

# Keep Smiling Vermont

**The Oral Health of Vermont's Children  
2022-2023**



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# Acknowledgements

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We would also like to thank the Centers for Disease Control and Prevention (CDC), who made this work possible through Cooperative Agreement funding, as well as the Association of State and Territorial Dental Directors (ASTDD), who developed the BSS toolkit which guided this project.

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## Executive Summary

With **Keep Smiling Vermont 2022-2023**, the Vermont Department of Health takes a fifth look at the oral health status of a representative sample of elementary school children throughout the state. Previous surveys were completed during the 2002-2003, 2009-2010, 2013-2014 and 2016-2017 school years. For the 2022-2023 survey, a total of 1,771 kindergarten and third grade children in 32 public elementary schools received a dental screening.

### Key Findings

1. Over 40% of Vermont's children have experienced tooth decay, a rate that is significantly worse than in recent years.
2. Despite developments in treatment options, the prevalence of tooth decay among third grade children has not improved since 2002-2003.
3. Dental care needs have increased significantly in the past ten years. One in four children need dental care.
4. Only 42% of third graders have dental sealants, a rate that has not improved in recent years.
5. Socioeconomic status has a significant impact on a child's oral health. Schools with more children eligible for the National School Lunch Program (NSLP) are more likely to have children with tooth decay.
6. Silver diamine fluoride (SDF) and other preventive oral health measures may be underutilized. Only 2.1% of children have teeth treated with SDF.

The Vermont Department of Health acknowledges that complex upstream factors, including social, economic and environmental inequities (e.g., systemic racism), can have a greater impact on health than individual behaviors and choices. Research shows that oral health promotion programs that provide services in schools are more effective than oral health education alone because programs promote improvement in both behaviors and the environment in which these behavioral choices are made. <sup>1</sup> The results of the **Keep Smiling Vermont** survey support the need for community-based oral health programs (such as programs under the [802 Smiles Network](#)) that include education, screening, referrals and on-site dental services. Since teeth develop before birth and start to appear in the mouth when a child is about six months old, efforts to prevent tooth decay must start during pregnancy and continue throughout childhood.

## Introduction

**Good oral health in childhood is the precursor to good oral health and overall health at later stages of life.** <sup>2</sup> Although tooth decay is a preventable bacterial disease, it continues to be the most common chronic disease of children in the United States. <sup>3</sup> Nationwide, tooth decay affects more than half of all children by third grade. <sup>4</sup> Furthermore, children from lower income households and children who are Black, Indigenous, and people of color (BIPOC) generally experience more disease and less access to treatment. <sup>5</sup>

**If left untreated, tooth decay can lead to symptoms like pain and infection.** These symptoms may cause complications that negatively affect everyday life including problems with nutrition, speech, tooth loss and poor oral health throughout adulthood. Tooth pain can also have profound psychological effects, including sleep deprivation, attention problems, mood changes and slower social development. Children with infected and painful teeth miss more school days than other children, and caregivers are more likely to miss work and spend more time and money on dental appointments for their children.

**Tooth decay is preventable.** Early dental visits and preventive care may reduce the need and cost associated with treatment in the future. Evidence-based strategies for preventing and managing tooth decay in children include early and regular dental visits, brushing with fluoride toothpaste, community water fluoridation or fluoride supplements and good eating habits. Dental health care professionals can also apply fluoride varnish, silver diamine fluoride (SDF) and dental sealants as appropriate. Families can reinforce healthy oral health habits by setting a good example and being involved in their children's oral health education. Medical, dental and public health professionals should focus on making preventive dental health care and oral health education accessible for Vermont families. Addressing the oral health needs of Vermont's infants, toddlers and children requires the development of policies and strategies that will ensure all children receive the oral health care they need. **There is no better investment in the future of Vermont than supporting the health and well-being of our children.**

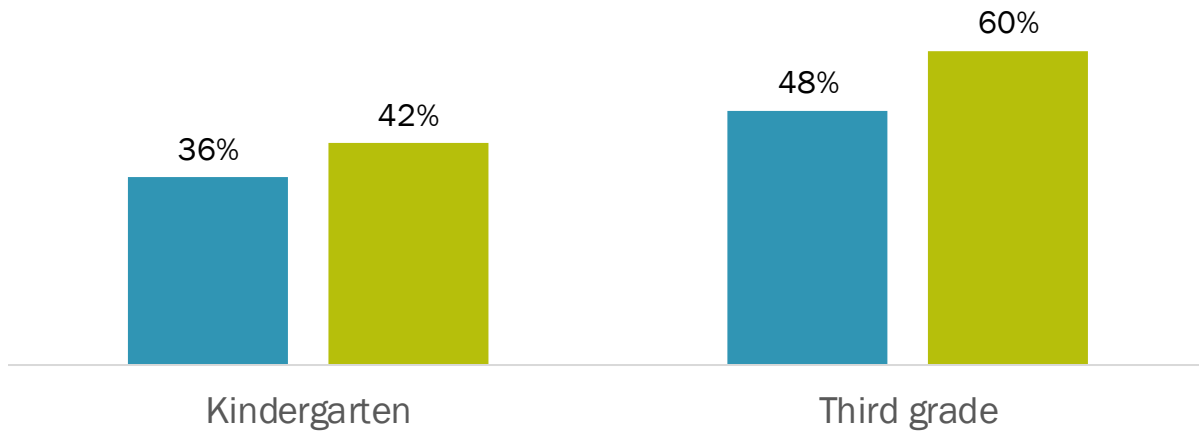
# Key Findings



## Key Finding #1: Over 40% of Vermont's children have experienced tooth decay.

### Decay Experience among Vermont Children and U.S. Children\*

(Treated Decay and/or Untreated Decay)



Source for Vermont data: Vermont Basic Screening Survey, 2022-2023

\* Source for U.S. data: National Health and Nutrition Examination Survey (NHANES) 2011-2012, 2013-2014, 2015-2016. Caution is needed in comparing data to NHANES. The survey design, sampling frames, and oral health examination protocols may not be comparable between the Vermont BSS and NHANES.

- Caries experience in primary teeth among U.S. children aged 5 years is used as the comparison for Vermont kindergarteners.

- Caries experience in primary or permanent teeth among U.S. children with highest education level of second grade completed is used as the comparison group for Vermont third graders.

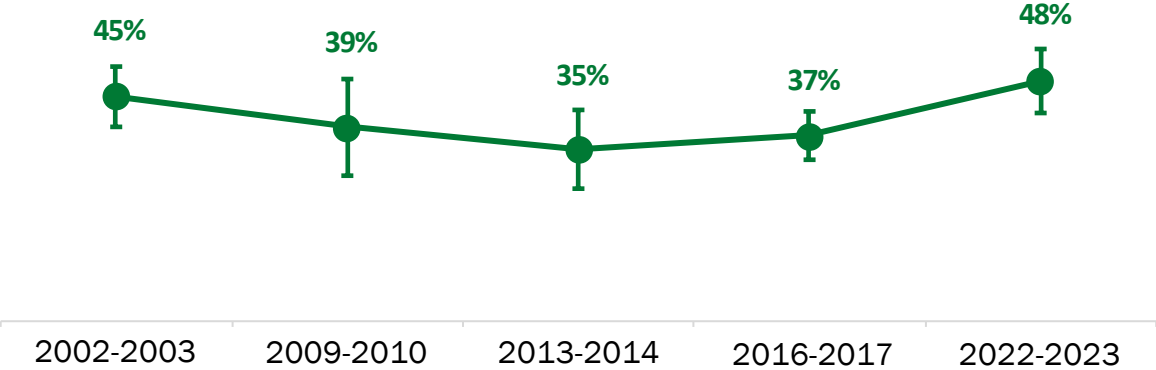
Although Vermont children have less decay than U.S. children, 36% of kindergarten and 48% of third grade children with decay experience is still too high. The current overall rate of decay experience among Vermont children is 42%, which is significantly higher than the previous survey rate of 31%.

**The rate of decay among VT kids is significantly higher than the last survey.**

Good oral health care must start early to prevent tooth decay. The American Dental Association (ADA), American Academy of Pediatric Dentistry (AAPD), and the American Association of Pediatricians (AAP) all recommend preventive dental care and parent education by age one. <sup>2</sup>

**Key Finding #2: Despite developments in treatment options, the prevalence of tooth decay among third grade children has not improved since 2002-2003.**

**Third Grade Vermont Children with Decay Experience by Year**  
(Treated Decay and/or Untreated Decay)



Source: Vermont Basic Screening Surveys

Although the percentage of third grade children with decay experience has fluctuated over the past 20 years, differences are not statistically significant, despite developments in dental treatment options. This suggests that our current system of dental care is not working for many Vermonters.

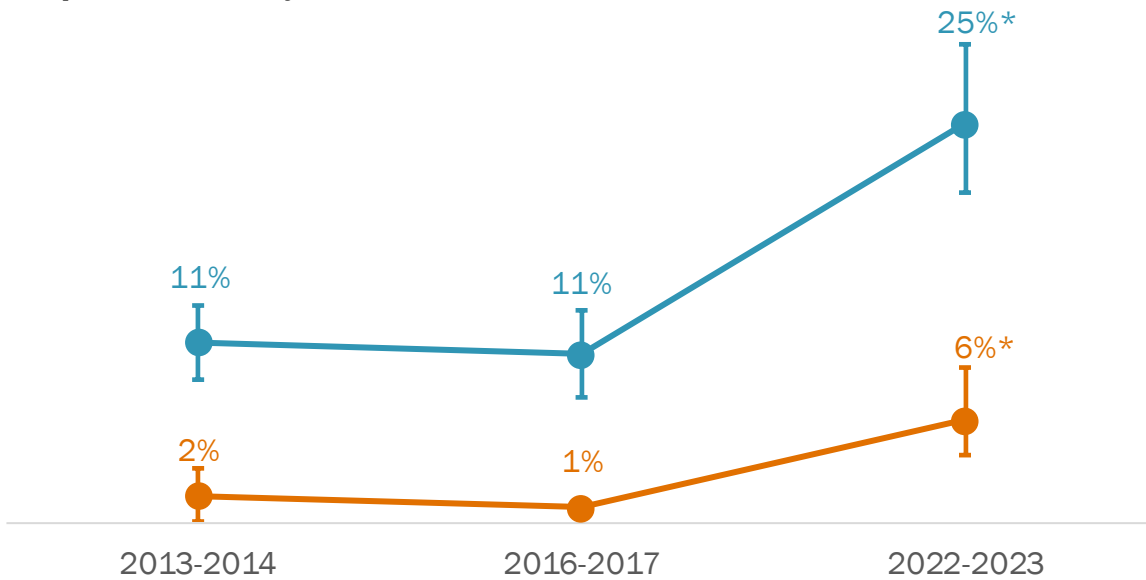
The [2022 Vermont Oral Health Plan](#) outlines priority goals, evidence-based strategies and proposed activities to improve oral health for all Vermonters. Medical and dental health care practitioners, professional associations, public health organizations and advocacy groups should become familiar with the plan and get involved.

One of the 2022 Vermont Oral Health Plan goals is to expand the [802 Smiles Network](#) of school dental health programs. 802 Smiles programs offer five [tiers of service](#). These services are performed by a registered dental hygienist or a dentist; they range from dental screenings, education and help making dental appointments to on-site preventive services (e.g., fluoride varnish, silver diamine fluoride (SDF), and sealants) and restorative services such as fillings.



### Key Finding #3: Dental care needs have increased significantly in the past ten years. One in four children need dental care.

There are more **Total Dental Care Needs** and **Urgent Dental Care Needs** compared to recent years.



\* 2022-2023 rates are significantly higher than both 2013-2014 and 2016-2017 rates.

Source: Vermont Basic Screening Surveys

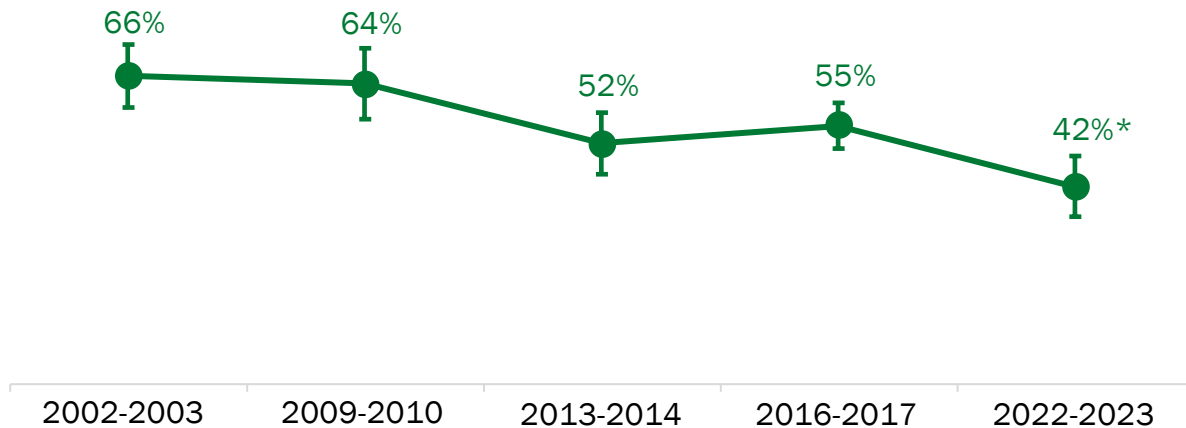
Both overall dental care needs and urgent dental care needs have increased significantly since the last **Keep Smiling Vermont** survey. About one in four (24.8%) of Vermont’s children need dental care – with 18% needing early dental care for untreated decay or broken fillings and 6% needing urgent dental care due to pain or infection.

In 2022-2023, there were almost 12,000 kindergarten and third grade children in Vermont. <sup>6</sup> If 25% need dental care, this means that about 3,000 are in the classroom with a cavity. Of those children, over 700 of them are in pain or with an oral infection, which can affect their ability to concentrate and learn.

The system of dental care needs to prioritize prevention and minimally invasive treatments to maximize effectiveness and efficiency. Increased capacity for care and lower overhead costs can be the reality if all oral health professionals (i.e., dental assistants, dental hygienists, dental therapists and dentists) operate within their license at the top of their scope of practice and in settings beyond the traditional dental office; For example, in school-based programs (e.g., [802 Smiles](#)), primary care settings, local public health offices or home visits.

## Key Finding #4: Only 42% of third graders have dental sealants.

### Third Grade Children with Dental Sealants by Year



\* 2022-2023 rates are significantly lower than all other years except 2013-2014.

Source: Vermont Basic Screening Surveys

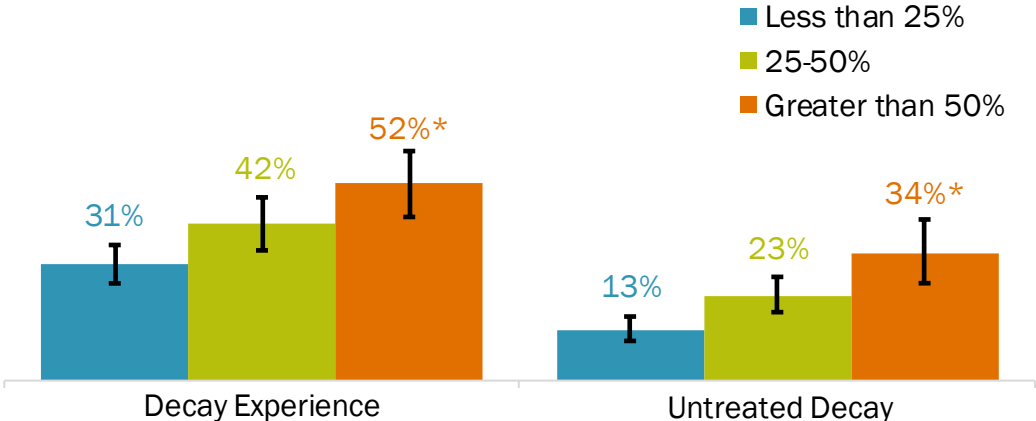
Significantly fewer third grade children have dental sealants compared to the last survey. Dental sealants are thin coatings that are applied to the grooved surfaces of the back teeth (molars) to prevent tooth decay for many years. <sup>7</sup> Sealants protect the chewing surfaces by keeping germs and food particles out of these grooves. They are safe, effective, easy and painless to apply. The Centers for Disease Control and Prevention (CDC) found that “children aged 6-11 years without sealants have nearly three times more first molar cavities than children with sealants.” <sup>7</sup>

The [Vermont Periodicity Schedule](#) recommends sealants be placed as soon as possible after eruption of cavity-susceptible primary molars, permanent molars, premolars and anterior teeth with deep pits and fissures. This guidance outlines that pit and fissure sealants can be placed for children as young as two to six years old. <sup>8</sup> Children can have sealants applied by a dental health care at their dental home or through an [802 Smiles](#) Tier 4 or 5 program.

**Sealants are a safe, effective, easy and painless way to prevent tooth decay on back teeth.**

**Key Finding #5: Schools with higher proportions of children eligible for the National School Lunch Program (NSLP) are more likely to have children with tooth decay.**

**Vermont Children with Decay Experience and Untreated Decay by School Proportion of National School Lunch Program (NSLP)**



\* Schools with greater than 50% NSLP participation have significantly higher rates of both experience and untreated decay compared to schools with less than 25% NSLP participation.  
Source: Vermont Basic Screening Survey, 2022-2023

The NSLP is a federally assisted meal program operating in public and nonprofit private schools. It provides nutritionally balanced, low-cost or free meals to children each school day. Eligibility for NSLP is often used as an indicator of socioeconomic status because annual income must be below 185% of the federal poverty level to be eligible. <sup>9</sup> These data suggest that lower-income children are not receiving the benefit of early preventive services and they are less likely to access dental care for restorative treatment (e.g., fillings).

The [2022 Vermont Oral Health Plan](#) is equity focused. Plan goals include increasing access to dental health care for all Vermonters, increasing medical dental integration and expanding school based dental health programs. The [802 Smiles Network](#) of school dental health programs is working to eliminate oral health disparities and improve oral health for all Vermont children.

**Key Finding #6: Only 2.1% of Vermont children have teeth treated with Silver Diamine Fluoride (SDF).**



These teeth have been treated with SDF and covered with a white filling. This treatment modality is known as **Silver-Modified Atraumatic Restorative Therapy (SMART)**.

**What is SDF?**

[Silver Diamine Fluoride \(SDF\)](#) is a brush-on liquid containing silver and fluoride that is applied to dental decay. <sup>10</sup> Silver destroys the germs (bacteria) that cause decay and fluoride helps strengthen the tooth. SDF turns decayed areas black; the dark color means SDF is working as intended. If needed, the black area can be covered with a white filling material; This is called SMART, or silver modified atraumatic (i.e., no needles or drilling) restorative technique. SDF may not work on all cavities and sometimes more dental work is needed. It cannot be used on individuals with silver allergies or those with painful sores or raw areas in the mouth.

## **SDF is safe and effective.**

Both the [American Dental Association](#) and the [American Academy of Pediatric Dentistry](#) recommend SDF as a treatment for dental decay. <sup>10</sup> The U.S. Food and Drug Administration (FDA) approved the use of SDF in 2015 and granted it a “breakthrough therapy designation” to stop tooth decay in 2017. SDF has also been named an [essential medicine](#) by the World Health Organization (WHO).

## **Why is SDF important?**

Each year, about 400 Vermont children under age six undergo general anesthesia to treat tooth decay. <sup>10</sup> SDF is a safe, easy and effective treatment alternative that can help stop decay and keep children (and adults) out of the hospital setting. Considering the increased rates of dental care needs in this year’s **Keep Smiling Vermont** survey, SDF may be underutilized.

# Recommendations



## Recommendations Based on the Key Findings

1. To address tooth decay more broadly, expand early access to primary prevention efforts in medical, dental and public health settings.
2. To reduce tooth decay rates, medical and dental health care providers, professional associations, public health organizations and advocacy groups should become familiar with the [2022 Vermont Oral Health Plan](#) and get involved in the activities.
3. To reduce children’s dental care needs, expand the [802 Smiles Network](#) of school dental health programs and increase the number of programs that provide dental services on site.
4. To increase children’s dental sealant rates, provide education on the importance of sealants, promote expansion of 802 Smiles school-based dental programs and upgrade current 802 Smiles programs to include placement of dental sealants.
5. To improve oral health equity, expand public health prevention efforts like 802 Smiles, increase the number of dental providers accepting Medicaid and promote medical-dental health integration.
6. To increase use of preventive treatments such as fluoride varnish, SDF and sealants, promote accessible oral health information for all Vermonters. Work with payers to incentivize the [medical management of dental decay](#) and [value-based dental care](#).

## Health Equity

Health Equity is one of the guiding principles for Vermont’s [2022 State Oral Health Plan](#). According to the [Vermont State Health Improvement Plan](#):

“Health equity exists when all people have a fair and just opportunity to be healthy – especially those who have experienced socioeconomic disadvantage, historical injustice, and other avoidable systemic inequalities that are often associated with social categories of race, gender, ethnicity, social position, sexual orientation and disability.”

Data was analyzed by grade, gender, race/ethnicity and school NSLP participation to identify oral health inequities. As shown in the Key Findings, oral health disparities by socioeconomic status were prevalent. Schools with the highest proportion of NSLP-eligible children have more children with decay experience, untreated decay and dental care needs compared to schools with the lowest proportion of NSLP-eligible children.

The **Keep Smiling Vermont** survey does not provide an all-inclusive understanding of children’s oral health. We acknowledge that data presented in this report are driven by complex upstream factors, including social, economic and environmental inequities. We are continually working to further incorporate information highlighting the social determinants of health and inform the communities and partners we seek to serve. This survey is one of many tools used by the Office of Oral Health to better understand disparities, address the causes and promote equity in oral health among all Vermonters.

# Data Notes





## Demographics

The following tables show unweighted **Keep Smiling Vermont** survey data describing the demographics of the Vermont children who were screened.

Kindergarten & Third Grade (n=1,771)			
Demographic Characteristic		# of Children	% of Sample
<b>Gender</b>	Male	901	50.9
	Female	819	46.2
	Missing/Unknown	51	2.9
<b>Race/Ethnicity</b>	American Indian/Alaska Native	10	0.6
	Asian (non-Hispanic)	59	3.3
	Black (non-Hispanic)	60	3.4
	Native Hawaiian / Pacific Islander	2	0.1
	White (non-Hispanic)	1479	83.5
	Multiracial	28	1.6
	Hispanic / Latino/a (any race)	35	2.0
	Missing/Unknown	98	5.5
<b>School NSLP* Participation</b>	Less than 25%	748	42.2
	25-50%	646	36.5
	Greater than 50%	377	21.3
<b>Child NSLP* Participation</b>	No	1020	57.6
	Yes	704	39.8
	Missing/Unknown	47	2.7

\* NSLP = National School Lunch Program

Note: Participation in the NSLP is used as a proxy for socioeconomic status in this report. Analyses were completed using NSLP data from 2020-2021 when the **Keep Smiling Vermont** survey sample was drawn. There is some uncertainty in both school-level and child-level NSLP rates due to Vermont's permanent universal meals law and reduced incentive for households to return family income information. <sup>11</sup> More information about current and previous free and reduced meals eligibility data can be found on the Agency of Education website. <sup>9</sup> The Vermont Department of Health recommends caution when using the NSLP data.

## Demographics (continued)

Kindergarten & Third Grade (n=1,771)			
Demographic Characteristic		# of Children	% of Sample
School County	Addison	15	0.8
	Bennington	103	5.8
	Caledonia	26	1.5
	Chittenden	850	48.0
	Essex	0	0.0
	Franklin	137	7.7
	Grand Isle	23	1.3
	Lamoille	8	0.5
	Orange	18	1.0
	Orleans	0	0.0
	Rutland	283	16.0
	Washington	173	9.8
	Windham	63	3.6
	Windsor	72	4.1

## Methodology

The Association of State and Territorial Dental Director's (ASTDD) Basic Screening Survey (BSS) toolkit was used to develop the **Keep Smiling Vermont** survey.

A representative sample of kindergarten and third grade children were screened for the 2022-2023 **Keep Smiling Vermont** survey. The sampling frame consisted of all public schools with 20 or more children in kindergarten and/or third grade. Some communities have kindergarten and third grade in different schools. If both the kindergarten and third grade schools were included in the sampling frame, children in these communities would have a higher probability of being selected. For this reason, the sampling frame was further limited to schools with only third grade, although the enrollment number used for selection included both kindergarten and third grade for the community. If a school with only third grade was selected, an appropriate feeder school was chosen by random selection from the same sampling interval and added to the sample.

To assure representation by geographic region and socioeconomic status, the sampling frame was ordered by county then by National School Lunch Program (NSLP) participation within each county. A systematic probability proportional to size sampling scheme was used to select a sample of 27 schools. Of the 27 third grade schools selected, three did not have kindergarten. Five kindergarten feeder schools were added for a total of 32 schools. One participating school had only one student opt-in to the survey, so that data was excluded from analysis. Of the 2,783 kindergarten and third grade children enrolled in the 32 participating schools, 1,771 were screened for an overall response rate of 64% (63% for kindergarten and 64% for third grade children).

One registered dental hygienist completed the screenings at the participating schools. The following information was collected for each child: grade, gender, race/ethnicity, presence of untreated decay, presence of treated decay, presence of potentially arrested decay (e.g., treated with silver diamine fluoride), urgency of need for dental care and presence of dental sealants in the permanent first molar teeth. The ASTDD's BSS clinical indicator definitions and data collection protocols were used.<sup>12</sup>

All statistical analyses were performed using complex sample analyses procedures within IBM SPSS Statistics for Windows, version 28 (IBM Corp., Armonk, N.Y., USA). Sample weights were used to produce population estimates based on selection probabilities.

## Limitations

The **Keep Smiling Vermont** survey's overall response rate was 64%. A combination of passive and active consent forms in paper and digital formats were used, depending on individual school preference. Based on previous years' experience, participation in the survey is highest with passive consent methods. Although there is no official response rate goal, a greater proportion of screened students would yield more representative results and greater confidence in results.

The survey did not include complete diagnostic dental examinations. Instead, dental screenings were performed. A dental screening is a quick look inside the mouth with a dental mirror, without x-rays or advanced diagnostic tools. Due to this, some problems were likely missed. It is reasonable to assume that these findings may underestimate the number of children needing dental care.

The number of sampled children identifying as Black, Indigenous, or a person of color does not allow for analysis with strong statistical confidence. To have enough confidence for analysis and comparison of race/ethnicity data, all Black, Indigenous, and people of color were part of the "BIPOC" category to compare to white, non-Hispanic (WnH) individuals.

It is also important to note that this standardized survey does not analyze data by children with special needs, children with disabilities, non-binary genders or health behaviors. Additionally, household-level data regarding parent/guardian income level, education level, health behaviors and oral health were not surveyed this year. The Vermont Department of Health's Office of Oral Health recognizes these health equity knowledge gaps and will look for additional ways to assess oral health needs of priority populations.

## References

1. Nakre PD, Harikiran AG. Effectiveness of oral health education programs: A systematic review. *J Int Soc Prev Community Dent*. 2013;3(2):103-115. doi:10.4103/2231-0762.127810.
2. Head Start Early Childhood Learning and Knowledge Center. Promoting the Age 1 Dental Visit. Head Start ECLKC. Updated April 26, 2023. Accessed January 22, 2024. <https://eclkc.ohs.acf.hhs.gov/oral-health/brush-oral-health/promoting-age-1-dental-visit>.
3. Institute for Health Metrics and Evaluation (IHME). GBD Compare Data Visualization. Seattle, WA: IHME, University of Washington. 2020. <http://vizhub.healthdata.org/gbd-compare>. Accessed January 22, 2024.
4. Centers for Disease Control and Prevention (CDC). *Oral Health Surveillance Report: Trends in Dental Caries and Sealants, Tooth Retention, and Edentulism, United States, 1999–2004 to 2011–2016*. Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2019. Updated December 9, 2021. Accessed January 22, 2024. <https://www.cdc.gov/oralhealth/publications/OHSR-2019-index.html>.
5. National Institutes of Health (NIH). *Oral Health in America: Advances and Challenges*. Bethesda, MD: US Department of Health and Human Services (HHS), National Institutes of Health (NIH), National Institute of Dental and Craniofacial Research (NIDCR); 2021: section 2A. Accessed January 22, 2024. <https://www.nidcr.nih.gov/sites/default/files/2021-12/Oral-Health-in-America-Advances-and-Challenges.pdf>.
6. State of Vermont Agency of Education. Vermont Education Dashboard: Enrollment. State of Vermont Agency of Education. Updated August 23, 2023. Accessed January 22, 2024. <https://education.vermont.gov/data-and-reporting/vermont-education-dashboard/vermont-education-dashboard-enrollment>.
7. Centers for Disease Control and Prevention (CDC). Dental Sealants. cdc.gov. Updated July 28, 2021. Accessed January 22, 2024. [https://www.cdc.gov/oralhealth/dental\\_sealant\\_program/index.htm](https://www.cdc.gov/oralhealth/dental_sealant_program/index.htm).
8. Vermont Department of Health Office of Oral Health. Vermont Preventive Pediatric Oral Health Care. Department of Vermont Health Access. Published February 2018. Accessed January 22, 2024. <https://dvha.vermont.gov/sites/dvha/files/documents/Members/Vermont%20Dental%20Periodicity%20Schedule.pdf>.
9. State of Vermont Agency of Education. *Child Nutrition Programs, Annual Statistical Report, Percent of Students Approved for Free and Reduced Price School Meals; School Year 2022-2023*. Accessed January 22, 2024. [https://education.vermont.gov/sites/aoe/files/documents/edu-CN-2023-Free-and-Reduced-Eligibility-Report-update\\_0.pdf](https://education.vermont.gov/sites/aoe/files/documents/edu-CN-2023-Free-and-Reduced-Eligibility-Report-update_0.pdf).

10. Vermont Department of Health, Office of Oral Health. Silver Diamine Fluoride Facts. healthvermont.gov. Accessed January 22, 2024. <https://www.healthvermont.gov/sites/default/files/documents/pdf/HPDP-Oral%20Health-SDF-FactSheet.pdf>.
11. State of Vermont Agency of Education. Free and Reduced Meals. State of Vermont Agency of Education. Accessed January 22, 2024. <https://education.vermont.gov/student-support/nutrition/school-meals/free-and-reduced-meals>.
12. Association of State and Territorial Dental Directors (ASTDD). *Basic Screening Survey: An approach to monitoring community oral health: Head Start and school children*. PDF. ASTDD; 2022. Accessed January 22, 2024. <https://www.astdd.org/basic-screening-survey-tool/>.

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## Visit these Vermont Department of Health resources to learn more:

- Office of Oral Health - <https://www.healthvermont.gov/wellness/oral-health>
- 802 Smiles Network - <https://www.healthvermont.gov/wellness/oral-health/vermont-802-smiles-network>
- Fluoride - <https://www.healthvermont.gov/wellness/oral-health/fluoride>
- Oral Health Data - <https://www.healthvermont.gov/stats/surveillance-reporting-topic/oral-health-data>



**For additional questions related to the Keep Smiling Vermont survey,  
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