

The Effect of Health Insurance on Food Security: Evidence from the Affordable Care Act's Medicaid Expansions

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Abstract

Background: Food insecurity, defined as the inability to afford enough food at all times, is linked to diabetes, obesity, depression and worse overall health. Research indicates that low-income Americans must often choose between competing basic needs, such as food and health care. Providing free or low-cost health insurance coverage might make household funds available to reduce food insecurity, improving this important social determinant of health.

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

Design: Difference-in-difference analysis comparing trends in very low food security (VLFS) in states that did and did not expand Medicaid in 2014 under the ACA.

Setting: U.S. states, years 2010-2013 and 2015-2016

Participants: Adult respondents to the Food Security Supplements to the Current Population Survey, with a focus on non-elderly low-income childless adults, the demographic group most likely to newly acquire insurance coverage in 2014

Measurements: The U.S. Department of Agriculture's composite metric of VLFS, which indicates actual reduction of food intake due to unaffordability.

Results: Among low-income, non-elderly childless adults, VLFS rose from 17.2% pre-ACA to 17.3% post-ACA in non-expansion states, and fell from 17.4% to 15.6% in expansion states. In difference-in-difference analysis, Medicaid expansion was associated with a significant improvement in rates of VLFS, equivalent to a 12.6 % relative reduction (95% CI 0.6% to 25.8%).

Limitations: Data is repeated cross-sectional rather than longitudinal, requiring the use of state of residence as an instrument for gaining Medicaid coverage

Conclusions: The improvement in food security after the ACA's health insurance expansion suggests a role for such expansions in holistic anti-poverty policies.

Funding Source: None

Background

The 2010 Affordable Care Act (ACA) represented an historic expansion of the social safety net in the United States. While the ACA, as passed, required all states to expand Medicaid in 2014, a 2012 Supreme Court decision allowed states to opt-out of Medicaid expansion. This provided a natural experiment for examination of the downstream effects of health insurance on health, healthcare, and social wellbeing.

In addition to significant direct effects on health and health care (1), studies indicate that the ACA improved metrics of financial wellbeing – reducing out-of-pocket health care spending (2), the number of unpaid bills, and the amount of debt sent to collections agencies (3). Other research suggests that the ACA may have improved social determinants of health such as poverty rates (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 deprivation across multiple areas, including access to health care and nutrition. In particular, the poor often suffer from *health care poverty*, defined as uninsurance or underinsurance due to lack of funds, reducing their access to care (7). 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 anti-poverty policies.

One significant dimension of poverty is food insecurity, which the U.S. Department of Agriculture (USDA) monitors using a scale (see Appendix A) 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 (8) diabetes (9), worse self-reported health and wellbeing (10), higher rates of depression (11), and other negative health

outcomes (12). Some suggest that ameliorating food insecurity should be a policy priority in reducing health disparities (13).

While government programs such as the Supplemental Nutrition Assistance Program (SNAP) have partially ameliorated food insecurity (14), approximately 12.3% of U.S. households experienced some degree of food insecurity during 2016, and 4.9% experienced very low food security (VLFS) (15).

Given its effects on financial wellbeing, 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, no previous research has explored this possibility.

The current study exploits the natural experiment of non-uniform Medicaid expansion under the ACA to examine whether providing free or nearly-free insurance coverage ameliorates food insecurity.

Study Design

I use a difference-in-differences (DiD) quasi-experimental design, and person-level data on food insecurity before and after the ACA's 2014 Medicaid expansion, to compare trends in expansion and non-expansion states. Because persons who actually enroll in health insurance may differ from those who are eligible but fail to enroll, I use residence in an expansion state as an instrument for acquisition of insurance.

States were considered expansion states if they expanded Medicaid to cover persons up to 138% of the federal poverty level (FPL) before January 1, 2015. States were considered non-expansion states if they had not expanded Medicaid eligibility by January 1, 2017. Overall, 28 states and Washington D.C. were considered expansion states, and 18 states were considered

non-expansion states. (See Appendix B for lists of expansion and non-expansion states). Four states (Alaska, Indiana, Louisiana and Montana) were excluded from the analysis because they expanded Medicaid during 2015 or 2016. The pre-expansion period was defined as 2010-2013, and the post-expansion period was defined as 2015-2016; 2014 was excluded as a transition year because many expansion states had ongoing enrollment increases throughout that year.

Prior to the ACA-facilitated Medicaid expansions, most states covered several demographic groups under Medicaid and/or sCHIP, including low-income children and their custodial parent(s). Hence, families with children were much less likely to *newly* acquire Medicaid under the ACA expansion than were childless adults. Furthermore, most poor adults over the age of 65 already had coverage (through Medicare) prior to the expansion, and were also less likely to benefit from the expansion. For these reasons, analyses were limited to low-income childless adults ages 19-64, the group most likely to newly acquire Medicaid coverage under the expansion. Following other research looking at the downstream effects of the ACA Medicaid expansions (16), I conduct a falsification test by examining outcomes for adults age 65+ who were unlikely to benefit from the ACA Medicaid expansions.

Data and Outcomes

Data on food security status and demographic characteristics were obtained from the Current Population Survey (CPS) 2010-2016 December Food Security Supplements (FSS) conducted jointly by the U.S. Census Bureau and the Bureau of Labor Statistics. The CPS-FSS is the source of national estimates of food security by the U.S. Department of Agriculture. The CPS utilizes a unique 4-8-4 design; residents living at a given address are included in the survey for four consecutive months, exit the survey for 8 months, then rejoin the survey for an

additional 4 months. This results in half of addresses being resampled in consecutive years. However, because the residents of the addresses may change throughout the year, I treat the data as repeated cross-sectional samples.

The FFS is asked of all December CPS households with household incomes below 185% of the FPL, as well as all households with higher incomes who answer yes to either of two 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 FFS, the CPS classifies all adults and children on a spectrum from High Food Security to Very Low Food Security (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 due to unaffordability, and represents the category of food insecurity likely to act most strongly as a social determinant of health. To align with the December FFS, I define those with household incomes less than 185% of the FPL as “low-income”.

Finally, I also analyzed person-level health insurance status as reported in the CPS March Annual Social and Economic Supplement (ASEC) for 2011-2017, which mostly reflects data for the previous calendar year. This data was used to aid in the interpretation of findings, but not used in the main analysis

Statistical Analysis

Adjusted and unadjusted difference-in-difference (DiD) analyses were performed, comparing average rates of VLFS among childless non-elderly, low-income adults in expansion vs. non-expansion states before and after the ACA expansions.

The DiD analyses incorporate an assumption that trends in food insecurity in expansion and non-expansion states would not have differed in the absence of Medicaid expansion (a so-called "parallel trends" assumption). I test this assumption in several ways. First I examine a graph of the trends in rates of VLFS over the time period in question, comparing states that did and did not choose to expand Medicaid (Figure 1) in the pre- and post-treatment periods (as denoted by the dotted lines).

I then explored the parallel trends assumption statistically by comparing pre-expansion trends in a regression analysis that interacted the variable indicating a respondent's residence in an expansion v. non-expansion state ($Treat_s$) with an indicator variable for each pre-treatment year. If the parallel trends assumption holds, all coefficients on the interaction terms between each pre-treatment year and $Treat_s$ should be near zero. I formally tested this hypothesis using a Wald test, which returned a non-significant p-value, ($p > 0.05$), supporting the parallel trends assumption.

The main analysis employs the following DiD logit regression model:

$$Y_{ist} = \beta_0 + \beta_1(Treat_s * Post_t) + \beta_2Treat_s + \beta_3Post_t + \beta_4X_{ist} + \varepsilon$$

where Y_{ist} is an indicator variable for very low food security of persons 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. β_1 (the coefficient of the interaction term) is the DiD estimate of the effect of ACA-facilitated Medicaid expansion on food insecurity, which can be exponentiated to generate an odds ratio. X_{ist} is a vector of individual-level controls (used in adjusted analyses only) including: sex, race, unemployment, and SNAP receipt in the previous month. The same models were used

in the falsification test carried out on the sample of low-income, childless adults age 65 or greater.

Because the interpretation of odds ratios from the logit DiD model is not intuitive, I created a synthetic cohort with the demographic characteristics of persons in the expansion states, applied the observed effect of refusing expansion to this cohort, and calculated the difference in the probability of VLFS between this synthetic cohort and the actually observed probability of VLFS in the expansion states. The results portray the predicted change in VLFS if expansion states had, instead, declined the Medicaid expansion.

To further aid in interpretation, the actual change in Medicaid enrollment for non-elderly childless adults with incomes less than 185% of poverty was calculated for expansion and non-expansion states from the March-ASEC.

Finally, I undertook three sensitivity analyses: alternative multivariable models additionally controlling for the baseline medical uninsurance rates in each state in 2010; models including indicators of whether the respondent lived in an urban, suburban, or rural area; and analyses excluding “mild” expansion states – i.e. states that had partial eligibility for low-income childless adults prior to 2014 and hence experienced a smaller increase in Medicaid coverage in 2014 than other expansion states (appendix B). Results of these sensitivity analyses were numerically similar to the main models and are not reported further.

Results

The CPS-FSS samples 2010-2013 and 2015-2016 together included 922,521 individuals, of whom 41,053 were low-income childless adults. Of these 24,281 were age 19-64, and 16,772

were age 65 and older. Table 1 displays the characteristics of the low-income, non-elderly childless adult sample.

While the rate of VLFS was higher in the general population of non-expansion states than in expansion states, this was not the case for non-elderly childless adults under 185% of poverty. For this group, the rate of VLFS rose from an average of 17.2% in 2010-2013, to 17.3%, in 2015-2016 in non-expansion states, but fell from 17.4%, to 15.6% in expansion states.

Unadjusted and adjusted results of the DiD analyses are shown in Table 2. In the adjusted analysis VLFS fell more post-ACA in expansion states than in non-expansion states, with an odds-ratio of the DiD estimator of 0.85 ($p < 0.05$). Factors associated with deprivation (unemployment and current SNAP receipt) also predicted VLFS.

When the DiD estimate was applied to the synthetic cohort, Medicaid expansion reduced the absolute probability of VLFS of low-income childless adults ages 19-64 by 2.2 percentage points (95% CI 0.1-4.5), as shown in Figure 2. This represents a relative reduction in VLFS of 12.6% (95% CI 0.6- 25.8%).

The falsification analysis of VLFS rates among low-income elderly adults is shown in Table 3. As expected, neither the odds ratio (1.075) nor the synthetic cohort analysis (data not shown) suggest a reduction of VLFS associated with Medicaid expansion in this group, which was largely unaffected by Medicaid expansion.

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

Discussion

My findings, based on a quasi-experimental analysis, indicate that the ACA's Medicaid expansion improved food security. Although the 2.2 percentage point reduction in the prevalence of severe food insecurity appears small, the difference between expansion and non-expansion states in the share of persons who newly-acquired Medicaid was modest (5.7 percentage points), i.e. only a small fraction of the study population was affected by the intervention. Hence, the findings suggest that gaining insurance had a substantial beneficial effect on food security for individuals who actually acquired coverage.

How might acquiring Medicaid improve this important social determinant of health? The most likely mechanism is that Medicaid coverage (which carries no or minimal co-payments or deductibles) decreased out-of-pocket health care spending, leaving more funds available for the purchase of food. The ACA caused an 11.2% reduction in out-of-pocket spending nationally, with larger reductions for the lowest income groups (17). Survey data indicate that many Americans make trade-offs between paying medical bills and buying food (18). A 2008 report found that 41% of working-age Americans struggled with medical bills and medical debt. Of those, 29% reported that medical bills caused difficulty paying for basic needs like food, heat or rent; 16% of fully insured persons reported such difficulty vs. 42% of those who had been uninsured in the past year (2). A 2013 Gallup poll, found that half of food insecure persons in the U.S. had unpaid medical bills, and 66% reported having to choose between buying food and medicines (19). The probability of food insecurity increases as out-of-pocket medical expenditures increase (20), offering support for the hypothesis that medical expenditures and food insecurity represent competing basic needs.

Other mechanisms could also explain my findings. Uninsured persons often have difficulty finding health care providers willing to accept them as patients (21). Acquiring coverage may have reduced the non-monetary burdens of obtaining health care (e.g. time spent on transportation or in emergency department waiting rooms), allowing more time for obtaining and preparing food. Alternatively, 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. 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 Medicaid expansion had a very limited effect on job switching and other labor-market outcomes (22).

My analysis has several limitations. First, because of the structure of the December FSS CPS data I was unable to match my definition of “low-income” (i.e. less than 185% of the FPL) to that used to determine Medicaid eligibility under the ACA (138% of FPL). However, because persons with incomes 138-185% of poverty would be equally eligible (at least in theory) for highly subsidized exchange coverage in all states, my use of 185% of the FPL threshold would tend to bias my results towards the null. While merging the December FSS with the March ASEC would provide more detail on income and individual 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. Inter-state migration could confound my analysis, and the CPS data does not allow analysis of migration between expansion and non-expansion states. However, the similarities of the characteristics of the pre- and post- ACA samples shown in Table 1 offer reassurance that the food security improvements 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 U.S., it can mask significant within-group heterogeneity (23). Finally, although food insecurity shows significant variation across seasons, with higher rates found in winter, perhaps due to heating and oil costs (24), I was unable to examine seasonality since the CPS only collects food security data once annually in December.

The decision to expand Medicaid under the ACA was highly politicized; more Democrat-controlled states chose to expand Medicaid than did Republican-controlled states. These differences may be associated with other key differences, including providers’ influence and racial resentment (25). However, the DiD model implicitly controls for time invariant state characteristics (e.g. climate zone, or being a former slave state). My adjusted models also control 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, both graphic inspection of the data shown in Figure 1 and statistical testing suggest that the parallel trends assumption holds.

The ACA’s Medicaid expansion was associated with significant improvement in food security, a major social determinant of health. Further expansions and improvements of coverage for the millions of Americans who remain uninsured or inadequately insured could improve food security. Conversely, cutting Medicaid enrollment by implementing work requirements - as several states have proposed - might exacerbate food insecurity and its downstream health effects.

Table 1: Characteristics of Low Income Childless Adults in Sample

	Medicaid Expansion States		Medicaid Non-Expansion States	
	Before Expansion (2010-2013) n = 9,731	After Expansion (2015-2016) n = 4,102	Before Expansion (2010-2013) n = 7,385	After Expansion (2015-2016) n = 3,371
Race/Ethnicity				
White	77.0%	75.6%	75.8%	71.8%
Black	14.0%	13.8%	18.1%	21.7%
Hispanic	13.9%	14.9%	11.9%	11.4%
Place of Residence				
Urban	36.0 %	35.9 %	25.9 %	26.0 %
Suburban	28.5 %	26.7 %	21.6 %	26.9 %
Rural	19.3 %	20.6 %	32.1 %	26.2 %
Female	48.4%	47.2%	46.4%	48.6%
Unemployed	42.5%	46.7%	39.9%	43.7%
SNAP* Recipient	21.8%	22.5 %	20.7%	19.3%
Mean Years of Education	11	11	11	11
Very Low Food Security	17.4%	15.6%	17.2%	17.3%

*SNAP=Supplemental Nutrition Assistance Program

Figure 1: Rates of Very Low Food Security Among Adults in States that Did and Did Not Expand Medicaid in 2014

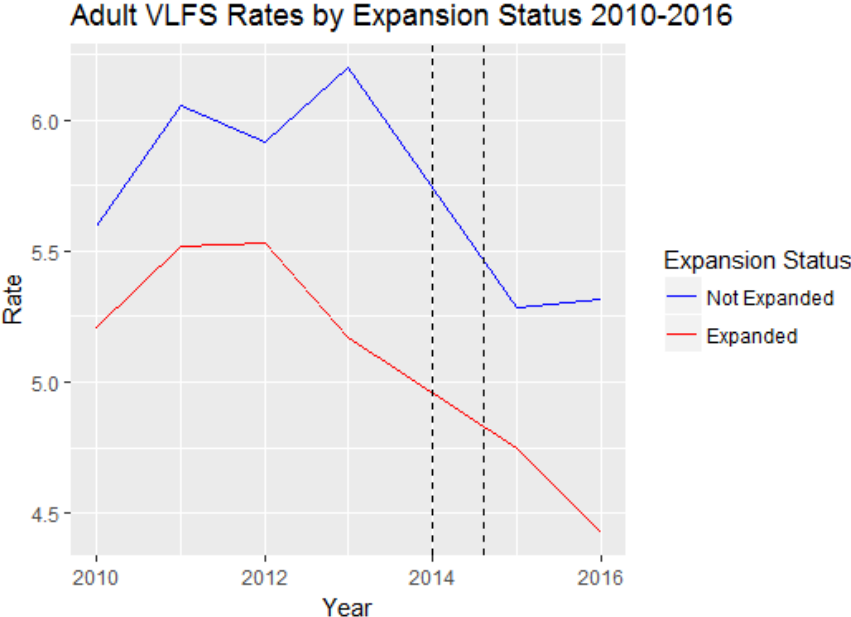


Table 2: Odds Ratios for Very Low Food Security Among Low Income, Childless Non-elderly Adults, Medicaid Expansion ("Treated") vs. Non-Expansion States

	<i>Dependent variable:</i>	
	Odds Ratios for Very Low Food Security	
	(1)	(2)
Treated*Post	0.878 (0.086)	0.848** (0.084)
Treated	1.016 (0.046)	0.995 (0.047)
Post	1.009 (0.057)	1.014 (0.055)
SNAP		2.710*** (0.040)
White		0.957 (0.043)
Female		1.046 (0.036)
Unemployed		1.353*** (0.037)
Constant	0.210*** (0.034)	0.143*** (0.055)
Observations	24,104	24,104
Note:	*p<0.1; **p<0.05; ***p<0.01	

Figure 2: Synthetic Cohort Analysis of Medicaid Expansion vs. Non-Expansion – Low income, Non-elderly, Childless Adults

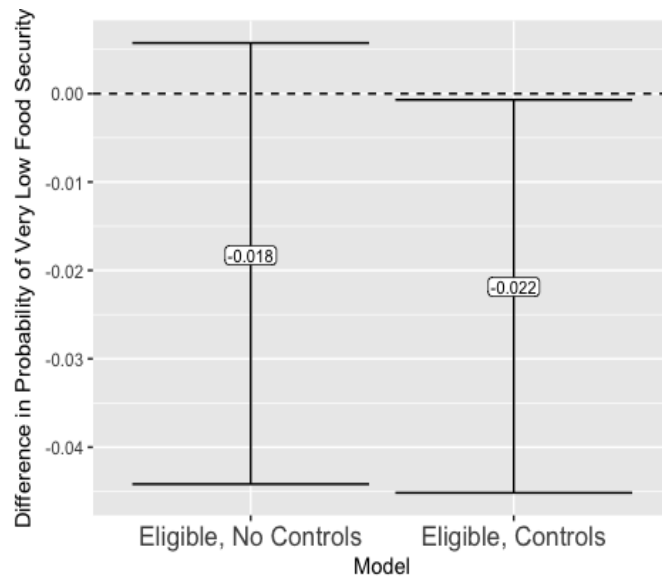


Table 3: Odds Ratios for Very Low Food Security Among Low Income Adults Age 65+,
Expansion ("Treated") vs. Non-Expansion States

	<i>Dependent Variable:</i>	
	Odds Ratios for Very Low Food Security	
	(1)	(2)
Treated*Post	1.075 (0.102)	1.075 (0.105)
Treated	0.915 (0.055)	0.919 (0.057)
Post	0.947 (0.078)	0.926 (0.081)
White		0.589*** (0.056)
Female		1.237*** (0.049)
SNAP		8.645*** (0.054)
Unemployed		1.303*** (0.067)
Constant	0.031*** (0.042)	2.343*** (0.299)
Observations	69,300	69,300
Log Likelihood	-8,954.396	-8,023.665
Akaike Inf. Crit.	17,916.790	16,065.330

Note: *p<0.1; **p<0.05; ***p<0.01

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Appendix A: Adult Food Security CPS Survey Tool (Coleman-Jensen, 2017)

Questions asked of all households:

1) “(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more.” Was that often true, sometimes true, or never true for (you/your household) in the last 12 months?

2) “The food that (I/we) bought just didn’t last, and (I/we) didn’t have money to get more.” Was that often, sometimes, or never true for (you/your household) in the last 12 months?

3) “(I/we) couldn’t afford to eat balanced meals.” Was that often, sometimes, or never true for (you/your household) in the last 12 months?

If affirmative response (i.e., "often true" or "sometimes true") to one or more of questions 1-3 then asked:

4) In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

4a) If yes, how often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

5) In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?

6) In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food?

7) In the last 12 months, did you lose weight because there wasn't enough money for food?

If yes to one or more of questions 4-7, then asked:

8) In the last 12 months, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food?

8a) If yes, how often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

Responses of “yes,” “often,” “sometimes,” “almost every month,” and “some months but not every month” are coded as affirmative. The sum of affirmative responses to the 10 questions in the Adult Food Security Scale is the household’s raw score on the scale.

Food security status is assigned as follows:

- Raw score zero—High food security among adults
- Raw score 1-2—Marginal food security among adults

- Raw score 3-5—Low food security among adults
- Raw score 6-10—Very low food security among adults

Appendix B: Classification of Expansion and Non-Expansion States, and Mild Expansion States

Expansion States	Non-Expansion States
Arizona	Alabama
Arkansas	Florida
California*	Georgia
Colorado	Idaho
Connecticut*	Kansas
Delaware*	Maine
Washington D.C.*	Mississippi
Hawaii*	Missouri
Illinois	Nebraska
Iowa	North Carolina
Kentucky	Oklahoma
Maryland	South Carolina
Massachusetts*	South Dakota
Michigan	Tennessee
Minnesota*	Texas
Nevada	Utah
New Hampshire	Virginia
New Jersey	Wyoming
New Mexico	
New York*	
North Dakota	
Ohio	
Oregon	
Pennsylvania	
Rhode Island	
Vermont*	
Washington	
West Virginia	
Wisconsin*	

(*) Indicate “mild” expansion states (16), which had some eligibility for childless adults prior to the ACA, and were thus excluded in some sensitivity analyses