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Effects of the Recent Medicaid Expansions on Dental Preventive Services and Treatments

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Abstract

Background: Low-income adults in the US have historically had poor access to dental services largely due to limited dental coverage.

Objective: We examined the effects of recent Medicaid income eligibility expansions under the Affordable Care Act on dental visits separately for preventive care and treatments.

Research Design: We used restricted data from the 2011–2016 Medical Expenditure Panel Survey with state geocodes. The main analytical sample included nearly 21,000 individuals who were newly eligibles for Medicaid. We employed a quasi-experimental difference-in-differences design to identify the impact of the state Medicaid expansions effective in 2014 on dental services use by the level of state Medicaid dental benefit for the newly eligible.

Results: Expanding Medicaid in 2014 with extensive or limited dental coverage increased preventive dental visits and use of major dental treatments by over 5 percentage-points in 2014 and 2015. The increase in preventive visits continued in 2016 in expanding states with extensive coverage, while increase in major dental treatments continued in 2016 in expanding states with limited coverage. There is some but less consistent evidence of an increase in dental treatment with emergency-only coverage.

Conclusions: Medicaid expansions with dental coverage beyond emergency-only services have increased access of the newly eligible low-income adults to dental treatments and preventive services, with extensive coverage showing continuing increase in preventive services use 3 years after the expansion. With limited coverage, there is some evidence of individuals needing to stretch treatments over a longer period. Providing comprehensive dental coverage can address unmet dental needs and improve oral health among low-income adults.

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Keywords

Medicaid; Dental Services; Disparities

Introduction

Disparities in access to dental services by income have long persisted in the US. Over 56% of higher-income individuals had at least one dental visit in 1995 compared with only 26% of lower-income individuals, and this gap was unchanged two decades later.¹ Nearly 1 in 4 low-income adults have never had a dental visit or not returned for one for more than five years, compared to fewer than 1 in 10 of higher-income adults.² Due to inadequate access to dental services, untreated caries rates are nearly 40% among low-income adults, more than double the rate for higher-income adults.³

Lack of or limited dental insurance among low-income adults is likely a major barrier to dental service use. Before the recent Medicaid expansions under the Affordable Care Act (ACA), states had very limited Medicaid eligibility for poor adults, especially childless adults who were mostly ineligible. Only very poor parents (excluding pregnant women) were typically eligible for Medicaid, and only in some states are adult dental benefits included. State governments have the option and flexibility with Medicaid to cover additional services such as dental care. Even though most state Medicaid programs currently provide at least some dental coverage for adults, there has been and continues to be notable variation in the level of that coverage. Therefore, not all adults covered in Medicaid have adequate dental coverage or access to dental services. Further, Medicaid recipients may not know what services are covered, potentially affecting whether or not they take advantage of benefits.

Several studies have demonstrated that the ACA Medicaid expansions beginning in 2014 have substantially increased Medicaid coverage among low-income adults.⁴⁻⁶ Only a few studies have focused on the effects of the Medicaid expansions on dental service use. Nasseh, Vujicic⁷ used Gallup Wellbeing Index survey from 2010–2016 with a difference-in-differences model to examine the Medicaid expansion effects on any dental visits and found a 3–6 percentage point increase in the likelihood of such visits among low-income adults. Singhal, Damiano, Sabik⁸ examined changes in the likelihood of dental visits in 2014 by state expansion and dental coverage status using data from the Behavioral Risk Factors Surveillance System (BRFSS). They reported a small (1.8 percentage-point) increase in the likelihood of visits among low-income childless adults in expanding states providing coverage for dental services (other than emergency-only dental services). Most recently, Wehby, Lyu, Shane⁹ investigated the effects of Medicaid expansions on the likelihood of dental visits by levels of dental coverage using a difference-in-differences model and BRFSS data through 2016. They found that expanding Medicaid with extensive coverage of dental services increased the likelihood of any dental visits in the past 12 months by over 5 percentage-points but found no evidence of an impact in expanding states providing limited coverage. There is also evidence from earlier Medicaid expansions that offering dental

benefits was associated with more dental visits,^{10,11} reduction in untreated caries,¹² and greater dentist participation in Medicaid.¹³

The studies discussed above provide initial evidence of a potential increase in dental visits with Medicaid expansions, especially with extensive coverage. However, important gaps remain in our understanding of the Medicaid expansion effects on dental services use. Prior studies examined one general measure of dental care, any dental visits, the only measure available in their data sources. As such, prior studies do not distinguish between preventive dental visits and treatments, distinct services that may be affected differently by the Medicaid expansions due to varying behavioral responses to new coverage and unmet dental needs. For example, low-income individuals may be more responsive to seeking treatment for previously untreated dental problems right after gaining coverage, but less likely to change their use of preventive services (which involves lower out-of-pocket cost before coverage) shortly after gaining coverage if they perceive these services to be less beneficial. Separating changes in prevention and treatment can help to understand how dental coverage changes impact oral health among low-income adults both in the short and long-term. While access to treatment is critical to resolving problems, increasing prevention is also important to maintain and improve oral health long-term. Prior studies also did not disentangle the effects of expanding income eligibility for Medicaid from simultaneous changes in the levels of dental coverage in multiple states that affected those previously eligible for Medicaid (before the recent income expansions). Prior estimates are thus a mix of both effects, higher-income eligibility, and benefit changes for previously income eligible. While both effects are relevant, separating these effects allows an understanding of the effect of increasing income eligibility for a given set of dental benefits versus increasing dental benefits for those already income eligible.

This study examines the effects of the ACA Medicaid expansions on dental care use by separating preventive and treatment services. We identify effects from increasing income eligibility and providing a given set of dental benefits to the newly income eligible, thus avoiding the conflating effects from changing dental benefits for previously Medicaid eligible individuals during the same period.

Methods

Data and Sample

We use restricted data from the Medical Expenditure Panel Survey (MEPS) with state geocodes. MEPS provides detailed individual-level self-reported data on dental services utilization. No other national survey provides similarly detailed individual-level data on different types of received dental services over multiple and consecutive years. We include data from 2011 through 2013 as the period before the Medicaid expansions and 2014 to 2016 as the post-expansion period.

Over this period, 15 states changed the coverage of dental benefits for adults in Medicaid. Of those, 7 states also expanded their income eligibility for Medicaid under the ACA. For example, California had no dental benefits for adults in Medicaid until 2012, then provided limited dental coverage in 2013 before providing extensive coverage in 2014 and beyond

when income eligibility also expanded. As noted above, one innovation of our study is that it avoids conflating effects from changing dental coverage for previously income eligible individuals at the time of increasing income eligibility. To do that, we restrict the analytical sample of individuals aged 19–64 years in each state to those whose income exceeds the income eligibility level before the expansion in the state. Therefore, individuals who would be previously eligible for Medicaid based on the pre-ACA state Medicaid eligibility income level are excluded from the analysis. State by state, we account for variation in income eligibility levels between childless adults and parents. The newly eligible for Medicaid after the expansion receive the dental coverage provided in the state to adults at that time and are not directly affected by changes in Medicaid benefits.

We exclude a few states from the main analytical sample (Table 1). We exclude North Dakota, which does not provide dental coverage to the newly income eligible and Arizona because it does not provide dental coverage to adults. We do so to account for any possibility of increased access to medical services influencing referral to and use of dental care (if dental problems or concerns are identified or discussed during medical visits since oral health can affect overall health). In sensitivity analyses, however, we add these states as control states. Also, because we focus on states that expanded Medicaid in 2014, we exclude five more states Alaska, Indiana, Louisiana, Montana, and Pennsylvania which expanded later in 2015 and 2016.

Outcomes

The MEPS dental event file collects detailed, individual-reported, event-level information on utilization of all dental services that surveyed individuals have received in the current survey year. Using these event-level dental files, we separate dental visits into preventive and treatment services. A preventive dental visit is defined as receiving a dental exam or cleaning. We code three treatment measures. The first is visits involving any treatment including cavity fillings, inlay, crown, root canal, periodontal scaling, implant, abscess treatment, oral surgery, bridges, dentures, orthodontics, TMD/TMJ treatment, whitening, or tooth extraction. We further separate dental treatments into minor dental treatment that includes cavity fillings only, and major dental treatment focusing on the more common treatments (all except dentures, orthodontics, and whitening). To compare our results to prior studies, we also evaluate any dental visits as an outcome.

Study Design

We employ a difference-in-differences design to identify the impact of the state Medicaid expansions on dental services use by level of dental coverage. We use an event study specification that provides separate estimates for each of the post-expansion years (2014, 2015, and 2016). This specification also estimates trends in dental services use before 2014 and tests if they are similar between expanding and non-expanding states as a check for whether the difference-in-differences design is valid. The regression model is specified as follows:

$$\begin{aligned} \text{Dental}_{ist} = & \alpha + \beta_1 \text{Medicaid}_s * Y2011 + \beta_2 \text{Medicaid}_s * Y2012 \\ & + \beta_3 \text{Medicaid}_s * Y2014 + \beta_4 \text{Medicaid}_s * Y2015 + \beta_5 \text{Medicaid}_s * Y2016 + \gamma \mathbf{X}_{ist} \\ & + \theta_s + \omega_t + \epsilon_{ist} \end{aligned} \quad (1).$$

Dental_{ist} are binary indicators for the different types of dental visits noted above for individual *i* in state *s* in year *t*. Medicaid_s is a binary indicator for states that had full Medicaid expansions under the ACA beginning in 2014. Y2011, Y2012, Y2014, Y2015 and Y2016 are indicators for whether the year is 2011, 2012, 2014, 2015 or 2016 (with 2013 as the reference year). X_{ist} includes basic demographic characteristics: age in categories, gender and race/ethnicity. θ_s are state fixed effects capturing time-invariant confounders between states, and ω_t includes year fixed effects capturing national trends shared between expanding and non-expanding states. ε_{ist} is the error term of the regression. The effects of Medicaid expansion during 2014, 2015 and 2016 (relative to 2013) are β₃, β₄ and β₅, respectively, which are the coefficients of the interactions between the dummies for these years and the Medicaid expansion status. The identifying assumption of the difference-in-differences model is that in the absence of Medicaid expansions, outcome changes in 2014–2016 would be similar between expanding and non-expanding states. One way to check this assumption is by testing whether pre-expansion outcome trends are different between expanding and non-expanding states, which we do through a joint F-test of β₁ and β₂, which are the coefficients of interactions between the 2011 and 2012 dummies (capturing changes in these years relative to 2013) and the Medicaid expansion status.

We estimate the model separately for groups of expanding states based on their level of dental services coverage for the newly income eligible. We follow a previously used definition of level of coverage based on the following three categories: 1) extensive coverage (>100 dental procedures covered, annual Medicaid spending cap per person \$1,000) adopted by 9 expanding states; 2) limited coverage (<100 dental procedures covered, annual Medicaid spending cap < \$1,000) adopted by 8 states; and 3) emergency only coverage adopted by 5 states.^{3,14} We follow this definition to compare to prior studies and examine separately the effects of each benefit group. Of the states covering only emergency services including treatments to relieve acute pain, control infection and emergency teeth extractions, only Maryland required the services to be provided in emergency departments (ED), while the others do not specify a setting.^{15,16} When estimating the main model for expanding Medicaid with extensive dental coverage, only those expanding states offering extensive dental coverage are included in the model. Similarly, only expanding states offering limited dental coverage are included when examining the effects of limited dental coverage. The same when examining the effects of emergency only coverage. Table 1 lists the treatment states by dental coverage groups (states with extensive dental benefit, limited dental benefit, and emergency dental benefit) and control states that did not expand Medicaid at any time in 2014 through 2016.

We estimate the regression models using OLS, which provides directly interpretable estimates of the difference-in-differences parameter as the Medicaid expansion effect on the likelihood of dental visits. The standard errors are clustered at the state level. We follow the recommendation to estimate the models both with and without sampling weights and report both results.¹⁷ In the absence of endogenous sampling, unweighted estimates are consistent and more precise than weighted estimates.

Results

In Supplementary Table 1, we show the rates of the dental services use measures before and after the Medicaid expansion years separately for expanding and non-expanding states. Below we present the results from the difference-in-differences models separately for the level of dental coverage in expanding states.

Effects of Expansion with Extensive Dental Coverage

In Table 2, we report the difference-in-differences estimates of the Medicaid expansion effects on the likelihood of dental visits (by type) for the newly income eligible receiving extensive dental coverage. We report the results from one model without sampling weights, and another using the weights. Both models indicate an increase in preventive visits and major treatments after state expansion with extensive dental coverage and most estimates are comparable between unweighted and weighted models. However, there are two important differences between unweighted and weighted estimates to note before discussing the magnitude of effects. First, with one exception, estimated effects are more precise (i.e., have lower standard errors) without using sampling weights as is generally expected.^{17,18} This greater precision is not because the sample size for the unweighted models is slightly larger (some observations in the MEPS have zero as sampling weight, so they are automatically dropped from the weighted models); the unweighted estimates (and their standard errors) are virtually unchanged when excluding these observations (Supplementary Table 2). The overall similarity of the unweighted and weighted estimates and greater precision of unweighted estimates indicate that the latter is preferred as there is no evidence of endogenous sampling that requires weighting to obtain consistent estimates.¹⁷ The identifying assumption of the difference-in-differences design is also better supported in the unweighted versus the weighted models for most outcomes. Parallel pre-expansion trends between expanding and non-expanding states are rejected only for minor treatments in the unweighted model but are rejected for all other outcomes in the weighted model (Supplementary Table 3). Visual examination of the outcome trends also supports these differences in pre-trend tests from the regression models (Supplementary Figure 1).

The unweighted estimates indicate that expanding Medicaid while offering extensive dental coverage has increased the likelihood of preventive dental visits by nearly 5 percentage points each year after the expansion. Similarly, the likelihood of visits for major dental treatments increased by 4–5 percentage points in 2014–2015 but the effect was smaller by half and statistically insignificant in 2016, likely reflecting greater demand for previously untreated dental problems shortly after gaining coverage. These changes are meaningful and represent a more than 30% increase in likelihood of preventive visits and more than 70%

increase in likelihood of major treatment visits from pre-expansion rates in those expanding states. When aggregating all visits, there is an increase in likelihood of any dental visits by 5–8 percentage points across the years, which is within the range of previous estimates for any dental visit.⁹ The likelihood of any dental visits in 2016 is higher by nearly 5 percentage-points in expanding states which is similar to what recently reported using the BRFSS.

Effects of Expansion with Limited Dental Coverage

In Table 3, we report the difference-in-differences estimates of the effects of Medicaid expansions with limited dental coverage. We find that the unweighted and weighted estimates are once again largely comparable, but that the unweighted estimates are more precise (lower standard errors) with no evidence of differential pre-trends between expanding and non-expanding states; we find the same when excluding the observations with an assigned weight of zero (Supplementary Table 4). In contrast, the weighted models indicate differential pre-trends for any visit, preventive visits, and any treatments (Supplementary Table 5). Graphical data are also consistent with the unweighted pre-trend tests (Supplementary Figure 2). Therefore, we focus on discussing the unweighted estimates.

The likelihood of preventive visits increased in 2014 and 2015 by about 7–8 percentage-points respectively or 54%–62% relative to the pre-expansion rate in the expanding states. But the effect was much smaller and insignificant in 2016. Also, the likelihood of visits for major treatments increased by 3–5 percentage points across all three years after expansion which represents nearly 47%–79% increase relative to pre-expansion rate. The effects on minor treatments are much smaller and statistically insignificant.

Effects of Expansion with Emergency Only Coverage

The estimates for expanding Medicaid with emergency-only dental coverage are in Table 4. We find significant differential pre-trends between expanding and non-expanding states for most outcomes in both unweighted and weighted models (Supplementary Table 6) suggesting that the difference-in-differences estimates for those outcomes are confounded. Differential pre-trends are also evident graphically in the case of emergency-only expansion (Supplementary Figure 3). Only any dental treatment and minor dental treatment visits show no significant differential pre-trends in the unweighted models. For those outcomes, there is a 5–6 percentage-point increase in likelihood of any dental treatment in 2015 and 2016, and a 2 percentage-point increase in likelihood of minor dental treatment (marginally significant).

Additional Estimations

We estimate additional models using alternative sample selection and state treatment or control group assignment to assess the sensitivity of results. The details of these models are in Supplementary Material 1 and Tables 7-16 online. In most cases, results are similar to the main estimates. One exception is finding smaller and insignificant effects of limited or emergency dental benefits when adding to the sample those previously eligible for Medicaid based on their income (before ACA expansion). This change in estimates might be due to a

smaller proportion gaining or using coverage among those previously income eligible or because of conflating effects from benefit changes.

Discussion

This work extends the literature on understanding how the recent Medicaid income eligibility expansions under the ACA affected the use of dental services among the newly eligible by examining preventive and treatment services separately and the level of dental coverage benefits. In previous work, Singhal et al.⁸ and Wehby, Lyu, Shane⁹ used BRFSS data that do not separate visits into preventive services versus treatments. Both found overall increases; Wehby, Lyu, Shane⁹ reported that the likelihood of any dental visits increased by about 10% through 2016, though this was only in states that expanded Medicaid with extensive coverage and only in areas with high supply of dentists. Nasseh and Vujicic⁷ also found roughly a 10–15% increase in any dental visits using the Gallup Wellbeing Index.

Our results suggest slightly larger increases in any dental visits compared to pre-expansion averages, in part perhaps due to our focus on those newly eligible rather than those benefitting from more coverage. We find increases of 30%–40% in expansion states that had extensive or limited coverage compared to non-expansion states. In terms of our new evidence on specific types of visits, we find that expanding Medicaid with extensive dental coverage has increased preventive dental visits each year from 2014–2016. We also find evidence of increased preventive services use with expanding and limited dental benefits but mainly for 2014–2015. Furthermore, we find that expanding with either extensive or limited dental coverage has increased the use of major dental treatments. For extensive benefits, the increases in dental visits involving major treatments occur in 2014 and 2015, whereas the significant increase in these visits with limited coverage occurs in 2014, 2015, and 2016. The continued increase in 2016 (relative to 2013) with limited but not extensive coverage may be a result of beneficiaries having to space their dental treatments across consecutive years given the cap of \$1,000 of Medicaid spending per year. This may also be the reason why there is little evidence of a continuing effect on preventive services in 2016 with limited benefits. In contrast, the insignificant effect of extensive coverage on major treatments in 2016 may be due to beneficiaries completing treatments of previously untreated problems in prior years after gaining coverage (2014 and 2015).

Unlike major treatments, both extensive and limited coverage do not appear to notably affect the use of minor treatments in the form of cavity fillings. This may be due to the newly eligible having less unmet need and fewer treatment delays (and therefore less pent-up demand after gaining coverage) for relatively minor treatments which are less costly to pay out of pocket compared to major treatments. Descriptive data of average out-of-pocket expenditures by visit type supports this interpretation. In the analytical sample and 2011–2013, average out-of-pocket expense (per visit) for visits only involving a minor treatment was \$58, compared to \$69 for visits only involving preventive services, and \$180 for visits only involving a major treatment.

The increase in preventive services, especially with extensive coverage through 2016, suggests that gaining extensive dental benefits may have additional long-term benefits to oral

health and any resulting changes in use of dental services that require a longer window to capture than reflected in these years. Examining these effects in subsequent years when the data become available may be useful to gain further insights into the continuation or changes in effects on dental services use. Such changes may include increased utilization stemming from additional years of exposure to consistent dental benefits that allows more beneficiaries to become aware of what services are covered.

We are unable to provide clear evidence on the effects of expansions with emergency-only coverage due to the significant differential pre-trends in services use between expanding and non-expanding states. We do, however, find some evidence of an increase in visits involving any dental treatment in 2015–2016. Based on the design of the MEPS questionnaire, the dental services we evaluate are those received in dental offices/clinics and those specific questions are not designed to capture services received in emergency departments (EDs). As noted above, 4 of the 5 expanding states with emergency-only coverage do not appear to restrict provision of services to EDs only. If the observed increase is accurate, the increase in dental treatment visits with emergency-only coverage would be visits to dental offices or clinics.

It is possible that increased ED visits for emergency dental services prompt subsequent dental office visits to complete treatment. MEPS provides data on ED visits and the reason for visits. The rate of EDs for dental purposes among the low-income population is very low, however (rates are below 1% in the MEPS which is consistent with other data).¹⁹ We explored the Medicaid expansion effects with emergency-only coverage on ED visits for dental reasons and found an increase but there were significant differential pre-trends between expanding and non-expanding states and therefore we do not report those results (available from the authors upon request). Evidence from the earlier lottery-based Medicaid expansion in Oregon indicates increased use of emergency dental visits and medications with emergency-only coverage but no changes in use of uncovered dental services. Another study from California found that the elimination of comprehensive adult dental coverage led to significant and immediate increases in dental ED visits by more than 1,800 visits per year.²⁰ More work is needed to understand effects of emergency only coverage on dental services use.

Our study has several strengths including separating dental services into preventive care and treatments, using national data, examining different coverage levels, focusing on the effects of income-eligibility expansions, removing the conflating effects of changing benefit levels for the previously eligible, and employing difference-in-differences to address confounding. One limitation in addition to those discussed above is that the measure of dental coverage we employ captures both the number of covered procedures and caps on spending, which can have different effects on use. Finally, our estimates are intent-to-treat (similar to most prior studies of the Medicaid expansions). Factors like beneficiary awareness can modify coverage effects; for example, educating beneficiaries about covered services may increase dental services use and the benefits of the Medicaid expansion. We leave these questions to future work.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Grouping of Treatment and Control States for Medicaid Expansion

Excluded States		
Alaska ¹		Arizona ^{2,4}
Indiana ¹		North Dakota ^{3,4}
Louisiana ¹		
Montana ¹		
Pennsylvania ¹		
Control States		
Alabama		North Carolina
Delaware ⁵		Oklahoma
Florida		South Carolina
Georgia		South Dakota
Idaho		Tennessee
Kansas		Texas
Maine		Utah
Massachusetts ⁵		Vermont ⁵
Mississippi		Virginia
Missouri		Washington, DC ⁵
Nebraska		Wisconsin
New York ⁵		Wyoming
Treatment States		
<i>Extensive Dental Coverage</i>	<i>Limited Dental Coverage</i>	<i>Emergency Dental Coverage</i>
California	Arkansas	Hawaii
Connecticut	Colorado	Maryland
Iowa	Illinois	Nevada
New Jersey	Kentucky	New Hampshire
New Mexico	Michigan	West Virginia
Ohio	Minnesota	
Oregon		
Rhode Island		
Washington		

Notes:

¹ indicates states that were excluded in the main estimation of the difference-in-differences model identifying the Medicaid expansion effects because these states expanded in later 2015 and 2016.

² Arizona was excluded in the main estimation because it is a Medicaid expanding states but offers no dental coverage.

³ North Dakota expanded Medicaid in 2014 and provides extensive dental benefits for traditional Medicaid adults, but provides no benefits for adults gaining coverage under the recent expansions.

⁴ In sensitivity analysis, Arizona and North Dakota are added as control states.

⁵ Delaware, Massachusetts, New York, Vermont, and Washington DC announced adopting the ACA Medicaid expansion in 2014, but these states had prior full or near full Medicaid expansions similar to ACA for both parents and childless adults. Thus, in our main analysis, we included these five states as control states. However, in sensitivity analysis, we switch both Massachusetts and New York as treatment states with extensive dental benefits, and DC and Vermont as treatment states with limited dental benefits. We keep Delaware as a control state because it offers no dental benefits.

Table 2.

Effects of ACA Medicaid Expansion on the Likelihood of Dental Services Use among Non-elderly Adults below 138% FPL Among States Offering Extensive Dental Benefits

	N	Pre-Mean in Treatment Group	p Value of Parallel Trend Test	Effects in 2014	Effects in 2015	Effects in 2016
<i>Panel A: Without Sampling Weights</i>						
Any Dental Visits	17864	0.185	0.158	0.074*** (0.021)	0.079*** (0.025)	0.056*** (0.019)
Any Preventive Dental Visits	17864	0.147	0.112	0.058** (0.023)	0.053* (0.028)	0.054** (0.023)
Any Dental Treatment	17864	0.107	0.117	0.052*** (0.023)	0.035* (0.020)	0.017 (0.014)
Any Minor Treatment [†]	17864	0.043	0.029	0.018 (0.014)	0.012 (0.010)	0.005 (0.006)
Any Major Treatment	17864	0.059	0.412	0.044** (0.017)	0.049*** (0.015)	0.020 (0.012)
<i>Panel B: With Sampling Weights</i>						
Any Dental Visits [†]	16905	0.209	0.008	0.081** (0.034)	0.092** (0.039)	0.062* (0.034)
Any Preventive Dental Visits [†]	16905	0.170	0.029	0.081* (0.045)	0.064 (0.049)	0.060 (0.036)
Any Dental Treatment [†]	16905	0.140	0.029	0.031 (0.026)	0.014 (0.024)	0.012 (0.020)
Any Minor Treatment	16905	0.069	0.445	0.009 (0.016)	0.001 (0.018)	-0.012 (0.014)
Any Major Treatment [†]	16905	0.067	0.003	0.043* (0.025)	0.053** (0.020)	0.026 (0.018)

Notes: Standard errors are in parentheses and clustered by state. These effects were estimated from the difference-in-differences model and represent the change in likelihood of use of dental services in 2014, 2015, and 2016 versus 2013 as a result of the Medicaid expansions. All regressions controlled for age, gender, race/ethnicity, education, state and year fixed effects.

* Significant at 10 percent level;

** significant at 5 percent level;

*** significant at 1 percent level.

[†] indicates that point estimates should be viewed with caution due to potential pre-trends in these outcomes that may bias the DD estimates.

Table 3.

Effects of ACA Medicaid Expansion on the Likelihood of Dental Services Use among Non-elderly Adults below 138% FPL Among States Offering Limited Dental Benefits

	N	Pre-Mean in Treatment Group	p Value of Parallel Trend Test	Effects in 2014	Effects in 2015	Effects in 2016
<i>Panel A: Without Sampling Weights</i>						
Any Dental Visits	14903	0.182	0.149	0.082** (0.035)	0.077** (0.029)	0.048* (0.025)
Any Preventive Dental Visits	14903	0.129	0.196	0.077*** (0.019)	0.067*** (0.022)	0.024 (0.020)
Any Dental Treatment	14903	0.111	0.759	0.052 (0.035)	0.036 (0.027)	0.036 (0.022)
Any Minor Treatment	14903	0.041	0.771	0.027 (0.020)	0.010 (0.013)	0.013 (0.013)
Any Major Treatment	14903	0.063	0.630	0.049* (0.025)	0.042** (0.017)	0.032** (0.013)
<i>Panel B: With Sampling Weights</i>						
Any Dental Visits [†]	14053	0.199	0.014	0.109*** (0.037)	0.080** (0.032)	0.081*** (0.027)
Any Preventive Dental Visits [†]	14053	0.149	0.031	0.099*** (0.035)	0.062** (0.030)	0.060* (0.034)
Any Dental Treatment [†]	14053	0.117	0.070	0.058 (0.037)	0.024 (0.034)	0.053** (0.024)
Any Minor Treatment	14053	0.048	0.337	0.045** (0.018)	0.008 (0.020)	0.014 (0.016)
Any Major Treatment	14053	0.059	0.186	0.063* (0.032)	0.043** (0.017)	0.050*** (0.015)

Notes: Standard errors are in parentheses and clustered by state. These effects were estimated from the difference-in-differences model and represent the change in likelihood of use of dental services in 2014, 2015, and 2016 versus 2013 as a result of the Medicaid expansions. All regressions controlled for age, gender, race/ethnicity, education, state and year fixed effects.

* Significant at 10 percent level;

** significant at 5 percent level;

*** significant at 1 percent level.

[†] indicates that point estimates should be viewed with caution due to potential pre-trends in these outcomes that may bias the DD estimates.

Table 4.

Effects of ACA Medicaid Expansion on the Likelihood of Dental Services Use among Non-elderly Adults below 138% FPL Among States Offering Emergency Dental Benefits

	N	Pre-Mean in Treatment Group	p Value of Parallel Trend Test	Effects in 2014	Effects in 2015	Effects in 2016
Panel A: Without Sampling Weights						
Any Dental Visits [†]	13133	0.195	0.020	0.054 (0.042)	0.088 (0.063)	0.051 ^{**} (0.019)
Any Preventive Dental Visits [†]	13133	0.172	0.001	0.025 (0.053)	0.040 (0.078)	0.005 (0.032)
Any Dental Treatment	13133	0.070	0.284	0.033 (0.029)	0.054 ^{***} (0.016)	0.059 ^{***} (0.017)
Any Minor Treatment	13133	0.008	0.293	0.020 [*] (0.010)	0.030 (0.027)	0.057 [*] (0.030)
Any Major Treatment [†]	13133	0.039	0.001	0.020 (0.026)	0.032 (0.027)	0.014 (0.012)
Panel B: With Sampling Weights						
Any Dental Visits [†]	12379	0.262	0.032	0.012 (0.047)	0.029 (0.073)	-0.012 (0.068)
Any Preventive Dental Visits [†]	12379	0.243	0.008	0.019 (0.050)	-0.028 (0.088)	-0.062 (0.063)
Any Dental Treatment	12379	0.062	0.091	0.038 (0.033)	0.063 ^{**} (0.024)	0.093 ^{***} (0.033)
Any Minor Treatment [†]	12379	0.014	0.431	0.051 (0.034)	0.018 (0.031)	0.056 (0.041)
Any Major Treatment [†]	12379	0.028	0.001	0.015 (0.016)	0.054 ^{**} (0.024)	0.049 ^{***} (0.012)

Notes: Standard errors are in parentheses and clustered by state. These effects were estimated from the difference-in-differences model and represent the change in likelihood of use of dental services in 2014, 2015, and 2016 versus 2013 as a result of the Medicaid expansions. All regressions controlled for age, gender, race/ethnicity, education, state and year fixed effects.

* Significant at 10 percent level;

** significant at 5 percent level;

*** significant at 1 percent level.

[†] indicates that point estimates should be viewed with caution due to potential pre-trends in these outcomes that may bias the DD estimates.