Oral Health Status of Children: Results of the 2018–2019 California Third Grade Smile Survey

CDPH California Department of PublicHealth

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OFFICE OF ORAL HEALTH

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Tooth decay (also known as caries) is a significant health problem for children in the United States. A key part of addressing tooth decay is measuring its burden and working with partners toward realistic goals of reduction of the disease. In 2018-2019, the California Department of Public Health (CDPH) conducted an assessment of tooth decay in third grade children across the state. This was the first statewide assessment of tooth decay in children since 2004-2005. It was completed in partnership with the California Department of Education and the Los Angeles County Department of Public Health. This assessment found that 61% of third grade children in California have had tooth decay. This document reports the results of this assessment, documents disparities present in tooth decay, and presents the programs and activities CDPH is working on to address tooth decay in California.

Key Findings

1. Tooth decay remains a significant public health problem. A noticeable reduction in tooth decay experience and untreated decay, as well as an increase in dental sealant prevalence have both been achieved.
2. Disparities by race/ethnicity and socioeconomic disadvantage for tooth decay and untreated decay are profound.
3. Dental sealant prevalence, a reflection of the use of preventive services, was low. However, disparities with respect to dental sealant prevalence were not observed.
4. Regional variation in children's oral health exists across California.

To address these findings, CDPH is working with state and local partners to implement the strategies described in the California Oral Health Plan 2018-2028. To support local infrastructure, CDPH supports 59 local oral health programs with a total of $18 million to implement community-based interventions and support statewide initiatives. Key projects to improve the oral health of children include community water fluoridation, school dental programs, the Kindergarten oral health assessment, improving access to dental care and the promotion of oral health literacy.

BACKGROUND

Tooth decay (also known as caries) is the most common chronic disease in children and the most frequent health problem in the United States [1]. Poor oral health in children can lead to attention problems, nutrition issues, missed school days, and increased dental care costs [2]. Furthermore, untreated tooth decay can lead to infection requiring emergency room visits, antibiotic and opioid prescriptions, and costly care under general anesthesia [3]. Tooth decay is mostly preventable through measures to minimize the development of decay such as brushing two times a day with fluoridated toothpaste, drinking fluoridated water and avoiding sugar-sweetened beverages. This is combined with professional dental care starting with early dental visits for risk assessment, counseling, and the application of topical fluoride and dental sealants where appropriate.

The United States Preventive Services Task Force recommends that primary care clinicians apply fluoride varnish to the primary teeth of all infants and children (birth through age 5 years) starting at the age of primary tooth eruption and prescribe oral fluoride supplements starting at age six months for children whose water supply is deficient in fluoride [4, 5]. The Community Preventive Services Task Force (CPSTF) recommends community water fluoridation and school-based dental sealant programs to reduce tooth decay [6]. Key public health strategies for cavity-free children in California include:

- community water fluoridation;
- school-based or school-linked dental programs, and programs in other community settings;
- Kindergarten oral health assessment;
- creative media and social messaging for healthy oral habits and;
- promotion of timely dental visits.

Other initiatives compatible with these strategies include increasing dental insurance coverage, enhancing access to dental care, and improving oral health literacy to enable individuals to maintain optimum oral health.

This report presents key findings from the California Smile Survey (CSS), a population based representative survey of 12,322 third grade children conducted during the 2018-2019 and 2019-2020 school years (henceforth referred to as the 2018-2019 Third Grade Smile Survey for ease of reading). The results are compared to a similar CSS survey conducted during the 2004-2005 school year [7].

FINDINGS

Key Finding 1

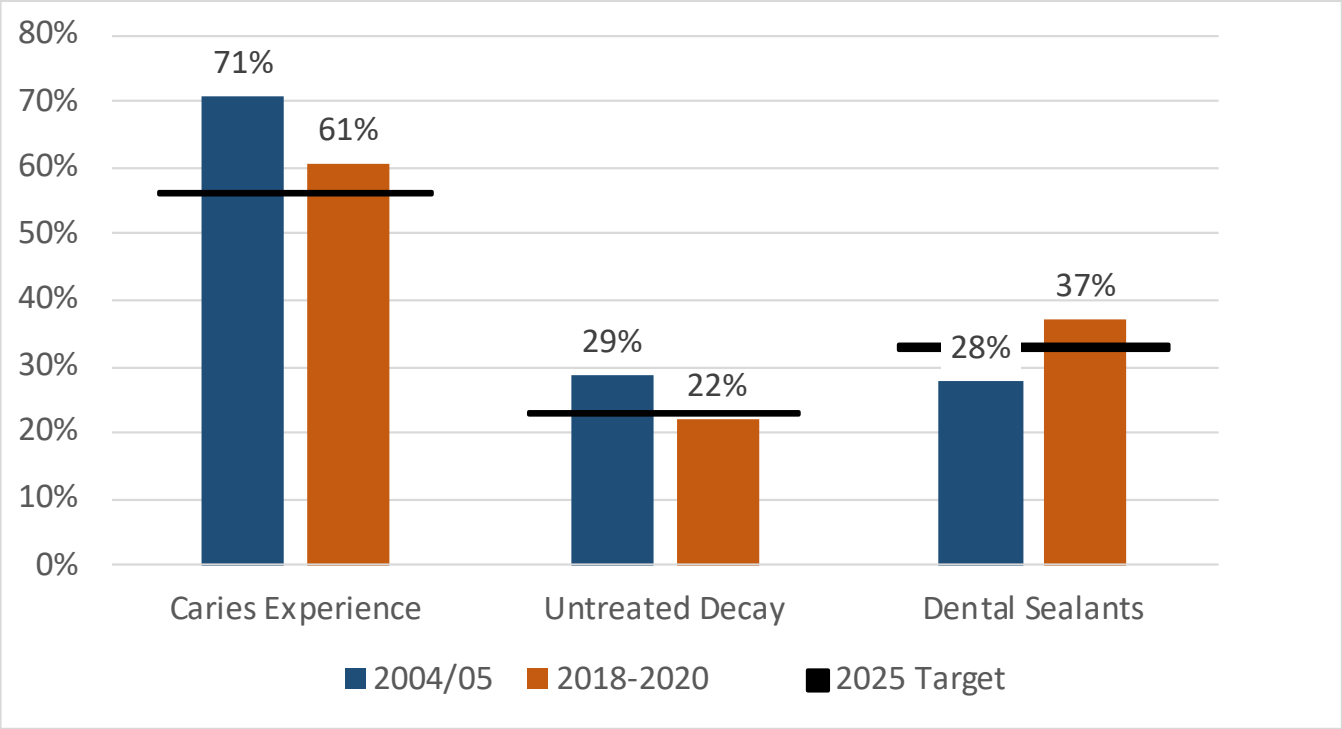
Tooth decay remains a significant public health problem. An overall noticeable reduction in tooth decay experience and untreated decay, and an increase in dental sealant prevalence have been achieved.

In California, tooth decay remains a significant public health problem. By the third grade, six in ten children (61%) have experienced tooth decay and one in five children (22%) have untreated tooth decay (Table 2). The prevalence of tooth decay and untreated decay was lower in 2018-2019 compared to the mid-2000s (Figure 1), representing a 10-percentage point decrease in tooth decay and seven percentage point decrease in untreated decay. Additionally, 37% more children are benefiting from dental sealants, an eight-percentage point increase from the mid-2000s.

Among California children, improvements in oral health are evident in tooth decay and application of sealants. However, California third graders have a substantially higher proportion of tooth decay compared to the national median of 53% among states [2]. The California Oral Health Plan 2018-2028 set targets for tooth decay, untreated decay, and sealant prevalence in third grade children. While the results of the CSS show that California has met its goals for prevalence of untreated decay and use of sealants, the state has work to do to meet the goal for the reduction of tooth decay.

Multiple initiatives have been implemented since the last survey and may have contributed to this improvement in oral health. Since 2007, several water systems, including the Metropolitan Water District of Southern California, began providing fluoridated water, resulting in 59.3% of the population receiving fluoridated water, up from 27.1% [8]. The percentage of children under 21 who were enrolled in the Medi-Cal dental program and received a dental service also increased to 48% in 2018 from 28% in 2006.

Figure 1. Percent of third grade children with caries experience, untreated tooth decay and dental sealants (2004-2005 & 2018-2019 California Third Grade Smile Surveys).



Additionally, several policies and system-level changes occurred during this timeframe:

- The implementation of the Kindergarten oral health assessment as part of the school entrance requirement;
- The promotion of screening, fluoride varnish, and anticipatory guidance during well child visits by the American Academy of Pediatrics and age one dental visit;
- The California Dental Association Foundation's 2010 Oral Health During Pregnancy and Early Childhood: Evidence-Based Guidelines for Health Professionals, and training of dental professionals to provide dental care for children under six years of age;
- The implementation of the Affordable Care Act (ACA) has increased dental insurance benefit coverage, affordability, and integration; and
- The 2015 Medicaid Dental Transformation Initiative was designed to increase preventive dental visit rates.

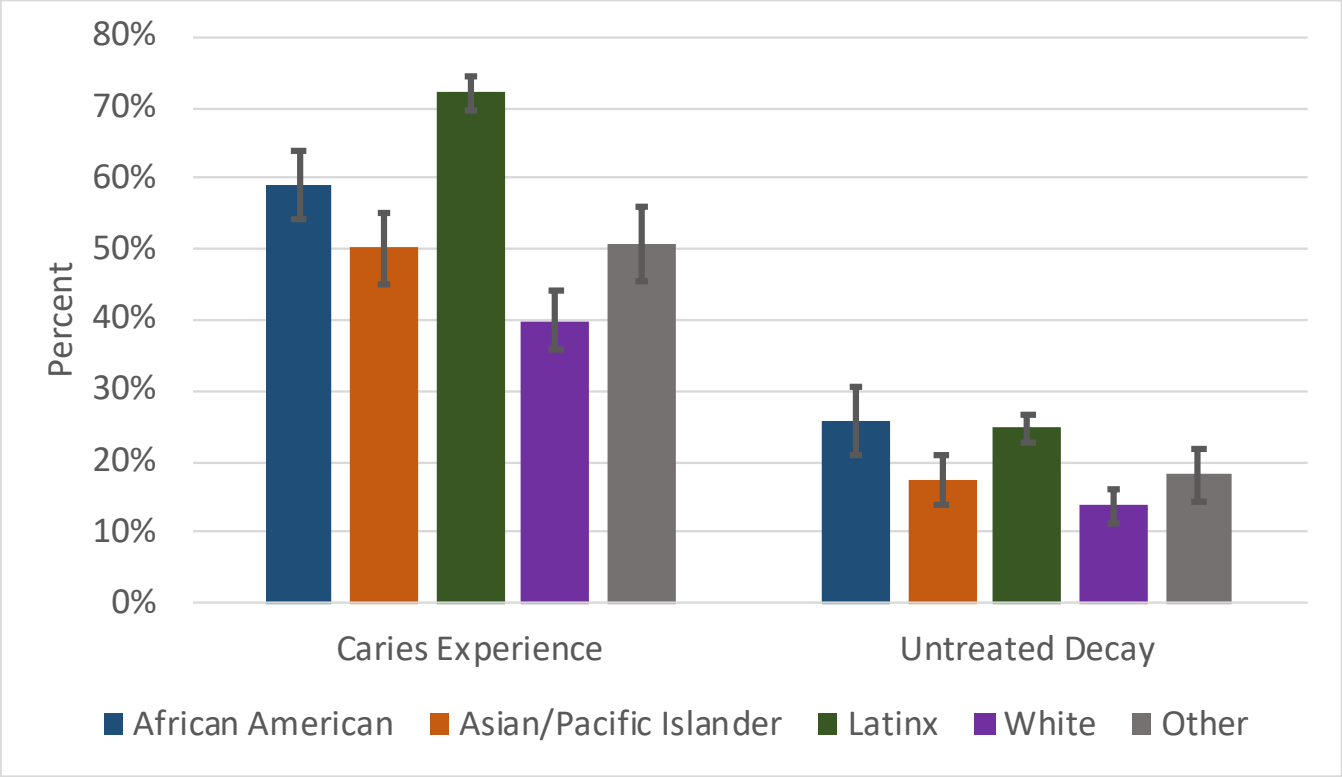
Key Finding 2

Disparities by race/ethnicity and socioeconomic disadvantage for tooth decay and untreated decay are profound.

While it is encouraging to observe improvements in tooth decay, untreated decay, and dental sealant prevalence, significant disparities still exist (Table 2). Latinx children had the highest prevalence of tooth decay, with more than 72% having experienced some form of tooth decay compared to 40% of white children (Figure 2). African American children had the highest prevalence of untreated decay at 25.8%, which is almost twice the rate of white children at 13.7%.

Socioeconomically disadvantaged children had almost twice the rate of tooth decay and untreated tooth decay, compared to children who were not socioeconomically disadvantaged (tooth decay 72.3% vs. 40.5%; untreated tooth decay 26% vs. 13.2%). Children from families whose parents' primary language is Spanish were more likely to have experienced tooth decay (77.9% vs. 52.2% for English language) or to have untreated decay (26.3% vs. 18.4% for English language). These disparities highlight the need for advancing oral health equity and addressing social determinants of oral health.

Figure 2. Percent of third grade children with caries experience and untreated tooth decay by race/ethnicity (2018-2019 California Third Grade Smile Survey).



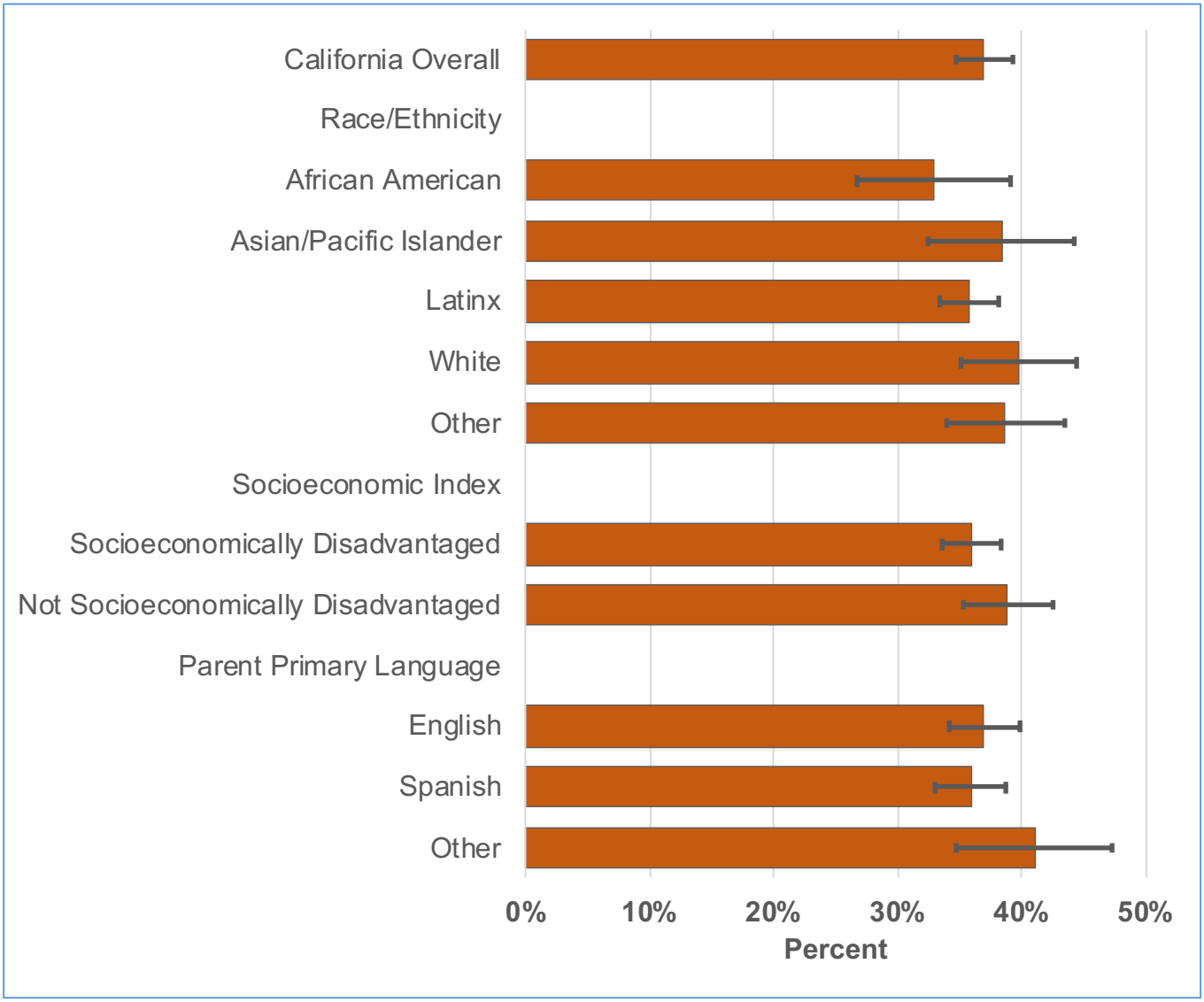
Vertical lines at the top of each bar represent 95% confidence intervals.

Key Finding 3

Dental sealant prevalence, a reflection of the use of preventive services, was low. However, disparities with respect to dental sealant prevalence were not observed.

The prevalence of dental sealants was low compared to national data observed among children aged 9–11 years examined in the National Health and Nutrition Examination 2011–2016 Survey (34.0% vs. 50.7%) [2]. However, the prevalence was similar across race/ethnicity and income subpopulations. (Figure 3). This suggests similarities in access to preventive services for school aged children across all population groups.

Figure 3. Percent of third grade children with dental sealants by race/ethnicity, socioeconomic disadvantage, and parent primary language (2018-2019 California Third Grade Smile Survey).



Horizontal lines at the end of each bar represent 95% confidence intervals.

Key Finding 4

Regional variation in children's oral health exists across California.

The oral health status of children varied by region (Table 3). Children from the Central Valley had the highest prevalence of tooth decay (75.9%) and untreated decay (29.7%). However, the Sacramento Region had the lowest prevalence of dental sealants (28.9%). While the Central Coast region had higher levels of tooth decay (64.2%), the proportion of children with untreated disease was lower (16.3%) and sealant prevalence was higher (46.8%). Overall, the Bay Area region had the most favorable outcomes: prevalence of tooth decay, untreated tooth decay and sealants were 45.4%, 15.7% and 44.6%, respectively.

CALIFORNIA ORAL HEALTH PLAN 2018-2028 STRATEGIES FOR IMPROVING ORAL HEALTH

California has set an ambitious goal to reduce the prevalence of caries (also known as tooth decay) to 56.5% by 2025. With respect to untreated caries, the survey finding of 21.8% is consistent with the findings from other states (median 20.7%; range 8% to 43%) [2]. The California Oral Health Plan 2025 measures whether untreated decay prevalence and dental sealant prevalence targets have been met, based on the survey results. However, those targets were modest to begin with. Further oral health improvement requires concerted, prevention-focused efforts starting from a very young age. Using the funding provided from the California Healthcare, Research and Prevention Tobacco Tax Act of 2016 (Proposition 56), the California Department of Public Health (CDPH) has established a statewide program with a focus on preventing tooth decay in children. It provides $18 million across 59 Local Health Jurisdictions to conduct a needs assessment, develop a community oral health improvement plan, and implement interventions.

Community Water Fluoridation

The Community Preventive Services Task Force (CPSTF) recommends community water fluoridation based on evidence of effectiveness in reducing dental caries across populations. Community water fluoridation (CWF) has been proven to be a safe and cost-effective intervention for preventing tooth decay [6]. CDPH is working to increase access to CWF through maintaining and expanding state, local, and tribal community water fluoridation programs. It is encouraging compliance with proper water fluoridation practices through the promotion of Centers for Disease Control and Prevention (CDC) training and technical assistance resources. With the availability of a new fluoridation tablet and feeder system, it is now possible to provide affordable, low maintenance, consistent levels of fluoridation to smaller public water systems. CDPH will be exploring the feasibility of this new system in California communities.

Children's Dental Disease Prevention Program

The CPSTF recommends school-based sealant delivery programs based on evidence of effectiveness in preventing tooth decay among children [9]. School-based and school-linked dental sealant programs are examples of a community-clinical linkage model where screening, counseling, provision of topical fluoride and sealants, referral and follow-up all occur in a school setting. Children are linked to a source of dental care where they can receive ongoing clinical services. CDPH is working with local oral health programs to develop other community-based programs such as the Women, Infants and Children (WIC) Dental Days and Virtual Dental Home model, which expand the reach to a variety of community settings and dental care providers.

Kindergarten Oral Health Assessment

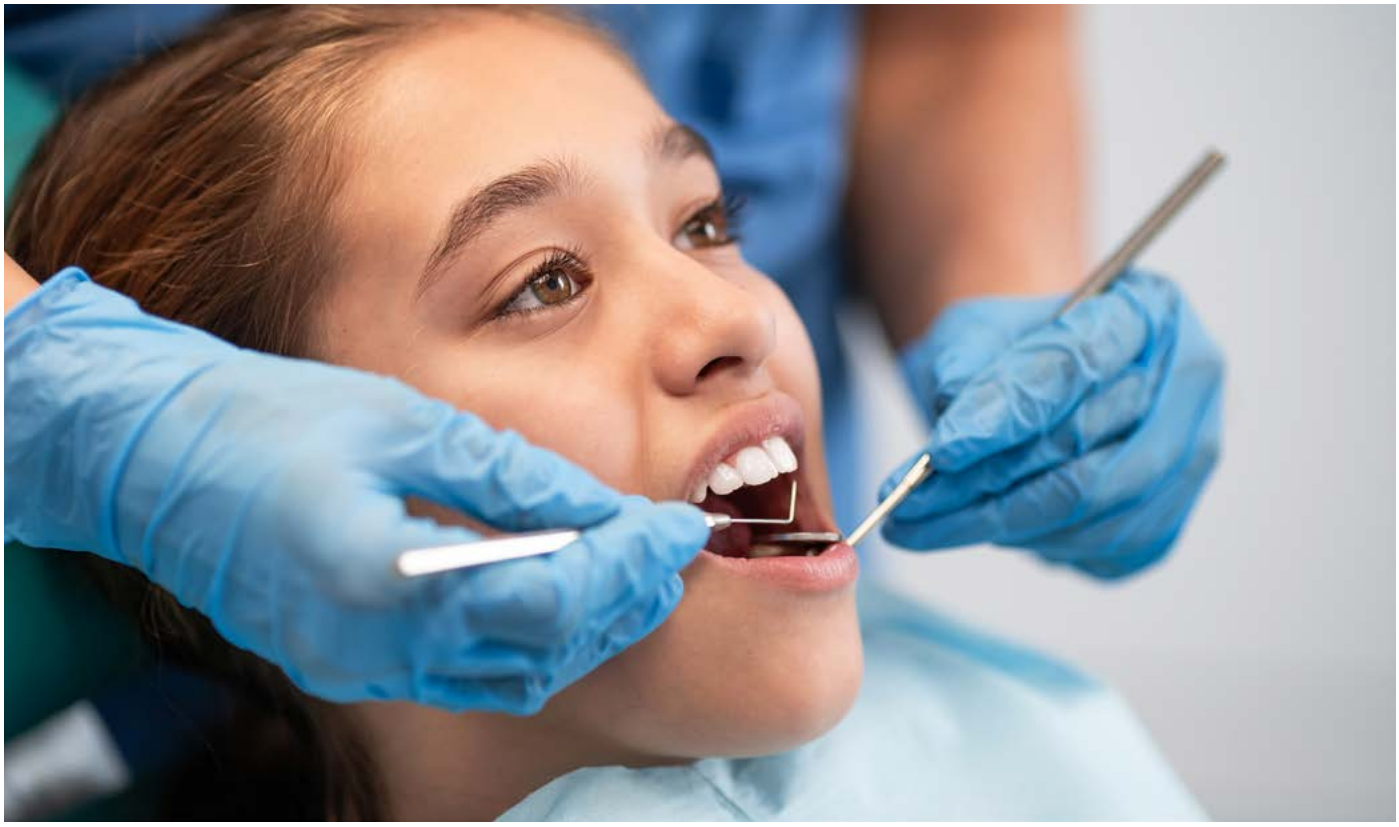
The Kindergarten oral health assessment, required in California, helps identify children suffering from dental disease and assists them in finding a source of dental care [10]. It also provides invaluable data on the status of children's oral health in California. CDPH and local oral health programs are collaborating to train dental practitioners to advocate for kindergarten dental assessment. They offer technical assistance to implement protocols, track progress, and seek to improve the performance of and compliance with the kindergarten dental assessment.

Dental Visit: A Leading Health Indicator

Improving access to dental care is critical to improving oral health outcomes and reducing disparities. This is identified as a Leading Health Indicator (LHI): a small subset of high-priority Healthy People national objectives selected to drive action toward improving health and well-being. Timely dental visits present the opportunity to provide preventive care and offer early treatment. The California Oral Health Plan 2018-2028 has identified several strategies to make it easier for people to get dental care. The Medi-Cal Dental Program and local oral health programs are implementing activities to improve access to dental care.

Oral Health Literacy: Enhancing the Communication Capacity of Dental Team

Low health literacy is a contributor to poor health outcomes and is of particular concern for vulnerable population groups. Limited oral health literacy of patients and inadequate communication skills of dental practitioners are potential barriers to effective prevention, diagnosis and treatment of oral diseases. The Office of Oral Health has contracted with the Health Research for Action Center at University of California, Berkeley to create materials for an oral health literacy toolkit, conduct trainings for dental teams and implement practices to improve the uptake of information about oral health literacy. The toolkit will include information on specific strategies including plain language communication, the use of visuals and drawings, the teach-back method, and creating a shame-free and welcoming clinical environment. In addition, the California Oral Health Technical Assistance Center at University of California, San Francisco has created resources for local health departments and dental practitioners to promote kindergarten oral health assessment, water fluoridation, school-based/linked programs and tobacco cessation counseling. The Medi-Cal Dental Program has launched, Smile, California, a campaign to increase members' use of Medi-Cal's dental benefit.



METHODOLOGY

The CSS was administered during the 2018-2019 and 2019-2020 school years from a representative sample of third grade children in California. The sampling design was a stratified random sample of public schools with 25 or more third grade students. The sample was selected to represent California's third grade public school population, utilizing implicit stratification by eight geographic regions across the state and a representative distribution of schools based on the percentage of children eligible for free or reduced-price meals within each region. Out of 223 schools selected for the sample, (with probability of selection proportional to size) 194 were screened, resulting in a total of 12,562 children. Every third grade student in the selected schools was screened, unless the student opted out. Passive consent was the preferred method, as there is an existing precedent in California law (AB 1433) allowing passive consent for oral health assessment for children in kindergarten [10]. However, 18.2% of the participants were screened at schools that required positive consent. The overall participation rate was 71.3% among children at schools that were screened. The participation rate was 56.0% and 75.1% for children at schools requiring positive consent and schools permitting passive consent, respectively.

This CSS assessed participating children for tooth decay experience, untreated tooth decay, and dental sealant prevalence. Additional participant information was provided by the California Department of Education (CDE), including the child's race/ethnicity, socioeconomic disadvantage, and the parent's primary language, among others. CDPH examined the socioeconomic disparities in children's oral health using the CDE's Socioeconomically Disadvantaged Index (SED). The following categories were used to determine socioeconomic disadvantage: children who were eligible for the National School Lunch Program at any time during the academic year; being a migrant, a foster child, or homeless at any time during the academic year; or having parents who did not receive a high school diploma (or equivalent).

Registered dental hygienists administered the CSS and the data were calibrated and gathered according to the Association of State and Territorial Dental Directors' Basic Screening Survey protocol [11]. The dental measures gathered from the assessment were caries experience, untreated decay, and dental sealants on permanent molars. The socioeconomic data was obtained through a data linkage with the CDE. Obtaining the data this way was beneficial because: 1) these variables were not limited to children whose parents returned paper surveys; 2) it facilitated the usage of passive consent, increasing the sample size; 3) it allowed for a more robust set of covariates; and 4) it gave CDPH access to certain individual-level variables that would otherwise be analyzed at the school level. The data linkage was successful, with 97.6% of the students matching on the main identification number: Statewide Student Identification number (SSID), and 96.7% matching on student's date of birth. Children who were not matched in the data linkage were not included in the analysis resulting in a final sample size of 12,322. CDPH used the geographic strata and the CDE socioeconomic disadvantage index in the creation of raking weights to ensure that the statistics generated from the data were representative of the target population.

Limitations

First, the Basic Screening Survey (BSS) methodology is meant to be used for surveillance of children's oral health. Therefore, a comprehensive oral examination to determine severity of the disease is not possible. Second, the sample size did not allow for estimation of the outcomes for each individual county or certain subgroups (e.g., homeless children). Third, these data are only available for children in public schools and public charter schools, not for children outside of the public school system. Fourth, it is possible there were inconsistencies in how different hygienists recorded the data. To minimize this, the same trainer calibrated (standardized instruction to ensure consistent methods) the screening and standardized the data collection by each dental hygienist gathering the oral health data. Finally, certain parents and schools were reticent to provide the data necessary to complete the data linkage. It is possible the missing data caused by this reticence is not random and the estimates generated are therefore biased in some way. However, the overall participation rate was still quite high, and the creation of the raking weights would have accounted for some of the potential bias.

Definitions

Dental Caries Experience: Caries experience means that a child has had tooth decay at some point in time. Caries experience covers both past treatment (e.g., fillings, crowns) and untreated decay at the present time (e.g., untreated cavities).

Untreated Tooth Decay: Untreated decay is tooth decay (e.g., one or more cavities) that has not received treatment.

Dental Sealants: Dental sealants are plastic-like coatings that are applied to the chewing surfaces of teeth. The applied sealant protects the teeth from decay.

TABLES

Table 1. Characteristics of the 2018-2019 California Third Grade Smile Survey sample and the weighted percent

Category	Number	Percentage (weighted)
RACE/ETHNICITY		
African American	705	5.3%
Asian/Pacific Islander	1,196	9.2%
Hispanic/Latino	7,400	54.9%
White	2,083	22.2%
Other	823	7.4%
Missing	115	1.0%
GENDER		
Female	6,039	49.0%
Male	6,283	51.0%
ENGLISH LEARNERS [a]		
English Learner	3,627	24.7%
English Proficient	8,695	75.4%
PARENT PRIMARY LANGUAGE		
English	6,917	61.2%
Spanish	4,247	29.6%
Other	1,158	9.2%
MIGRANT PROGRAM STATUS [b]		
Migrant Program: Yes	143	1.1%
Migrant Program: No	12,179	98.9%
SPECIAL EDUCATION [c]		
Special Education Program: Yes	1,457	11.9%
Special Education Program: No	10,865	88.1%
SOCIOECONOMIC INDEX		
Socioeconomically Disadvantaged [d]	8,407	61.9%
Not Socioeconomically Disadvantaged	3,915	38.1%

a. English learner students are those students for whom there is a report of a primary language other than English on the state-approved Home Language Survey and who, on the basis of the state approved oral language (kindergarten through grade twelve) assessment procedures and literacy (grades three through twelve only), have been determined to lack the clearly defined English language skills of listening comprehension, speaking, reading, and writing necessary to succeed in the school's regular instructional programs.

b. The Migrant Education Program is designed to support high-quality and comprehensive educational programs for migrant children to help reduce the educational disruption and other issues that result from repeated moves.

c. Special education is specially designed instruction to meet the unique needs of a child with a disability.

d. Socioeconomically disadvantaged is defined as children who were migrant, foster, or homeless, were eligible for the free or reduced-priced meal program, or both parents have not graduated high school.

Table 2. Percent (95% CI) of third grade children with caries experience, untreated tooth decay and dental sealants by selected characteristics (2018-2019 California Third Grade Smile Survey)

Category	Caries Experience (95% Confidence Interval)	Untreated Decay (95% Confidence Interval)	Sealants (95% Confidence Interval)
All of California	60.6% (57.7-63.5)	21.9% (20.2-23.6)	37.0% (34.7-39.3)
RACE/ETHNICITY			
African American	59.1% (54.3-63.9)	25.8% (20.9-30.8)	32.9% (26.8-39.0)
Asian/Pacific Islander	50.2% (45.1-55.2)	17.4% (13.9-20.9)	38.4% (32.5-44.4)
Hispanic/Latino	72.2% (69.8-74.6)	24.8% (22.8-26.7)	35.8% (33.4-38.2)
White	40.0% (35.8-44.2)	13.7% (11.2-16.3)	39.8% (35.1- 44.4)
Other	50.6% (45.3-55.9)	18.2% (14.4-22.0)	38.7% (34.0-43.3)
Missing	52.6% (41.1-64.1)	19.3% (11.5-27.1)	42.8% (31.1-54.6)
GENDER			
Female	60.3% (57.0-63.5)	22.4% (20.3-24.6)	36.8% (34.3-39.2)
Male	60.9% (57.8-64.0)	20.0% (18.0-22.0)	37.3% (34.8-39.8)
ENGLISH LEARNERS			
English Learner	76.0% (73.5-78.4)	26.8% (24.3-29.3)	36.5% (32.9-40.1)
English Proficient	54.7 (51.6-57.8)	19.0% (17.2-21.0)	37.2% (34.7-39.8)
PARENT PRIMARY LANGUAGE			
English	52.2% (49.1-55.4)	18.4% (16.5-20.3)	37.0% (34.2-39.8)
Spanish	77.9% (75.7-80.0)	26.3% (23.9-28.7)	35.9% (33.0-38.7)
Other	55.3% (50.1-60.4)	21.8% (17.8-25.8)	41.0% (34.8-47.3)
MIGRANT PROGRAM STATUS			
Migrant Program: Yes	76.3% (67.8-84.9)	31.1% (23.7-38.6)	40.2% (28.0-52.5)
Migrant Program: No	60.4% (57.4-63.4)	21.1% (19.3-22.9)	37.0% (34.7-39.3)

SPECIAL EDUCATION			
Special Education Program: Yes	62.1% (58.8-65.5)	20.9% (18.2-23.5)	35.4% (32.1-38.7)
Special Education Program: No	60.4% (57.4-63.4)	21.2% (19.3-23.1)	37.2% (34.9-39.6)
SOCIOECONOMIC INDEX			
Socioeconomically Disadvantaged	72.8% (70.9-74.7)	26.0% (24.0-28.1)	35.9% (33.5-38.2)
Not Socioeconomically Disadvantaged	40.5% (37.3-43.8)	13.2% (11.4-15.0)	38.9% (35.2-42.6)

Table 3. Percent of third grade children with caries experience, untreated tooth decay and dental sealants by region (2018-2019 California Third Grade Smile Survey)

Region	Caries Experience	Untreated Decay	Sealants
Bay Area	45.4% (35.7-55.2)	15.7% (9.4-22.1)	44.6% (37.7-51.6)
Central Coast	64.2% (53.2-75.1)	16.3% (11.3-21.4)	46.8% (36.5-57.1)
Los Angeles County	64.7% (60.1-69.4)	20.7% (18.7-23.2)	30.5% (27.5-33.4)
Northern/Sierra	51.6% (36.6-66.7)	20.7% (8.9-32.6)	36.5% (27.8-45.2)
Sacramento Region	46.2% (36.9-55.4)	17.2% (10.1-24.3)	28.9% (22.0-35.8)
San Joaquin Valley	75.9% (70.8-80.9)	29.7% (25.8-33.5)	33.2% (28.7-37.6)
Southern	60.4% (54.6-66.2)	21.8% (18.5-25.1)	40.0% (35.0-45.1)

Note: 95% Confidence Interval is provided in parenthesis.

County Regional Grouping

- Bay Area (9)
  - Santa Clara, Contra Costa, Alameda, San Francisco, San Mateo, Sonoma, Solano, Marin, Napa
- Central Coast (6)
  - Ventura, Santa Barbara, Santa Cruz, San Luis Obispo, Monterey, San Benito
- Los Angeles County (1)
  - Los Angeles
- Northern/Sierra (25)
  - Butte, Humboldt, Mendocino, Tehama, Glenn, Colusa, Yuba, Tuolumne, Calaveras, Amador, Inyo, Mariposa, Mono, Alpine, Shasta, Del Norte, Siskiyou, Lassen, Trinity, Modoc, Plumas, Sierra, Lake, Sutter, Nevada
- Sacramento Region (4)
  - Sacramento, Placer, Yolo, El Dorado
- San Joaquin Valley (8)
  - Fresno, Kern, San Joaquin, Stanislaus, Tulare, Merced, Kings, Madera
- Southern (5)
  - Orange, San Diego, San Bernardino, Riverside, Imperial

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