

## ORIGINAL RESEARCH

# Type of insurance coverage and dental sealants among US children: findings from the National Survey of Children's Health

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**Abstract**

Access to preventive dental services, such as dental sealants, varies based on several factors, including insurance coverage. The aim of this study was to examine the association between different types of insurance and dental sealant placement among US children. Data from the National Survey of Children Health (NSCH) cycle 2018 was analyzed. The sample size comprised 18,012 children aged 4–14 years. The main outcome was dental sealant placement in the past year (yes/no). The primary predictor was the type of insurance (public, private, both public and private, and uninsured). Bivariate and adjusted multivariate analysis was carried out to estimate weighted prevalence and adjusted odds ratios using SAS 9.4. The adjusted multivariate results showed that dental sealant use was the lowest among uninsured children compared to publicly insured children, followed by privately insured children, and finally mixed insured (public and private) children (adjusted odds ratio (AOR): 0.70; 95% confidence interval (CI): 0.57–0.86, AOR: 0.79; 95% CI: 0.54–1.14, AOR: 0.57; 95% CI: 0.40–0.82, respectively). In conclusion, privately insured, mixed insured, and uninsured children had lower odds of dental sealant use compared to publicly insured children. There was a significant variation in the accessibility of dental sealants among US children based on their insurance coverage. Despite these disparities, every child should have access to dental sealants, regardless of insurance status.

**Keywords**

Child; Dental caries; Health services accessibility; Pit and fissure sealants; Preventive dentistry

## 1. Introduction

Dental caries remains a major chronic disease among US children, despite being largely preventable. The prevalence of dental caries is higher than that of asthma or hay fever [1–3]. If left untreated, it might cause serious effects on a child's systematic and social health as well as quality of life. It affects the child's ability to chew, sleep and smile. Dental caries is linked to absenteeism, poor academic performance, and increased emergency room visits [4–9]. The US national estimate of caries experience in primary or permanent teeth was approximately 46%, affecting about 21% of children aged 2–5 years and slightly more than half aged 6–19 years [10].

Pits and fissures are the most susceptible areas in dental caries [11, 12]. The World Health Organization (WHO) considers dental sealants to be the primary preventive measure to prevent dental caries [13]. It is a coating material applied mainly on the occlusal surfaces of premolars and molars to create a barrier that prevents bacterial stagnation and proliferation [14]. It reduces caries in permanent molars for up to four years compared to unsealed molars [15]. A strong body of evidence

showed that the success rate of dental sealants reached up to 80–90% [16]. Dental sealants are one of the cost-effective preventive methods, and they provide Medicaid expenditure savings mainly for high-risk groups [17, 18]. Research has shown that the preventive effect of sealants may last even after partial or complete loss since some sealant material may remain deep within the fissures [19–22]. One national goal is to increase the proportion of children receiving dental sealants and reduce disparities in accessing preventive services [23].

Medicaid and the Children's Health Insurance Program (CHIP) covered over 84 million individual in all 50 states and District of Columbia in January 2024 [24]. Medicaid covers dental services of all enrolled children through the Early and Periodic Screening, Diagnostic and Treatment (EPSDT) benefit, which includes dental sealants. In addition, states with CHIP are required to provide EPSDT benefits to children [25]. Prior research has found that dental care benefits through Medicaid have improved access to dental care [26]. In 2010, the percentage of children using dental preventive services under Medicaid increased to 40% [27].

One study found that most Medicaid programs reimburse

only for dental sealants on permanent molars, and only a few reimburse for sealants on primary molars. In addition, among those who reimburse for both, the reimbursement rate was significantly higher for permanent teeth than for primary teeth. However, this is an association rather than a causal relationship [28]. Although private healthcare coverage is mandated to include dental coverage, dental sealant benefits are either not covered or covered with a low reimbursement rate [26, 27].

Recently, there have been studies on the association between the type of insurance, dental access and dental caries; however, there is scarce evidence in the literature about its relation to preventive dental services, such as dental sealants. In this study, our aim was to examine the difference between insurance types and the use of dental preventive services, mainly dental sealants, among US children using a national representative sample. We hypothesize that uninsured children are less likely to have dental sealants in the past year compared to insured children.

## 2. Materials and methods

The data was utilized from the 2018 National Survey of Children's Health (NSCH). NSCH is a nationwide survey that collects important health data at the national and state levels. The data is collected yearly by the State and Local Area Integrated Telephone Survey program (SLAITS). The sampling design and data collection methods of the NSCH have been described elsewhere [29].

The total sample size was 18,012 children. The inclusion criteria were children aged 4–14 years living in the 50 states and the District of Columbia and those who completed the initial screening survey and detailed topical questionnaire. The questionnaire was completed by the child's parent or caregiver.

### 2.1 Main predictor

The primary variable of interest was insurance type. The NSCH asked about the type of insurance at the time of the survey. Insurance types were categorized into public insurance, private insurance, public and private insurance, and currently uninsured.

### 2.2 Outcome variables

The main outcome variable was dental sealants. The NSCH asked if the child had had any preventive dental services in the past year. Dental sealants were listed as one of the options. We further categorized dental sealants into those that had or did not have dental sealants.

### 2.3 Covariates

The final logistic model included all the following covariates: age was categorized into (4–7, 8–11 and 12–14) years, sex (male or female), race/ethnicity (Hispanic, White, Black and others), federal poverty level (FPL: 0–199%, 200–399% and  $\geq 400\%$ ), highest level of education among reported adults (high school or less, some college or technical school, college degree or higher) and primary language spoken in the household (English/other than English).

## 2.4 Statistical analyses

Descriptive and bivariate statistics were used to compare the characteristics of children by insurance type. Multiple logistic regression analysis was performed to predict dental caries from insurance types among children. In order to account for the complex multistage sampling design, survey procedures were used. Unequal probabilities of selection were accounted for by applying sampling weights. Any significance level below 0.05 was considered significant. All statistical analyses were conducted using SAS software version 9.4 (SAS Institute Inc., Cary, NC, USA) [30].

## 3. Results

Our sample comprised 18,012 children aged 4–14 years. There were comparable proportions of gender. Overall, half of the children were White (50.3%), 25.4% were Hispanic, and 13.6% were Black. Approximately half of the children had a parental education of college degree or higher (49.4%). About 42% had an FPL below 200%, and 31% had an FPL  $\geq 400\%$ . Most of the children spoke English as their primary language (85.6%) and did not have dental sealants in the past year (80%). The highest proportion of publicly insured and uninsured children was among children aged 8–11 years (39.2% and 40.1%, respectively). Children with private insurance were likelier to be White, while more than one-third of the children with public insurance and those without insurance were Hispanic. The majority of children with public insurance had an FPL below 200%. Half of the children with private insurance had an FPL  $\geq 400\%$ . Of the uninsured children, two-thirds had an FPL below 200%. The highest proportion of high parental education was among children with private insurance, while the highest proportion of low parental education was among children without current insurance. The highest proportion of children who spoke other languages was among those who were uninsured. Dental sealant application was the lowest among the uninsured children (Table 1).

Table 2 presents the results of the multiple logistic regression model. We detected a significant association between insurance type and dental sealant application. After adjusting for all confounding variables, children without insurance had the lowest odds of sealant application in the past year (AOR: 0.57; 95% CI: 0.40–0.82). Children with private insurance as well as those with both public and private insurance had lower odds of dental sealant application compared to children with public insurance (AOR: 0.70; 95% CI: 0.57–0.86 and AOR: 0.79; 95% CI: 0.54–1.14, respectively). Blacks were less likely to get dental sealants compared to Whites (AOR: 0.71; 95% CI: 0.55–0.91). Children with a FPL below 200% were less likely to receive dental sealant application compared to children with a higher FPL (AOR: 0.70; 95% CI: 0.57–0.86). In addition, children with lower parental education had lower odds of having dental sealants compared to children with higher parental education. Those who speak English as their primary language were likelier to have dental sealants compared to children who speak other languages (AOR: 1.52; 95% CI: 1.08–2.12) (Table 2).

**TABLE 1. Characteristics for the study population and by insurance type.**

| Characteristics                                  | Full sample<br>(n = 18,012) | Public<br>insurance<br>(n = 3805) | Private<br>insurance<br>(n = 12,459) | Public & private<br>insurance<br>(n = 688) | Currently<br>uninsured<br>(n = 820) | p-value <sup>†</sup> |
|--|-----------------------------|-----------------------------------|--------------------------------------|--|-------------------------------------|----------------------|
| n (weighted %)                                   |                             |                                   |                                      |  |                                     |                      |
| Age  |                             |                                   |                                      |  |                                     |                      |
| 4–7  | 5855 (34.92)                | 1358 (35.12)                      | 4004 (35.97)                         | 202 (35.06)                                | 216 (25.03)                         |                      |
| 8–11   | 6533 (37.38)                | 1446 (39.22)                      | 4411 (35.98)                         | 268 (40.94)                                | 323 (40.08)                         | 0.009*               |
| 12–14  | 5624 (27.70)                | 1001 (25.66)                      | 4044 (28.05)                         | 218 (24.00)                                | 281 (34.89)                         |                      |
| Gender   |                             |                                   |                                      |  |                                     |                      |
| Male   | 9415 (51.13)                | 2078 (55.08)                      | 6382 (48.80)                         | 394 (55.01)                                | 444 (51.68)                         | 0.007*               |
| Female   | 8597 (48.87)                | 1727 (44.92)                      | 6077 (51.20)                         | 294 (44.99)                                | 367 (48.32)                         |                      |
| Race/ethnicity                                   |                             |                                   |                                      |  |                                     |                      |
| Hispanic   | 218 (25.42)                 | 802 (37.99)                       | 1097 (16.72)                         | 90 (21.31)                                 | 157 (39.38)                         |                      |
| White  | 12,336 (50.34)              | 2023 (32.83)                      | 9313 (62.66)                         | 422 (42.85)                                | 454 (34.74)                         | <0.0001              |
| Black  | 1193 (13.62)                | 499 (21.06)                       | 511 (8.87)                           | 78 (23.22)                                 | 79 (14.88)                          |                      |
| Others   | 2285 (10.62)                | 481 (8.11)                        | 1538 (11.74)                         | 98 (12.62)                                 | 130 (11.00)                         |                      |
| Federal poverty level                            |                             |                                   |                                      |  |                                     |                      |
| 0–199%   | 5227 (41.75)                | 2764 (80.28)                      | 1610 (17.29)                         | 343 (64.69)                                | 404 (60.89)                         |                      |
| 200–399%   | 5585 (27.25)                | 833 (15.27)                       | 4195 (33.57)                         | 232 (26.65)                                | 257 (33.57)                         | <0.0001*             |
| 400% and above                                   | 7200 (31.00)                | 208 (4.45)                        | 6654 (49.14)                         | 131 (8.67)                                 | 161 (11.65)                         |                      |
| Highest level of education among reported adults |                             |                                   |                                      |  |                                     |                      |
| ≤High school                                     | 2912 (29.01)                | 1460 (53.32)                      | 951 (12.30)                          | 145 (31.76)                                | 287 (56.43)                         |                      |
| Some college                                     | 4364 (21.63)                | 1393 (28.05)                      | 2429 (18.21)                         | 248 (31.76)                                | 238 (16.21)                         | <0.0001*             |
| College degree or higher                         | 10,736 (49.36)              | 952 (18.63)                       | 9079 (69.49)                         | 295 (36.48)                                | 295 (27.35)                         |                      |
| Primary language                                 |                             |                                   |                                      |  |                                     |                      |
| English  | 16,709 (85.60)              | 3310 (77.52)                      | 11,901 (92.49)                       | 620 (83.90)                                | 690 (71.56)                         | <0.0001*             |
| Other than English                               | 1207 (14.40)                | 461 (22.48)                       | 511 (7.51)                           | 60 (16.10)                                 | 124 (28.44)                         |                      |
| Dental sealant                                   |                             |                                   |                                      |  |                                     |                      |
| Yes  | 3983 (19.99)                | 805 (19.67)                       | 2850 (21.36)                         | 149 (18.41)                                | 147 (13.68)                         | 0.009*               |
| No   | 13,869 (80.01)              | 2967 (80.33)                      | 9528 (78.64)                         | 532 (81.59)                                | 653 (86.32)                         |                      |

<sup>†</sup>Chi-square test; \*Statistically significant.

## 4. Discussion

The aim of this study was to examine the associations between insurance type and the use of dental sealants among US children. Our main results showed that publicly insured children had significantly the highest odds of having dental sealants in the past year compared to privately insured, both publicly and privately insured, and uninsured children. The highest odds of dental sealant placement were among uninsured children.

Dental sealants are often covered as part of preventive dental care benefits provided by public insurance programs, such as Medicaid and the State Children's Health Insurance Program (SCHIP) [31, 32]. Low-income children may be able to benefit from SCHIP as their primary dental insurer. Three options were available to states for designing SCHIP programs: expanding Medicaid, establishing a separate health insurance program, or combining the two [33]. SCHIP enrollees in states that expanded Medicaid were required to receive full Medicaid

benefits (including dental benefits) [33]. In SCHIP programs, dental benefits were generally more generous than in private insurance plans [33]. Low-income families may be able to afford dental sealants through public insurance programs with little or no out-of-pocket costs [31]. There is a wide range of insurance coverage available for dental sealants under private insurance plans. The cost-sharing for dental sealants can vary widely across private insurance plans, e.g., copayments or deductibles [30, 31, 34, 35]. These factors can affect how much the insured person pays out of pocket [35]. Another explanation could be that some private insurance companies do not reimburse for sealants because they are not disclosed on radiographs [36].

Our results are somewhat in agreement with a previous study that investigated the effect of family income on the relationship between parental education and dental sealants [37]. They used the National Health and Nutrition Examination Survey data (cycles 2005–2010) and found that uninsured children were

**TABLE 2. Multiple logistic regression analysis predicting dental sealant application from insurance type.**

| Characteristics                                  | Dental sealant     |                 |
|--|--------------------|-----------------|
|  | AOR (95% CI)       | <i>p</i> -value |
| Insurance type                                   |                    |                 |
| Public insurance                                 | Ref                | Ref             |
| Private insurance                                | 0.70 (0.57–0.86)   | 0.007*          |
| Public and private insurance                     | 0.79 (0.54–1.14)   | 0.21            |
| Currently uninsured                              | 0.57 (0.40–0.82)   | 0.002*          |
| Age  |                    |                 |
| 4–7  | 0.50 (0.43–0.59)   | <0.001*         |
| 8–11   | 0.82 (0.69–0.97)   | 0.02*           |
| 12–14  | Ref                | Ref             |
| Gender   |                    |                 |
| Male   | 0.92 (0.80–1.05)   | 0.2             |
| Female   | Ref                | Ref             |
| Race/ethnicity                                   |                    |                 |
| Hispanic   | 0.98 (0.77–1.23)   | 0.8             |
| White  | Ref                | Ref             |
| Black  | 0.71 (0.55–0.91)   | 0.007*          |
| Others   | 1.01 (0.82–1.24)   | 0.9             |
| Federal poverty level                            |                    |                 |
| 0–199%   | 0.70 (0.57–0.86)   | 0.0007*         |
| 200–399%   | 0.96 (0.81–1.14)   | 0.6             |
| 400% and above                                   | Ref                | Ref             |
| Highest level of education among reported adults |                    |                 |
| ≤High school                                     | 0.71 (0.57–0.88)   | 0.002*          |
| Some college                                     | 0.93 (0.78–0.1.11) | 0.4             |
| College degree or higher                         | Ref                | Ref             |
| Primary language                                 |                    |                 |
| English  | 1.52 (1.08–2.12)   | 0.02*           |
| Other than English                               | Ref                | Ref             |

AOR: adjusted odds ratio; CI: confidence interval; Ref: reference, \*Statistically significant.

less likely to have dental sealants compared to privately insured children. While children with Medicaid/CHIP insurance did not differ from privately insured children [37]. Likewise, they found that non-Hispanic Black children were less likely to have dental sealants compared to non-Hispanic White children [37].

Our finding broadly supports a previous study on data from the 2009–2013 Medical Expenditure Survey, which showed that uniformly insured children had better access to health care and less unmet dental needs than mixed insured children (publicly insured children with privately insured parents) [38]. The author pointed out that policies and efforts are more toward uninsured children; however, the number of under-insured children is more than uninsured children [38]. In addition, a

child's access to health care services is influenced by the type of insurance the parents have. They found that children with privately insured parents were more likely to have unmet dental needs compared to publicly insured children (odds ratio = 1.68, 95% CI: 1.10–2.58). In 2013, the World Health Organization (WHO) published a report that emphasized the importance of universal healthcare to reduce disparities and ensure healthcare access worldwide [39].

Similar results were found in a study using the 2017–2018 NSCH dataset, which focused on preventive dental visits among children [40]. They found that children living below the federal poverty line had lower odds of receiving preventive dental visits compared to those whose families earned 400 percent above the federal poverty line [40]. Additionally, children whose parents had less than a high school education were less likely to receive preventive dental care than those whose parents had some college education [40]. Children without insurance were less likely to receive preventive dental care than those with private insurance. However, there was no statistically significant difference between children with public and private insurance [40].

This study has a few limitations. First, due to the cross-sectional nature of the study, we were not able to determine causal relationships. Second, due to the fact that this is secondary data, we were not able to determine if dental sealants were placed in primary or permanent teeth. In addition, it was self-reported and parents could misunderstand the question or think it was filling, which could lead to misclassification. Despite these limitations, our study used a nationally representative sample of US children. In addition, the use of appropriate sample weights enables us to generalize results to the general population. Also, previous studies examined the association between type of insurance and medical preventive services; however, to our knowledge, no study has examined the relationship between insurance type and preventive dental services.

Further research could investigate how dental preventive services are utilized based on different insurance policy designs. Future studies would examine how private insurance policies differ in terms of coverage and how specific features, such as deductibles and copayments, impact preventive dental treatment adoption.

According to the American Academy of Pediatric Dentistry (AAPD) policy adopted in 2021, the use of sealants and their maintenance is a cost-effective and scientifically proven way of preventing pit-and-fissure caries and preventative non-cavitated tooth decay [41]. It is possible to increase utilization rates with public or private insurance through awareness campaigns, improving access to care, and providing education about the benefits of sealants.

## 5. Conclusions

Our results revealed that privately insured and uninsured children were less likely to have dental sealants in the past year compared to publicly insured children. Efforts should be made to assure access to preventive dental services, such as dental sealants, among children.

## ABBREVIATIONS

WHO, World Health Organization; CHIP, Children's Health Insurance Program; EPSDT, Early and Periodic Screening, Diagnostic and Treatment; NSCH, National Survey of Children's Health; SLAITS, State and Local Area Integrated Telephone Survey; FPL, federal poverty level; AOR, adjusted odds ratio; CI, confidence interval; AAPD, American Academy of Pediatric Dentistry.

## AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the National Survey of Children's Health (NSCH) website. The datasets were derived from publicly available sources and can be accessed through (<https://www.childhealthdata.org/learn-about-the-nsch/NSCH>).

## AUTHOR CONTRIBUTIONS

LB—designed the study, performed the analyses, interpreted the results, wrote and revised the manuscript.

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was exempted from ethical approval as it involves the analysis of secondary data from the National Survey of Children's Health, which is publicly available and de-identified to protect privacy.

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## CONFLICT OF INTEREST

The author declares no conflict of interest.

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