

WASHINGTON STATE DEPARTMENT OF HEALTH

Smile Survey 2015-2016





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WASHINGTON STATE DEPARTMENT OF HEALTH

Smile Survey 2015-2016

A Report on the Oral Health of Washington's Children

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Executive Summary

During the 2014–15 and 2015–16 school years, the Washington State Department of Health’s Oral Health Program conducted Washington’s fifth assessment of the oral health status and treatment needs of children throughout the state. Previous assessments were conducted in 1994, 2000, 2005, and 2010. In the past, results from Smile Survey reports have been used by local, state, and national organizations to advance policies and programs that help children achieve better health.

For the 2015–16 Smile Survey, more than 13,000 kindergarten and second- and third-grade children in 76 public elementary schools participated, as well as more than 1,400 preschool children from 47 Head Start and ECEAP¹ programs. Each child received a dental screening and specific indicators for dental decay and dental sealants were noted.

Dental screenings were completed by licensed dental hygienists and one dentist, following the standardized protocol set by the Association of State and Territorial Dental Directors (ASTDD) for conducting Basic Screening Surveys.²

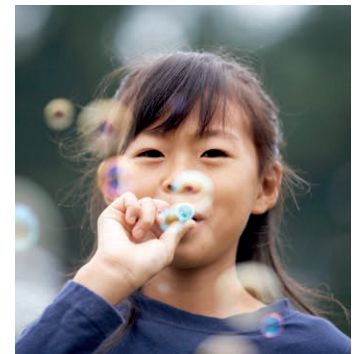
In this report, results are compared with 2010 and 2005 Smile Survey results where possible.³ Comparisons

with Healthy People 2020 objectives and national averages⁴ have also been included where available.

The survey results revealed that Washington’s oral health policies and programs have made some progress for a few indicators. However, findings also show that tooth decay is still a major health concern for Washington’s children, with especially alarming rates for children of color and for children living in poverty.

Washington is home to many racial and ethnic population groups. National data show that children of color bear a much larger share of the burden of tooth decay and treatment need than children who are white. In previous Smile Surveys, the numbers of children representing racial/ethnic population groups other than black, Hispanic,⁵ or white were too few to be able to report the extent of oral health disparity that existed statewide for these underrepresented groups. In 2015–16, we included second grade in order to improve our ability to report disparity-related concerns.

For this report, the results are organized to describe the oral health of elementary school children first, followed by the oral health of children in Head Start and ECEAP early learning programs.



Washington’s oral health policies and programs are making progress in some areas: yet tooth decay is still a major health concern for children.

Washington's oral health programs are making progress for kindergarten and second- and third-grade children.

Findings from this Smile Survey indicate that in addition to meeting Healthy People 2020 objectives for children ages 6 to 9, access to preventive dental sealants and treatment and management of tooth decay caused by dental caries⁶ is improving for children in kindergarten and third grade in Washington.



Dental caries, the disease that causes tooth decay, is largely preventable, and yet is the most common chronic disease of children.

Healthy People 2020

- Washington is meeting or exceeding all of the Healthy People 2020 Oral Health Objectives for children ages 6 to 9.⁷

Disease Prevalence

- The rate of children who ever had a cavity (caries experience) was significantly lower for third graders compared with 2005 (53 percent versus 60 percent).
- The prevalence of decay found in permanent teeth was significantly lower compared with 2005 for third graders (13 percent versus 24 percent).

Untreated Decay

- Most elementary children (88 percent) were getting needed dental treatment. Rates for untreated decay were around 12 percent for all age groups in kindergarten and second and third grades.

Dental Sealants

- Dental sealant utilization: For kindergarten children, rates were much higher (14 percent) than in 2010 (5 percent). For third graders,

the prevalence of dental sealants (54 percent) was far exceeding the Healthy People 2020 target (28 percent) and the national average (32 percent).

- Dental sealant equity: The prevalence of dental sealants was not significantly different⁸ between lower-income and higher-income groups. Likewise, rates of dental sealant usage were similar⁹ for children of color when compared with white children. Additionally, children of Hispanic descent had a much higher rate of dental sealant placement than non-Hispanic white children.



Despite improvements in some measures, tooth decay continues to be a major health concern for children in Washington.

Despite these positive trends, findings clearly show that there is still much progress to be made for the health and well-being of Washington's elementary-age children.

Decay Experience

Too many children are adversely affected by dental caries, a chronic condition that is preventable.

- More than half of all third graders (53 percent) and almost four in 10 kindergarteners (38 percent) experienced tooth decay.

Oral Health Disparities

Large gaps exist by income, race and ethnicity, and language spoken at home.¹⁰

- By the third grade, children from low-income households had at least 60 percent higher rates of decay experience in all categories¹¹ and also needed treatment at a 60 percent higher rate than their more affluent peers.
- Children of color in second and third grades had significantly higher rates of decay experience and 40 to 180 percent higher rates of treatment need than white children.
- Kindergarten and third-grade children whose primary language spoken in the home was not English had more than a 50 percent higher rate of treatment need than English-only speakers.



For children attending Head Start or ECEAP preschool programs, unmet dental treatment needs remain low.

Untreated Decay

- The current rate of untreated tooth decay (17 percent) was still lower than 2005 (26 percent), but had not improved from 2010.
- Washington's preschoolers have a much lower rate of unmet treatment need (13 percent) than both the national average (25 percent) and the Healthy People 2020 objective of 21 percent.

As with elementary children, decay experience is too high and disparities are significant.

Decay Experience

- More than four out of every 10 Head Start and ECEAP preschoolers (45 percent) had experienced tooth decay.
- Nearly half of those experiencing decay (21 percent overall) had rampant decay (with seven or more teeth affected).
- Washington is not meeting the Healthy People 2020 objective of

30 percent for caries experience in children ages 3 to 5.

Oral Health Disparities

- Compared with white children, children of Hispanic and Asian descent had much higher rates of decay experience, and American Indian/Alaskan Native children had more than double the rates of untreated decay.

It is our hope that the information presented in this report can be used to influence and shape health policy in ways that will continue to improve the oral health of all of Washington's children.



Introduction

Dental caries is a preventable, chronic condition and is the most widespread chronic disease found in children. “Caries” is the clinical term for the disease (and the process) that leads to dental cavities (tooth decay). Contrary to public perception, childhood tooth decay is not simply a minor or normal occurrence. If left untreated, tooth decay can lead to chronic pain and infection; difficulty speaking, chewing, and swallowing; failure to thrive; sleep and behavior problems; loss of self-esteem; difficulty learning; and missed school days.^{12,13} In rare cases, death can result from infection from tooth decay that has spread to the brain.¹⁴ Children with untreated tooth decay become adults with higher rates of chronic and oral diseases.

It is critical to establish a dental home by a child’s first birthday.¹⁵ Early assessment of a child’s risk for tooth decay by the child’s medical provider in the first year of life is a key step in the prevention of this disease and can be a link to early care, if needed. The goal of the early caries risk assessment,¹⁶ which should occur before age one, is to establish the child’s individual needs and to provide primary preventive interventions,¹⁷ such as family oral health education and fluoride varnish applications during well-child visits.¹⁸

A child’s risk for tooth decay can be influenced by factors such as family income level, parent education levels, race/ethnicity, and/or even the oral health status of the child’s mother or primary caregiver.¹⁹ There is a strong relationship between mothers with

poor oral health and the prevalence of tooth decay in their children regardless of income status. When mothers have high levels of untreated decay or tooth loss from decay, their children are three times more likely to experience tooth decay before age five.²⁰ Parent/caregiver knowledge, beliefs and attitudes about children’s oral health needs are also influential.²¹ Once the caries infection is established in a child, dietary factors create the conditions that allow cariogenic (decay-causing) bacteria²² to thrive and spread the disease from tooth to tooth. In fact, preventing the development of dental caries from an early age is critical for reducing health inequities²³ across the population.²⁴

Successful management of the caries disease process requires a complex approach, including a coordination of efforts that should occur as early as possible.²⁵ If prevention or suppression of the infection is not successful, caries lesions (cavities) may grow deeper into the teeth, and timely treatment is needed to stop pain and to restore the function of damaged teeth.

While timely treatment is essential for a child’s health and well being, it is important to understand that repairing the damage caused by cavities does not eliminate the disease. Once the decay process results in a cavity, early and frequent interventions are needed to manage the progression of the disease.²⁶ As the child grows, the primary teeth are replaced in stages — they do not simply all fall out at once. Since caries is an infection that is not self-limiting, disease in the



Once dental caries is established in a child, successful management of the disease requires a complex approach, including a coordination of efforts that should occur as early as possible.



child's primary teeth can lead to tooth decay in the incoming permanent teeth. Without early treatment and frequent ongoing prevention efforts, the infection may spread to each new tooth as it emerges. Younger children that continue to have untreated, active tooth decay while new teeth emerge (between ages 6 and 12) are at higher risk for rampant²⁷ decay, which is a more generalized, ongoing, and often a more severe type of tooth decay.²⁸

Primary teeth are important to a child's ability to eat and speak properly, but they also serve as guiding placeholders for the permanent teeth forming in the bone beneath them. Early loss of baby teeth from tooth decay can result in poor positioning of the emerging adult teeth, requiring costly and painful corrective orthodontic alignment (braces) for proper functioning of the teeth and jaw joints.²⁹

Studies have shown that poor child dental health is associated with reduced school performance and psychosocial well-being. In addition, learning can be disrupted for children with untreated dental needs. Children with dental problems are more likely to have problems at school, to miss school, and are less likely to complete all required homework.³⁰ A 2011 study found that children with poor oral health status were nearly three times more likely than their counterparts to miss school as a result of dental pain. Absences caused by pain were associated with poorer school performance, but absences for routine care were not.³¹ In another study,

compared with children in good oral health, children with poor dental health were found to experience more shyness and feeling worthless or inferior and unhappy, sad, or depressed.³²

Washington State has a strong track record of policymakers, public health officials, community advocates, and medical and dental health providers working together to advance effective policies and programs to support and improve the oral health of Washington's children.³³ The good news is that the data findings reported here demonstrate that our state and local oral health policies and programs may be contributing to moving desired oral health outcomes in a positive direction.³⁴

However, while Washington has made some promising gains toward improving the oral health of children, findings also tell us that there are significant barriers to overcome for a more equitable distribution of these gains. Additionally, the data reveal a need for more effective ways to make early prevention efforts more successful.

The data presented in this report serves to aid in the recognition and understanding of the oral health needs of Washington's children. Stakeholders and advocates may use the contents of this data report to develop new — and contribute to current — state and local policies and programs to ensure that all children receive the oral disease prevention and care they need for lifelong health and well-being.

Survey Methods Overview

The Smile Survey collected information on decay experience, untreated decay, severity of the disease, and urgency of need for dental care. The prevalence of dental sealants was collected for elementary children only. For Head Start and ECEAP preschool children, information on the presence of early, reversible tooth decay of primary (baby) teeth known as “white spots” was also collected.

The 2015–16 Washington State Smile Survey was conducted during the 2014–15 and 2015–16 school years. Specially trained dental hygienists and one dentist screened 14,544 children in preschool, kindergarten, and second and third grades from a statewide representative sample of 76 elementary schools and 47 Head Start/ECEAP programs. Data were also collected for 21 counties that wanted local information.³⁵ For detailed survey methodology, see Appendix E.

Survey screeners were trained and calibrated to collect data using a standardized set of diagnostic criteria that can be readily assessed visually. Screeners attended a day-long training session, concluding with hands-on training with children from a nearby elementary school, who were pre-screened and pre-selected for the purpose of this training in order to assess screener uniformity with data collection.³⁶

The screeners performed a brief visual screening of each child’s mouth using gloves, a pen-light, and a mouth mirror. Information on race and ethnicity, grade, age, sex, and language spoken at home was obtained from the school. Information on student participation in the National School

Lunch Program (NSLP) was obtained from the school district’s nutrition program. To protect from screener bias, this information was provided after the screenings took place.

Data collected for the Smile Survey are representative of the state of Washington, but do not accurately measure rates for any individual school, community, city, or region. The data reported here represent the statewide burden of oral disease related to tooth decay, but are not intended to measure the effect of any one specific intervention, such as community water fluoridation, on rates of tooth decay.

Smile Survey Oral Health Indicator Definitions

Caries Experience: Also may be referred to as “decay experience”. Any evidence of past or present tooth decay, an indicator for the disease known as “dental caries,” or “caries.” This measure is reflective of progress with prevention efforts.

Untreated Decay: The presence of an obvious breakdown of the enamel surface (cavitated lesions only), as readily observed by the dental screener. This measure is reflective of problems with access (barriers) to receiving dental care.

Rampant Decay: The presence of seven or more teeth with any caries experience, also considered generalized tooth decay. This measure is used to designate increased severity of disease.

Treatment Need: The presence of active, untreated decay with no swelling or pain was coded as “early treatment need,” while the presence of swelling or pain was coded as “urgent treatment need.” The term “treatment need” is also used to represent early and urgent needs combined.

White Spots: The presence of early, reversible decay of primary teeth, known as “white spot lesions.”

Dental Sealants: The presence of a dental sealant on at least one permanent molar tooth.



RESULTS: ELEMENTARY

RESULTS:

The Oral Health of Elementary School Children in Washington

Washington’s oral health programs are making progress for kindergarten and second- and third-grade children.

During the 2014–15 and 2015–16 program years, the Washington State Department of Health conducted oral health screenings on 13,615 kindergarten and second- and third-grade children, from a statewide representative sample of randomly selected public elementary schools throughout the state.

Finding: Healthy People 2020 Washington is meeting or exceeding the Healthy People 2020 oral health objectives for 6- to 9-year-olds.

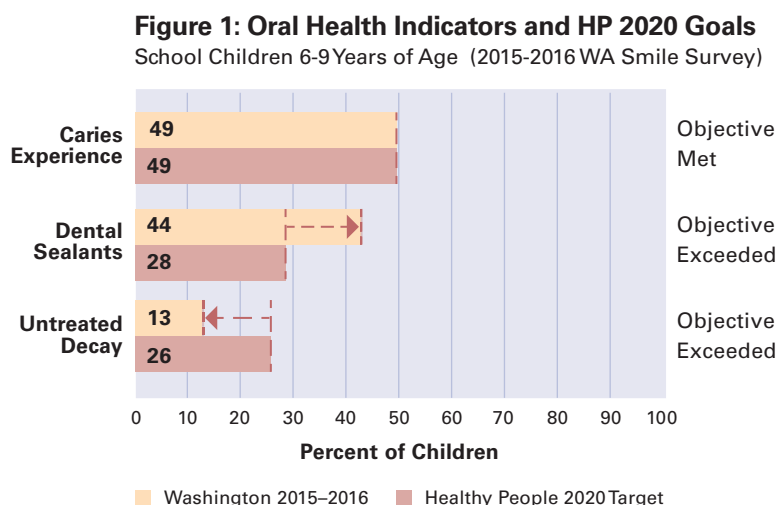
Healthy People 2020 (HP 2020) provides 10-year national objectives

for improving the health of all Americans.³⁷ These objectives provide comparison targets for states and communities. There are three HP 2020 objectives related to oral health in children ages 6 to 9: caries experience, untreated decay, and dental sealants (Figure 1). For this comparison, only children who were age 6, 7, 8, or 9 were included in the analyses.

Caries experience is noted by the presence of any treated or untreated decay in primary (baby) teeth and/or permanent (adult) teeth. “Caries experience” is an indicator of how well efforts aimed at preventing



FINDING:
Healthy People 2020
Washington is meeting or exceeding the Healthy People 2020 oral health objectives for 6- to 9-year-olds.





FINDING: Disease Prevalence

Caries experience is lower for third grade children than it was in 2005.

the disease are working. Screening results of participating children who were age 6, 7, 8, or 9 years old indicated that Washington was just meeting the Healthy People 2020 objective of 49 percent or less for children ages 6 to 9 with decay experience.

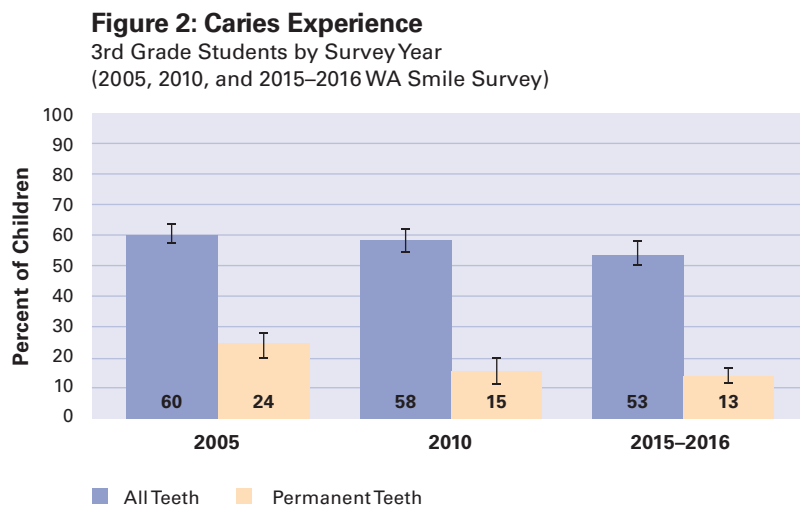
Untreated decay is an indicator of problems with barriers to accessing care and treatment for the disease. The Healthy People 2020 target rate for this measure is 26 percent or lower for children ages 6 to 9. Washington's 6- to 9-year-olds are doing far better with a combined rate of 13 percent.

Dental sealants are smooth, clear, or opaque resinous coatings placed on the chewing surfaces of the molar teeth in order to prevent dental decay in the pits and grooves found there. Sealants are a safe, economical, and highly effective way to prevent tooth

decay on the chewing surfaces of the back teeth.³⁸ The Healthy People 2020 target for dental sealants is 28 percent or higher for children ages 6 to 9. Washington's 6- to 9-year-olds are far surpassing this with a combined rate of 44 percent.

Finding: Disease Prevalence Caries experience is lower for third grade children than it was in 2005.

Smile Survey findings indicated that the prevalence of dental decay in Washington's third graders (53 percent) improved since 2005 (60 percent).³⁹ Caries experience in permanent teeth for third graders (13 percent) was much lower than in 2005 (24 percent).⁴⁰ These findings suggest that in Washington, preventive interventions are making positive gains (Figure 2).





**Finding:
Untreated Decay**

Rates of untreated tooth decay are much lower than they were in 2005.

We found that most of Washington’s elementary children were getting needed dental treatment in 2015–2016.

Rates were low for untreated tooth decay in all of the age groups screened. The untreated decay rate for third grade (12 percent) was much lower than in 2005, lower than the Healthy People 2020 target, and lower than the national average ⁴¹ (Figure 3).

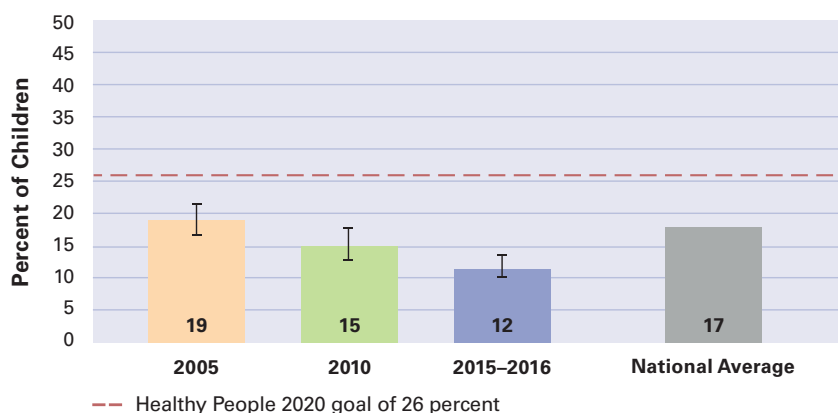


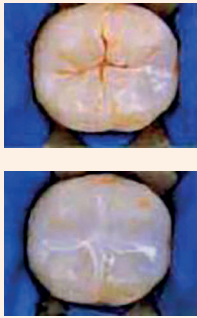
**FINDING:
Untreated
Decay**

Rates of untreated tooth decay are much lower than they were in 2005.

Figure 3: Untreated Decay

3rd Grade Students by Survey Year with US National Average (2005, 2010, and 2015–2016 WA Smile Survey)





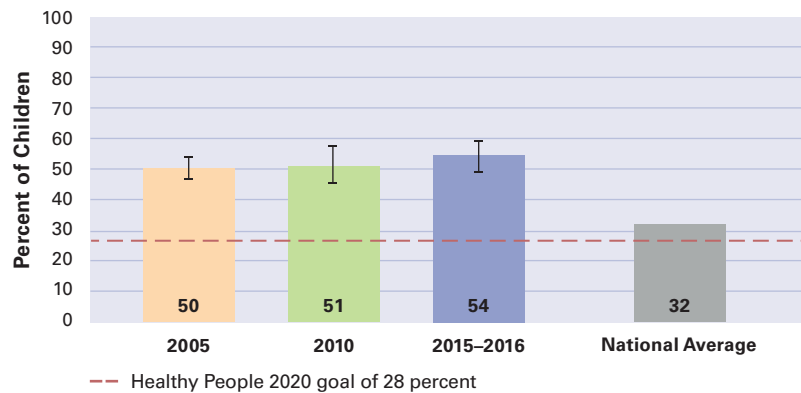
Use of dental sealants in Washington has increased since 2010. These photos show a tooth before and after dental sealant was applied.



FINDING: Dental Sealant Utilization

In 2015-16, more than half of third grade children had dental sealants, far exceeding the Healthy People 2020 target and the national average. For kindergarten children, rates were much higher than in 2010.

Figure 4: Dental Sealant Placement, ≥ 1 Molar
3rd Grade Children by Year



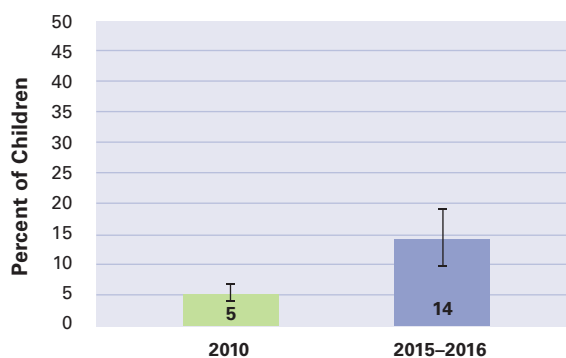
Finding:
Dental Sealant Utilization
In 2015-16, more than half of third grade children had dental sealants, far exceeding the Healthy People 2020 target and the national average. For kindergarten children, rates were much higher than in 2010.

Dental Sealants are clear or opaque smooth coatings placed on the chewing surfaces of the molar teeth in order to prevent dental decay in the pits and grooves of these teeth. Most tooth decay in permanent teeth (approximately 90 percent) occurs on these chewing surfaces.⁴² Studies have found that sealants on permanent molars reduce the risk of cavities by 80 percent.⁴³ Evidence shows that when provided in school-based

settings, dental sealants are a highly effective, cost-saving public health intervention.⁴⁴ The rationale behind this is that by focusing on schools with a high rate of students on the National School Lunch Program, the service is being provided to kids who need it the most, where they are, and to children whose parents may not have time or transportation options to get their child to a dental office.⁴⁵ There is now a renewed national focus recommending the placement of dental sealants on primary molar teeth as well as permanent molar teeth.⁴⁶

In Washington, more than half (54 percent) of third graders had dental sealants (Figure 4). The rate of dental sealant placement in kindergarten children (14 percent) more than doubled since 2010 (Figure 5).

Figure 5: Dental Sealants, ≥ 1 Molar
Kindergarten Students by Year
(2010 and 2015-2016 WA Smile Survey)



**Finding:
Dental Sealant Equity**
In Washington, the rates of dental sealant use are similar between lower-income and higher-income groups as well as between children of color and white children.

Attention is needed to reduce oral health disparities in Washington’s children. Although the term disparity is often thought to mean racial or ethnic disparities, many dimensions of disparity exist, particularly in health. If a health outcome is seen to be greater or lesser between populations, this is disparity. Race or ethnicity, education level of parents, socioeconomic status, and geographic location are some of the factors that may contribute to a child’s ability to achieve good health. It is important not to minimize the impact that social determinants (such as income, the availability of high quality education, nutritious food, and culturally sensitive health care providers) have on health outcomes for specific population groups.⁴⁷

Healthy People 2020 defines health equity as the “attainment of the highest level of health for all people. Achieving health equity requires valuing everyone equally, with focused and

ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health- and health-care disparities.”⁴⁸

In Washington, our findings indicate that children from all races, ethnicities, and socioeconomic backgrounds had similar access to dental sealants. This positive result is likely due to the combined efforts of private and community clinic practitioners applying sealants on their patients in clinical settings as well as those of school-based sealant programs that focus on serving children attending schools with a high number of low-income students.

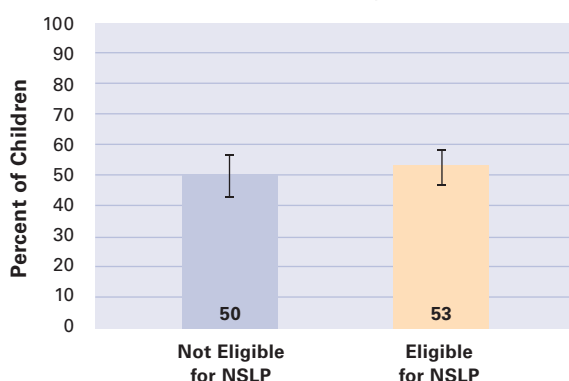
Dental Sealant Equity by Income

Smile Survey 2015–16 findings indicate the rate of dental sealant use was similar between lower-income and higher-income groups in Washington. Eligibility for the National School Lunch Program (NSLP)⁴⁹ was used as the proxy for low income, and these data were compared with data from children listed as ineligible for NSLP, the indicator we used to designate higher income levels (Figure 6).



**FINDING:
Dental Sealant Equity**
In Washington, the rates of dental sealant use are similar between lower-income and higher-income groups as well as between children of color and White children.

Figure 6: Dental Sealants, ≥ 1 Molar
Combined 2nd and 3rd Grades by NSLP Eligibility as Proxy for Household Income Status (2015–2016 WA Smile Survey)





FINDING: Decay Experience

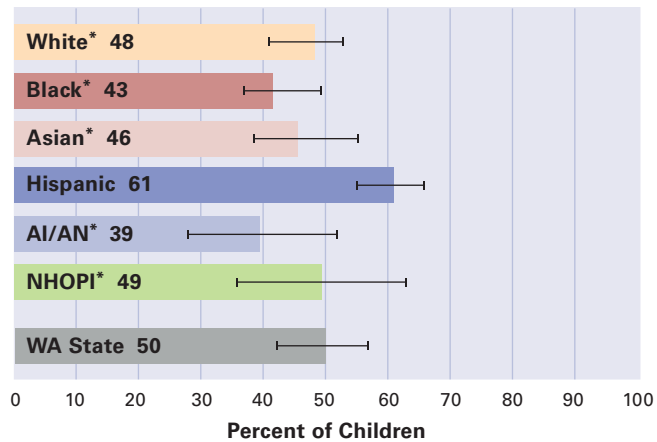
More than half of second and third graders have experienced tooth decay, as well as nearly four in 10 kindergarteners.

Dental Sealant Equity by Race/Ethnicity

Compared with white children, the prevalence of dental sealants was found to be similar⁵⁰ for children from most of the non-white population groups measured in Washington’s 2015–16 Smile Survey (Figure 7). The exception

was that Hispanic children had a much higher rate of dental sealant placement than white children (Figure 8).⁵¹ To review specific racial/ethnicity trend data from 2005 and 2015–16 (second and third grade children), see Table 24 on page 49.

Figure 7: Dental Sealant on ≥ 1 Molar
Combined 2nd and 3rd Grades by Race/Ethnicity
(2015/2016 WA Smile Survey)



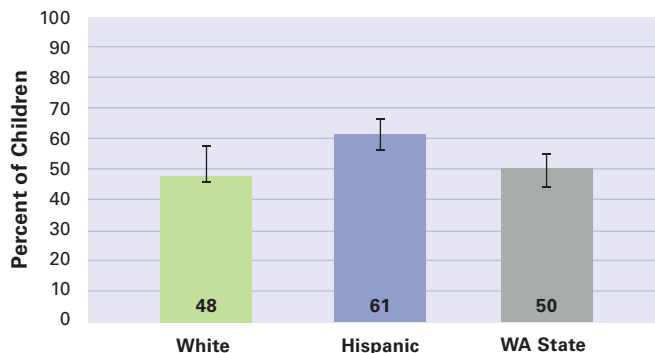
(AI/AN = American Indian/Alaska Native, NHOPI = Native Hawaiian or Other Pacific Islander)
*Non-Hispanic

Despite improvements in some measures, tooth decay continues to be a major health concern for all children in Washington.

Finding: Decay Experience
More than half of second and third graders have experienced tooth decay, as well as four in 10 kindergarteners.

While the overall decay experience rate is improving,⁵² still more than half of second and third graders had a history of tooth decay in Washington. This means that on any given day

Figure 8: Dental Sealants on ≥ 1 Molar
2nd and 3rd Grades Combined non-Hispanic White and Hispanic (2015/2016 WA Smile Survey)





across the state, more than 144,000 7-, 8-, and 9-year-olds are affected by this largely preventable disease.⁵³ This is an important point because if caries is not prevented early on, managing the disease process is complex. Without appropriate and regular intervention (ongoing preventive care and treatment), the chronic nature of this disease can set the stage for poor lifelong health consequences (Figure 9).

Finding:
Oral Health Disparities

Large gaps in oral health equity exist with regard to race and ethnicity, language spoken at home, and income.

Attention is needed to reduce oral health disparities in Washington’s children.

Although the distribution of dental sealants appears to be more equitable, significant oral health disparities related to race and ethnicity, language spoken at home, and income were

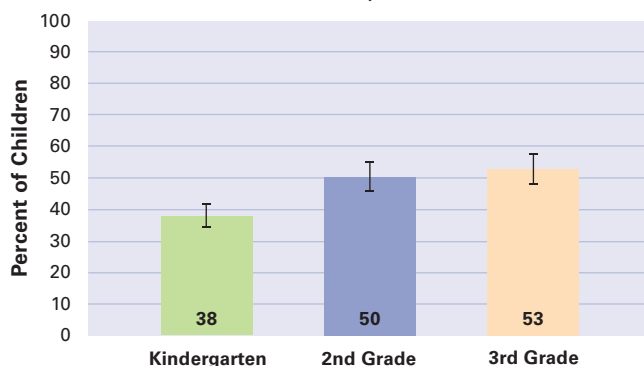


FINDING:
Oral Health Disparities

Large gaps in oral health equity exist with regard to race and ethnicity, language spoken at home, and income.

Figure 9: Caries Experience, Any Teeth

Kindergarten, 2nd and 3rd Grades
(2015–2016 WA Smile Survey)





FINDING: Oral Health Disparities

Large gaps in oral health equity exist with regard to race and ethnicity, language spoken at home, and income.

also identified. Children from low-income households* and children of color had much higher rates of tooth decay, higher rates of rampant tooth decay, and higher rates of treatment need.⁵⁴ Children whose primary language was not English were also found to have much higher rates of overall decay experience.

Disparity by Income

Compared with third-grade children from higher-income households, 60 percent more children from low-income households had experienced tooth decay and had unmet dental needs, and more than twice as many were suffering the effects of rampant dental decay (Figure 10).

Disparity by Race/Ethnicity

Compared with white, non-Hispanic children in second and third grades combined (Figures 11-14):

- Black and Asian children⁵⁶ had statistically similar rates of decay experience, rampant decay, and dental sealants.
- Hispanic children had a higher rate of decay experience (71 percent versus 45 percent), were nearly twice as likely to have permanent teeth affected (16 percent versus 9 percent), had twice the rate of rampant decay (29 percent versus 15 percent), and higher rate of treatment need (13 percent versus 9 percent).

*Information on household income was not collected in this survey. Individual participation in the National School Lunch Program (NSLP)⁵⁵ was used as a proxy for household income.

Figure 10: Third Grade Oral Health Indicators

By NSLP Eligibility as Proxy for Household Income
(2015-2016 WA Smile Survey)

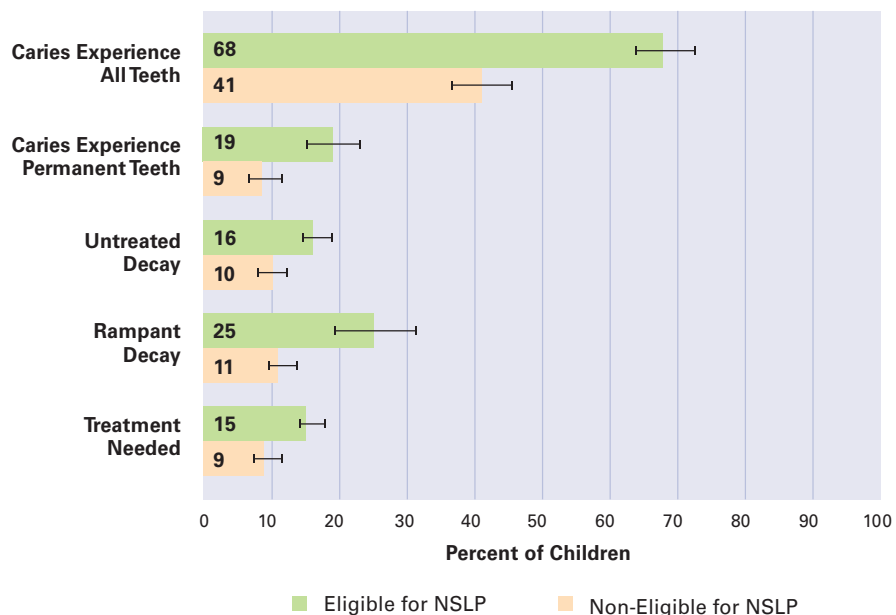
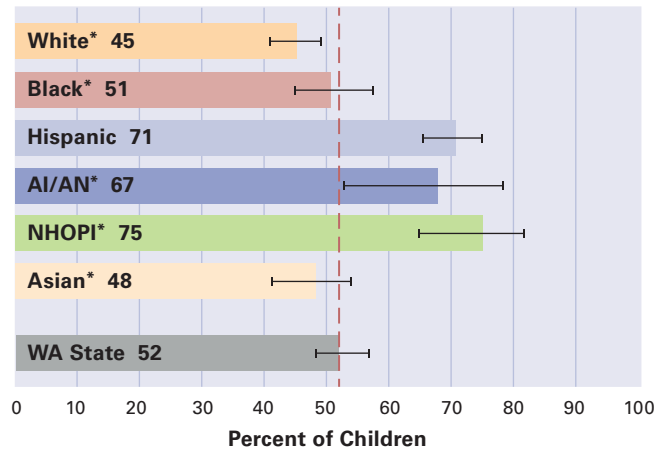


Figure 11: Caries Experience, All Teeth
Combined 2nd and 3rd Grades by Race/Ethnicity
(2015–2016 WA Smile Survey)



(AI/AN = American Indian/Alaska Native, NHOPI = Native Hawaiian or Other Pacific Islander)
-- Healthy People 2020 goal of 52 percent *Non-Hispanic

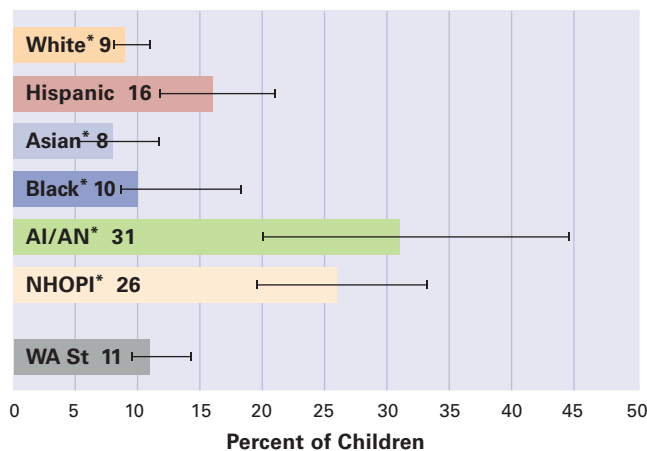
- American Indian/Alaska Native children had more severe and higher rates than white children in all categories: Decay experience (67 percent versus 45 percent); prevalence of disease in permanent teeth (31 percent versus 9 percent); untreated decay (19 percent versus 10 percent); rampant decay (37 percent versus 15 percent); and more than twice the rate of treatment need (19 percent versus 9 percent).
- Native Hawaiian/Pacific Islander⁵⁷ children had significantly higher rates of decay (75 percent versus 45 percent); three times the prevalence in permanent teeth (26 percent versus 9 percent); more than two-and-a-half times the rate of untreated decay (26 percent versus 10 percent); more than twice the rate of rampant decay (32 percent versus 15 percent); and more than three times the rate of early or



**FINDING:
Oral Health
Disparities**

Large gaps in oral health equity exist with regard to race and ethnicity, language spoken at home, and income.

Figure 12: Caries Experience, Permanent Teeth
Combined 2nd and 3rd Grades by Race/Ethnicity
(2015–2016 WA Smile Survey)



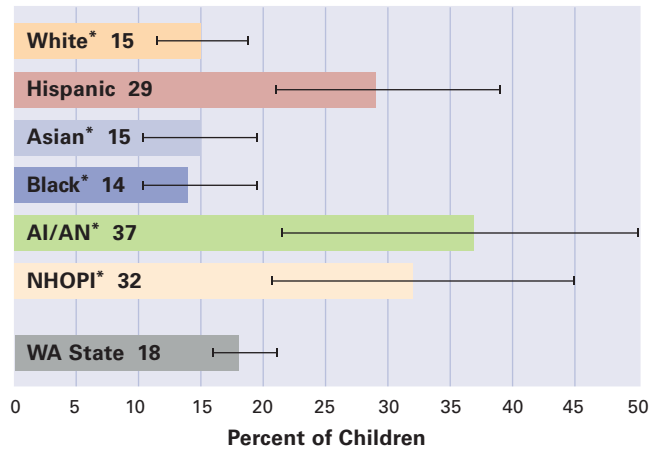
(AI/AN = American Indian/Alaska Native, NHOPI = Native Hawaiian or Other Pacific Islander)
*Non-Hispanic



FINDING: Oral Health Disparities

Large gaps in oral health equity exist with regard to race and ethnicity, language spoken at home, and income.

Figure 13: Rampant Caries, 7+ Teeth
Combined 2nd and 3rd Grades by Race/Ethnicity
(2015/2016 WA Smile Survey)



(AI/AN = American Indian/Alaska Native, NHOPI = Native Hawaiian or Other Pacific Islander)
*Non-Hispanic

urgent treatment need (26 percent versus 9 percent).

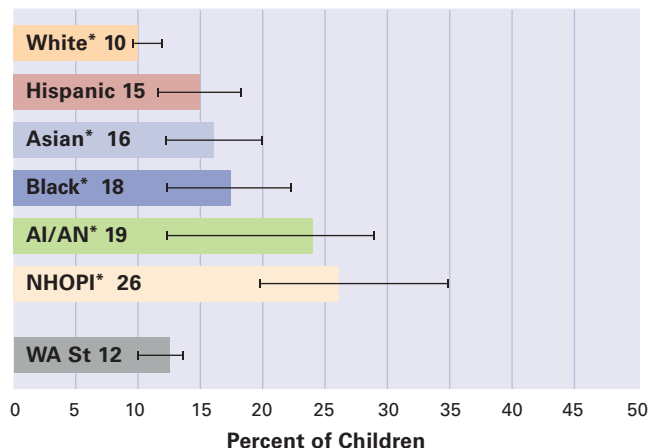
- Black and Asian children had much higher rates of untreated tooth decay than white children (18 percent, 16 percent versus 10 percent) as well as much higher rates of treatment need (17 percent, 16 percent versus 9 percent).

Disparity by Primary Language Spoken in Home

Washington State is home to speakers of dozens of languages.⁵⁸ Compared with children who speak English only,

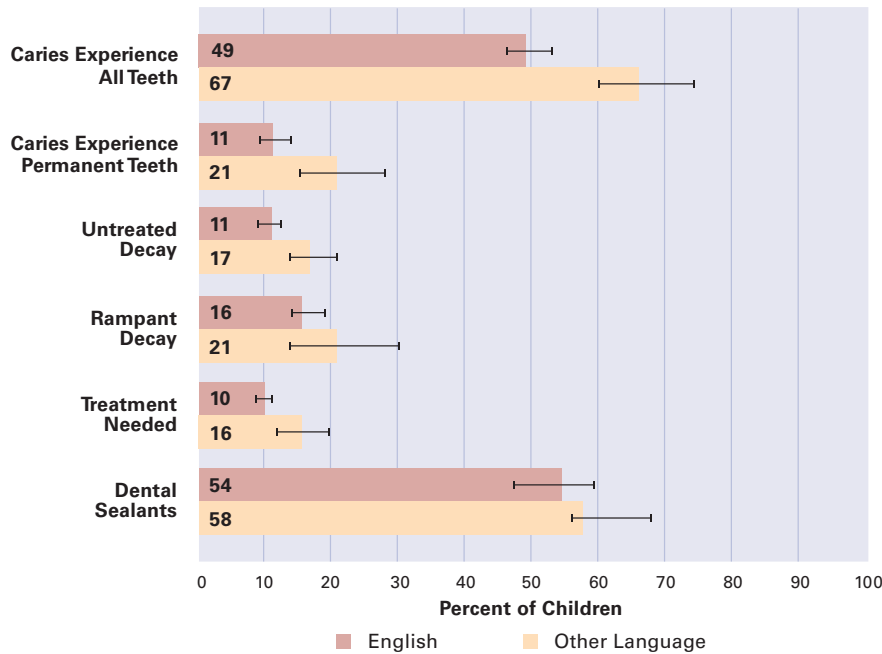
by the third grade, children whose primary language spoken in the home was not English had a higher rate of decay experience by about one-third (67 percent versus 49 percent); and nearly twice the prevalence in permanent teeth (21 percent versus 11 percent). There was half-again the rate of untreated decay (17 percent versus 11 percent); and a 60 percent higher rate of treatment need (16 percent versus 10 percent). Rates for rampant decay and dental sealants were similar to children whose primary language was English (Figure 15).

Figure 14: Untreated Decay, All Teeth
Combined 2nd and 3rd Grades by Race/Ethnicity
(2015/2016 WA Smile Survey)



(AI/AN = American Indian/Alaska Native, NHOPI = Native Hawaiian or Other Pacific Islander)
*Non-Hispanic

Figure 15: Dental Indicators
Third Grade Students by Language Spoken at Home
(2015-2016 WA Smile Survey)



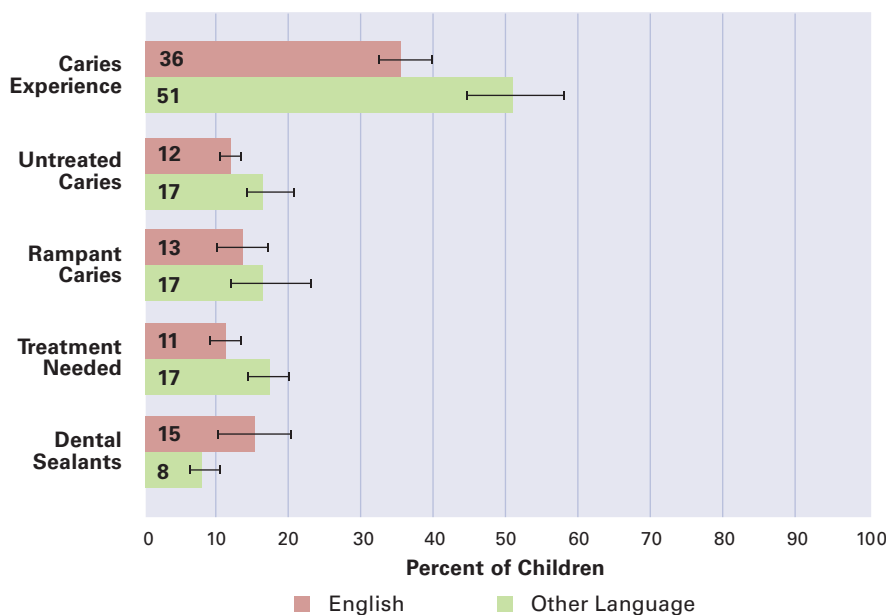
Kindergarten children whose primary language at home is not English had a 42 percent higher rate of decay experience (51 percent versus 36 percent), as well as untreated decay (17 percent versus 12 percent); and the rate of treatment needed was more than 50 percent higher. The rate of rampant decay was similar to that of English-only speakers (Figure 16).



**FINDING:
Oral Health
Disparities**

Large gaps in oral health equity exist with regard to race and ethnicity, language spoken at home, and income.

Figure 16: Dental Indicators
Kindergarten Students by Language Spoken at Home
(2015-2016 WA Smile Survey)





RESULTS: PRESCHOOL

RESULTS:

The Oral Health of Children Attending Head Start and ECEAP Preschool Programs in Washington

During the 2014–15 and 2015–16 program years, the Washington State Department of Health conducted oral health screenings on 1,479 children, ages 3 to 5, from a statewide representative sample of randomly selected Head Start programs and Early Childhood Education and Assistance Programs (ECEAP) throughout the state. The indicators measured for this age group include caries experience, untreated decay, rampant decay, the presence of white spot lesions, and early or urgent need for treatment. Information on the presence of dental sealants was not collected.

Federally-funded Head Start and state-funded ECEAP programs promote school readiness by providing educational, health, nutritional, social and other services to enrolled children and their families. Enrollment priority is given to children whose families

are at or below the federal poverty level.⁵⁹ Results from the *2015–16 Smile Survey* can provide important clues about how well we are doing with regard to the dental health of our youngest, most vulnerable children as they are working toward kindergarten readiness.

Nationally, compared with children from higher-income households, low-income preschoolers are about twice as likely to experience dental caries.⁶⁰ Children with cavities in their baby (primary) teeth are three times more likely to develop cavities in their adult (permanent) teeth.⁶¹ Compared with 2005, Washington's oral health policies and programs have held the gains reached in 2010 for ensuring that Head Start/ECEAP preschool children receive needed dental treatment. Yet, dental caries is still a major health concern for this young age group.

For children attending Head Start or ECEAP preschool programs, unmet dental treatment needs remain low.

Finding: Unmet Treatment Need

The current rate of untreated tooth decay is much lower than in 2005, but has not significantly changed from 2010.

Despite being preventable, dental caries is a chronic disease that, once it is allowed to develop, has lifelong effects on health and quality of life for an individual. When children develop decay as infants or toddlers, it can progress rapidly, and it is likely to affect the permanent teeth.⁶² Pain associated with tooth decay in primary (baby) teeth creates difficulty with eating and speech development; causes sleep difficulties; and can negatively affect play activity, self-esteem, and the child's ability to learn and socialize.⁶³ As with other chronic diseases of childhood, such as obesity, diabetes, and asthma, management of this disease is complex and requires a coordination of efforts between health providers, dental providers, parents, and community and statewide policies and systems.⁶⁴

Healthy People 2020 (HP 2020)

provides 10-year national objectives for improving the health of all Americans. These objectives provide comparison targets for states and communities.⁶⁵ There are three HP 2020 oral health objectives for children ages 3 to 5: caries experience, untreated decay, and dental sealants.⁶⁶

Untreated tooth decay⁶⁷ is a measure of how well a population is accessing needed dental care. That is, the lower this rate is, the better it has been for people to get the care they need. The current rate of 17 percent remains much lower than the 2005 rate of 26 percent, but has not significantly changed from 2010 (Figure 17). Washington is doing far better than both the national average (25 percent)⁶⁸ and the Healthy People Objective (21 percent) for the rate of untreated decay in children ages 3 to 5. (Note that the national average is specific to low-income 3- to 5-year-olds; while the Healthy People 2020 target is for all children ages 3 to 5, regardless of family income.

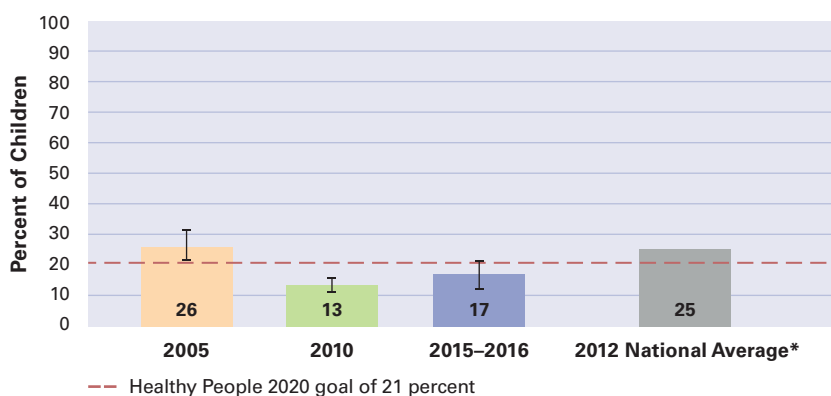


FINDING: Unmet Treatment Need

The current rate of untreated tooth decay is much lower than in 2005, but has not significantly changed from 2010.

Figure 17: Untreated Decay

Head Start/ECEAP Preschoolers
(2005, 2010, and 2015/2016 WA Smile Survey)



*National average is specific to low-income 3- to 5-year-olds while Healthy People 2020 goal is for all 3- to 5-year-olds regardless of family income level.



As with elementary children, decay experience is too high, and disparities are significant.

Finding: Decay Experience
Head Start and ECEAP preschool children experience high rates of tooth decay and rampant tooth decay.

In Washington, more than four out of every 10 Head Start and ECEAP preschool children (45 percent) have

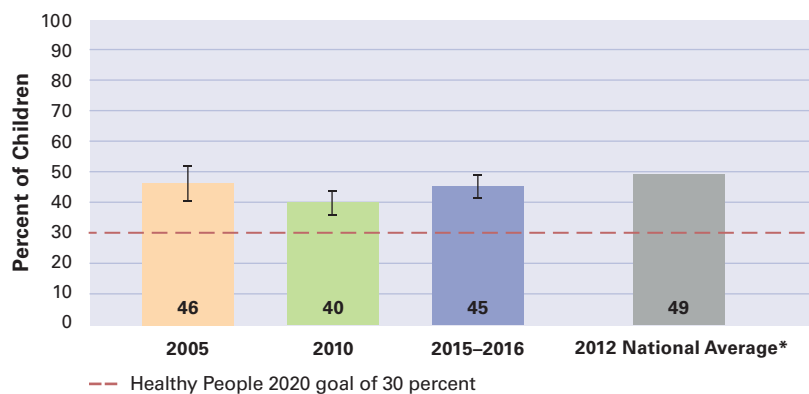
experienced tooth decay; and of those, nearly half (21 percent) are affected by rampant (generalized) tooth decay⁶⁹ Progress is needed to meet the Healthy People 2020 target of reducing this rate to three in 10 (30 percent) or fewer 3- to 5-year-olds with any decay experience (Figure 18).



FINDING: Decay Experience
Head Start and ECEAP preschool children experience high rates of tooth decay and rampant tooth decay.

Figure 18: Caries Experience, All Teeth

Head Start/ECEAP Preschoolers
(2005, 2010, and 2015/2016 WA Smile Survey)



*National average is specific to low-income 3- to 5-year-olds; while Healthy People 2020 goal is for all 3- to 5-year-olds regardless of family income level.

Finding:
Oral Health Disparities
 Significant disparities exist between racial and ethnic groups in the Head Start and ECEAP programs.

Significant disparities were evident for children of some racial and ethnic groups compared with white children in Washington’s Head Start and ECEAP preschools. For example, children of Hispanic and Asian descent had much higher rates of decay experience than white children (Figure 19).⁷⁰ American Indian/Alaska Native preschool children

had more than double the rates of untreated tooth decay. (Figure 20).

Black children had similar rates of decay experience, untreated decay, and treatment need when compared with white children (Figure 21 and Table 30). (For a discussion on health disparities, see page 14.)

White spot lesions are found on enamel smooth surfaces close to the gum line and are early, but reversible, areas of tooth decay. Fluoride varnish applications have been shown to reverse these pre-decay lesions and heal and strengthen teeth. Fluoride



FINDING:
Oral Health Disparities
 Significant disparities exist between racial and ethnic groups in the Head start and ECEAP programs.

Figure 19: Caries Experience

Head Start/ECEAP Preschoolers by Race/Ethnicity (2015/2016 WA Smile Survey)

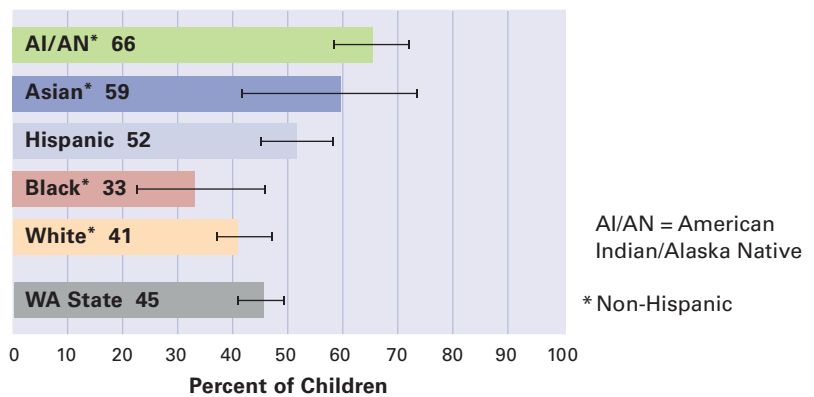


Figure 20: Selected Oral Health Indicators

Head Start/ECEAP Preschool by Race/Ethnicity (Non-Hispanic American Indian/Alaska Native and Non-Hispanic White) (2015-2016 WA Smile Survey)

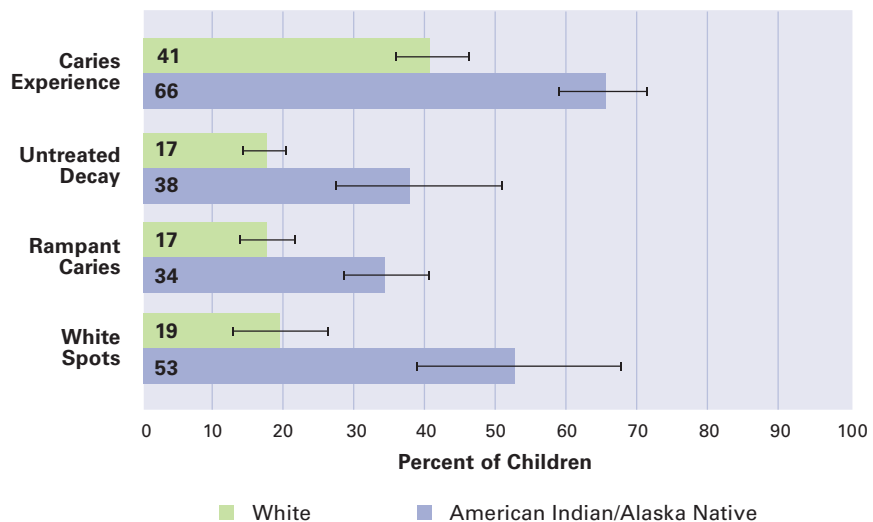
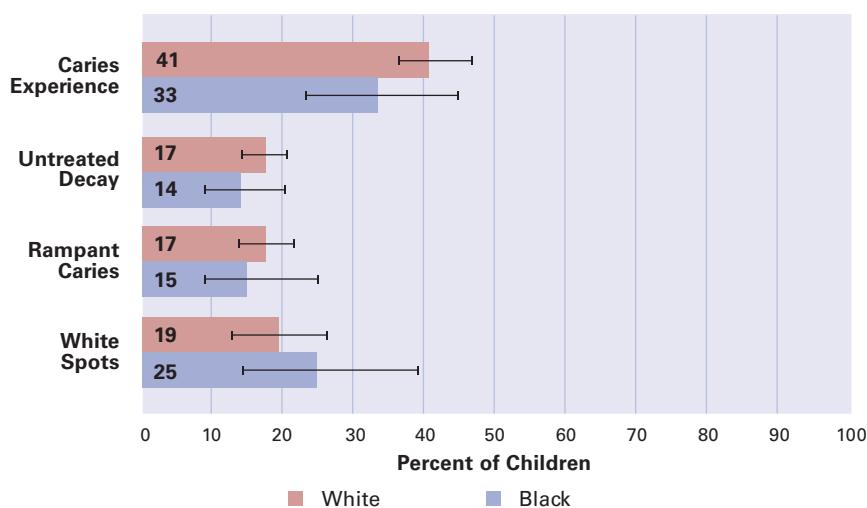


Figure 21: Selected Oral Health Indicators

Head Start/ECEAP Preschool by Race/Ethnicity (Non-Hispanic White and non-Hispanic Black) (2015-2016 WA Smile Survey)



varnish is a safe, cost-effective way to provide protection for very young children’s teeth, even when the child

lives in a community that already receives the benefits of water fluoridation.⁷¹

Findings from our Partners: Oral Health Survey of American Indian and Alaska Native Children Served by Region XI Tribal Head Start Programs in Washington State

During the 2014–15 program year, Indian Health Service and Tribal health clinics screened 477 children attending Region XI Head Start programs, which serve American Indian and Alaskan Native (AI/AN) children in Washington State. The survey was conducted using identical methods and criteria for decision-making as the Department

of Health’s 2015–16 Smile Survey. Oral health findings between the two groups identified a similar rate of decay experience and untreated tooth decay between AI/AN children attending Tribal Region XI and non-Tribal Washington State Region X Head Start/ECEAP programs⁷² (Figure 22).

Figure 22: Oral Health Indicators for American Indian/Alaska Native Children

Head Start Children Attending Regions X and XI Preschool Programs in Washington

Decay Experience	Untreated Decay	Rampant Decay (Severe)	Needing Treatment	Urgent Need
Indian Health Service Region XI Tribal Head Start Oral Health Survey 2014				
64%	36%	No data	34%	10%
Non-Hispanic AI/AN Children in Region X Head Start/ECEAP programs DOH 2015–2016 Smile Survey (n= 39)				
66% (58-73)	38%	34% (28-41)	*	*

* Data suppressed due to high rate of standard error



FINDING: Oral Health Disparities

Significant disparities exist between racial and ethnic groups in the Head start and ECEAP programs.



CONCLUSION

Conclusion

Dental caries is a chronic infection, caused by the interaction of specific types of bacteria and sugary foods on tooth enamel. This disease affects children physically and psychologically, and influences their ability to learn, how they grow, look, speak, chew, taste food, and socialize, as well as their feelings of social well-being.^{73, 74} For these reasons, oral health means more than healthy teeth. Failure to identify and prevent dental disease has consequential and costly long-term adverse effects.

Results of the *2015–2016 Smile Survey* indicate that the oral health of Washington’s children is improving. Compared with national data, untreated decay rates are low and sealant placement rates are high. Washington is meeting or exceeding Healthy People 2020 Oral Health Indicators for children ages 6 to 9, and the racial disparity gap appears to be closing with regard to preventive dental sealant placement. In the general population, we found most of the disease is occurring in primary teeth, and by the third grade, the rate of decay experience is much lower in the permanent dentition. Together, these findings indicate that Washington’s oral health policies and programs are progressing in ensuring that most children have access to oral care, including dental sealants and treatment of tooth decay.

Although gains have been made, results also show that there is still much to do especially with regard to improving oral health equity. Large

gaps remain with regard to income levels as well as with regard to race and ethnicity. Twice as many children from economically challenged families were suffering from the effects of rampant tooth decay than children from higher-income households. Children who are of Native Hawaiian/Pacific Islander or American Indian/Alaskan Native descent had two to three times the rate of permanent teeth affected by tooth decay as children who are white, black, or Asian. Children who are Hispanic, Pacific Islander or American Indian/Alaskan Native had twice the rate of rampant decay as children who are white, black or Asian. All non-white children had significantly higher rates of treatment need than children who are white.

Finally, more than half of third graders and about four in 10 kindergarteners and low-income preschoolers alike had ever had tooth decay. This is far too many children affected by a preventable disease that carries such dire consequences. It is clear that more progress is needed to expand and sustain efforts aimed at early prevention to give all of Washington’s children the best chance at achieving lifelong health and quality of life.

Washington’s oral health advocates have implemented excellent policies and programs that benefit the oral health of children, but there is much more that can be done to help children attain their lifelong potential.

“To live well into old age free of pain and infirmity, and with a high quality of life, is the American dream.”

— *Oral Health in America: A Report of the Surgeon General* (2000)

To aid in this vision, the U.S. Centers for Disease Control and Prevention (CDC) has recommended the following oral health strategies for improving population health:⁷⁵

- **Expand Dental Sealant Programs**
- **Integrate Dental Care into Primary Care Settings**
- **Expand and Maintain Community Water Fluoridation Systems**
- **Improve Data Analytics Capabilities**
- **Maximize Current Workforce Efforts**

Appendix A

Strategies for Improved Population Health

Centers for Disease Control and Prevention (CDC)

<https://www.cdc.gov/policy/hst/statestrategies/oralhealth/index.html>

Expand Dental Sealant Programs

Expanding low-income children's access to dental sealants through school-based sealant programs improves the health of children and provides savings to state Medicaid programs. One economic analysis suggests that allowing dental hygienists to place sealants without a prior examination by a dentist can increase sealant receipt and lower program costs by 18 to 29 percent depending on program size.

Integrate Dental Care into Primary Care Settings

Care delivery models that integrate preventive dental interventions (e.g., fluoride varnish) into primary care, such as well child visits, can reduce tooth decay among very young children.

Expand and Maintain Community Water Fluoridation Systems

In 2012, 74.6 percent of the U.S. population on public water systems had access to fluoridated water. The useful life of equipment needed to fluoridate water at the public water system is about 15 years. Based on this estimate, up to 10 percent of systems may need to replace equipment annually. Maintaining or increasing water fluoridation coverage will ensure continued broad access to this cost-effective intervention.

Improve Data Analytics Capabilities

States may consider strategies that improve their ability to collect and analyze Medicaid and Children's Health Insurance Program data to evaluate program performance and inform policy decisions. To ensure that the data can be used to generate useful, comparable information, states could consider using age and risk categories consistent with recommended measures for performance-based care such as those put forth by the Dental Quality Alliance and endorsed by the National Quality Forum.

Maximize Current Workforce Efforts

To increase access to effective interventions that show cost-savings, states may consider maximizing dental workforce efforts by implementing recommendations from the Institute of Medicine. These include expanding scope of practice laws and changing Medicaid reimbursement policies to allow oral health professionals to practice to the top of their training. A recent issue brief by the National Governors Association discusses in depth the expanding dental health workforce.

Unless year is specified, all values are as reported in 2014.

Appendix B

Oral Health Policies and Programs in Washington State

Washington State has a strong track record of policymakers, public health officials, community advocates, and providers working collaboratively to implement policies and programs to support the oral health of Washington children. Because of this commitment to children's oral and overall health, over the years we have seen improvements both in utilization rates and oral health outcomes. Below are some examples of innovative and effective programs and policies in place in Washington.*

- **Access to Baby and Child Dentistry (ABCD).** ABCD, which is now in all 39 counties, connects Apple Health-insured children ages 0 to 5 to dentists that are trained to treat young children. The program includes outreach and education for families about the importance of oral health and how to get their young children into care. ABCD is a public/private partnership between the Health Care Authority, University of Washington School of Dentistry, the Washington State Department of Health (WIC), the Washington State Dental Association, and the Washington Dental Service Foundation. ABCD has made Washington a national leader in young children's utilization of oral health care. For more information visit abcd-dental.org.
- **Preventive Oral Health Care Delivered in the Pediatrician's Office.** The ABCD program's work to foster collaborations between the medical and dental communities helped pave the way to further engage pediatricians and family medicine providers in oral health. More than 40 percent of Washington's physicians serving children are trained to deliver preventive oral health services, including providing oral health education, screenings, and applying fluoride varnish during well-child visits. For more information visit abcd-dental.org.
- **School-Based Dental Sealant Programs.** In Washington, state practice acts allow registered dental hygienists to perform preventive dental services outside of the dental office, in school based settings. Numerous dental hygienists apply dental sealants and fluoride varnish in school-based health centers and other school settings across Washington. This has increased access to preventive oral health care for students who may be lacking a dental home. For more information, visit: http://here.doh.wa.gov/materials/sealant-fluoride-varnish-guidelines/15_OHsealguid_E12L.pdf.
- **Preventive Oral Health Education in Early Learning programs.** Head Start and ECEAP programs, child care providers, and home-visitors throughout Washington are trained to identify children at risk for oral health problems, connect them to dental resources, and work with families to prevent decay.



- **Community Water Fluoridation.** Adjusting the level of naturally occurring fluoride in drinking water is a proven, cost-effective way to prevent tooth decay. Many Washington communities have implemented fluoridation, to the benefit of children and their families. Currently, 56 percent of Washingtonians live in communities with optimized levels of water fluoridation.
- **New Provider Models.** The Swinomish Indian Tribal Community has hired a mid-level dental provider, called a dental health aide therapist, who practices under the general supervision of a dentist at the Swinomish Dental Clinic. The tribe has pursued utilizing a mid-level dental provider in order to help meet the oral health needs of children and families in their Tribal community. For more information, visit: <http://www.swinomish.org/news/first-tribe-in-the-lower-48-to-use-dental-therapists.aspx>.
- **Washington State Board of Health: Strategies to Improve the Oral Health of Washington Residents.** Based on a review of established evidence and best practice models, consultation with expert informants, and input from Washington and National experts, the Washington State Board of Health approved seven strategic recommendations to improve the oral health of Washington Residents. The recommendations are to be considered by communities, organizations, and agencies seeking to promote oral health in the State of Washington. For more information visit: <http://sboh.wa.gov/OurWork/CurrentProjects/OralHealthStrategies>.
- **Regional Initiatives in Dental Education (RIDE) program:** The RIDE program was developed by the University of Washington School of Dentistry (UWSOD) to address oral health workforce needs in rural and underserved communities. RIDE is a partnership with Eastern Washington University (EWU) and the UW School of Medicine WWAMI (Washington, Wyoming, Alaska, Montana and Idaho) program to create educational efficiencies as well as innovations. Dental associations, community health centers, Area Health Education Centers (AHECs), and other stakeholders also play an invaluable role in supporting RIDE activities. RIDE was funded by the Washington State Legislature in 2007. The first cohort of RIDE students graduated in 2012. For more information visit: <https://dental.washington.edu/ride/>.

*This is only a partial list of many outstanding advocacy groups and organizations who work to advance access to oral disease prevention and oral health care in Washington. In addition to the programs and policies listed are many regional and community-based health and dental clinics across the state that provide oral health care and disease prevention to vulnerable populations in their service regions as well as local health districts and several active local oral health coalitions that work to connect and mobilize oral health stakeholders to improve oral health outcomes for their communities.

Appendix C

Overview of Findings for Third Grade Students (N = 4432)

Caries experience	53% of third graders have experienced treated and untreated tooth decay (significant change from 2005 but not from 2010)
Untreated dental decay	12% have untreated decay (no change from 2010, but significantly lower than 2005—19%)
Rampant decay	17% have seven or more teeth with decay experience, treated or untreated (no significant change from 2005 or 2010)
Treatment needed	11% of third graders are needing dental treatment — 9% early; 2% urgent (no significant change from 2005 or 2010)
Dental sealants	54% of third graders have at least one preventive dental sealant (no significant change from 2005 or 2010)

Overview of Findings for Kindergarten Students (N = 4482)

Caries experience	38% of kindergarteners have experienced dental decay (no significant change from 2010)
Untreated dental decay	13% have untreated tooth decay (no significant change from 2010)
Rampant decay	13% have rampant decay (no significant change from 2010)
Treatment needed	12% of kindergarteners are in need of dental treatment — 10% early; 2% urgent (no significant change from 2010)
Dental sealants	14% of kindergarteners have at least one dental sealant (a significant change from 2010)

Overview of Findings for Head Start Preschool Students (N = 1479)

Caries experience	45% have experienced dental decay (no significant change from 2005 or 2010)
Untreated dental decay	17% have untreated tooth decay (no change from 2010, but significantly lower than 2005)
Rampant decay	21% have seven or more teeth affected by decay (no change from 2010 or 2005)
Treatment needed	13% of Head Start and ECEAP children are in need of early or urgent dental treatment (no change from 2010, but significantly lower than 2005)
White spot lesions	22% have white spots (no significant change from 2005 or 2010)

Appendix D

Healthy People 2020 Oral Health Objectives

Oral Health of Children and Adolescents:

OH-1: Reduce the proportion of children and adolescents who have dental caries experience in their primary and permanent teeth.

OH-1.1: Reduce the proportion of children aged 3–5 years with dental caries experience in their primary teeth, from 33.3 percent (1999-2004) to 30.0 percent (10 percent improvement).

OH-1.2: Reduce the proportion of children aged 6-9 years with dental caries experience in their primary and permanent teeth from 54.4 percent (1999-2004) to 49.0 percent (10 percent improvement).

OH-1.3: Reduce the proportion of adolescents aged 13-15 years with dental caries experience in their permanent teeth from 53.7 percent (1999-2004) to 48.3 percent (10 percent improvement).



OH-2: Reduce the proportion of children and adolescents with untreated dental decay.

OH-2.1: Reduce the proportion of children aged 3 to 5 years with untreated dental decay in their primary teeth from 23.8 percent (1999-2004) to 21.4 percent (10 percent improvement).

OH-2.2: Reduce the proportion of children aged 6-9 years with untreated decay in their primary and permanent teeth from 28.8 percent (1999-2004) to 25.9 percent (10 percent improvement).

OH-2.3: Reduce the proportion of adolescents aged 13–15 years with untreated decay in their permanent teeth from 17.0 percent (1999-2004) to 15.3 percent (10 percent improvement).

OH-12: Increase the proportion of children and adolescents who have received dental sealants on their molar teeth.

OH-12.1: Increase the proportion of children aged 3 to 5 years who have received dental sealants on one or more of their primary teeth from 1.4 percent (1999-2004) to 1.5 percent (10 percent improvement).

OH-12.2: Increase the proportion of children aged 6 to 9 years who have received dental sealants on one or more of their permanent first molar teeth from 25.5 percent (1999-2004) to 28.1 percent (10 percent improvement).

OH-12.3: Increase the proportion of adolescents aged 13 to 15 years who have received dental sealants on one or more of their permanent molar teeth from 19.9 percent (1999-2004) to 21.9 percent (10 percent improvement).

Appendix E

Methodology in Detail

Sample size calculation

For both the preschool and elementary school samples a cluster sampling design methodology was employed. The unit of sampling is the preschool/elementary school with all the eligible individuals within the sampled programs/schools included in the surveyed population. The first step was to conduct a sample power calculation. The equation used to determine the size of the sample is as follows: $A*B(1-A)*C$. Value A is the exposure of interest. In both the preschool and elementary school samples this was assumed to be 50 percent as in previous surveys the rate of sealant placement in elementary schools approximated this and it would give the largest minimum sample size to detect outcomes of interest. Value B, the design effect (based on sealant placement in 3rd grade students in the 2010 Smile Survey), which takes into account the impact the sampling methodology has on needed sample size. The design effect was calculated using STATA v13. The “estat effects” command was used after calculating the mean for 3rd grade sealant placement in 2010. The effect was calculated to be 8.5. Value C is the p-value at which a statistically significant difference can be detected (for $p=.05$ it is $(1.96/.05)^2$, the value used.)

As a final step the result of the equation was divided by the anticipated response rate. The 2015–16 Smile Survey used the response rates from 2010 as the best estimator. In 2010 the preschool response rate was 76 percent and 80 percent for elementary schools. The final sample total was calculated by: $((A*B(1-A)*C)/\text{response rate})$. This total was then divided by the average number of students per preschool/elementary school, 33 and 54 kids respectively, to determine the final number of preschools/schools which needed to be sampled. For preschools that total was 44 and for elementary schools it was 76.

Sampling

Preschools

In the summer of 2014 the Department of Early Learning supplied DOH with a list of Head Start programs and a separate list of ECEAP programs. These two lists were reconciled with duplicates eliminated to compile a list of preschools in Washington State serving low-income families. The resulting list contained 537 preschools from which the sample of 44 were to be taken. The list was then sorted on a randomly generated number and a systematic random sample of 44 Head Start/ECEAP sites was chosen. The preschool programs selected were contacted and invited to participate. If they declined to participate, the next program on the list was contacted and invited, repeating until a replacement was identified. Over the course of the survey 16 programs had to be replaced. All attendees of a selected preschool program were eligible to be surveyed (screened). The final sample size was 1,479 preschoolers between the ages 3 and 5, a 78 percent response rate. A final list of all participating preschool sites is shown in **Table 32**.

Public School Kindergarteners and Third Graders

An electronic data file of all elementary schools in Washington was obtained from the Office of Superintendent of Public Instruction's (OSPI) website. The data file used was for the 2013–2014 school year. The file included all 2,300 public schools in Washington State. All schools with at least 15 children each in kindergarten and second and third grade were included in the sampling frame (n=1,040 schools). Schools were sorted by the percent of children eligible for the free or reduced price National School Lunch Program (NSLP). The range in percent eligible for FRL NSLP in the sample frame went from <1 percent of students eligible to 98.9 percent eligible. The previously calculated 76 sample schools were drawn from this sample frame. All schools were sorted by proportion of students being served free/reduced lunch, from lowest to highest. A randomly determined school was selected and from there every 30.6th school was included select the 76 schools. Selecting a sample using this implicit stratification process assures that the sample is representative of the state's schools in terms of free/reduced school lunch program participation. As with the Head Start/ECEAP sites, all selected schools were contacted and invited to participate in the survey. If a school declined to participate, the next school in the sorted sample frame was chosen until a replacement was secured. 47 schools declined in this manner. In schools that did agree to participate, all students in kindergarten, second and third grade of the selected school were eligible to be surveyed (screened). The final total sample size was 13,553 elementary school children, with 4,369 third graders, 4,686 second graders, 17 in a mixed second/third grade, 4,437 kindergarteners and 44 whose grade was not recorded and are unknown. A final list of all participating schools can be found [here](#). The overall response rate for elementary school children was 78 percent. (See Table 26).

School Recruitment and Refusal Replacement

After being identified as a school/preschool to be included in the survey the school/preschool was contacted and invited to participate in the survey. If the school decided to participate a screener was identified to collect the data and a date was set for the screening to take place. If it was a preschool that declined, the next preschool in the pre-randomized list of preschools was chosen and contacted. If that program also refused the process was repeated until a willing program was identified. If an elementary school declined, the next school in the sample frame was contacted and invited to participate. Again, as with preschools, if that school also declined the next school on the list was contacted until a willing school was identified. Since the elementary school data frame was sorted by percent of children in NSLP, the next school on the list was likely to have a very similar percent of its children receiving free or reduced priced lunch.

Data Collection

The exams for the survey were conducted by oral health professionals; either Registered Dental Hygienists or participating licensed Doctors of Dental Surgery. Each examiner underwent a calibration training the fall before the commencement of data collection to ensure the different examiners were classifying disease and other conditions in the same way. Examiners worked in different regions and screened different numbers of schools/preschools. Some examiners worked within one county or limited geographic area, while others collected data across a much wider expanse of the state. Also, some examiners went to only a few schools/preschools while others screened many more. In many cases, examiners were aided by a scribe who acted as a data recorder to facilitate and speed the data collection process. Data were collected and entered directly into mobile tablets, or were recorded on paper for later entry. In most cases, the data were subsequently entered by screeners/scribes, but in some cases the paper forms were forwarded to the Department of Health where trained DOH personnel entered the data.

The actual examination was brief, lasting under one minute and consisting of the dental professional visually examining the child's mouth using only a penlight and dental mirror. Other dental instruments or diagnostic tools were not used during the exam. Children were provided a tooth brush, dental floss and a small reward in the form of a sticker to take home with them, even if they did not participate in the screening process.

Data Management and Analysis

Data collection and entry was completed using Epi Info Version 7.1.4. on MS Surface Pro or iPad tablets and/or paper forms, according to the preference of the screener. Epi Info is a public access software program developed and supported by the Centers for Disease Control and Prevention. Data presented in this report were analyzed using STATA version 13.1. Data analysis was conducted taking the clustering effect of the sampling methodology into account, treating each school as an individual sampling unit as part of the weighting of the data. In addition, the data were adjusted for non-response within each school/program, also included as part of the data weighting. For the non-response sampling weight, the number of children enrolled in each school/program was divided by the number of children screened. Where possible comparisons between the 2005, the 2010 and the 2015–16 surveys were made.

References

- 1 Early Childhood Education and Assistance Program, a state-funded early learning (pre-school) program.
- 2 Association of State and Territorial Dental Directors, *Basic Screening Survey for Children Planning and Implementation Toolkit* (Reno, NV: ASTTD, 2011), available online at <http://www.astdd.org/basic-screening-survey-tool/>.
- 3 Comparisons to data collected in 1994 and 2000 are not made in this report because different methods for sampling and consent strategies were employed.
- 4 National averages are as reported in: Centers for Disease Control and Prevention, National Center for Health Statistics, *NCHS Data Brief, No 104: Oral Health Disparities as Determined by Selected Healthy People 2020 Oral Health Objectives for the United States, 2009-2010* (Hyattsville, MD: NCHS, August 2012), available online at <https://www.cdc.gov/nchs/data/databriefs/db104.pdf>.
- 5 The term “Hispanic” in this report includes children of Hispanic, Latino, or Spanish origin, such as Mexican, Mexican American, Puerto Rican, Cuban, Dominican, or from any of the Central or South American countries.
- 6 “Dental caries” is the name of the disease that causes tooth decay (cavities). Dental caries is an infectious process that develops into a chronic, transmissible condition.
- 7 See Appendix D for Healthy People 2020 oral health objectives in detail.
- 8 Statistically significant difference is determined by no overlapping confidence intervals at 95 percent confidence.
- 9 Statistically similar, as determined by overlapping 95 percent confidence intervals.
- 10 “Health disparity” means there is a marked difference in health between defined populations. For a discussion on health disparities, see page 14.
- 11 Decay categories: Caries experience in all teeth; caries experience in permanent teeth; untreated caries; and rampant caries.
- 12 United States Department of Health and Human Services, *Oral Health in America: A Report of the Surgeon General* (Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000).
- 13 H.A. Alkarimi, R.G. Watt, H. Pikhart, A. Sheiham, and G. Tsakos, “Dental Caries and Growth in School-Age Children,” *Pediatrics* 133 no. 3 (2014), accessed online at <http://pediatrics.aappublications.org/content/pediatrics/133/3/e616.full.pdf>. (DOI: 10.1542/peds.2013-0846)
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- 16 American Academy of Pediatrics’ Oral Health Risk Assessment Tool, available online at: <http://www2.aap.org/oralhealth/docs/RiskAssessmentTool.pdf>.
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- 19 Social determinants of health are factors that predispose an individual for better or worse health outcomes and that may be beyond a person’s control, such as their income level, geographic location, race, ethnicity, or education level, among others. For more information, see: <http://www.cdc.gov/socialdeterminants/>.

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- 21 Ibid.
- 22 Cariogenic bacteria: The type of bacteria that cause the disease known as "dental caries," and play a pivotal role in the development of tooth decay.
- 23 "Health equity" means equal opportunities to achieve similar health outcomes between populations. For a discussion on the definition of "health equity," see (page)
- 24 American Academy of Pediatric Dentistry, "Guideline on Caries-Risk Assessment and Management for Infants, Children, and Adolescents," *Council on Clinical Affairs Clinical Practice Guidelines Reference Manual 37* No. 6 (2014), available online at http://www.aapd.org/media/policies_guidelines/g_cariesriskassessment.pdf.
- 25 F. Ramos-Gomez, Y.O. Crystal, M.W. Ng, N. Tinanoff, J.D. Featherstone, "Caries Risk Assessment, Prevention, and Management in Pediatric Dental Care," op. cit.
- 26 M.W. Ng, et al. "Disease management of early childhood caries," *International Journal of Dentistry* 2014 (DOI: 10.1155/2014/327801)
- 27 The term "rampant decay" is used as a marker of disease severity and is reported here to mean that there are seven or more teeth ever having had decay, whether treated or untreated.
- 28 Adapted from Columbia University's *Opening the Mouth: Continuing Education in Oral Health* module, available online at <http://ccnmtl.columbia.edu/projects/otm/action.html>.
- 29 Ibid.
- 30 C.C. Guarnizo-Herreno and G.L. Wehby, "Children's dental health, school performance and psychosocial well-being," *Journal of Pediatrics* 161 no. 6 (2012): 1153-9 (DOI: 10.1016/j.jpeds.2012.05.025)
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- 32 C.C. Guarnizo-Herreno and G.L. Wehby, op. cit.
- 33 See Appendix B for a summary list of Washington's oral health policies and programs
- 34 While we speak of policies and programs throughout, the findings in this report may not reliably be used to determine the specific success or failure of any one specific oral health intervention or program, such as community water fluoridation.
- 35 Funding for individual county-level data collection and coordination was provided by Washington Dental Service Foundation. County-level findings are not included with this report.
- 36 Findings from the children who participated in the workshop were not included in the *Smile Survey* data.
- 37 See Appendix D for a list of all of the HP 2020 Oral Health Objectives for children and adolescents.
- 38 In Washington, dental sealants may be placed on children in school settings by dental hygienists or dentists. See Appendix B for more information.
- 39 2015 survey results do not indicate a significant change from 2010 (58 percent), and 2010 results are not a significant difference from 2005 (60 percent).
- 40 2010 survey results (15 percent) reported a significant change from 2005 to 2010; but there was not significant change between 2010 and 2015.
- 41 Centers for Disease Control and Prevention, National Center for Health Statistics, op. cit.
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- 43 American Dental Association, online at <http://ada.org>.
- 44 United States Department of Health and Human Services, "Dental Caries (Cavities): School-Based Dental Sealant Delivery Programs," *The Community Guide* (Washington, DC: HHS, 2013), available online at www.thecommunityguide.org/oral/schoolsealants.html.
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- 49 Formerly known as Free or Reduced School Lunch Program (FRL). Eligibility for the National School Lunch Program (NSLP) is a household income at or below 130 percent (free) and between 130 percent to 185 percent (reduced price) of the federal poverty level. More information available online at <http://www.fns.usda.gov/>.
- 50 Based on finding no significant difference, due to the point estimate of whites residing within the confidence intervals of non-white population measures, at the 95 percent confidence level.
- 51 To review specific racial/ethnicity trend data from 2005 and 2015-16 (second and third grade children), see Table 24.
- 52 See Figure 2, page 11.
- 53 Washington State Office of Financial Management, *State Population Forecast: November 2015 Data Tables* (Olympia, WA: OFM, 2015), available online at <http://www.ofm.wa.gov/pop/stfc/default.asp>.
- 54 For this survey, "rampant tooth decay" was defined as seven or more teeth that ever had a cavity, a filling, or a crown; or that were missing due to tooth decay.
- 55 Eligibility for the National School Lunch Program (NSLP) is a household income at or below 130 percent (free) and between 130 percent and 185 percent of the federal poverty level.
- 56 There are many cultures and ethnicities represented within this population grouping. For the purpose of this report, the term "Asian" includes children who are of Vietnamese, Korean, Japanese, Chinese, Laotian, Thai, Filipino, Cambodian, Pakistani, Asian Indian, or Hmong descent.
- 57 For the purpose of this report, the term "Pacific Islander" includes children who are of Native Hawaiian, Guamanian, Samoan, Fijian, Tongan, or other Pacific Island descent.
- 58 State of Washington Office of the Superintendent of Public Instruction, "Languages in Washington State," (Olympia, WA: OSPI, 2016), available online at <http://www.k12.wa.us/WorldLanguages/WLinWashington.aspx>.
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- 61 Children's Dental Health Project, "The State of Dental Health," (Washington, DC: Children's Dental Health Project, 2016), available online at: <https://www.cdhp.org/state-of-dental-health/pregnancy-early-childhood>.
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- 64 M.W. Ng, et al., op. cit.
- 65 For a more detailed list of Healthy People 2020 Oral Health Objectives for children, see Appendix D.
- 66 Our findings on the presence of dental sealants in this age group were negligible, but the recently renewed focus on dental sealant recommendations for prevention of decay in primary teeth,³⁸ may result in increased utilization rates in preschool children.
- 67 Tooth decay is the result of the disease known as “dental caries,” or simply “caries.”
- 68 Centers for Disease Control and Prevention, National Center for Health Statistics, op. cit.
- 69 Rampant decay for this survey was noted with the presence of seven or more teeth that had ever had decay or had been extracted due to decay.
- 70 There were too few survey participants of Pacific Islander descent (n=7) to report their results (See Table 30).
- 71 F. Ramos-Gomez, Y.O. Crystal, M.W. Ng, N. Tinanoff, J.D. Featherstone, “Caries Risk Assessment, Prevention, and Management in Pediatric Dental Care,” op. cit.
- 72 The small number of AI/AN children in the Smile Survey sample resulted in high rate of standard error (high RSE) for treatment needs, so the point estimates for these may not be as accurate.
- 73 C.C. Guarnizo-Herreno and G.L. Wehby, op. cit.
- 74 D. Locker, “Concepts of oral health, disease and the quality of life,” *Measuring oral health and quality of life* (Edited by GD Slade) (Chapel Hill, NC: University of Chapel Hill North Carolina, 1997): 11-23.
- 75 See Appendix A for expanded version; visit online for more information and source citations: <https://www.cdc.gov/policy/hst/statestrategies/oralhealth/index.html>.

TABLE 1:
Washington Kindergarten Comparison
By Year (2010, 2015–2016)

	2010 n= 2,858		2015/16 n= 4,482	
	Percent	95% CI	Percent	95% CI
Free of Dental Decay	60	57, 64	62	58, 65
Decay Experience				
Primary and/or Permanent	40	36, 43	38	35, 42
Any Permanent Teeth	**	**	2	1, 2
Untreated Decay	14	12, 16	13	12, 15
Rampant Decay	15	12, 18	13	11, 16
Treatment Needed				
No Obvious Problem	87	85, 89	88	86, 90
Early Treatment	12	11, 14	10	9, 12
Urgent Treatment	2	1, 2	2	1, 3
Dental Sealants	5†	4, 7	14	10, 19

TABLE 2:
Washington Kindergarten Disparities
National School Lunch Program Eligibility

	Not Eligible n=1,755		Eligible n=1,538	
	Percent	95% CI	Percent	95% CI
Decay Experience				
Primary and/or Permanent	29	25, 32	51†	47, 55
Any Permanent Teeth	1	1, 2	2	1, 3
Untreated Decay	11	9, 13	17†	14, 20
Rampant Decay	7	5, 10	21†	16, 26
Treatment Needed				
Early or Urgent Treatment	10	8, 12	16†	13, 19
Urgent Treatment	**	**	2	1, 3

TABLE 3:
Washington Kindergarten Disparities
Primary Language Spoken at Home

	English n=3,703		Other Language n=719	
	Percent	95% CI	Percent	95% CI
Decay Experience				
Primary and/or Permanent	36	32, 40	51†	44, 58
Any Permanent Teeth	2	1, 2	3	2, 4
Untreated decay	12	11, 14	17†	15, 21
Rampant Decay	13	10, 16	17	12, 23
Treatment needed				
Early or Urgent Treatment	11	9, 13	17†	14, 20
Urgent treatment	2	1, 3	**	**
Dental Sealants	15	10, 21	8†	6, 11

† = Statistically significantly different from reference group
** = Relative standard error ≥ 30%

TABLE 4:
Washington Kindergarten Demographics

	Count	Percent
Age		
5	3,219	52
6	2,126	47
7	27	<1
Gender		
Male	2,279	51
Female	2,201	49
Nat School Lunch Prog Eligibility		
Eligible	1,538	39
Not Eligible	1,755	36
Missing/Unknown	1,085	25
Language Spoken at Home		
English	3,703	82
Spanish	376	9
Other	248	6
English and Other	95	2
Unknown	59	1
Race/Ethnicity		
White	2,770	62
Black	258	6
Hispanic	765	17
Asian	356	8
American Indian/Alaska Native	24	<1
Native Hawaiian/Pacific Islander	48	1
Multi-racial	241	5
Other	12	<1
Unknown	8	<1

TABLE 5:
Washington Kindergarten Core Indicators

2015/16 n= 4,482	Percent	95% CI
Free of Dental Decay	62	58, 65
Decay Experience		
Primary and/or Perm	38	35, 42
Any Permanent Teeth	2	1, 2
Untreated Decay	1	0.5, 1
Rampant Decay	13	11, 16
Treatment Needed		
No Obvious Problem	88	86, 90
Early Treatment	10	9, 12
Urgent Treatment	2	1, 3
Dental Sealants	14	10, 19

TABLE 6:
Washington Kindergarten Disparities
By Race and Ethnicity

	Primary and/or Permanent	Any Permanent Teeth	Untreated Decay	Rampant Decay	Early or Urgent Treatment	Urgent Treatment	Dental Sealants
non-Hispanic White (n= 2,770 Reference Group)							
Percent	32	1	11	10	9	2	14
95% CI	29, 36	1, 2	9, 12	8, 13	8, 11	1, 3	9, 20
non-Hispanic Black (n= 258)							
Percent	38	**	14	13	14 [†]	**	16
95% CI	31, 45	**	11, 18	9, 18	11, 18	**	10, 23
Hispanic (n= 765)							
Percent	56 [†]	3 [†]	16 [†]	22 [†]	15 [†]	2	12
95% CI	51, 60	2, 5	13, 20	16, 29	12, 19	1, 4	7, 19
non-Hispanic Asian (n= 356)							
Percent	41 [†]	**	20 [†]	13	20 [†]	**	12
95% CI	35, 49	**	16, 24	8, 19	9, 35	**	7, 20
non-Hispanic American Indian/Alaska Native (n= 24)							
Percent	65 [†]	**	**	**	**	**	**
95% CI	41, 83	**	**	**	**	**	**
non-Hispanic Native Hawaiian or Other Pacific Islander (n= 48)							
Percent	71 [†]	**	31 [†]	36 [†]	31 [†]	**	**
95% CI	58, 82	**	18, 48	22, 54	18, 48	**	**
Multi-racial (n=241)							
Percent	39	**	15	12	14	**	22
95% CI	32, 46	**	11, 21	8, 17	10, 20	**	14, 33
Minority (n= 1,673)							
Percent	48 [†]	2	17 [†]	18 [†]	16 [†]	3	14
95% CI	43, 53	2, 3	15, 19	14, 23	14, 19	2, 4	10, 20

† = Statistically significantly different from reference group
 ** = Relative standard error ≥ 30%

TABLE 7:
Washington 2nd Grade Comparison
By Year (2005, 2015–2016)

	2005 n=3,632		2015/16 n=4,740	
	Percent	95% CI	Percent	95% CI
Decay Experience				
Primary and/or Permanent	58	55, 62	50 [†]	46, 54
Any Permanent Teeth	21	16.8, 25.3	9 [†]	7, 11
Untreated Decay	20	18.1, 22.8	12 [†]	11, 14
Rampant Decay	21	18.3, 24.6	19	16, 22
Dental Sealants	39	35.3, 43.4	45 [†]	40, 50

TABLE 8:
Washington 2nd Grade Disparities
Primary Language Spoken at Home

	English n= 3,878		Other Language n= 810	
	Percent	95% CI	Percent	95% CI
Decay Experience				
Primary and/or Permanent	48	44, 51	64 [†]	58, 69
Any Permanent Teeth	8	6, 11	12.0	9, 15
Untreated Decay	12	10, 14	15.0	11, 20
Rampant Decay	18	15, 21	23.0	17, 32
Treatment Needed				
Early or Urgent Treatment	10	9, 13	15 [†]	11, 19
Urgent Treatment	2	1, 3	**	**
Dental Sealants	45	39, 51	48.0	41, 55

TABLE 9:
Washington 2nd Grade Disparities
Free Reduced Lunch Eligibility

	Not Eligible n= 1,822		Eligible n= 1,689	
	Percent	95% CI	Percent	95% CI
Decay Experience				
Primary and/or Permanent	41	37, 45	64 [†]	60, 68
Any Permanent Teeth	9	6, 13	11	9, 14
Untreated Decay	12	9, 15	14	12, 17
Rampant Decay	12	9, 15	27 [†]	22, 32
Treatment Needed				
Early or Urgent Treatment	11	8, 14	14	12, 16
Urgent Treatment	**	**	2	2, 4
Dental Sealants	45	39, 52	48	41, 53

TABLE 10:
Washington 2nd Grade Demographics

	Count	Percent
Age		
7 yrs	2,248	48
8 yrs	2,423	51
9 yrs	63	1
Gender		
Male	2,505	53
Female	2,239	48
National School Lunch Prog Eligibility		
Eligible	1,699	38
Not Eligible	1,822	38
Missing/Unknown	1,180	24
Language Spoken at Home		
English	3,878	80
Spanish	387	10
Other	288	6
English and Other	135	3
Unknown	58	1
Race/Ethnicity		
White	2,868	59
Black	335	7
Hispanic	784	19
Asian	364	7
American Indian/Alaska Native	42	1
Native Hawaiian/Pacific Islander	55	1
Multi-racial	258	5
Other	17	<1
Unknown	23	<1

TABLE 11:
Washington 2nd Grade Core Indicators

2015/16 n=4,740	Percent	95% CI
Free of Dental Decay	50	46, 54
Decay Experience		
Primary and/or Permanent	50	46, 54
Any Permanent Teeth	9	7, 11
Permanent Only	5	4, 7
Untreated Decay	12	11, 14
Rampant Decay	19	16, 22.3
Treatment Needed		
No Obvious Problem	89	87, 90
Early Treatment	9	8, 11
Urgent Treatment	2	1, 3
Dental Sealants	45	40, 51

† = Statistically significantly different from reference group
** = Relative standard error ≥ 30%

TABLE 12:
Washington 2nd Grade Disparities
By Race and Ethnicity

	Primary and/or Permanent	Any Permanent Teeth	Untreated Decay	Rampant Decay	Early or Urgent Treatment	Urgent Treatment	Dental Sealants
non-Hispanic White (n= 2,868 Reference Group)							
Percent	44	7	10	15	9	2	44
95% CI	39, 48	6, 10	8, 11	12, 18	7, 11	1, 2	38, 50
non-Hispanic Black (n= 335)							
Percent	50	11	18 [†]	14	18 [†]	**	36
95% CI	44, 57	7, 16	12, 26	10, 19	12, 26	**	29, 45
Hispanic (n= 784)							
Percent	69 [†]	12 [†]	14 [†]	32 [†]	14 [†]	**	54 [†]
95% CI	65, 73	9, 15	11, 19	25, 40	10, 18	**	47, 61
non-Hispanic Asian (n= 364)							
Percent	51	9	18 [†]	15	17 [†]	**	43
95% CI	44, 58	5, 15	13, 23	10, 20	13, 22	**	34, 52
non-Hispanic American Indian/Alaska Native (n= 42)							
Percent	**	40 [†]	**	44 [†]	**	**	35
95% CI	**	23, 60	**	29, 61	**	**	21, 53
non-Hispanic Native Hawaiian or Other Pacific Islander (n= 55)							
Percent	70 [†]	20	25 [†]	32 [†]	25 [†]	**	46
95% CI	58, 81	12, 31	16, 34	22, 46	16, 38	**	32, 61
Multi-racial (n= 258)							
Percent	50	7	13	20	12	**	49
95% CI	43, 57	4, 12	10, 17	14, 27	9, 15	**	39, 60

† = Statistically significantly different from reference group

** = Relative standard error ≥ 30%

**TABLE 13:
Washington 3rd Grade Demographics**

	Count	Percent
Age		
8 yrs	2239	50
9 yrs	2,117	48
10 yrs	61	1
Gender		
Male	2,278	52
Female	2,150	48
Nat School Lunch Prog Eligibility		
Eligible	1,664	38
Not Eligible	1,697	39
Missing/Unknown	1,006	23
Language Spoken at Home		
English	3,515	80
Spanish	434	10
Other	274	6
English and Other	153	3
Unknown	56	1
Race/Ethnicity		
White	2,631	60
Black	293	7
Hispanic	780	17
Asian	337	7
American Indian/Alaska Native	59	1
Native Hawaiian/Pacific Islander	58	1
Multi-racial	236	5
Other	25	<1
Unknown	12	<1

**TABLE 15:
Washington 3rd Grade Disparities
Primary Language Spoken at Home**

	English n= 3,515		Other Language n= 861	
	Percent	95% CI	Percent	95% CI
Decay Experience				
Primary and/or Permanent	49	44, 54	67 [†]	60, 74
Any Permanent Teeth	11	9, 14	21 [†]	16, 27
Untreated Decay	11	9, 13	17 [†]	14, 21
Rampant Decay	16	14, 19	21	15, 30
Treatment Needed				
Early or Urgent Treatment	10	8, 11	16 [†]	12, 20
Urgent Treatment	2	1, 3	2	1, 3
Dental Sealants	54	47, 60	58	52, 64

**TABLE 16:
Washington 3rd Grade Disparities
National School Lunch Program Eligibility**

	Not Eligible n= 1,697		Eligible n= 1,696	
	Percent	95% CI	Percent	95% CI
Decay Experience				
Primary and/or Permanent	41	36, 45	68 [†]	63, 72
Any Permanent Teeth	9	7, 12	19 [†]	15, 24
Untreated Decay	10	8, 13	16 [†]	14, 19
Rampant Decay	11	9, 14	25 [†]	19, 32
Treatment Needed				
Early or Urgent Treatment	9	7, 11	15 [†]	12, 17
Urgent Treatment	**	**	**	**
Dental Sealants	54	47, 61	56	50, 62

**TABLE 14:
Washington 3rd Grade Core Indicators**

2015/16 n= 4,432	Percent	95% CI
Decay Experience		
Primary and/or Permanent	53	48, 57
Any Permanent Teeth	13	11, 16
Untreated Decay	12	10, 14
Rampant Decay	17	14, 21
Treatment Needed		
No Obvious Problem	89	87, 91
Early Treatment	9	7, 11
Urgent Treatment	2	1, 3
Dental Sealants	54	49, 60

**TABLE 17:
Washington 3rd Grade Comparison
By Year (2005, 2010, 2015–2016)**

	2005 n= 3,632		2010 n= 2,875		2015/16 n= 4,369	
	Percent	95% CI	Percent	95% CI	Percent	95% CI
Decay Experience						
Primary and/or Perm	60	57, 63	58	54, 61	53 [†]	48, 57
Any Permanent Teeth	24	19, 29	15	11, 20	13 [†]	11, 16
Untreated Decay	19	17, 22	15	13, 18	12 [†]	10, 14
Rampant Decay	21	18, 25	19	16, 22	17	14, 21
Treatment Needed						
No Obvious Problem	83	80, 86	85	82, 88	89 [†]	87, 91
Early Treatment	14	11, 17	13	11, 15	9 [†]	7, 11
Urgent Treatment	3	2, 4	2	1, 3	2 [†]	1, 3
Dental Sealants	50	47, 54	51	46, 57	54 [†]	49, 60

TABLE 18:
Washington 3rd Grade Disparities
By Race and Ethnicity

	Primary and/or Permanent	Any Permanent Teeth	Untreated Decay	Rampant Decay	Early or Urgent Treatment	Urgent Treatment	Dental Sealants
non-Hispanic White (n= 2,631 Reference Group)							
Percent	48	10	10	15	9	1	52
95% CI	43, 52	8, 14	9, 12	12, 18	7, 11	1, 2	46, 59
non-Hispanic Black (n= 293)							
Percent	51	11	16 [†]	13	15 [†]	**	50
95% CI	45, 58	7, 16	12, 21	9, 18	11, 20	**	41, 58
Hispanic (n= 780)							
Percent	71 [†]	12 [†]	14	27 [†]	13 [†]	3	65 [†]
95% CI	65, 77	16, 28	11, 18	18, 38	10, 17	1, 5	61, 70
non-Hispanic Asian (n= 337)							
Percent	45	8	15	13	14 [†]	**	49
95% CI	36, 54	6, 12	11, 19	9, 19	11, 19	**	40, 59
non-Hispanic American Indian/Alaska Native (n= 59)							
Percent	60	25 [†]	**	**	18	**	43
95% CI	40, 78	16, 37	**	**	10, 31	**	31, 56
non-Hispanic Native Hawaiian or Other Pacific Islander (n= 58)							
Percent	80 [†]	32 [†]	27 [†]	32 [†]	27 [†]	**	52
95% CI	71, 87	19, 48	18, 37	21, 46	18, 37	**	35, 68
Multi-racial (n= 236)							
Percent	55	17 [†]	13	20	12	**	58
95% CI	46, 64	12, 24	9, 17	15, 45	8, 23	**	48, 67

† = Statistically significantly different from reference group

** = Relative standard error ≥ 30%

TABLE 19:
Washington Combined 2nd and 3rd Grade Core Indicators

2015/16 n= 9,222	Percent	95% CI
Decay Experience		
Primary and/or Permanent	52	48, 56
Any Permanent Teeth	11	9, 14
Untreated Decay	12	11, 14
Rampant Decay	18	15, 22
Treatment Needed		
No Obvious Problem	89	87, 90
Early Treatment	9	8, 11
Urgent Treatment	2	1, 3
Dental Sealants	50	44, 55

TABLE 22:
Washington Combined 2nd and 3rd Grade Disparities
Primary Language Spoken at Home

	English n= 7,433		Other Language n= 1,675	
	Percent	95% CI	Percent	95% CI
Decay Experience				
Primary and/or Permanent	49	45, 53	66 [†]	60, 72
Any Permanent Teeth	10	8, 12	17 [†]	13, 21
Untreated Decay	12	10, 13	16 [†]	13, 20
Rampant Decay	17	15, 20	22	16, 29
Treatment Needed				
Early or Urgent Treatment	10	9, 12	15 [†]	12, 19
Urgent Treatment	2	1, 3	2	1, 3
Dental Sealants	49	43, 55	54	48, 61

TABLE 20:
Washington Combined 2nd and 3rd Grade Disparities
National School Lunch Program Eligibility

	Not Eligible n= 3,519		Eligible n= 3,353	
	Percent	95% CI	Percent	95% CI
Decay Experience				
Primary and/or Permanent	41	37, 45	67 [†]	62, 70
Any Permanent Teeth	9	7, 12	15 [†]	12, 19
Untreated Decay	11	9, 14	15 [†]	13, 17
Rampant Decay	12	9, 15	26 [†]	20, 31
Treatment Needed				
Early or Urgent Treatment	10	8, 13	14 [†]	12, 16
Urgent Treatment	2	1, 3	3	2, 4
Dental Sealants	50	43, 56	53	47, 58

TABLE 23:
Washington Combined 2nd and 3rd Grade
Demographics

	Count	Percent
Age		
7 yrs	2,275	25
8 yrs	4,682	50
9 yrs	2,190	24
10 yrs	62	1
Gender		
Male	4,806	52
Female	4,410	48
National School Lunch Program Eligibility		
Eligible	3,353	39
Not Eligible	3,519	38
Missing/Unknown	2,186	24
Language Spoken at Home		
English	7,433	80
Spanish	822	10
Other	565	6
English and Other	288	3
Unknown	114	1
Race/Ethnicity		
White	5,527	59
Black	630	7
Hispanic	1,565	18
Asian	706	7
American Indian/Alaska Native	101	1
Native Hawaiian/Pacific Islander	113	1
Multi-racial	502	5
Other	43	<1
Unknown	35	<1

TABLE 21:
Washington Combined 2nd and 3rd Grade
Comparison

	2005 n= 7,291		2015/16 n= 9,072	
	Percent	95% CI	Percent	95% CI
Decay Experience				
Primary and/or Perm	59	56, 62	52	48, 56
Any Permanent Teeth	22 [†]	18, 27	11	9, 14
Untreated Decay	20 [†]	18, 22	12	11, 14
Rampant Decay	21	18, 24	18	15, 22
Treatment Needed				
No Obvious Problem	82 [†]	78, 85	89	87, 90
Early Treatment	15 [†]	12, 18	9	8, 11
Urgent Treatment	3 [†]	3, 4	2	1, 3
Dental Sealants	45	42, 48	50	44, 55

TABLE 24:
Washington Combined 2nd and 3rd Grade Disparities
By Race and Ethnicity

	Primary and/or Permanent	Any Permanent Teeth	Untreated Decay	Rampant Decay	Early or Urgent Treatment	Urgent Treatment	Dental Sealants
non-Hispanic White (n= 5,527 Reference Group)							
Percent	45	9	10	15	9	1	48
95% CI	41, 50	7, 12	9, 12	12, 17	7, 11	1, 2	42, 54
non-Hispanic Black (n= 630)							
Percent	51	11	18 [†]	14	17 [†]	**	43
95% CI	46, 57	8, 15	13, 23	11, 19	13, 23	**	36, 49
Hispanic (n= 1,565)							
Percent	71 [†]	16 [†]	14 [†]	29 [†]	13 [†]	2	61 [†]
95% CI	66.4, 75.2	13, 21	12, 18	22, 38	11, 16	1, 3	55, 66
non-Hispanic Asian (n= 706)							
Percent	48	8	16 [†]	15	16 [†]	**	46
95% CI	42, 55	6, 12	14, 20	11, 19	13, 19	**	38, 55
non-Hispanic American Indian/Alaska Native (n= 101)							
Percent	67 [†]	31 [†]	19 [†]	37 [†]	19 [†]	**	39
95% CI	53, 79	20, 44	12, 29	23, 54	12, 29	**	27, 63
non-Hispanic Native Hawaiian or Other Pacific Islander (n= 113)							
Percent	75 [†]	26 [†]	26 [†]	32 [†]	26 [†]	**	49
95% CI	66, 82	19, 35	20, 34	22, 44	20, 34	**	36, 63
Multi-racial (n= 502)							
Percent	53	12	13 [†]	21 [†]	12	3	53
95% CI	46, 59	8, 17	11, 16	16, 26	10, 15	2, 5	40, 55

† = Statistically significantly different

TABLE 25:
Washington Combined 2nd and 3rd Grade Disparities Comparison
 By Race and Ethnicity and by Year (2005 and 2015–16)

	Primary and/or Permanent	Any Permanent Teeth	Untreated Decay	Rampant Decay	Early or Urgent Treatment	Urgent Treatment	Dental Sealants
Non-Hispanic White							
2005 (n= 5,135)	55 (51, 59)	20 (16, 24)	16 (14, 19)	18 (15, 21)	15 (11, 19)	2 (2, 3)	47 (44, 51)
2016 (n= 5,527)	45 [†] (41, 50) [†]	9 [†] (7, 12) [†]	10 [†] (9, 12) [†]	15 (12, 17)	9 [†] (7, 11) [†]	1 [†] (1, 2) [†]	48 (42, 54)
Non-Hispanic Black							
2005 (n= 462)	60 (54, 65)	27 (18, 35)	25 (20, 29)	18 (13, 24)	19 (15, 24)	3	41 (35, 46)
2016 (n= 630)	51 (46, 57)	11 [†] (8, 15) [†]	18 (13, 23)	14 (11, 19)	17 [†] (13, 23) [†]	**	43 (36, 49)
Hispanic							
2005 (n= 981)	72 (68, 76)	30 (23, 36)	30 (26, 33)	34 (28, 39)	27 (23, 31)	6 (4, 8)	39 (33, 45)
2016 (n= 1,565)	71 (66, 75)	16 [†] (13, 21) [†]	14 [†] (12, 18) [†]	29 (22, 38)	13 [†] (11, 16) [†]	2 [†] (1, 3) [†]	61 [†] (55, 66) [†]
Non-Hispanic Asian							
2005 (n= 451)	68 (63, 72)	28 (18, 37)	27 (23, 32)	26 (19, 33)	25 (21, 30)	5	39 (33, 45)
2016 (n= 706)	48 [†] (42, 55) [†]	8 [†] (6, 12) [†]	16 (14, 20)	15 (11, 19)	16 (13, 19)	**	46 (38, 55)
Non-Hispanic American Indian/Alaska Native							
2005 (n= 133)	77 (69, 86)	28 (20, 37)	37 (24, 51)	42 (17, 67)	35 (20, 49)	6	48 (36, 59)
2016 (n= 101)	67 (53, 79)	31 (20, 44)	19 (12, 29)	37 (23, 54)	19 (12, 29)	**	39 (27, 63)

† = Statistically significantly different change from 2005

** = Relative standard error ≥ 30%

**TABLE 26 (Part 1):
List of Participating Elementary Schools in Washington (A-J)**

School	District	County	No. Kids Surveyed	Response Rate	Percent NSLP
Audubon Elementary	Lake Washington School District	King	247	100%	5%
Bemiss Elementary	Spokane School District	Spokane	189	76%	89%
Benjamin Rush Elementary	Lake Washington School District	King	229	80%	10%
Beverly Elementary school	Edmonds School District	Snohomish	156	69%	48%
Brewster Elementary	Brewster School District	Okanogan	226	80%	100%
Brouillet Elementary	Puyallup School District	Pierce	220	83%	29%
Bryn Mawr Elementary	Renton School District	King	198	79%	62%
Butler Acres Elementary	Kelso School District	Cowlitz	124	74%	43%
Canyon View Elementary	Kennewick School District	Benton	204	64%	72%
Cascade K-8 Elementary	Shoreline School District	King	74	56%	18%
Centennial Elementary	Mount Vernon School District	Skagit	244	88%	77%
Chambers Prairie Elementary	North Thurston Public Schools	Thurston	246	87%	56%
Cottonwood Elementary	Kennewick School District	Benton	263	100%	14%
Cottonwood Elementary	Central Kitsap School District	Kitsap	139	79%	37%
Crescent Harbor Elementary	Oak Harbor School District	Island	189	64%	55%
Daniel Bagley Elementary	Seattle Public Schools	King	176	83%	17%
East Olympia Elementary	Tumwater School District	Thurston	176	83%	33%
Edwin R. Opstad Elementary	Snoqualmie Valley School District	King	250	80%	21%
Emerald Park Elementary	Kent School District	King	184	85%	86%
Evergreen Elementary	Bethel School District	Pierce	213	83%	61%
Evergreen Elementary	Penninsula School District	Pierce	103	94%	76%
Evergreen Forest Elementary	North Thurston Public Schools	Thurston	193	81%	36%
Evergreen Primary School	University Place School District	Pierce	268	93%	38%
Franklin Elementary	Tacoma School District	Pierce	125	100%	73%
Harvard Elementary	Franklin Pierce School District	Pierce	185	88%	80%
Hazelwood Elementary	Renton School District	King	249	85%	23%
Hazelwood Elementary	Edmonds School District	Snohomish	171	80%	40%
Heights Elementary	Clarkston School District	Asotin	109	73%	39%
Hockinson Heights Elementary	Hockinson School District	Clark	284	80%	22%
Horizon Elementary	Mukilteo School District	Snohomish	192	52%	82%
Horizons Elementary	North Thurston Public Schools	Thurston	233	81%	24%
Hulan L Whitson Elementary	White Salmon Valley School District	Klickitat	274	89%	52%
Illahee Elementary School	Evergreen School District (Clark)	Clark	233	80%	20%
Irene Reither Elementary	Meridian School District	Whatcom	186	57%	50%
Jefferson Elementary	Tacoma School District	Pierce	110	73%	63%
Jefferson Elementary	Port Angeles School District	Clallam	120	84%	65%

**TABLE 26 (Part 2):
List of Participating Elementary Schools in Washington (K-Y)**

School	District	County	No. Kids Surveyed	Response Rate	Percent NSLP
Kirk Elementary	Lake Washington School District	King	102	100%	8%
Kitsap Lake Elementary	Bremerton School District	Kitsap	154	67%	48%
Lake Louise Elementary	Clover Park School District	Pierce	167	92%	75%
Lakeland Elementary	Federal Way School District	King	151	76%	53%
Lakeridge Elementary	Renton School District	King	108	50%	87%
Lea Hill Elementary	Auburn School District	King	172	81%	58%
Martin Luther King Jr Elementary	Yakima School District	Yakima	109	35%	92%
McDonald International Elementary	Seattle Public Schools	King	122	46%	6%
McKenny Elementary	Olympia School District	Thurston	130	84%	31%
McKinley Elementary	Yakima School District	Yakima	197	86%	100%
Midway Elementary	Mead School District	Spokane	177	75%	14%
Mt. View Elementary	Shelton School District	Mason	222	75%	65%
Mullenix Ridge Elementary	South Kitsap School District	Kitsap	168	81%	29%
Neely O'Brien Elementary	Kent School District	King	185	80%	65%
North Elementary	Moses Lake School District	Grant	114	87%	92%
Ocean Shores Elementary	North Beach School District	Gray's Harbor	72	64%	73%
Orcas Island Elementary	Orcas Island School District	San Juan	77	93%	48%
Phantom Lake Elementary	Bellevue School District	King	112	100%	36%
Pomeroy Elementary	Pomeroy School District	Garfield	53	79%	48%
Progress Elementary	Central Valley School District	Spokane	142	72%	66%
Rearдан Elementary	Rearдан-Edwall School District	Lincoln	79	72%	41%
Redmond Elementary	Lake Washington School District	King	202	82%	28%
Regal Elementary	Spokane School District	Spokane	179	90%	88%
Rocky Ridge Elementary	Bethel School District	Pierce	229	100%	54%
Sacajawea Elementary	Richland School District	Benton	206	100%	49%
Satus Elementary	Wapato School District	Yakima	287	78%	100%
Scenic Hills Elementary	Kent School District	King	245	85%	85%
Shiloh Hills Elementary	Mead School District	Spokane	211	86%	73%
Silver Beach Elementary	Bellingham School District	Whatcom	159	75%	19%
South Whidbey Elementary	South Whidbey School District	Kitsap	184	76%	36%
Stevens Elementary	Seattle Public Schools	King	145	83%	37%
Sunny Hills Elementary	Issaquah School District	King	240	84%	8%
Sunrise Elementary	Enumclaw School District	King	161	76%	35%
Tiffany Park Elementary	Renton School District	King	205	84%	62%
Tonasket Elementary	Tonasket School District	Okanogan	212	86%	87%
Warrem Hunt Elementary	Puyallup School District	Pierce	202	84%	42%
Washington Hoyt Elementary	Tacoma School District	Pierce	171	81%	17%
Windsor Elementary	Cheney School District	Spokane	136	61%	44%
Winlock Elementary	Winlock School District	Lewis	101	72%	100%
Yacolt Primary	Battle Ground School District	Clark	451	94%	40%
Total			13,553	78%	

**TABLE 27:
Washington Preschool Demographics**

	Count	Percent
Age		
3 yrs	172	12
4 yrs	764	52
5 yrs	543	37
Gender		
Male	757	51
Female	720	49
Unknown	2	<1
Language Spoken at Home		
English	1,000	68
Spanish	376	25
Other	36	2
English and Other	48	3
Unknown	19	1
Race/Ethnicity		
White	665	45
Black	138	9
Hispanic	522	35
Asian	30	2
American Indian/Alaska Native	39	3
Native Hawaiian/Pacific Islander	7	<1
Multi-racial	74	5
Other	3	<1
Unknown	1	<1

**TABLE 28:
Washington Preschool Disparities
Primary Language Spoken at Home**

	English		Other Language	
	Percent	95% CI	Percent	95% CI
Decay Experience	42	38, 47	53 [†]	45, 61
Untreated Decay	17	14, 22	18	12, 24
Rampant Decay	20	16, 24	24	17, 32
White Spots	23	17, 29	20	14, 28
Early or Urgent Treatment Needed	13	10, 16	14	10, 18
Urgent Treatment Needed	**	**	**	**

**TABLE 29:
Washington Preschool Core Indicators
3-5 year olds**

	Percent	95% CI
Decay Experience	45	41, 49
Untreated Decay	17	13, 21
Rampant Decay	21	17, 25
White Spots	22	17, 28
Treatment Needed	13	10, 16
No Obvious Problem	86	83, 89
Early Treatment Needed	12	10, 15
Urgent Treatment Needed	**	**

**TABLE 30:
Washington Preschool Comparison
By Year (2005, 2010, 2015–2016)**

	2005 n=1,172		2010 n=1,552		2015/16 n=1,479	
Decay Experience	46	39, 52	40	37, 44	45	41, 49
Untreated Decay	26	21, 32	13 [†]	11, 16	17 [†]	13, 21
Rampant Decay	16	12, 20	17	15, 20	21	17, 25
White Spots	23	17, 31	21	16, 26	22	17, 26
Early or Urgent Treatment Needed	23	17, 29	12 [†]	10, 15	13 [†]	10, 16

† = Statistically significantly different from reference group

** = Relative standard error ≥ 30%

TABLE 31:
Washington Preschool Disparities
By Race and Ethnicity

	Decay Experience	Untreated Decay	Rampant Decay	White Spots	Early or Urgent Treatment	Urgent Treatment
Non-Hispanic White (n= 431)						
Percent	41	17	17	19	13	**
95% CI	36, 46	14, 21	14, 22	14, 26	11, 16	**
Non-Hispanic Black (n= 112)						
Percent	33	14	**	25	12	**
95% CI	32, 45	9, 21	**	15, 39	8, 18	**
Hispanic (n= 359)						
Percent	51 [†]	16	26	22	11	**
95% CI	45, 58	11, 22	19, 34	16, 29	8, 16	**
Non-Hispanic Asian (n= 22)						
Percent	58 [†]	**	**	**	**	**
95% CI	42, 74	**	**	**	**	**
Non-Hispanic American Indian/Alaska Native (n= 27)						
Percent	66 [†]	38 [†]	34 [†]	53 [†]	**	**
95% CI	58, 73	27, 51	28, 41	38, 67	**	**
Non-Hispanic Native Hawaiian or Other Pacific Islander (n= 7)						
Percent	**	**	**	**	**	**
95% CI	**	**	**	**	**	**
Multi-racial (n= 59)						
Percent	37	17	**	27	15	**
95% CI	29, 45	11, 25	**	15, 43	10, 21	**
Minority (n= 588)						
Percent	49 [†]	17	24	24	12	**
95% CI	43, 56	12, 22	19, 31	18, 31	9, 17	**

† = Statistically significantly different from reference group

** = Relative standard error ≥ 30%

**TABLE 32 (Part 1):
List of Participating Preschools in Washington (A-S)**

Site	City	County	# Screened	Percent Screened
ACAP Head Start	Auburn	King	13	62%
Basin City Child Development Center	Mesa	Franklin	29	81%
Cedar Valley Community School	Lynnwood	Snohomish	27	79%
Centralia Head Start	Centralia	Lewis	44	80%
Children's Learning Center	Everett	Snohomish	18	90%
Colville Head Start	Colville	Stevens	44	68%
Creative Kids Learning Center	Porth Orchard	Kitsap	23	47%
Curlew Preschool	Curlew	Ferry	9	64%
Denise Schmidt Center	Moses Lake	Grant	72	90%
George/Quincy Inspire	Geoprge	Grant	19	76%
Green Park Head Start/ECEAP	Walla Walla	Walla Walla	28	85%
Hamilton Elementary Headstart	Port Angeles	Clallam	24	60%
Hawks Prairie Head Start	Lacey	Thurston	82	79%
Hawthorne ECEAP	Kennewick	Benton	30	83%
Hugs, Tugs and Luvs	Spanaway	Pierce	15	88%
Issaquah Briarwood	Renton	King	31	84%
Lake Stevens ELC	Lake Stevens	Snohomish	66	86%
Little Rainbow Head Start	Puyallup	Pierce	6	86%
Mallot Migrant Head Start	Malott	Okanogan	23	100%
Mattawa ECEAP	Mattawa	Grant	38	95%
Mattawa Inspire	Mattawa	Grant	18	100%
Memorial ECEAP	Vancouver	Clark	50	76%
Mount Vernon CDC	Mt. Vernon	Skagit	56	93%
Northeast Tacoma ECEAP	Tacoma	Pierce	23	82%
North Omak ECEAP	Omak	Okanogan	63	80%
Northport ECEAP	Northport	Stevens	9	82%
Okanogan Head Start	Omak	Okanogan	27	90%
Omak Tribal Head Start	Omak	Okanogan	21	62%
Pioneer CDI Head Start	Sunnyside	Yakima	10	59%
Robert Lince ELC	Selah	Yakima	52	83%
Roosevelt Head Start	Tacoma	Pierce	54	90%
Shoreline Maridian Park	Shoreline	King	64	85%
Silver Lake ECEAP	Everett	Snohomish	32	89%
St. Francis Childcare Center	Bellingham	Whatcom	24	40%
Sunnyside	Marysville	Snohomish	59	84%
SWCC Image	Vancouver	Clark	24	60%

TABLE 32 (Part 2):
List of Participating Preschools in Washington (S-Y)

Site	City	County	# Screened	Percent Screened
Tapteal ECEAP	West Richland	Benton	23	77%
TCC Early Learning Center	Tacoma	Pierce	19	95%
Trent ECEAP	Spokane Valley	Spokane	53	78%
Union Gap EPIC Head Start	Union Gap	Yakima	18	100%
Vaughn ECEAP	Tacoma	Pierce	17	81%
VOA Trailside ECEAP	Everett	Snohomish	13	65%
Washington Elementary Head Start	Hoquiam	Grays Harbor	73	81%
Whitman Elementary	Tacoma	Pierce	18	95%
Yacolt Head Start	Yacolt	Clark	11	85%
YMCA Birchwood	Bellingham	Whatcom	16	89%
YMCA Silver Beach	Bellingham	Whatcom	13	76%
Total			1,501	80%

