

A Public Health Update:

The Oral Health of Delaware's Kindergarten and Third Grade Children in 2022

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Introduction

Good oral health means more than healthy teeth and gums. Oral diseases, such as tooth decay and gum disease, are multifactorial in causation and affect general health status. Oral health problems usually involve significant social and cultural factors that require many resources and partners to implement prevention and treatment services.¹ Social determinants of health include income, education, occupation, geographic implications, and cultural beliefs.² Access to oral health care is affected by similar social, cultural, economic, geographic, and structural factors, but more so by the separation of the oral health from the health care system. People and communities with inadequate access to oral health care experience notable social and economic burdens.³

Tooth decay is a serious public health problem that can affect a child's overall health and well-being. It can lead to pain and disfigurement, low self-esteem, nutritional problems, and lost school days. Children with oral health problems are three times more likely to miss school due to dental pain, and absences caused by pain are associated with poorer school performance.⁴

The National Oral Health Surveillance System (NOHSS) is a collaborative effort between the Centers for Disease Control and Prevention (CDC), Division of Oral Health and the Association of State and Territorial Dental Directors (ASTDD). NOHSS monitors the burden of oral disease, use of the oral health care delivery system, and the status of community water fluoridation on national and state levels. NOHSS captures oral health surveillance indicators based on data sources and surveillance capacity available to most states.

The Council of State and Territorial Epidemiologists (CSTE) and the National Association of Chronic Disease Directors (NACDD) developed a framework for chronic disease surveillance indicators, including oral health indicators for adult and child populations.

Children's oral health data from NOHSS include indicators for caries experience, untreated tooth decay, and dental sealants. More specifically, these indicators measure the percentage of third grade students with caries experience, the percentage of third grade students with untreated tooth decay, and the percentage of third grade students with dental sealants on at least one permanent molar tooth.⁵

Recognizing the need for community level oral health status and dental care access data, ASTDD developed the *Basic Screening Survey* (BSS). The primary purpose of the BSS is to provide a framework to collect oral health data efficiently and inexpensively in a consistent manner. By collecting data in a standardized manner, communities and states can compare their data with data collected by other organizations or agencies using the same methodology; and/or data from previous surveys.

The BSS model has two basic components: direct observation of a child's oral cavity and questions asked of, or about, the child being screened.⁶

To assess the current oral health status of Delaware's elementary school children, the Bureau of Oral Health and Dental Services (BOHDS) within the Delaware Department of Health and Social Services, Division of Public Health coordinated an inaugural statewide oral health survey of kindergarten and third grade children attending Delaware's public schools. The survey was conducted during the 2021-2022 school year among kindergarten and third grade children receiving a BOHDS dental screening at 40 schools. BOHDS received 4,236 oral health surveys and performed in-person screenings on 1,601 kindergarten and 1,517 third grade children. The kindergarten screening survey had not been completed previously in Delaware and the previous third grade BSS was completed in 2012. These two cohorts were selected because third grade oral health is a national comparison point used to assess the health of school age children, as there is a good mixture of primary and permanent dentition present. The kindergarten group allows for baseline assessment of oral health upon entry into the school system.

Data Source and Methods

BOHDS employees and Delaware state employees conducted the survey, screening children in kindergarten and third grade from a representative sample of Delaware's non-virtual public schools. The preliminary planning phase for the basic screening survey started more than six months prior to the in-school screenings taking place by collaborating with the Delaware Department of Education (DOE) to gain approval for the survey and to determine the procedure for distribution of the forms throughout the state, as well as obtaining individual consent to participate from the families of the students. To determine the schools included in the BSS, technical assistance was provided by an ASTDD consultant. Assuring the sampling scheme is correct is essential to submit the data for inclusion into the U.S. Oral Health Surveillance System, NOHSS.

To assure representation by geographic region and socioeconomic status, the sampling frame was ordered by county, then by the percentage of students in each school identified by DOE as being low-income and eligible for Temporary Assistance for Needy Families or the Supplemental Nutrition Assistance Program (SNAP). If a school with only third grade was selected, the appropriate kindergarten feeder school⁷ within the district was added to the sample. A systematic probability proportional to size sampling scheme was used to select a sample of 25 third grade schools. As four of the selected third grade schools did not have kindergarten students, the appropriate kindergarten feeder schools were added to the sample for a total of 28 schools representing 25 sampling intervals. Fifteen additional schools volunteered to participate, and their data were included in the results.

After developing data collection forms and the survey letters, the schools were contacted and arrangements were made for an in-person screening date, allowing ample time for the forms to be distributed and returned to BOHDS.

All the screeners were trained and calibrated by a representative from ASTDD and are actively licensed as either a dentist or a dental hygienist in the State of Delaware. The following definitions were used by the screeners to consistently categorize observations:

Decay experience refers to a child having tooth decay in the primary (baby) and/or permanent (adult) teeth in his or her lifetime. Decay experience can be past (fillings, crowns, or teeth that

have been extracted because of decay) or present (untreated tooth decay or cavities) and refers to having untreated decay or a dental filling, crown, or other type of restorative dental material present at the time of the screening.

If left untreated, tooth decay can have serious consequences, including needless pain and suffering, difficulty chewing (which compromises children's nutrition and can slow their development), difficulty speaking, and lost days in school. *Untreated decay* is used to describe dental caries or tooth decay that have not received appropriate treatment.

Dental sealants are plastic-like coatings applied to the chewing surfaces of back teeth. The applied sealant resin bonds into the grooves of teeth to form a protective physical barrier. Most tooth decay in children occurs on these surfaces. Sealants protect the chewing surfaces from tooth decay by keeping germs and food particles out of these grooves. Screeners utilized visual inspection to identify the presence of a dental sealant.

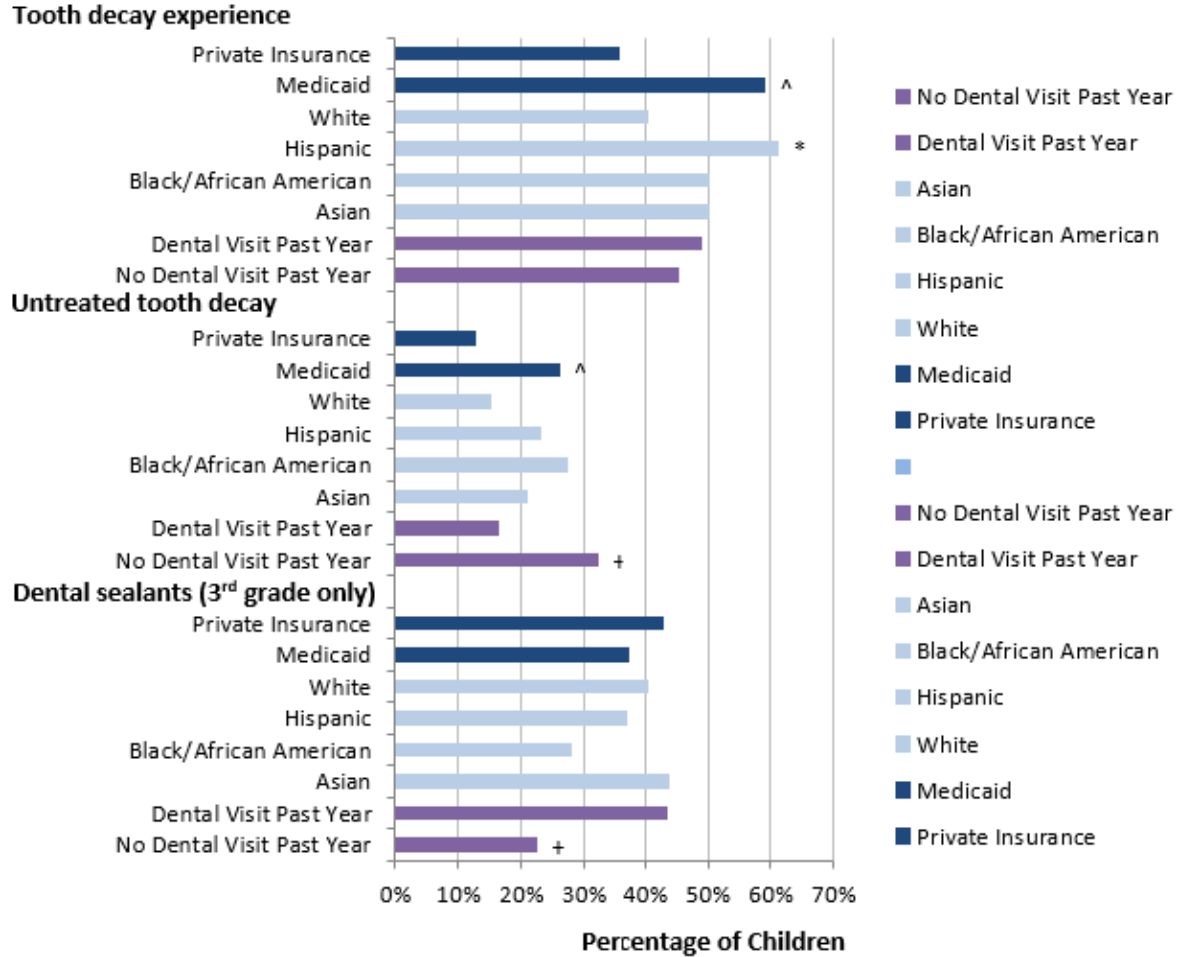
Each child who completed an in school, in-person screening received an oral health kit that included a toothbrush and toothpaste, age-appropriate dental education, oral health literature, and a dental resource guide. A copy of the screening result was sent home for the student's parent or guardian to review. For students where an urgent need was identified, BOHDS conducted case management and connected the family to a provider to address their oral health needs.

The information was collected using both the returned paper and electronic survey forms and the in-person screening. It included: grade, age, race/ethnicity, presence of untreated decay, presence of treated decay, presence of dental sealants on the permanent first molar teeth, and urgency of need for dental care. BOHDS used the BSS clinical indicator definitions and data collection protocols authored by ASTDD, titled *Basic screening surveys: An approach to monitoring community oral health*.⁶ The forms included an optional parent questionnaire which collected information on dental insurance, time since last dental visit, whether the child had a toothache or other dental problems in the last year, and whether the child needed dental care during the last year but was unable to obtain the needed care. All statistical analyses were performed using the complex survey procedures within SAS (Version 9.4; SAS Institute Inc., Cary, NC). Sample weights were used to produce population estimates based on selection probabilities.⁸

Results

There were 8,847 kindergarten and 3rd grade children enrolled in the participating schools for the 2020-2021 academic year. Three thousand one hundred and eighteen received a dental screening for a response rate of 35%. The following is a summary of the results of the 3,118 in-person screenings completed (figure 1, table 1). Forty-five percent of Delaware's kindergarten children have at least one tooth with decay experience. Twenty-two percent of Delaware's kindergarten children have untreated tooth decay. Since permanent molars generally appear in the mouth at six years of age, information on protective dental sealants in kindergarten was not included.

Figure 1. Prevalence of Tooth Decay Experience and Untreated Tooth Decay, and Dental Sealants Among Kindergarten and Third Grade Children by Type of Dental Insurance, Race/Ethnicity, and Dental Visit in the Past Year, Delaware, 2021-2022



^ Significantly different from children with private dental insurance
 * Significantly different from non-Hispanic White children
 + Significantly different from those with a dental visit in the past year

Table 1. Prevalence of Tooth Decay Experience and Untreated Tooth Decay in the Primary and Permanent Teeth Among Kindergarten and Third Grade Children Combined by Selected Characteristics, Delaware, 2021-2022

Characteristic	Decay Experience				Untreated Decay			
	Survey Total	Percent Yes	Lower CL	Upper CL	# With Data	Percent Yes	Lower CL	Upper CL
ALL CHILDREN	3,118	48.3	41.4	55.2	3,118	20.4	13.8	27.0
Race/Ethnicity								
Asian	175	50.2	39.8	60.7	175	20.8	8.1	33.6
Black/African American	603	50.0	38.5	61.6	603	27.3	16.8	37.8
Hispanic/Latinx	632	61.2*	56.4	65.9	632	23.1	17.6	28.7

White (reference)	1,450	40.4	34.1	46.7	1,450	15.0	10.5	19.5
County								
Kent	763	47.8	42.3	53.3	763	19.6	14.6	24.6
New Castle	1,392	47.8	36.0	59.5	1,392	20.6	9.1	32.0
Sussex	963	50.7	43.5	57.9	963	21.0	17.2	24.9
Dental Insurance								
Private Insurance (reference)	1,475	35.5	27.8	43.2	1,475	12.8	8.6	16.9
Medicaid	1,221	59.1*	52.2	65.9	1,221	26.0*	17.3	34.7
Dental Visit in Last Year								
No	673	45.2	40.0	50.5	673	32.2*	25.6	38.8
Yes (reference)	2,402	49.0	41.2	56.7	2,402	16.4	10.1	22.8
Toothache/Cavities in Last Year								
No (reference)	2,397	38.0	32.7	43.3	2,397	12.9	9.1	16.7
Yes	608	79.8*	71.4	88.1	608	40.1*	29.3	50.9
Needed Care but Couldn't Obtain								
No (reference)	2,715	45.9	38.9	52.8	2,715	16.6	10.7	22.6
Yes	300	64.6*	58.3	70.9	300	43.3*	36.3	50.2

Lower CL = Lower 95% confidence limit, Upper CL = Upper 95% confidence limit

* Significantly different than reference (p<0.05)

Regarding third graders, 53% of Delaware’s third grade children have at least one tooth with decay experience and 19% of Delaware’s third grade children have untreated tooth decay. Only 38% of Delaware’s third grade children were found to have protective dental sealants in present (table 2).

Delaware children with Medicaid have a significantly higher prevalence of decay experience and untreated tooth decay than those with private dental insurance. Over 60% of surveyed Hispanic/Latinx children had tooth decay experience compared to over 40% of surveyed non-Hispanic White children. Non-Hispanic Black and non-Hispanic Asian children had over 50% tooth decay experience compared to 40% for non-Hispanic White children. The prevalence of untreated tooth decay is significantly higher among children without a dental visit in the past year (over 30%) compared to those with a dental visit (over 20%). Among third grade children, those without a dental visit in the past year are significantly less likely to have protective dental sealants.⁸

Table 2. Prevalence of Dental Sealants on Permanent Molar Teeth Among Third Grade Children by Selected Characteristics, Delaware, 2021-2022

Characteristic	Dental Sealants on Permanent Molars							
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	Survey Total	Percent Yes	Lower CL	Upper CL
ALL THIRD GRADE CHILDREN	1,508	37.5	26.2	48.8
Race/Ethnicity				
Asian	88	43.7	22.9	64.6
Black/African American	289	27.8	13.3	42.2
Hispanic/Latinx	307	37.1	26.1	48.2
White (reference)	702	40.5	27.5	53.4
County				
Kent	344	28.4	14.9	41.9
New Castle	703	47.0	28.3	65.6
Sussex	461	22.0	7.8	36.2
Dental Insurance				
Private Insurance (reference)	757	42.8	27.9	57.6
Medicaid	534	37.3	26.8	47.8
Dental Visit in Last Year				
No	300	22.5*	11.4	33.6
Yes (reference)	1,179	43.5	32.2	54.7
Toothache/Cavities in Last Year				
No (reference)	1,167	39.7	28.3	51.1
Yes	285	39.6	27.7	51.4
Needed Care but Couldn't Obtain				
No (reference)	1,310	41.0	30.0	52.1
Yes	143	32.0	18.0	46.0

Lower CL = Lower 95% confidence limit, Upper CL = Upper 95% confidence limit

* Significantly different than reference ($p < 0.05$)

Discussion

The results of this BSS demonstrate that Delaware's third graders have experienced less decay than the national average yet are comparable to the national average for untreated decay. Fifty-three percent of Delaware's third grade children have at least one tooth with decay experience, which is lower than the national average of 60%. It was found that 19% of Delaware's third grade children have untreated tooth decay, similar to the national average of 20%; and only 38% of Delaware's third grade children have protective dental sealants, lower than the national average of 42%.

The decay experience and untreated decay rates for kindergarteners are higher than national averages. Forty-five percent of Delaware's kindergarten children have at least one tooth with decay experience, higher than the national average of 42%. Twenty-two percent of Delaware's kindergarten children have untreated tooth decay, higher than the national average of 15%.

More importantly, the results indicate that significant oral health inequities exist in Delaware, with tooth decay being more common in children from low-income households and among Hispanic children.

Limitations

It is important to understand the intent and limitations of a screening survey. A dental screening is not a thorough clinical examination and does not involve making a clinical diagnosis resulting in a treatment plan. A screening is intended to identify definitive dental or oral lesions and is conducted by dentists, dental hygienists, or other appropriate health care workers, in accordance with applicable state law. The information gathered through a screening survey is at a level consistent with monitoring the national health objectives found in Healthy People 2030, the United States Public Health Service's 10-year agenda for improving the nation's health.⁹ Surveys are cross sectional (looking at a population at a point in time) and descriptive (intended for determining estimates of oral health status for a defined population).⁶

It should be noted that the Delaware survey was conducted during the Coronavirus 2019 (COVID-19) pandemic and the lower prevalence of dental sealants may be partially due to limited access to preventive dental services at that time.

Dental Care in Delaware

More than two hundred families responded to the questionnaire that they had no dental insurance or were unsure of having any benefit. This information is important to consider as many individuals need assistance with navigating through healthcare benefits, understanding eligibility and determining potential of out-of-pocket costs before obtaining care.

Dental case management is one method that BOHDS has utilized in this effort to address these inequities and improve the overall oral health of these and other high-risk populations. Increasing access to care by the removal of barriers to care delivery ultimately results in connecting families to providers who match their preferences, thus establishing a dental home.¹⁰

To facilitate accessibility of a dental home, it is necessary to develop trust. Understanding a family's preferences, cultural beliefs, and ability to navigate the health care system is as critical as delivering care. For families to follow through with oral and dental health care, providers must educate them on the importance of preventive practices. Improving health literacy is needed to understand the connection between oral and systemic health. Offering appointment assistance regarding potential transportation options, provider schedules, and after care proves valuable to establishing a meaningful connection. Lastly, families can make well-informed decisions and be comfortable in their selection of an oral health provider when they receive administrative assistance to help determine benefit eligibility, comply with referrals, and pay responsibly.

To further address care needs, BOHDS developed the First Smile Delaware Dental Resource Guide in 2020. The resource guide is distributed during all community outreach events and public engagement and is available both electronically and in print.¹¹ It is designed to assist the public with finding a dentist that is right for them individually. The guide helps patients understand which dental benefits are covered, how to apply for dental insurance, and how to access oral health services in Delaware. BOHDS continually monitors the effectiveness of the resource guide and its content through consumer and dental provider feedback and updates the document annually. BOHDS plans to conduct a phone survey in the fourth quarter of 2023 with providers that have accepted referrals to assess their overall experiences, garner feedback on what has been working well and identify opportunities for improvement.

Next Steps

BOHDS expects the next BSS to be conducted for kindergarteners and third graders during the 2026-2027 academic year. While the BSS kindergarten and third grade screening surveys have a periodicity schedule of every five years, BOHDS' daily activity is similar in nature. BOHDS engages in community outreach activities and an in-school screening program throughout the year. The *Delaware Smile Check Program* is a school-based screening program that provides dental education and preventive services within the school, and includes dental case management for any family that identifies that they are without a dental home. If an urgent or emergent situation is identified during a screening visit that requires treatment, a BOHDS staff member will reach out to the parent or guardian and try to connect the child to a provider within 48 hours. Similar to the BSS, any child who is seen as part of the Delaware Smile Check Program receives customized dental education and oral health instruction in addition to a toothbrush, toothpaste, and a dental resource guide. A copy of the screening result is sent home with the child for the guardian's review and the school nurse receives a copy for the student's school health record. BOHDS will look to evaluate the effectiveness of the case management activities at the end of 2023 to determine what percentage of families were connected to a dental provider and if this has had impact on the burden of oral disease in the state. Since its inception in 2016, the Delaware Smile Check Program has provided services to more than 15,000 children throughout the state.

Public Health Implications

Tooth decay is preventable. Connecting children to a permanent dental home will work towards lowering the incidence of dental caries and the prevalence of untreated decay. To help lower the burden of childhood oral disease, BOHDS will continue to coordinate with Federally Qualified Health Centers and private dental providers across the state to link families in need of a provider to a dental home. When Delaware reaches the public health goal of lowering the burden of oral disease, our residents will experience an improved quality of life.

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