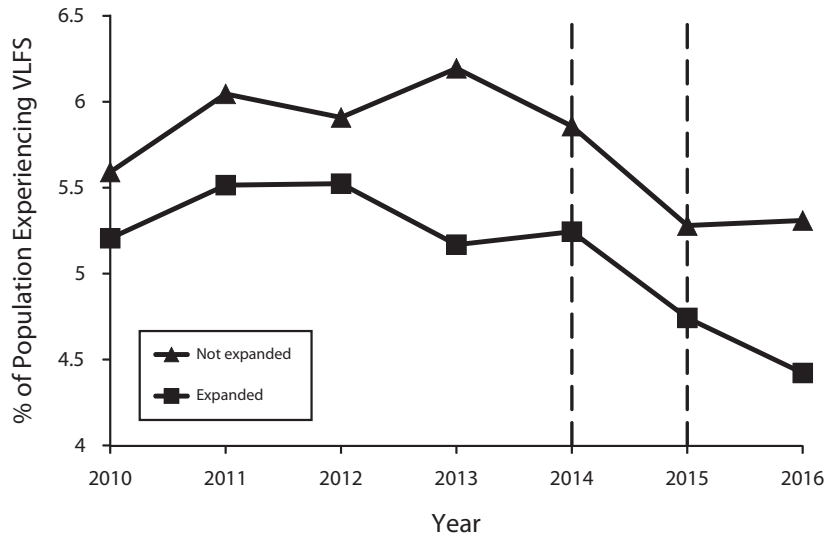

FIGURE 1—Rates of Very Low Food Security (VLFS) Among Adults in States That Did and Did Not Expand Medicaid in 2014: United States, 2010–2016

regression analysis that interacts the variable indicating a respondent's residence in an expansion versus nonexpansion state ($Treat_s$) with an indicator variable for each pretreatment year. If the parallel trends assumption holds, all coefficients on the interaction terms between each pretreatment year and $Treat_s$ should be near zero. I tested this hypothesis with a Wald test, which returned a *P* value of .35, supporting the parallel trends assumption. Detailed results are available in Appendix C (available as a supplement to the online version of this article at http://www.ajph.org).

My main analysis of the relationship between residence in a Medicaid expansion state and trends in VLFS employed the following regression model:

$$(1)\ Y_{ist} = b_0 + b_1(Treated_s \times Post_t) + b_2 Treat_s + b_3 Post_t + b_4 X_{ist} + \varepsilon_{ist}$$

Y_{ist} is a binary indicator variable for VLFS of person *i* in state *s* at time *t*; $Treat_s$ is an indicator variable equal to 0 in states that did not expand Medicaid and 1 in states that did. $Post_t$ is a time-indicator variable equal to 0 before January 1, 2014, and 1 after January 1, 2015. b_1 (the coefficient of the interaction term) is the DiD estimate of the effect of ACA-facilitated Medicaid expansion on food insecurity. X_{ist} is a vector of individual-level controls (used in adjusted analyses only) including gender, race/ethnicity, unemployment, and SNAP receipt in the previous month. I used the same models in the falsification test carried out on the sample of low-income, childless adults aged 65 years or older.

For my main analyses, I estimated linear probability models by using cluster robust standard errors. Linear probability models give reliable estimates of average effects[27] and have an intuitive interpretation. As a robustness check, I also ran logit models and estimated average marginal effects by using the *margins* command in Stata version 12 (StataCorp LP, College Station, TX) to account for nonlinearities in limited dependent variable models.[28] The logit models yielded similar findings to the linear probability models and are reported in Appendix D (available as a supplement to the online version of this article at http://www.ajph.org).

I also undertook 3 sensitivity analyses: alternative multivariable linear models controlling for the baseline uninsurance rates in each state in 2010 in addition to the control variables in my main models; models that included indicators of whether the respondent lived in an urban, suburban, or rural area; and analyses that excluded "mild" expansion states (i.e., states that had partial eligibility for low-income childless adults before 2014 and hence experienced smaller increases in Medicaid coverage in 2014 than did other expansion states; Appendix B). Because these sensitivity analyses yielded results closely similar to the main models, they are not reported further.

Finally, I analyzed the CPS March Annual Social and Economic Supplement (ASEC) for 2011 to 2017—which includes data on person-level health insurance status but no information on food security—to estimate the magnitude of the change in Medicaid coverage in expansion versus nonexpansion states. These figures on Medicaid coverage trends help provide insight into how much VLFS might change for a given change in the share of the population newly covered by Medicaid.

I carried out all analyses in R version 3.4.3 (R Foundation, Vienna, Austria),[29,30] unless otherwise noted.

RESULTS

The CPS-FSS samples in 2010 to 2013 and 2015 to 2016 together included 922 521 individuals, of whom 41 053 were low-income childless adults. Of these, 24 104 were aged 19 to 64 years, and 16 683 were aged 65 years or older. Table 1 displays the characteristics of the low-income, nonelderly childless adult sample.

The rates of VLFS for nonelderly childless adults at or below 185% of poverty were similar in expansion and nonexpansion states before 2014, 17.6% versus 17.4%. The rate of VLFS in this group rose from an average of 17.4% in 2010 to 2013, to 17.5% in 2015 to 2016 in nonexpansion states, a 0.1-percentage-point increase, but fell from 17.6% to 15.9% in expansion states, a decline of 1.7 percentage points.

Unadjusted and adjusted results of the linear probability model are shown in Table 2.

Adjusted analyses indicated that Medicaid expansion was associated with a significant 2.2-percentage-point decrease in VLFS for people in expansion states relative to those in nonexpansion states. Other personal factors associated with deprivation (unemployment and current SNAP receipt) also predicted VLFS.

The falsification analysis of VLFS rates among low-income elderly aged 65 years or

TABLE 1—Characteristics of Low-Income Childless Adults in Sample: United States, 2010–2016

	Medicaid Expansion States		Medicaid Nonexpansion States	
	Before Expansion (2010–2013; n = 9536)	After Expansion (2015–2016; n = 3986)	Before Expansion (2010–2013; n = 7277)	After Expansion (2015–2016; n = 3305)
Race/ethnicity,[a] %				
White	77.0	75.8	75.8	71.8
Black	14.0	13.8	18.1	21.7
Hispanic	13.7	14.4	11.7	11.1
Place of residence,[b] %				
Urban	34.0	35.5	25.6	25.8
Suburban	28.4	26.6	21.6	26.8
Rural	19.3	20.6	32.1	26.3
Female, %	48.4	47.4	46.5	48.4
Unemployed, %	42.0	46.2	39.8	43.5
SNAP recipient, %	21.9	22.9	20.7	19.2
Mean y of education	11	11	11	11
Very low food security, %	17.6	15.9	17.4	17.5

Note. SNAP = Supplemental Nutrition Assistance Program.

[a]Other racial categories not shown. Hispanics can be any race.

[b]Place of residence is used only in sensitivity analyses and is missing for 18.2% of the sample used in the main analyses.

older yielded a nonsignificant coefficient for the interaction term, suggesting, as expected, no ACA-associated change in VLFS in this group, which was largely unaffected by Medicaid expansion.

The logit models performed as a robustness check yielded almost identical results to the linear probability models; the DiD marginal effect estimated a 2.2-percentage-point decline in VLFS among nonelderly, childless, low-income adults associated with Medicaid expansion relative to nonexpansion states (Appendix D).

As expected, analysis of the March ASEC indicated that Medicaid coverage of childless, nonelderly adults at or below 185% of FPL rose less in nonexpansion than in expansion states. In nonexpansion states, Medicaid coverage for this group increased from 19.8% in 2010 to 2013 to 23.1% in 2015 to 2016 (a 3.3-percentage-point increase); in expansion states it rose from 27.4% to 36.4% (a 9.0-percentage-point increase)—a difference of 5.7 percentage points.

DISCUSSION

My findings, based on a natural experiment, suggest that the ACA's Medicaid expansion may have reduced rates of VLFS. In the study population, VLFS declined an adjusted 2.2 percentage points more in expansion than in nonexpansion states, equivalent to a 12.5% relative reduction, while the corresponding difference in Medicaid coverage rates was 5.7 percentage points. In other words, a 1-percentage-point increase in the share of persons with Medicaid coverage coincided with a reduction in the share of persons with VLFS of 0.39 percentage points.

The most likely way that Medicaid expansion might reduce food insecurity is by decreasing out-of-pocket health care spending, leaving more funds available for the purchase of food. This pathway is consistent with survey data showing that people often make trade-offs between paying for food and medical expenses.[19,20] Other mechanisms could also explain my findings. Acquiring coverage may have reduced the time burden of obtaining health care; uninsured persons often have difficulty finding health care providers willing to accept them as patients,[31] which may force them to spend more time on transportation or in emergency department waiting rooms. Hence, acquiring Medicaid may free up time for obtaining and preparing food. In addition, acquiring Medicaid coverage may bring low-income persons into contact with doctors, social workers, and others who can connect them to social services, including food resources. This mechanism would be consistent with the small increase in SNAP participation in expansion states that I observed (Table 1). It is also possible that Medicaid expansion allowed people to leave low-wage jobs that provided insurance for higher paying jobs, generating more resources for purchasing food. However previous research suggests that the ACA had a very limited effect on job switching and other labor-market outcomes.[32]

Limitations

My analysis had several limitations. The parallel trends assumption cannot be proven. Hence, I cannot rule out the possibility that my findings were driven by other time-varying state-level factors. The lack of detailed income information in the December CPS-FSS precluded matching my definition of "low-income" (i.e., up to 185% of the FPL) to the ACA's Medicaid eligibility threshold (up to 138% of FPL) and persons with incomes 138% to 185% of poverty would be equally eligible (at least in theory) for highly subsidized exchange coverage in all states. Hence, the use of 185% of the FPL threshold would tend to bias the results toward the null.

Although merging the December FSS with the March ASEC would provide more detail on income and individual-level insurance status, the design of the CPS means that less than a quarter of those in the FSS are surveyed in the subsequent year's ASEC, leading to unacceptably imprecise estimates. Interstate migration could confound my analysis, and the CPS data do not allow analysis of migration between expansion and nonexpansion states. However, the similarities of the characteristics of the pre- and post-ACA samples shown in Table 1 offer reassurance that the changes in food security are unlikely to be driven by migration. Although the CPS food security scale used in this analysis is considered the gold standard for monitoring food insecurity in the United States, it can mask significant within-group heterogeneity.[33] Finally, although food insecurity shows significant variation across seasons, with higher rates found in winter,

TABLE 2—Association Between States' Medicaid Expansion and Change (2010–2013 to 2015–2016) in Very Low Food Security (VLFS) Among Low-Income, Childless, Nonelderly Adults: United States

	Predictors of VLFS,[a] % (95% CI)	
	Unadjusted	Adjusted
Treated × post[b]	−1.812* (−1.832, −1.791)	−2.232* (−2.253, −2.212)
Post	0.135 (0.120, 0.151)	0.210 (0.194, 0.225)
SNAP		16.784** (16.772, 16.796)
White		−0.595 (−0.606, −0.584)
Female		0.620 (0.611, 0.630)
Unemployed		4.161** (4.151, 4.171)
Constant	17.384** (17.375, 17.392)	12.411** (12.398, 12.425)
Observations	24 104	24 104
R^2	0.0002	0.042
Adjusted R^2	0.0001	0.042
Residual SE	0.378 (df = 24 100)	0.370 (df = 24 096)
F statistic	1.990 (df = 3; 24 100)	151.660*** (df = 7; 24 096)

Note. CI = confidence interval; post = after vs before Medicaid expansion; SNAP = Supplemental Nutrition Assistance Program enrollee; treated = live in a Medicaid expansion state. Results shown are from difference-in-difference linear probability models.

[a]Expressed as percentage of study population experiencing VLFS.

[b]Treated × post is the change in VLFS in expansion states relative to nonexpansion states before vs after the 2014 Medicaid expansion.

*P < .05; **P < .01.

perhaps because of heating costs,[34] I was unable to examine seasonality because the CPS only collects food security data once annually, in December.

The decision to expand Medicaid under the ACA was highly politicized; more Democrat- than Republican-controlled states chose to expand Medicaid. These differences may be associated with other key differences, including providers' influence and racial resentment.[35] However, the DiD model implicitly controls for time-invariant state characteristics (e.g., climate zone or being a former slave state). The adjusted models also controlled for confounders that may vary with time, such as unemployment. Although I cannot rule out the possibility that an unmeasured, time-varying factor undermined the parallel trends assumption, statistical testing suggested that the parallel trends assumption is not unreasonable.

Public Health Implications

My findings suggest that the ACA's Medicaid expansion was associated with a significant reduction in rates of VLFS, a major social determinant of health. Further expansions and improvements of coverage for the millions of persons in the United States who remain uninsured or inadequately insured might further reduce food insecurity. Conversely, reducing Medicaid enrollment (e.g., by implementing work requirements for Medicaid beneficiaries—as several states have done or proposed) may cause adverse downstream health effects. As changes in public health insurance continue, the relationship between insurance provision and food security may prove a fruitful area for further research. AJPH

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CONFLICTS OF INTEREST

The author has no conflicts of interest to report.

HUMAN PARTICIPANT PROTECTION

The Princeton University institutional review board deemed this research exempt from review.

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