Impact of Medicaid Dental Coverage Expansion on Dental Care Utilization and Smoking Behavior Among Reproductive-Age Women*

Xuechao Qian† Anwar Assamidanov† Tim Bruckner†
Richard Manski‡ Maria Steenland‡ Brandy Lipton†

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Abstract

Dental care utilization among reproductive-age women not only affects their oral and overall health but also influences other health behaviors, with potential intergenerational implications. This study examines the effects of Medicaid dental coverage expansion for non-pregnant adults on dental care utilization and behavioral outcomes among reproductive-age women (21-44 years old) using data from the Behavioral Risk Factor Surveillance System (2000-2022). Exploiting state-level variations in dental benefit policies, we employ a difference-in-differences strategy to estimate the impact of expanded coverage. Our findings indicate that Medicaid dental benefit expansions increase the likelihood of dental care utilization by 4.8 percentage points, an 8.6% increase from the baseline rate. However, we also find evidence of potential moral hazard, as expanded coverage is associated with higher probabilities of smoking initiation and frequent smoking.

JEL Codes: Medicaid dental benefits, Reproductive-age women, Smoking, Moral hazard

Keywords: I12, I13, I18

*Qian, xuechaq@hs.uci.edu. Assamidanov, aassamid@hs.uci.edu. Bruckner, brucknet@uci.edu. Manski,rmanski@umaryland.edu. Steenland, msteenla@umd.edu. Lipton, blipton@uci.edu. We are very grateful to audiences at the HSB Seminar for their generous advice and feedback on this project. We gratefully acknowledge support from NIH R01DE033732.

†UC Irvine Joe C. Wen School of Population & Public Health

‡University of Maryland

1 Introduction

Oral health is an essential yet often understudied component of overall population health. In the United States, approximately one in five adults aged 20 to 64 has at least one untreated cavity, and the economic burden of untreated dental disease is substantial, with an estimated $45 billion in productivity lost annually (CDC, 2024). Beyond that, poor oral health has been linked to a wide range of adverse outcomes, including reduced quality of life (Naito et al., 2006; CDC, 2024) and an increased risk of chronic conditions such as cardiovascular disease (Sanz et al., 2020; Oliveira et al., 2010), diabetes (Nasseh et al., 2017; Chee et al., 2013; Díaz-Romero et al., 2005), and respiratory illnesses (Manger et al., 2017). Given the growing evidence that oral health may play a significant role in reproductive health and is associated with child outcomes (Dye et al., 2011; Chaffee et al., 2014; Iheozor-Ejiofor et al., 2017; Ide & Papapanou, 2013; Nasseh et al., 2017; Jeffcoat et al., 2014), an important research question emerges: how does access to affordable dental care affect the broader reproductive population, particularly women of reproductive age?

This study estimates the impacts of Medicaid dental benefit expansions on Medicaid-eligible women of reproductive age by leveraging state-by-year variation in coverage changes for non-pregnant adults from 2000 to 2022. The main policy treatment is the expansion of Medicaid dental coverage to include preventive and/or restorative care, beyond emergency-only services. Using nationally representative data from the Behavioral Risk Factor Surveillance System (BRFSS), we employ a difference-in-differences (DID) framework to evaluate two primary sets of outcomes. First, we examine changes in dental care utilization, measured by the probability of visiting a dentist or dental clinic in the past 12 months. Second, we assess whether these policy changes influence smoking behaviors, including both smoking initiation and current smoking status, among the same population. This extension is motivated by the critical role dental providers play in delivering smoking cessation counseling and oral health education related to tobacco use (Terrades et al., 2009; Yadav et al., 2022), as well as the well-established risks of smoking during pregnancy, including its link to adverse birth outcomes (Bharadwaj et al., 2014).

We find that the probability of visiting a dentist or dental clinic in the past 12 months increases substantially following the expansion of non-emergency dental coverage through state Medicaid programs. Among Medicaid-eligible women of reproductive age, the policy is associated with a 4.8 percentage point increase in dental care utilization—an 8.6% rise relative to the baseline rate of 56%. Given that only 42% of the BRFSS sample is identified as Medicaid-eligible (based on the midpoint of reported household income compared to the state-year Medicaid eligibility threshold), the implied effect among actual beneficiaries corresponds to an estimated 11.4 percentage point increase, or a 20% relative rise from the sample mean. This effect size is consistent with previous studies estimating the overall

impact of Medicaid dental benefits on adult populations (Decker & Lipton, 2015).

We then provide novel evidence on an unintended consequence of expanding public health insurance coverage—in our case, Medicaid dental benefits. Our results show that expanded dental coverage is associated with higher rates of smoking among Medicaid-eligible women of reproductive age. For smoking initiation, we estimate a 2.6 percentage point increase in the probability of having ever smoked 100 cigarettes, representing a 7% increase relative to the sample average. For current smoking status, we find a 2.1 percentage point increase in the likelihood of being a daily or occasional smoker, corresponding to an 8% rise from the baseline rate. These findings highlight the potential for behavioral spillovers in response to changes in public benefit design and underscore the importance of considering both intended and unintended health consequences in policy evaluation.

We explore two potential mechanisms: moral hazard and the income effect, to explain why improved dental care utilization coexists with increased rates of smoking among Medicaid-eligible reproductive-age women. Moral hazard (Zweifel & Manning, 2000; Aron-Dine et al., 2015) suggests that when individuals gain access to publicly funded dental care, they may feel less constrained by the oral health risks associated with smoking, knowing that treatment is now more affordable or accessible. This reduced perceived cost may weaken the incentive to avoid harmful behaviors such as tobacco use. The second mechanism, the income effect Sommers & Oellerich (2013); Abdus & Decker (2019), proposes that by lowering out-of-pocket spending on dental services, Medicaid dental benefit expansions free up limited financial resources, some of which may be redirected toward other consumption, including cigarettes. However, our supplementary analysis of alcohol use finds little evidence of similar increases, suggesting that the income effect alone may not fully explain the observed changes in smoking behavior and risk behaviors not related to dental care do not change with Medicaid dental benefits. Together, these mechanisms illustrate how expansions in public health insurance can generate complex behavioral responses, including unintended consequences that may counteract some of the policy's intended health benefits.

Subgroup analysis reveals meaningful heterogeneity across demographic groups. While the impact of Medicaid dental benefit expansions on dental care utilization is more pronounced among older reproductive-age women, the effects on smoking behaviors are primarily driven by younger individuals. Both sets of outcomes show stronger responses among racial and ethnic minority groups, particularly Hispanic and non-Hispanic Black women, as well as among those with lower levels of educational attainment. These findings underscore the potential disparities in how different populations respond to public policy and highlight the complexity of optimizing policy design to target and benefit vulnerable groups. Overall, our results remain robust across alternative model

specifications, including different sets of control variables, methods that account for time-varying treatment effects, and variations in sample composition.

This paper contributes to the broader literature on Medicaid expansions (Currie & Gruber, 1996; Buchmueller et al., 2016; Abdus & Decker, 2019; Wehby et al., 2019) while also joining a growing body of research focused specifically on Medicaid dental care (Decker & Lipton, 2015; Singhal et al., 2017; Meyerhoefer et al., 2019; Naavaal & Harless, 2022). Unlike prior studies that estimate average effects on the general adult population, we focus on Medicaid-eligible women of reproductive age—a group of high policy relevance. Women face greater unmet healthcare needs and more difficulty affording care compared to men (Long et al., 2011), and low-income women, who are more likely to rely on Medicaid, are particularly vulnerable. Our study complements existing research on dental care access for pregnant women (Dye et al., 2011; Ide & Papapanou, 2013; Chaffee et al., 2014; Iheozor-Ejiofor et al., 2017; Nasseh et al., 2017; Jeffcoat et al., 2014) by emphasizing the importance of improving oral health and related health behaviors earlier in the reproductive life course. Enhancing access to dental care before pregnancy may yield long-term benefits for both maternal and child health.

Our study also contributes novel insights into the unintended consequences of public policy design. Both moral hazard (Zweifel & Manning, 2000; Aron-Dine et al., 2015) and the income effect (Sommers & Oellerich, 2013; Abdus & Decker, 2019) offer plausible mechanisms through which Medicaid dental benefit expansions may influence health care utilization and health-related behaviors such as smoking. While both channels are theoretically relevant, our findings suggest a stronger role for the moral hazard mechanism, wherein reduced perceived costs of oral health care may weaken incentives to avoid harmful behaviors like smoking. These results underscore the importance of evaluating not only the intended health gains from expanded coverage but also the broader behavioral responses, which must be considered when assessing the overall social costs and benefits of public health insurance policies.

The remainder of this study is organized as follows. Section 2 describes the policy and individual-level data sources, introduces key variables, and presents summary statistics. Section 3 outlines the empirical framework and model specification. Section 4 presents and discusses the main findings. Finally, Section 5 concludes with a summary of results and implications for policy.

2 Data

2.1 State Level Medicaid Dental Coverage Policies

We gather Medicaid dental coverage policies for the period 2000 to 2020 from multiple sources, including the Kaiser Family Foundation (KFF), the National Academy for State

Health Policy (NASHP), the Medicaid and CHIP Payment and Access Commission (MACPAC) reports, and CMS state plan amendments. We also contacted state health departments and supplement policy change information using internet search of news articles to obtain the exact dates of Medicaid dental coverage changes if possible. In this study, we specifically examine policy changes in which states transition from covering only emergency dental care to providing more comprehensive services, including preventive and/or restorative care, or reverse such expansions by reverting to limited emergency coverage.

Table 1 presents the years in which individual U.S. states either added or dropped Medicaid dental benefits for non-pregnant adults beyond emergency services between 2000 and 2023. Several states, such as Alaska, Arkansas, Colorado, Delaware, the District of Columbia, Maine, Montana, New Hampshire, South Carolina, Virginia, West Virginia, and Wyoming, implemented dental benefit expansions without having previously dropped them. Florida is the only state listed as having dropped benefits (in 2002) without subsequently restoring them during the observed period. A number of states experienced both benefit cuts and restorations. For example, California dropped dental benefits in 2009 and reinstated them in 2014, while Idaho reduced benefits in 2011 and added them back in 2015. Similarly, Illinois, Massachusetts, Michigan, Missouri, Oklahoma, and Washington experienced multiple policy shifts, including both the reduction and expansion of benefits over time.[1]

(Table 1 here)

Figure 1 visualizes these patterns by categorizing states into five groups: those that only added dental benefits, those that only dropped benefits, those that both added and dropped benefits, and those that made no changes between 2000 and 2023—either because they had already provided non-emergency dental benefits before 2000 or never expanded coverage beyond emergency services. The substantial time and geographic variation in Medicaid dental coverage policies provides an ideal setting for quasi-experimental analysis. In this study, we define treatment states as those that either added or dropped Medicaid non-emergency dental coverage by 2023. The control group includes states that did not implement any such policy changes during the study period.

(Figure 1 here)

2.2 Behavioral Risk Factor Surveillance System (BRFSS)

Our primary outcome data come from the Behavioral Risk Factor Surveillance System (BRFSS), a nationally representative, state-based health survey administered annually

[1]Because Michigan dropped benefits in 2009 but reinstated them in 2010, we treat Medicaid dental coverage in Michigan as unchanged during those two years.

by the Centers for Disease Control and Prevention (CDC) in collaboration with states. Established in 1984, BRFSS is the largest continuously conducted health survey in the world and collects data via telephone interviews (landline and cellphone) from non-institutionalized adults aged 18 and older. The survey gathers information on a wide range of health-related topics, including chronic disease prevalence, health behaviors (such as smoking, drinking, diet, and physical activity), access to healthcare, and use of preventive services, including dental services.

Our primary sample are all Medicaid eligible reproductive age women between 21 to 44 years old in BRFSS from 2000 through 2022. We exclude currently pregnant women from our analysis for two primary reasons. First, Medicaid dental benefits for pregnant women are often implemented through separate programs that vary in scope and generosity across states, introducing additional policy heterogeneity that could confound our estimates. Second, the proportion of pregnant women among all reproductive-age women in the BRFSS sample is relatively small — only about 3.93%. Medicaid eligibility in the BRFSS is determined by comparing a respondent's household income—proxied by the midpoint of their reported income bracket—with the state-specific Medicaid income eligibility thresholds.[2]

Among this sample, we examine two sets of outcomes of interests. As a first-stage outcome of Medicaid dental care coverage, we study individual dental care utilization, which can be measured by an indicator of whether the person has visited a dentist, dental hygienist, or dental clinic within the past year (within 12 months). This question is surveyed annually from 2000 to 2005 and then biannually since 2006. Our second set of outcomes focuses on smoking behaviors, which are closely linked to dental health and may be influenced by individuals' access to dental services (Terrades et al., 2009; Blasi et al., 2018; Kawamura et al., 2022; Yadav et al., 2022). Using the BRFSS, we measure smoking initiation with an indicator for whether a respondent has smoked at least 100 cigarettes in their lifetime. We assess current smoking behavior using indicators for whether the respondent is currently a daily smoker or currently a frequent (including daily and occasionally) smoker. Smoking-related questions are asked annually in BRFSS.

(Table 2 here)

After pooling all Medicaid-eligible reproductive-age women from 2000 to 2022 in the BRFSS, we obtain 151,889 cross-sectional individual-year observations. As shown in Table 2, 56% of the sample reported having used dental care in the past 12 months. Regarding smoking behaviors, 37% of respondents have ever smoked 100 cigarettes in their lifetime, 20% are currently daily smokers, and an additional 6% are occasional smokers. The BRFSS also provides a rich set of demographic information. The average

[2]Medicaid income eligibility vary by state and are obtained from the Kaiser Family Foundation (KFF) for both non-parents and parents.

age in the sample is approximately 32 years; 36% identify as non-Hispanic white, 37% are married, and 36% have completed a college degree or higher. Because the sample is limited to Medicaid-eligible individuals, 30% fall within the lowest income bracket (less than $10,000 annually), while fewer than 1% are in the highest bracket (above $75,000). On average, households include fewer than two adults and about two children under age 18. These demographic characteristics are included as controls in the main analysis to adjust for individual-level confounding factors.

3 Identification Strategy

Utilizing both time and geographic variation in the expansion (or reduction) of Medicaid dental benefits for non-pregnant adults, we estimate the impact of Medicaid dental coverage on reproductive-age women using a difference-in-differences approach. Specifically, we compare outcomes among Medicaid-eligible reproductive-age women before and after the policy switch in states that adopted the policy, relative to similar women in states that did not change their Medicaid dental coverage during the same study period. In our main analysis, we assume that the effect of a Medicaid dental benefit expansion is symmetric to the effect of a benefits reduction, meaning that adding and removing coverage have equivalent but opposite impacts.

Our approach relies on parallel trends assumption, which indicates that change in the outcomes of Medicaid-eligible reproductive-age women in both treatment and control states would evolve in similar trends in the absence of Medicaid dental benefits change. In order to access the validity of this assumption, we first conduct a balance test to show the associations between the treatment variable, which is an indicator if the state is providing preventive and/or restorative dental services in that year, and several characteristics of the reproductive-age women. For example, if the education attainment of the Medicaid-eligible reproductive-age women in our sample change with Medicaid coverage, it is possible that this demographic change associate with outcomes. Table A.1 presents the estimated correlations between treatment variable and individual characteristics, including age, race/ethnicity, education attainment, income level, and household size, are overall not significant. The only exception is with the indicator of earning household income between $10,000 and $15,000. This suggests that the expansion indicator does not predict the demographic composition of our primary analysis sample.

Our baseline difference-in-differences specification is the standard two-way fixed effect (TWFE) model below. This specification allow us to use all states and include both expansions and reductions of Medicaid dental benefits

$$Outcome_{ist} = \alpha_0 + \beta_1 PROVIDED_{st} + X_{ist}\Gamma + Z_{st}\Upsilon + \mu_t + \lambda_s + \epsilon_{ist} \quad (1)$$

where, $Outcome_{ist}$ denotes the outcomes of interest of individual i from state s in year t. $PROVIDED_{st}$ is whether state s offers dental benefits beyond emergency-only in year t. X_{ist} denotes individual and household demographic controls, including age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. We also control state time-variant characteristics, including ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. Note that we further control for state-year level cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage, when examining smoking behavior outcomes. In all specifications, we include year fixed effects μ_t and state fixed effects λ_s.

In Equation (1), β_1 estimates the average treatment effect (ATE) of providing Medicaid preventive and/or restorative dental benefits on outcomes among Medicaid-eligible reproductive-age women.

We also extend Equation (1) to an event study specification, which can test the parallel trend assumption by estimating impacts in each time period both before and after the policy change year. We estimate the following model:

$$Outcome_{ist} = \alpha_0 + \sum_{k=-6, k\neq -1}^{11} \beta_k I\{t - T_s^{CHANGE} = k\} I\{s = CHANGE\} + X_{ist}\Gamma + Z_{st}\Upsilon + \mu_t + \lambda_s + \epsilon_{ist} \quad (2)$$

where, the indicator $PROVIDED_{st}$ is replaced with interactions between an indicator $I\{s = CHANGE\}$ denoting whether state s ever modified its dental benefits, and a set of time indicators $I\{t - T_s^{CHANGE} = k\}$, which represent the time gap between each year and the Medicaid dental coverage change year in state s: T_s^{CHANGE}. [3]

Therefore, each β_k estimates the change in outcomes among Medicaid-eligible reproductive-age women in year k relative to one year before the policy change year ($t = -1$). Under the parallel trend assumption, β_k are expected to show that $Outcome_{ist}$ have little or no association with the treatment indicator when $k < 0$.

In this study, some states changed their Medicaid dental benefit policies more than once—both expanding and reducing coverage for non-pregnant adults. To include all state-year observations, we treat each policy change as a separate event by splitting the observation period accordingly. For example, California reduced Medicaid non-emergent

[3] As shown in Figure A.1, the distribution of years with available dental care outcomes is concentrated between years -7 and 7 relative to the policy change, while smoking-related outcomes are mostly available between years -6 and 8. Note that we group the event study year gaps in two-year intervals for dental care utilization outcomes, as BRFSS has collected this information biennially since 2006. Therefore, we extend the pre-policy event study estimates for dental care outcomes to 10 years prior to the policy change to ensure a sufficient pre-treatment period for visual inspection of trends.

dental coverage in 2009 and subsequently expanded it again in 2014. Thus, we divide California's data into two distinct policy episodes: a reduction period spanning 2000 to 2010, and an expansion period from 2011 to 2022. Moreover, we recode the indicator $I\{t - T_s^{CHANGE} = k\}$ to be -1 if the policy change is reducing Medicaid dental benefits, under the assumption that the effect of expansion and that of reduction are symmetric.

4 Effects of Medicaid Dental Benefits on Reproductive-age Non-pregnant Women

4.1 Dental Care Utilization

Figure 2 presents the event study estimates of the effect of Medicaid non-emergency dental benefits on dental service utilization in the past 12 months, using the specification outlined in Equation (2). Because this outcome has been collected biennially since 2006, we group the relative year gaps in two-year intervals. Except for a dip within two years prior to the policy change, all coefficients estimated for the ten years preceding the change are close to zero, with wide confidence intervals crossing the zero line. This indicates no substantial evidence of a pre-existing trend in dental visits among Medicaid-eligible reproductive-age women. In contrast, Figure 2 shows that most post-policy coefficients are positive and sizeable, with statistically significant increases observed in years 2-3 and 6-7. The only exception is a zero coefficient in years 4-5.

(Figure 2 here)

Table 3 presents the aggregate ATE of Medicaid dental benefits beyond emergency care for non-pregnant Medicaid-eligible reproductive-age women on most recent dental care utilization in Column (1). The point estimate suggests that Medicaid dental benefit expansions increase the likelihood of dental care utilization by 4.8 percentage points among Medicaid-eligible reproductive-age women, an 8.6% increase from the sample mean (56%). Given that 42% of the Medicaid-eligible sample in BRFSS are actually Medicaid enrollees, the overall effect size is equivalent to 11.4 pp increase, approximately 20% rise relative to sample mean. Our finding is very consistent with existing study about the impacts of Medicaid dental coverage on general adult population (Decker & Lipton, 2015).

(Table 3 here)

This finding highlights the substantial impact of expanding access to more comprehensive dental services on utilization among reproductive-age women, particularly those who are economically vulnerable and likely eligible for Medicaid.

4.2 Smoking Behaviors

Figure 3 presents the event study coefficients for three smoking outcomes, including ever smoked 100 cigarettes (Panel (a)), being a daily smoker now (Panel (b)), and being a daily and occasional smoker now (Panel (c)). Panel (a) suggests some evidence that the probability of having ever smoked 100 cigarettes increases following the expansion of Medicaid dental benefits, particularly starting from year 3 and continuing through several years within the first decade after the policy change. The pre-treatment estimates are mostly close to zero, with a positive coefficient in year -4, but show no indication of an upward trend over time. Panel (b) shows much stronger positive impacts on the probability of being a daily smoker at the time of the survey, beginning around year 3 after the policy change. Most coefficients following year 3 are substantially and significantly positive. When we broaden the outcome to include occasional smokers in Panel (c), we continue to observe positive effects starting in the third year post-policy change, with no evidence of pre-treatment trends.

(Figure 3 here)

Table 3 reports the aggregated effects of Medicaid dental care benefits on smoking behaviors among Medicaid-eligible reproductive-age women. The results indicate that providing non-emergent dental care coverage increases the probability of having smoked 100 cigarettes by 2.6 percentage points, representing a 7% increase from the sample average. For current smoking behavior, Table 3 shows a 1.6 percentage point increase in the likelihood of being a current daily smoker—an 8% increase relative to the sample mean—and a 2.1 percentage point increase in the likelihood of being either a daily or occasional smoker, also reflecting an 8% increase from the sample average.

The overall findings on both smoking initiation and current smoking behavior suggest a somewhat unexpected policy consequence. While the expansion of Medicaid dental coverage for non-pregnant adults leads to increased use of dental care, it is also associated with higher rates of smoking initiation and current smoking. Specifically, we observe increases in both the intent to smoke and the prevalence of current smoking following the policy change. We explore several potential explanations for this pattern in the following Mechanisms section.

4.3 Heterogeneity Effects

(Figure 4 here)

Figure 4 presents estimated subgroup effects of Medicaid non-pregnant dental care benefits on Medicaid-eligible reproductive-age women, revealing broadly positive impacts across demographic groups. Statistically significant improvements are observed among

women aged 26 to 44, those with more than two children, Non-Hispanic Black and Hispanic women, individuals with both lower and higher educational attainment, and both married and unmarried women. While some groups, such as younger women under 26, those without children, and Non-Hispanic women of other races, show less precise or statistically insignificant effects, the overall pattern suggests that the expansion of dental benefits led to meaningful increases in access or utilization for many subpopulations, particularly those traditionally underserved.

(Figure 5 here)

We also present the heterogeneous effects on smoking behavior outcomes in Figure 5. It is important to note that we do not necessarily expect the same subgroups to respond similarly in terms of both dental care utilization and smoking behaviors, as our analysis includes all Medicaid-eligible reproductive-age women—not just those who utilize dental services. The observed increases in dental care use and smoking may be driven by different demographic groups, highlighting the complexity of behavioral responses to the policy change.

Panels (a) to (c) in Figure 5 show that the positive effects of Medicaid dental benefit expansion on smoking outcomes are more pronounced among relatively younger subgroups, particularly reproductive-age women under 35, parents with fewer children, and unmarried individuals. The impacts are also more substantial among those with lower educational attainment, especially individuals with a high school degree or less. Across racial and ethnic groups, the effects are consistently and significantly positive among Hispanic women across all smoking outcomes. For Non-Hispanic Black women, the effects are also notably positive in Panels (a) and (c), indicating a significant increase in both smoking initiation and current smoking prevalence in response to the policy change.

4.4 Mechanisms

Given the simultaneous increase in dental care utilization and higher rates of smoking among Medicaid-eligible reproductive-age women, we propose two potential mechanisms to help interpret and reconcile these seemingly contradictory findings.

4.4.1 Moral Hazard

One potential mechanism is moral hazard (Zweifel & Manning, 2000; Aron-Dine et al., 2015). In this context, the expansion of Medicaid dental benefits may reduce the perceived or actual costs associated with the health consequences of smoking, thereby weakening individuals' incentives to avoid risky behaviors. Specifically, if individuals believe that

dental care is now more accessible and affordable through Medicaid, they may feel less constrained by the oral health risks associated with smoking. As a result, some may be more likely to initiate or continue smoking, assuming that any resulting dental issues can be managed with Medicaid funded care. This behavioral response reflects classic ex-ante moral hazard, where insurance coverage leads to riskier health behaviors due to diminished cost exposure.

To further assure this moral hazard mechanism is predominantly via Medicaid dental benefits rather than other type of care provision, we present three event study estimates in Figure 6, using the same specification as in Equation (2). These outcomes capture respondents' drinking behaviors over the past 30 days and include indicators for any alcohol consumption, the log number of drinking days, and the log number of binge drinking circumstances. Overall, we do not observe that drinking, especially risky drinking behaviors (measured by binge drinking circumstances), positively associate with Medicaid dental benefits expansions among the same Medicaid-eligible reproductive-age women in our sample.

(Figure 6 here)

4.4.2 Income Effect

An alternative potential explanation is the income effect. As Medicaid expands dental coverage from emergency-only to include preventive and/or restorative services, out-of-pocket costs for dental care are substantially reduced. This easing of budget constraints may enable affected individuals to allocate more of their limited resources toward other forms of consumption, including cigarettes. Survey data from dental practitioners indicate that the average cost of a dental cleaning ranges from $90 to $120, and fillings range from $100 to $1,200 per tooth.[4] Under Medicaid, enrollee cost-sharing is typically minimal—between $1 and $3—representing a significant cost reduction for beneficiaries (KFF, 2018). Sommers & Oellerich (2013) and Abdus & Decker (2019) estimate that providing Medicaid dental benefits to non-pregnant adults reduces average annual out-of-pocket costs by $18.88 overall, and by $179.28 among those who had at least one dental visit. This shift in financial burden may, unintentionally, free up disposable income for potentially harmful consumption behaviors like smoking.

If the income effect hypothesis holds, we would expect to observe increased consumption not only of cigarettes but also of other goods, such as alcoholic beverages. However, the results in Figure 6 provide limited support for this hypothesis, as we do not find strong evidence that alcohol consumption increased among women in our main sample following the expansion of Medicaid dental benefits.

[4]Survey results are from: https://www.carefreedental.com/resources/14-dental-plans/276-howmuch-is-dental-cleaning-without-insurance

4.5 Robustness Checks

Our baseline results are robust to the inclusion of various sets of control variables, as demonstrated in Table A.2. To further strengthen causal interpretation, we expand the sample to include potentially Medicaid-ineligible individuals and implement a triple-differences (DDD) strategy that compares changes in outcomes between eligible and ineligible groups. As shown in Table A.3, the estimates for Medicaid-eligible reproductive-age women remain highly consistent with our baseline results

To rule out alternative explanations related to a general increase in healthcare utilization, we conduct a placebo analysis using responses on annual health examinations from the BRFSS. Applying the same event study specification as in Equation (2), we examine whether Medicaid dental benefit expansions are associated with changes in non-dental healthcare use. As shown in Figure 7, we find no evidence of a positive association between the expansion of dental benefits and the likelihood of receiving a general health examination in the past 12 months. This suggests that the observed increase in dental visits is not driven by a broader shift in healthcare utilization.

(Figure 7 here)

Our main results are estimated using a standard two-way fixed effects (TWFE) approach. This method is picked as our baseline approach given that the policy changes under study include not only expansions but also reductions and reversals in Medicaid dental coverage within states over time. However, a recent literature has raised concerns regarding staggered difference-in-difference designs (de Chaisemartin & D'Haultfœuille, 2020; Callaway & Sant'Anna, 2021; Goodman-Bacon, 2021; Borusyak et al., 2024; Roth et al., 2023). To address this, we re-estimate the main results following (Gardner, 2022) in Figure A.2 and Figure A.3. Both figures present consistent estimates of the effect of Medicaid dental benefit expansions on dental care utilization and smoking outcomes. To further assess the validity of our two-way fixed effects (TWFE) estimates, we follow Goodman-Bacon (2021) and decompose the overall TWFE estimate into a weighted average of all possible two-group, two-period difference-in-differences (2×2 DID) comparisons. The distribution of weights across comparison types is reported in Figure A.4. All four panels in this figure are estimated after excluding states that only dropped coverage or experienced both expansions and reductions, and the results suggest that our main estimates are not driven by problematic comparisons when early-treated units serve as controls for later-treated units. In addition, we estimate the alternative TWFE estimator proposed by Wooldridge (2021), again excluding states with only coverage reductions or mixed changes, and present the findings in Table A.4. Across all specifications and robustness checks, our results remain consistent, reinforcing the credibility of our main findings.

Lastly, we demonstrate that our baseline estimates are not sensitive to sample composition or selection concerns. In Table A.5, we estimate effects only among reproductive-age women with household incomes below the federal poverty line and show that the results are not driven by newly enrolled Medicaid beneficiaries, mitigating concerns about confounding from broader Medicaid eligibility expansions. To test the robustness of our findings to alternative definitions of Medicaid eligibility, Table A.6 replicates the main analysis using different eligibility criteria, including the maximum and minimum points of reported household income brackets and limiting the sample to individuals with a high school education or less. All four panels yield estimates highly consistent with those in Table 3. Further placebo tests in Table A.7 examine the effects among populations unlikely to be eligible for Medicaid, including individuals with a college degree or higher, those with household incomes above $50,000, and groups classified as ineligible based on the maximum income point within their bracket. These results show null or substantially reduced effects, supporting the credibility of our identification strategy.

We also explore the effects among other non-pregnant adult groups by age and gender in Table A.8. Columns (1) and (3) show null effects on men's dental care visits in younger or older age groups, although we observe some evidence of increased smoking among men over 44. Among women over 44, we find similar increases in dental care utilization and smaller effects on smoking behaviors.

In Figure A.5 and Figure A.6, we present event study estimates limited to states with monotonic expansion events and control groups. These figures yield patterns consistent with the main event study results in Figure 2 and Figure 3. Additionally, Table A.9 presents robustness checks across alternative samples. Column (1) restricts the analysis to states that experienced a Medicaid dental benefits change, reducing the overall sample size, yet still yields comparable estimates for both dental care use and smoking initiation. Column (2) excludes observations from 2020 onward to address potential confounding from the COVID-19 pandemic and confirms that our main results are not driven by the pandemic period. Lastly, while BRFSS implemented changes in survey structure after 2010, we find relatively consistent effects on dental care utilization across both pre- and post-2010 waves, with somewhat stronger effects on current smoking observed in the later period.

5 Conclusions & Discussions

This study examines the unintended behavioral responses to Medicaid dental benefit expansions among Medicaid-eligible reproductive-age women in the United States. We document that the provision of Medicaid non-emergency dental care is associated with

a meaningful increase in dental care utilization, affirming prior evidence that reducing cost barriers enhances access to care while providing novel evidence on dental benefits among reproductive-age women. However, we also find a somewhat unexpected pattern: significant increases in both smoking initiation and current smoking behaviors among this population following the expansion of dental benefits. Subgroup analyses suggests that the behavioral impacts of Medicaid dental benefit expansions are heterogeneous and extend beyond the immediate domain of oral health.

To interpret these complex findings, we explore two potential mechanisms. We consider the role of moral hazard, wherein the provision of publicly funded dental care may reduce individuals' perceived consequences of engaging in risky behaviors such as smoking. In this case, expanded dental coverage may unintentionally lower the deterrent effect of potential oral health costs associated with tobacco use, encouraging behaviors that are ultimately detrimental to overall health. Although an income effect may be at play—by reducing out-of-pocket spending on dental services, Medicaid frees up financial resources that can be redirected toward other consumption, including potentially harmful goods such as cigarettes. This mechanism receives limited support from our analysis of alcohol consumption, which does not show similarly robust increases following the policy change.

Together, our findings highlight the complexity of public health policy design and the importance of considering behavioral spillovers in program evaluation. While expanding dental benefits clearly improves access to care, policymakers should be aware of and seek to mitigate unintended consequences that may undermine broader health objectives. Integrating complementary interventions—such as tobacco cessation programs, health education, or behavioral counseling—into Medicaid coverage could help ensure that the benefits of expanded access are not offset by increases in health-risk behaviors.

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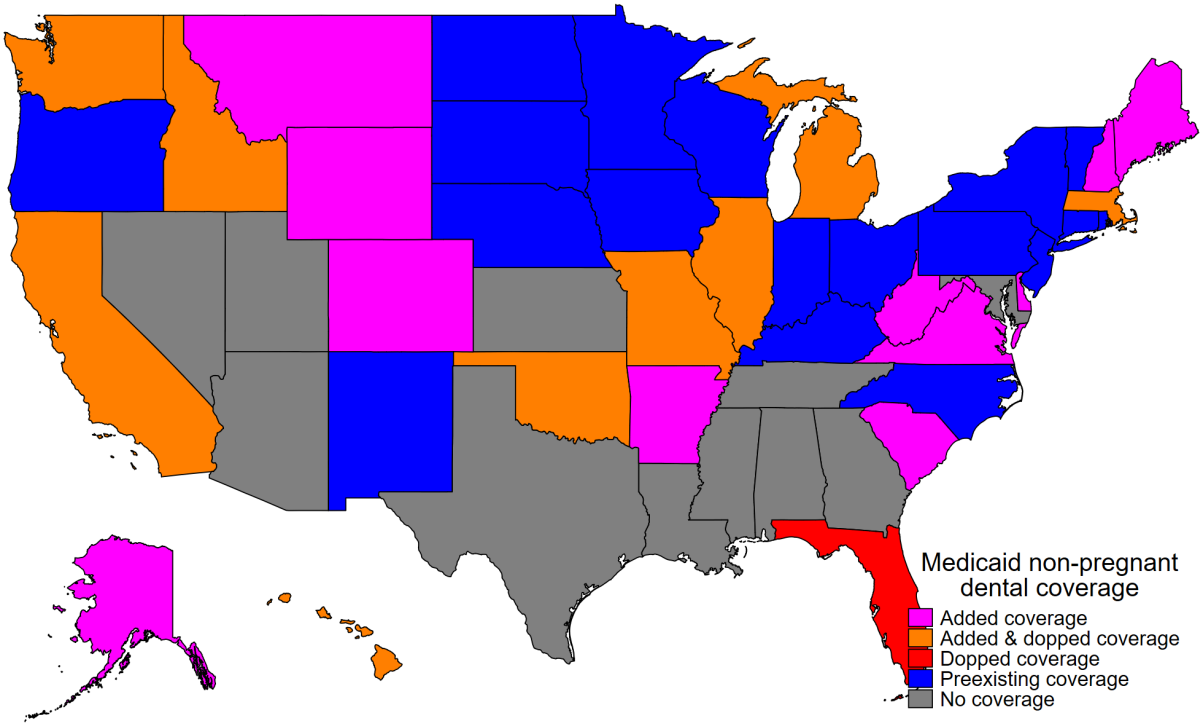
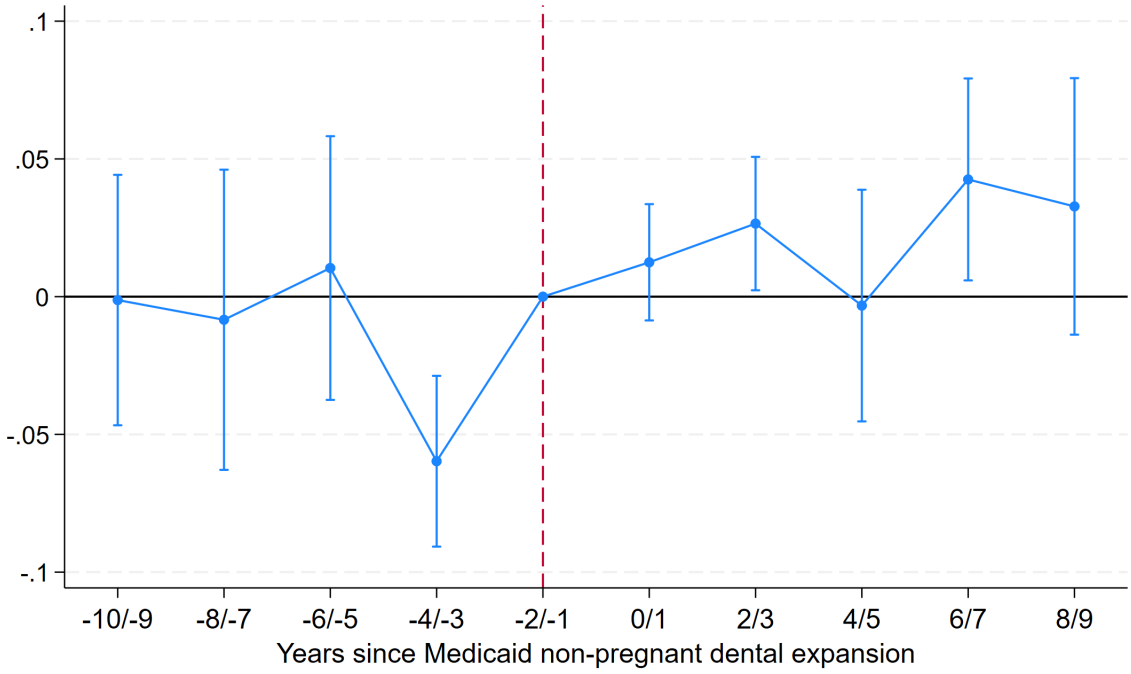
Figure 1: State level Medicaid non-pregnant dental coverage (2000 - 2023)



Notes: This map shows the state level Medicaid dental coverage for non-pregnant adults between 2000 and 2023.

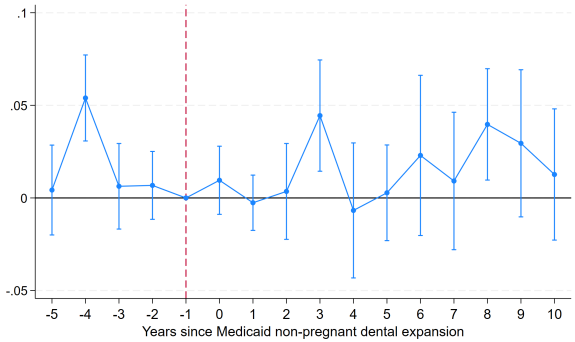
Figure 2: Effect of Medicaid non-pregnant dental care benefits on using dental care within the past 12 months



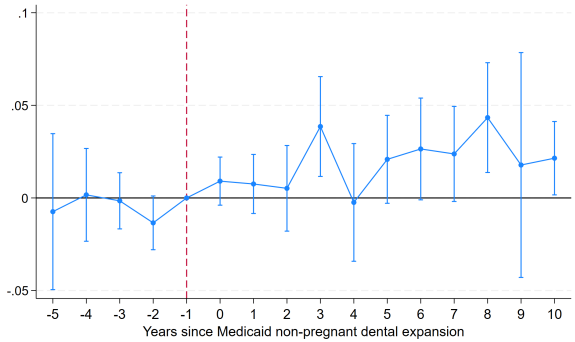
Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). This figure presents the event-study plot of the effect of Medicaid non-pregnant dental care benefits on the likelihood of having any dental visits in the past 12 months. Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level and are presented with 95% confidence intervals.

Figure 3: Effect of Medicaid non-pregnant dental care benefits on smoking behaviors

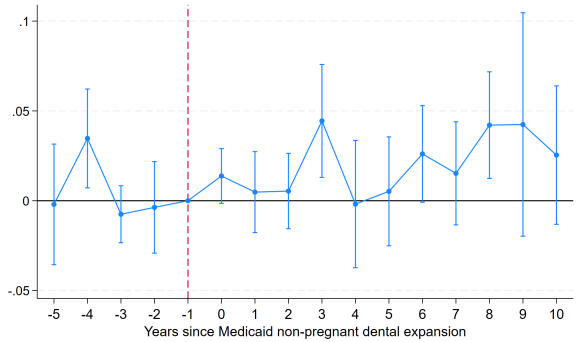
(a) Ever smoke 100 cigarettes



(b) Daily smoker now

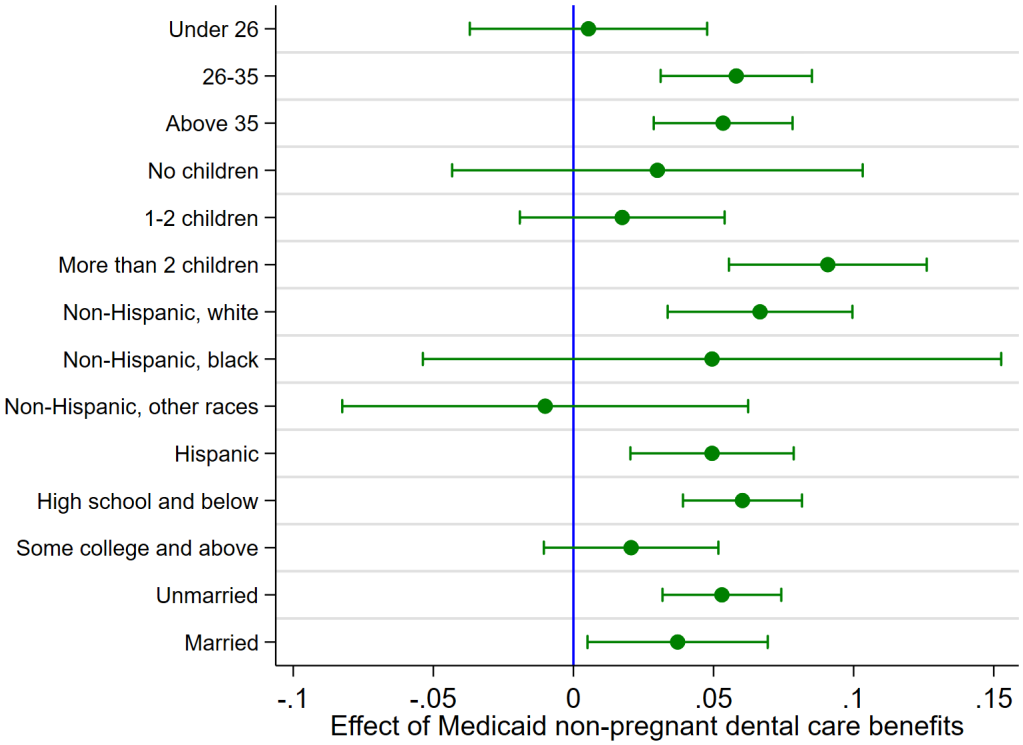


(c) Daily/ Occasional smoker now



Note: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). This figure presents the event-study plot of the effect of Medicaid non-pregnant dental care benefits on the likelihood of having ever smoked 100 cigarettes (Panel (a)), currently smoking daily (Panel (b)), and currently smoking either daily or occasionally (Panel (c)). Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, the number of dentists per capita, cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level and are presented with 95% confidence intervals.

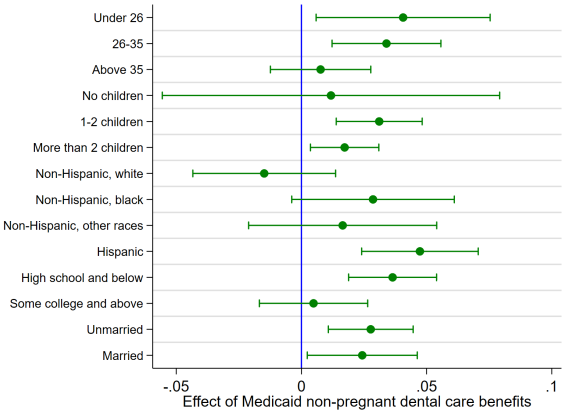
Figure 4: Effect of Medicaid non-pregnant dental care benefits on using dental care within the past 12 months by group



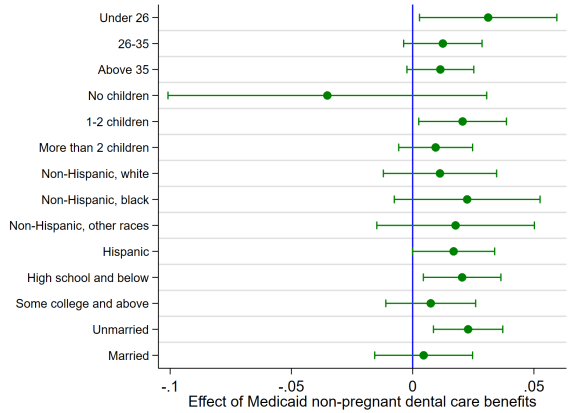
Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). This figure presents the effect of Medicaid non-pregnant dental care benefits on the likelihood of having any dental visits in the past 12 months. Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level and are presented with 95% confidence intervals.

Figure 5: Effect of Medicaid non-pregnant dental care benefits on smoking behaviors by group

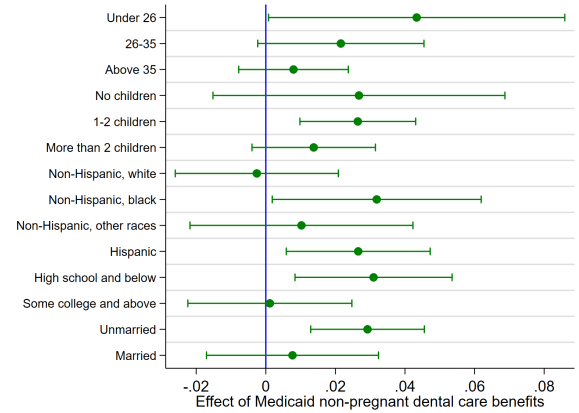
(a) Ever smoke 100 cigarettes



(b) Daily smoker now

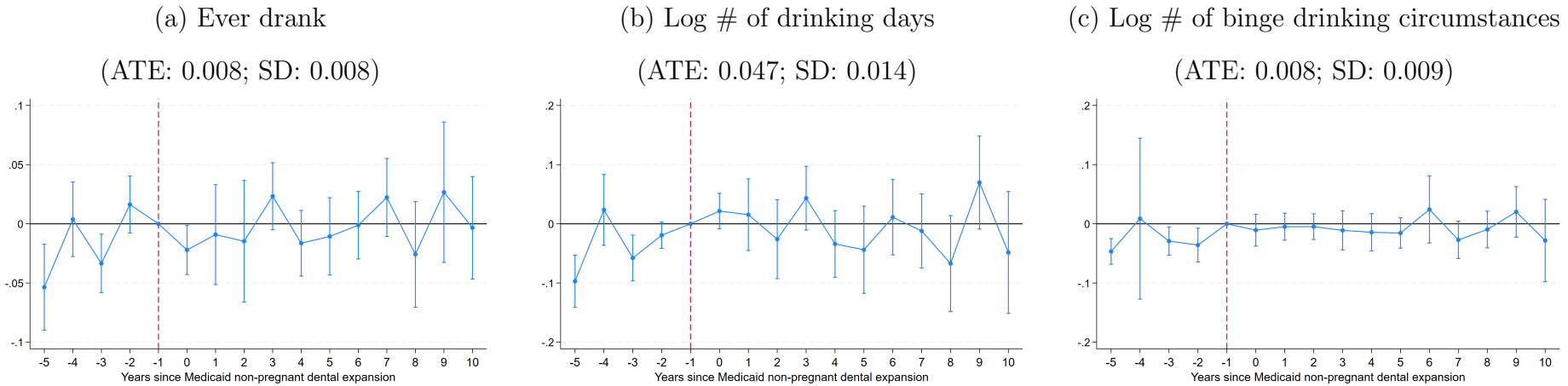


(c) Daily/Occasional smoker now



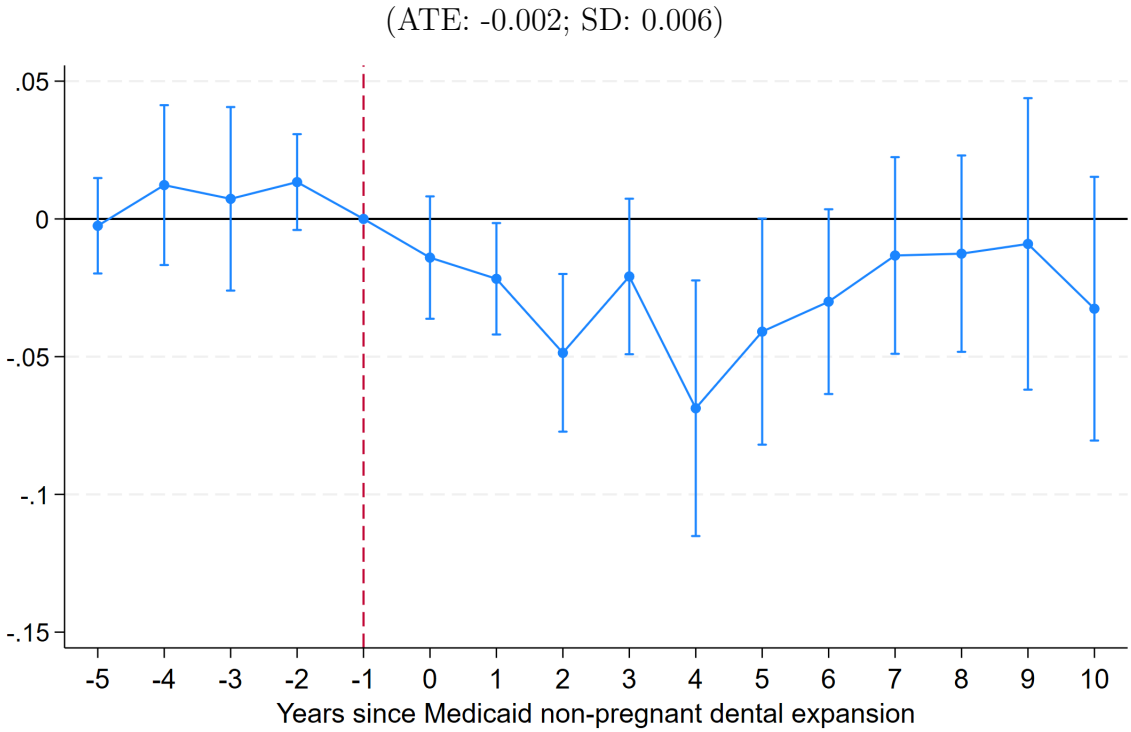
Note: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). This figure presents the effect of Medicaid non-pregnant dental care benefits on the likelihood of having ever smoked 100 cigarettes (Panel (a)), currently smoking daily (Panel (b)), and currently smoking either daily or occasionally (Panel (c)). Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, the number of dentists per capita, cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level and are presented with 95% confidence intervals.

Figure 6: Effect of Medicaid non-pregnant dental care benefits on drinking behaviors in the past 30 days



Note: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). This figure presents the effect of Medicaid non-pregnant dental care benefits on the likelihood of having ever drank (Panel (a)), log number of drinking days (Panel (b)), and log number of binge drinking circumstances (Panel (c)) in the past 30 days. Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, the number of dentists per capita, cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level and are presented with 95% confidence intervals.

Figure 7: Effect of Medicaid non-pregnant dental care benefits on having a routine health checkup within the past 12 months: placebo test



Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022).This figure presents the event-study plot of the effect of Medicaid non-pregnant dental care benefits on the likelihood of having any routine health checkup within the past 12 months. Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level and are presented with 95% confidence intervals.

Table 1: Years of Medicaid dental benefit changes for non-pregnant adults by state

State	Year(s) Dropping Benefits	Year(s) Adding Benefits
Alaska		2007
Arkansas		2009
California	2009	2014
Colorado		2014
Delaware		2020
District of Columbia		2006
Florida	2002	
Hawaii	2009	2006
Idaho	2011	2015
Illinois	2012	2014
Maine		2022
Massachusetts	2002	2006
Michigan	2003; 2009	2005; 2010
Missouri	2005	2003; 2016
Montana		2016
New Hampshire		2023
Oklahoma	2002	2021
South Carolina		2014
Virginia		2021
Washington	2011	2014
West Virginia		2021
Wyoming		2007

Notes: This table lists all the years of Medicaid dental benefit changes for non-pregnant adults by state from 2000 to 2023.

Table 2: Summary statistics

	N=151,889	
	Mean	SD
Demographics		
Age	32.38	6.61
Non-Hispanic, white	0.36	0.48
Non-Hispanic, black	0.16	0.37
Non-Hispanic, other races	0.08	0.27
Hispanic	0.40	0.49
Married	0.37	0.48
Never attended school or only kindergarten	0.00	0.06
Elementary	0.11	0.32
Some high school	0.19	0.39
High school graduate	0.33	0.47
Some college or technical school	0.27	0.45
College graduate	0.09	0.28
Less than $10,000	0.30	0.46
$10,000 to less than $15,000	0.18	0.38
$15,000 to less than $20,000	0.19	0.39
$20,000 to less than $25,000	0.17	0.37
$25,000 to less than $35,000	0.12	0.32
$35,000 to less than $50,000	0.04	0.20
$50,000 to less than $75,000	0.00	0.06
$75,000 or more	0.00	0.01
Number of adult members	1.97	1.18
Number of children below age 18	2.22	1.40
Outcomes		
Have dental visits in the past 12 months	0.56	0.50
Ever smoked 100 cigarettes	0.37	0.48
Daily smoker now	0.20	0.40
Daily/Occasional smoker now	0.26	0.44

Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). This table presents weighted summary statistics of 151,889 individual observations.

Table 3: Effect of Medicaid non-pregnant dental care benefits on using dental care within the past 12 months and smoking behaviors

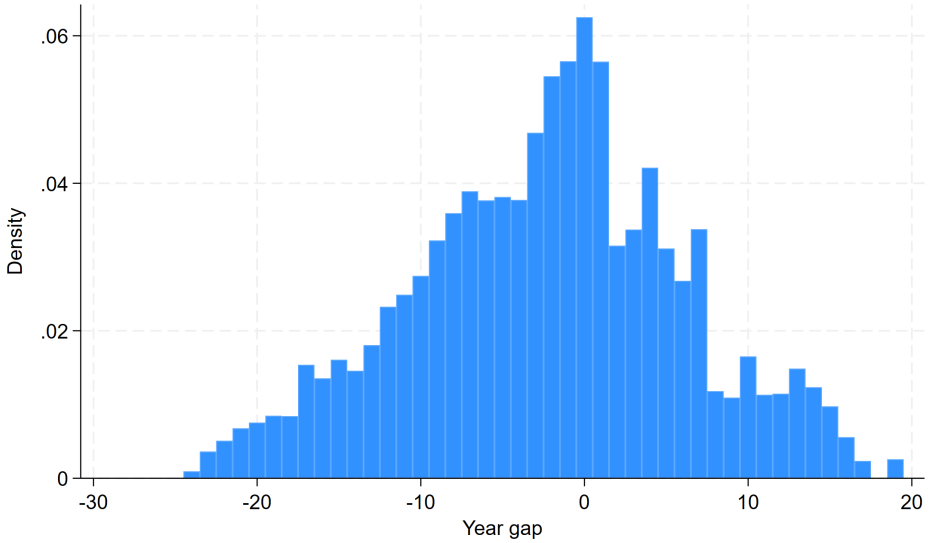
	(1) Dental visits in the past 12 months	(2) Ever smoke 100 cigarettes	(3) Daily smoker now	(4) Daily/Occasional smoker now
Sample mean	0.56	0.37	0.20	0.26
Expansion	0.048***	0.026***	0.016***	0.021***
	(0.010)	(0.006)	(0.006)	(0.008)
Observations	79,027	152,437	152,372	152,372
R-squared	0.038	0.212	0.167	0.177

Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). The outcome variables include the likelihood of having any dental visits in the past 12 months (Column (1)), having ever smoked 100 cigarettes (Column (2)), currently smoking daily (Column (3)), and currently smoking either daily or occasionally (Column (4)). Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. In Columns (2) to (4), we further control for state-year level cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level. Significant level at ***p<0.01, **p<0.05, *p<0.1.

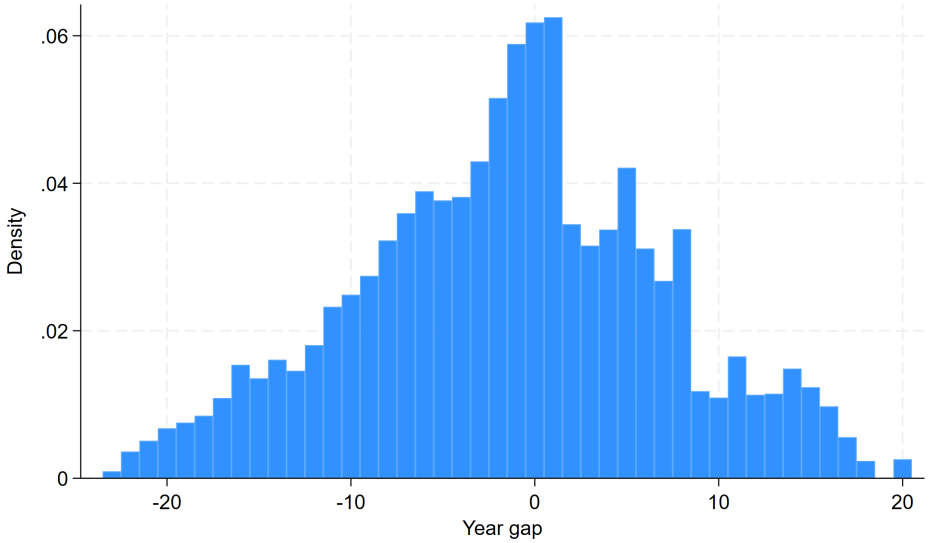
Appendix

Figure A.1: Sample Distribution by leads and lags relative to policy adoption year

(a) Sample distribution: dental outcome



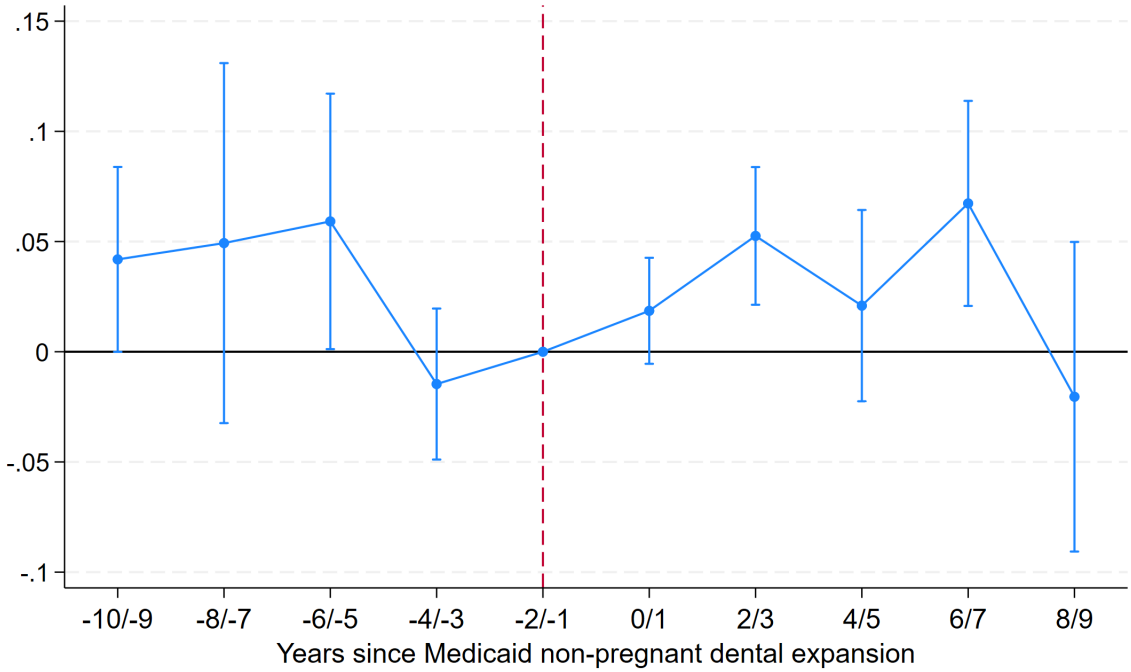
(b) Sample distribution: smoking outcome



Note: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). This figure presents the sample distribution by leads and lags relative to policy adoption year for both dental and smoking outcomes.

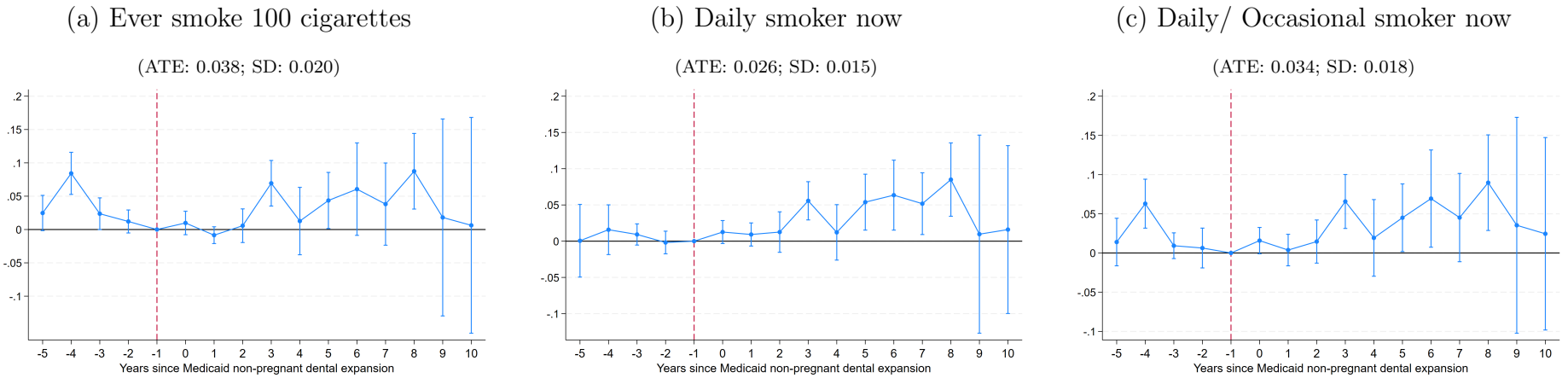
Figure A.2: Effect of Medicaid non-pregnant dental care benefits on using dental care within the past 12 months: 2-stage DID

(ATE: 0.040; SD: 0.015)



Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). This figure presents the event-study plot of the effect of Medicaid non-pregnant dental care benefits on the likelihood of having any dental visits in the past 12 months, following Gardner (2022). Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level and are presented with 95% confidence intervals.

Figure A.3: Effect of Medicaid non-pregnant dental care benefits on smoking behaviors: 2-stage DID

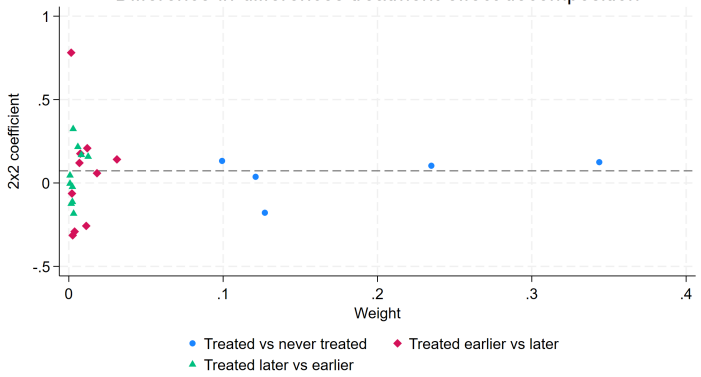


Note: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). This figure presents the event-study plot of the effect of Medicaid non-pregnant dental care benefits on the likelihood of having ever smoked 100 cigarettes (Panel (a)), currently smoking daily (Panel (b)), and currently smoking either daily or occasionally (Panel (c)), following Gardner (2022). Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, the number of dentists per capita, cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level and are presented with 95% confidence intervals.

Figure A.4: Goodman-Bacon decomposition

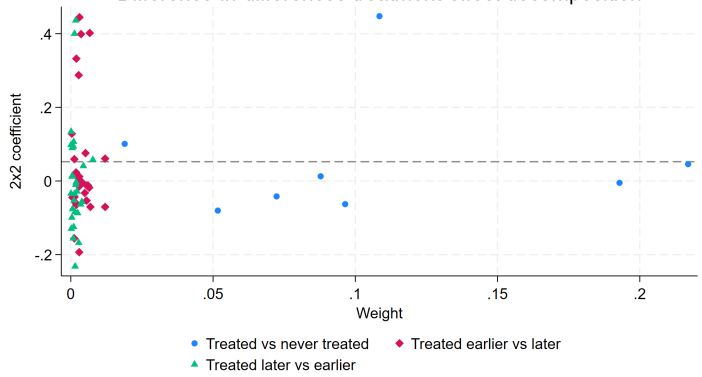
(a) Dental visits in the past 12 months

Early vs Late: β=0.005; weight=0.089
Late vs Early: β=0.004; weight=0.040
Treated vs Never: β=0.067; weight=0.871



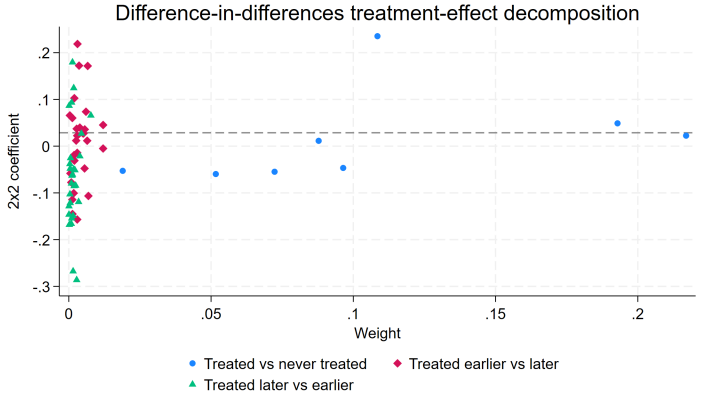
(b) Ever smoke 100 cigarettes

Early vs Late: β=0.005; weight=0.109
Late vs Early: β=0.000; weight=0.045
Treated vs Never: β=0.056; weight=0.846



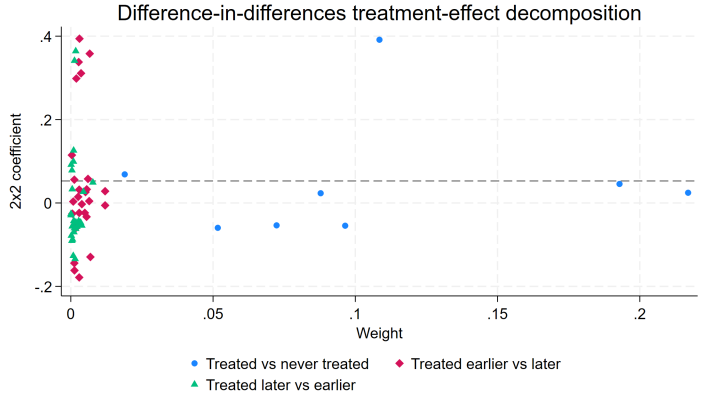
(c) Daily smoker now

Early vs Late: β=0.002; weight=0.109
Late vs Early: β=-0.002; weight=0.045
Treated vs Never: β=0.033; weight=0.846



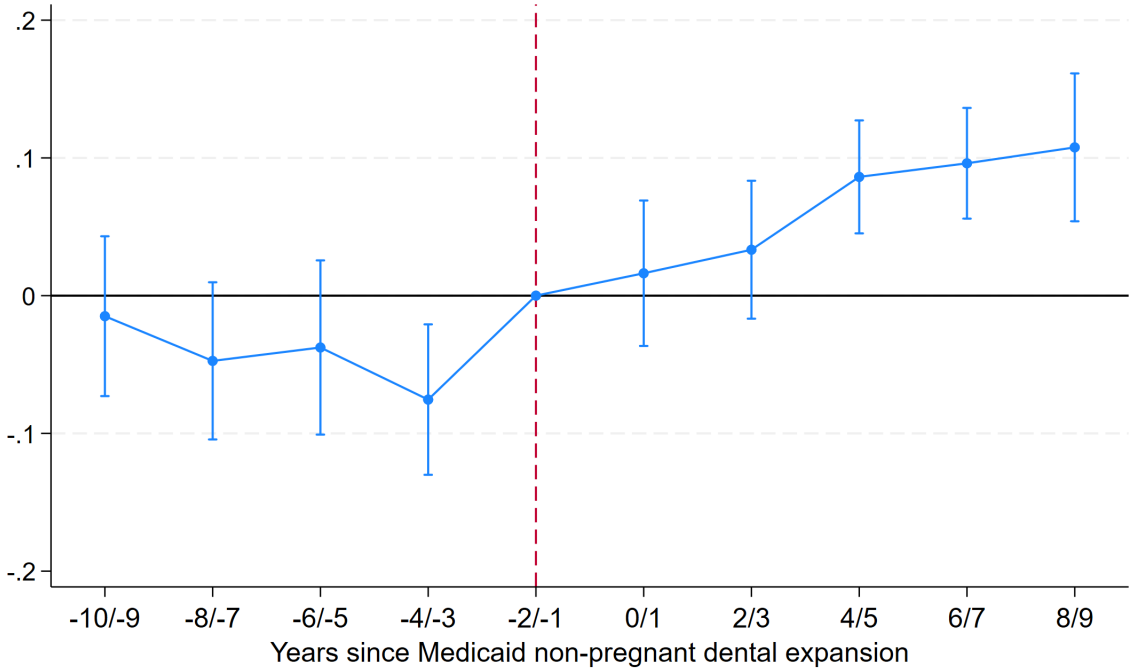
(d) Daily/ Occasional smoker now

Early vs Late: β=0.005; weight=0.109
Late vs Early: β=0.000; weight=0.045
Treated vs Never: β=0.056; weight=0.846



Note: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). States that have only dropped coverage or have both added and dropped coverage between 2000 and 2023 are excluded. This figure presents the Goodman-Bacon decomposition (Goodman-Bacon, 2021) for three comparisons: Early vs Late, Late vs Early, and Treated vs Never. The outcome variables include the likelihood of having any dental visits in the past 12 months, having ever smoked 100 cigarettes, currently smoking daily, and currently smoking either daily or occasionally.

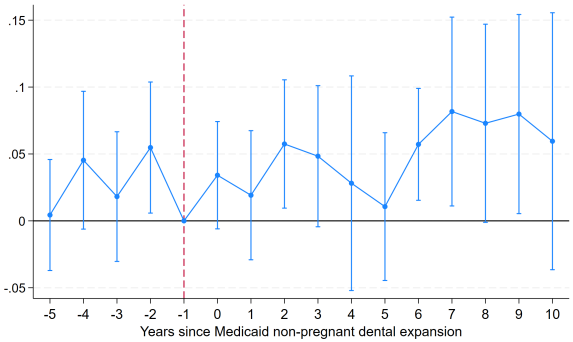
Figure A.5: Effect of Medicaid non-pregnant dental care benefits on using dental care within the past 12 months: Excluding states with benefits reductions



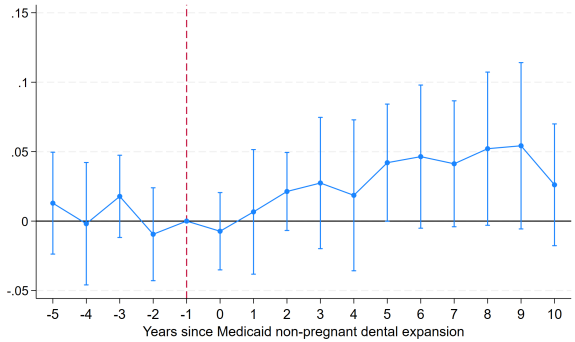
Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). States that have only dropped coverage or have both added and dropped coverage between 2000 and 2023 are excluded. This figure presents the event-study plot of the effect of Medicaid non-pregnant dental care benefits on the likelihood of having any dental visits in the past 12 months. Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level and are presented with 95% confidence intervals.

Figure A.6: Effect of Medicaid non-pregnant dental care benefits on smoking behaviors: Excluding states with benefits reductions

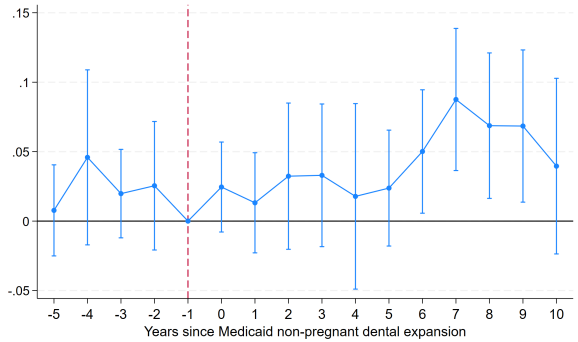
(a) Ever smoke 100 cigarettes



(b) Daily smoker now



(c) Daily/ Occasional smoker now



Note: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). States that have only dropped coverage or have both added and dropped coverage between 2000 and 2023 are excluded. This figure presents the event-study plot of the effect of Medicaid non-pregnant dental care benefits on the likelihood of having ever smoked 100 cigarettes (Panel (a)), currently smoking daily (Panel (b)), and currently smoking either daily or occasionally (Panel (c)). Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, the number of dentists per capita, cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level and are presented with 95% confidence intervals.

Table A.1: Balance test: Effect of Medicaid non-pregnant dental care benefits on individual characteristics among all reproductive-age women

	(1) Age	(2) Non-Hispanic, white	(3) Non-Hispanic, black	(4) Non-Hispanic, other races	(5) Hispanic	(6) Married	(7) Never attended school (kindergarten)	(8) Elementary	(9) Some high school	(10) High school graduate	(11) Some college/ technical school
Expansion	0.019	0.003	0.003	-0.002	-0.004	0.006	0.000	-0.003	-0.002	-0.005	0.003
	(0.085)	(0.007)	(0.003)	(0.004)	(0.007)	(0.007)	(0.000)	(0.003)	(0.002)	(0.003)	(0.003)
Observations	1,373,021	1,359,762	1,359,762	1,359,762	1,359,762	1,367,211	1,369,568	1,369,568	1,369,568	1,369,568	1,369,568
R-squared	0.009	0.115	0.114	0.100	0.114	0.022	0.000	0.012	0.007	0.011	0.006
	(12) College graduate	(13) <$10,000	(14) [$10,000, $15,000)	(15) [$15,000, $20,000)	(16) [$20,000, $25,000)	(17) [$25,000, $35,000)	(18) [$35,000, $50,000)	(19) [$50,000 to less than $75,000)	(20) ≥$75,000	(21) # of adults	(22) # of children below 18
Expansion	0.006	-0.003	-0.004**	-0.004	-0.001	-0.004	-0.001	0.002	0.015	0.010	-0.005
	(0.006)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)	(0.009)	(0.021)	(0.018)
Observations	1,369,568	1,217,199	1,217,199	1,217,199	1,217,199	1,217,199	1,217,199	1,217,199	1,217,199	1,369,991	1,360,659
R-squared	0.022	0.008	0.005	0.006	0.004	0.006	0.006	0.004	0.043	0.052	0.021

Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). The outcome variables column headings. All specifications include state and year fixed effects. Standard errors are clustered at the state level. Standard errors are clustered at the state level. Significant level at ***p<0.01, **p<0.05, *p<0.1.

Table A.2: Effect of Medicaid non-pregnant dental care benefits on using dental care within the past 12 months and smoking behaviors: Adding controls

	(1) Dental visits in the past 12 months	(2) Ever smoke 100 cigarettes	(3) Daily smoker now	(4) Daily/Occasional smoker now
Expansion	0.060***	0.030***	0.016***	0.020**
	(0.010)	(0.009)	(0.006)	(0.010)
State & Year F.E.	Y	Y	Y	Y
Demographics	N	N	N	N
State-yearly controls	N	N	N	N
Observations	80,889	154,347	154,278	154,278
R-squared	0.027	0.077	0.066	0.069
Expansion	0.053***	0.021***	0.015***	0.017**
	(0.010)	(0.007)	(0.005)	(0.007)
State & Year F.E.	Y	Y	Y	Y
Demographics	Y	Y	Y	Y
State-yearly controls	N	N	N	N
Observations	79,822	152,437	152,372	152,372
R-squared	0.038	0.211	0.166	0.176
Expansion	0.048***	0.026***	0.016***	0.021***
	(0.010)	(0.006)	(0.006)	(0.008)
State & Year F.E.	Y	Y	Y	Y
Demographics	Y	Y	Y	Y
State-yearly controls	Y	Y	Y	Y
Observations	79,027	152,437	152,372	152,372
R-squared	0.038	0.212	0.167	0.177

Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). The outcome variables include the likelihood of having any dental visits in the past 12 months (Column (1)), having ever smoked 100 cigarettes (Column (2)), currently smoking daily (Column (3)), and currently smoking either daily or occasionally (Column (4)). Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. In Columns (2) to (4), we further control for state-year level cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level. Significant level at ***p<0.01, **p<0.05, *p<0.1.

Table A.3: Effect of Medicaid non-pregnant dental care benefits on using dental care within the past 12 months and smoking behaviors: Triple differences

	(1) Dental visits in the past 12 months	(2) Ever smoke 100 cigarettes	(3) Daily smoker now	(4) Daily/Occasional smoker now
Expansion*Eligible	0.050***	0.015	0.012**	0.018*
	(0.011)	(0.009)	(0.005)	(0.009)
Observations	596,471	1,186,591	1,186,266	1,186,266
R-squared	0.091	0.134	0.125	0.133

Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). The outcome variables include the likelihood of having any dental visits in the past 12 months (Column (1)), having ever smoked 100 cigarettes (Column (2)), currently smoking daily (Column (3)), and currently smoking either daily or occasionally (Column (4)), using a triple-differences specification. Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. In Columns (2) to (4), we further control for state-year level cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level. Significant level at ***p<0.01, **p<0.05, *p<0.1.

Table A.4: Effect of Medicaid non-pregnant dental care benefits on using dental care within the past 12 months and smoking behaviors: Wooldridge (2021)

	(1) Dental visits in the past 12 months	(2) Ever smoke 100 cigarettes	(3) Daily smoker now	(4) Daily/Occasional smoker now
Expansion	0.047***	0.109***	0.099***	0.111***
	(0.008)	(0.009)	(0.008)	(0.009)
Observations	59,744	114,148	114,101	114,101
R-squared	0.049	0.184	0.145	0.154

Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). States that have only dropped coverage or have both added and dropped coverage between 2000 and 2023 are excluded. The outcome variables include the likelihood of having any dental visits in the past 12 months (Columns (1)), having ever smoked 100 cigarettes (Columns (2)), currently smoking daily (Columns (3)), and currently smoking either daily or occasionally (Columns (4)), following Wooldridge (2021). States that ever-dropped Medicaid non-pregnant dental benefits between 2000 to 2020 are excluded from the sample. Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. In Columns (3) to (8), we further control for state-year level cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level. Significant level at ***p<0.01, **p<0.05, *p<0.1.

Table A.5: Effect of Medicaid non-pregnant dental care benefits on using dental care within the past 12 months and smoking behaviors: Women under poverty lines

	(1) Dental visits in the past 12 months	(2) Ever smoke 100 cigarettes	(3) Daily smoker now	(4) Daily/Occasional smoker now
Expansion	0.051***	0.024***	0.012**	0.017**
	(0.014)	(0.008)	(0.006)	(0.007)
Observations	55,335	106,672	106,622	106,622
R-squared	0.035	0.227	0.187	0.198

Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). Sample is restricted to women under federal poverty lines. The outcome variables include the likelihood of having any dental visits in the past 12 months (Column (1)), having ever smoked 100 cigarettes (Column (2)), currently smoking daily (Column (3)), and currently smoking either daily or occasionally (Column (4)). Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. In Columns (2) to (4), we further control for state-year level cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level. Significant level at ***p<0.01, **p<0.05, *p<0.1.

Table A.6: Effect of Medicaid non-pregnant dental care benefits on using dental care within the past 12 months and smoking behaviors: Other Medicaid eligibility definitions

	(1)	(2)	(3)
Eligibility	Max of income interval	Min of income interval	High school and below
	Panel a: Dental visits in the past 12 months		
Expansion	0.044***	0.053***	0.036***
	(0.012)	(0.010)	(0.008)
Observations	61,161	107,733	171,424
R-squared	0.035	0.043	0.068
	Panel b: Ever smoke 100 cigarettes		
Expansion	0.026***	0.030***	0.029***
	(0.006)	(0.007)	(0.010)
Observations	117,318	208,672	343,782
R-squared	0.216	0.197	0.182
	Panel c: Daily smoker now		
Expansion	0.022***	0.020***	0.016***
	(0.006)	(0.005)	(0.005)
Observations	117,267	208,587	343,670
R-squared	0.171	0.157	0.142
	Panel d: Daily/Occasional smoker now		
Expansion	0.027***	0.026***	0.022***
	(0.007)	(0.007)	(0.007)
Observations	117,267	208,587	343,670
R-squared	0.181	0.167	0.150

Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). The outcome variables include the likelihood of having any dental visits in the past 12 months (Panel (a)), having ever smoked 100 cigarettes (Panel (b), currently smoking daily (Panel (c)), and currently smoking either daily or occasionally (Panel (d)). Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. In Panels (b) to (d), we further control for state-year level cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level. Standard errors are clustered at the state level. Significant level at ***p<0.01, **p<0.05, *p<0.1.

Table A.7: Effect of Medicaid non-pregnant dental care benefits on using dental care within the past 12 months and smoking behaviors: Potential ineligible samples

	(1)	(2)	(3)	(4)	(5)
Sample	Ineligible based on mid-point of income interval				Ineligible based on max-point
	Some college and below	College and above	Below $50,000	Above $50,000	
	Panel a: Dental visits in the past 12 months				
Expansion	0.015*	-0.001	0.013**	-0.002	0.003
	(0.008)	(0.008)	(0.005)	(0.010)	(0.006)
Observations	239,101	278,343	277,629	239,815	488,738
R-squared	0.051	0.037	0.074	0.045	0.079
	Panel b: Ever smoke 100 cigarettes				
Expansion	0.020**	0.012**	0.024**	0.005	0.014**
	(0.008)	(0.005)	(0.009)	(0.004)	(0.006)
Observations	487,749	546,405	560,748	473,406	977,919
R-squared	0.139	0.097	0.113	0.045	0.118
	Panel c: Daily smoker now				
Expansion	0.009***	0.005*	0.013***	-0.002	0.005**
	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)
Observations	487,607	546,287	560,582	473,312	977,679
R-squared	0.113	0.074	0.097	0.027	0.111
	Panel d: Daily/Occasional smoker now				
Expansion	0.012**	0.001	0.012**	-0.003	0.004
	(0.005)	(0.003)	(0.005)	(0.003)	(0.003)
Observations	487,607	546,287	560,582	473,312	977,679
R-squared	0.116	0.078	0.100	0.035	0.116

Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). The outcome variables include the likelihood of having any dental visits in the past 12 months (Panel (a)), having ever smoked 100 cigarettes (Panel (b), currently smoking daily (Panel (c)), and currently smoking either daily or occasionally (Panel (d)). Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. In Panels (b) to (d), we further control for state-year level cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level. Standard errors are clustered at the state level. Significant level at ***p<0.01, **p<0.05, *p<0.1.

Table A.8: Effect of Medicaid non-pregnant dental care benefits on using dental care within the past 12 months and smoking behaviors: Other population groups

	(1)	(2)	(3)
Sample	Men 21-44	Women above 44	Men above 44
	Panel a: Dental visits in the past 12 months		
Expansion	-0.018	0.055***	-0.006
	(0.016)	(0.007)	(0.012)
Observations	37,594	54,660	36,154
R-squared	0.045	0.050	0.055
	Panel b: Ever smoke 100 cigarettes		
Expansion	0.008	0.020*	0.015
	(0.006)	(0.012)	(0.011)
Observations	70,913	100,562	65,735
R-squared	0.094	0.184	0.086
	Panel c: Daily smoker now		
Expansion	-0.020*	0.016**	0.031***
	(0.010)	(0.008)	(0.009)
Observations	70,848	100,471	65,636
R-squared	0.123	0.101	0.087
	Panel d: Daily/Occasional smoker now		
Expansion	0.005	0.019*	0.039***
	(0.007)	(0.011)	(0.014)
Observations	70,848	100,471	65,636
R-squared	0.098	0.123	0.100

Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). The outcome variables include the likelihood of having any dental visits in the past 12 months (Panel (a)), having ever smoked 100 cigarettes (Panel (b), currently smoking daily (Panel (c)), and currently smoking either daily or occasionally (Panel (d)). Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. In Panels (b) to (d), we further control for state-year level cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level. Standard errors are clustered at the state level. Significant level at ***p<0.01, **p<0.05, *p<0.1.

Table A.9: Effect of Medicaid non-pregnant dental care benefits on using dental care within the past 12 months and smoking behaviors: Various samples

	(1)	(2)	(3)	(4)
Sample	No always treated	Pre-2020	Pre-2011	Post-2010
	Panel a: Dental visits in the past 12 months			
Expansion	0.040***	0.043***	0.039*	0.048***
	(0.011)	(0.010)	(0.020)	(0.017)
Observations	44,413	71,424	29,046	49,980
R-squared	0.034	0.038	0.049	0.036
	Panel b: Ever smoke 100 cigarettes			
Expansion	0.015*	0.025***	0.014	0.014*
	(0.008)	(0.007)	(0.014)	(0.008)
Observations	85,907	129,295	57,024	95,413
R-squared	0.219	0.211	0.213	0.218
	Panel c: Daily smoker now			
Expansion	0.005	0.018***	-0.003	0.032***
	(0.006)	(0.006)	(0.009)	(0.010)
Observations	85,865	129,247	57,018	95,354
R-squared	0.173	0.171	0.187	0.156
	Panel d: Daily/Occasional smoker now			
Expansion	0.009	0.023***	-0.000	0.028***
	(0.008)	(0.007)	(0.014)	(0.010)
Observations	85,865	129,247	57,018	95,354
R-squared	0.183	0.180	0.188	0.174

Notes: Data comes from the Behavioral Risk Factor Surveillance System (BRFSS) (2000-2022). The outcome variables include the likelihood of having any dental visits in the past 12 months (Panel (a)), having ever smoked 100 cigarettes (Panel (b), currently smoking daily (Panel (c)), and currently smoking either daily or occasionally (Panel (d)). Individual and family-level controls include age fixed effects, a male indicator, income level, highest educational attainment, race and ethnicity, marital status, and the number of adults and children in the household. State-year-level controls include an ACA expansion indicator, managed care penetration rate, the number of Federally Qualified Health Centers per capita, and the number of dentists per capita. In Panels (b) to (d), we further control for state-year level cigarette tax rate, beer tax rate, an indicator for smoke-free laws, an indicator for e-cigarette taxes, and an indicator for Medicaid comprehensive cessation coverage. During the COVID-19 pandemic, additional controls include an indicator for stay-at-home orders, an indicator for elective procedure delay orders, the log of yearly total new cases, and the log of yearly total deaths. All specifications include state and year fixed effects. Standard errors are clustered at the state level. Standard errors are clustered at the state level. Significant level at ***p<0.01, **p<0.05, *p<0.1.