

Smile Survey 2010: The Oral Health of Children in Pierce County

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Executive Summary

During the 2009-2010 school year about 1,300 kindergartners, 1,300 3rd graders and 300 3–5 year old children in Head Start or Early Childhood Education and Assistance Program (ECEAP) preschools received brief dental examinations as part of the Washington State Smile Survey. This report focuses on three measures from this assessment:

- *The percent of children with a history of decay, particularly history of widespread decay.* History of decay includes both treated and untreated decay and widespread decay is decay in seven or more teeth. History of decay is an indicator of the effectiveness of primary prevention efforts in the community.
- *The percent of children with current untreated decay.* This is a measure of the burden of suffering and an indicator of access to restorative dental services in the community.
- *The percent of children with dental sealants.* Dental sealants are applied to first permanent molars to protect them from decay. This is an indicator of access to preventive dental services in the community.

Elementary school children. Sixty-two percent of kindergartners and 49% of 3rd graders screened in 2010 had never experienced tooth decay. History of widespread decay declined about 20 percentage points among 3rd graders between 2005 and 2010. Unfortunately, 14% of kindergartners and 21% of 3rd graders still had a history of widespread decay in 2010.

Widespread decay also declined roughly 20 percentage points within subgroups based on race or socioeconomic status, although children of color and children of low income continued to be at higher risk of having experienced decay. This similar pattern of improvement within subgroups suggests that primary prevention of tooth decay improved via some broad-based mechanism that was independent of race or socioeconomic status.

In 2010 prevalence of untreated decay was about 17% among kindergartners and about 19% among 3rd graders. Our performance on this measure was better than the Healthy People 2010 target of 21% and not detectably different than for all of Washington State.

Only about 39% of 3rd graders in Pierce County had dental sealants; the Healthy People 2010 target was 50%. This was the only measure in this report in which Pierce County children had detectably poorer oral health than children statewide.

There was no population-wide improvement between 2005 and 2010 in either the prevalence of untreated decay or of sealants. Both measures, however, improved among children of color. This greatly reduced earlier disparities on the basis of race. The similar pattern of results for these two measures suggests that they reflect a common factor, access to professional dental services

Low-income preschool children. Among low-income preschool children prevalence of decay history decreased from about 51% to 35%, and prevalence of widespread decay history decreased from about 20% to 13%. Just as for older children, improvements were similar among groups based on race and ethnicity, so disparities were preserved. Non-white and Hispanic children had almost twice the prevalence of decay as did white non-Hispanic

children. In addition, prevalence of untreated decay improved among low-income preschool children from about 30% to 15%.

Taken together, the data paint a picture of expanded access to dental care among high-risk children, children of color and young children of low income, and improved decay prevention population-wide. Despite improvements, non-white and Hispanic children, children of low income, and children attending schools without fluoridated water were disproportionately affected by dental decay.

Background

Tooth decay declined precipitously since the 1950s as fluoride became more and more available through water systems and toothpastes. In the 1990s, however, this downward trend seemed to reverse at both the national¹ and Washington State² levels. Tooth decay remains one of the most common chronic diseases in children in the United States³ and results in an estimated loss of 52 million school hours per year⁴. The primary focus of this report will be to examine change since 2005 when the last Smile Survey was performed.

Overall trends in tooth decay, however, obscure large disparities in how decay is distributed in the population. In children 2–5 years of age, 75% of decayed tooth surfaces are found in just 8% of children.⁵ The children at highest risk of dental decay are low-income children and children of color.⁶

Dental decay is largely preventable through personal behavior (e.g. diet and oral hygiene), community measures (e.g. water fluoridation), targeted interventions (e.g. school-based sealant delivery programs) and professional dental care. Disparities in decay signal that preventive and restorative efforts are inequitably distributed. A second focus of this report will be to examine disparities in oral health and how they have changed since 2005.

Every five years the State of Washington conducts a survey to assess the oral health of Washington State children. The assessment primarily conveys information about children's oral health, but it also indicates how we as a community fare in caring for our children's teeth. The key measures and what they say about our community are listed in Table 1.

Table 1 Key oral health indicators

Indicator	Community-level interpretation
Percent with untreated decay	Access to restorative dental services (e.g. fillings)
Percent with pit and fissure sealants	Access to preventive dental services
History of decay (treated and untreated)	Effectiveness of decay prevention by families, communities and providers

To put current Pierce County performance into perspective, we have included several benchmarks to which local data can be compared. These are:

- 2010 Washington State data⁷
- Healthy People 2010 objectives⁸
- 2005 Pierce County Smile Survey data⁹

Methods

The most recent Washington State Smile Survey was conducted during the 2009–2010 school year. The survey was conducted in two groups of schools. The first sample included 21 elementary schools systematically selected to represent the county. The second sample was a random sample of 14 Head Start and Early Childhood Education and Assessment Program (ECEAP) preschools. Low income is an eligibility criterion for these programs, so children in this sample were expected to be at high risk of dental decay.

A dental hygienist conducted oral health screenings of children at the selected schools using disposable dental mirrors and strong penlights to visualize untreated decay, treated decay and sealants. Because examinations were brief and x-rays were not used, the survey probably underestimated the level of untreated decay.

In addition to the clinical measures, we also collected demographic information such as race (by observation) and whether an elementary school student was receiving free or reduced price meals at school. In order to qualify for free or reduced price meals, a child must be from a household with income less than 185% of the federal poverty level, so this measure was used as an indicator of low income. Subsidized meals status was missing for two schools and for 3rd graders at a third school.

Preschool children younger than three were excluded. School was treated as the primary sampling unit in data analysis. For elementary school data, observations were weighted for non-response. Data are presented as percents and 95% confidence intervals (95% CI). Confidence intervals indicate how well the sample results estimate the results for the whole county population. They show the range of population values that would be consistent with the sample value. Confidence intervals are shown as error bars in the figures.

Changes in prevalence since 2005 were assessed using Pearson chi-square statistics, corrected for the survey design. Kindergarteners were not assessed in 2005, so change could not be examined in this age group. We used log binomial regression models with school as a clustering variable to statistically evaluate the independent contributions of time, demographic and community factors to dental outcomes. To determine whether trends differed for different subgroups, we tested year x group interaction terms in these models. These methods yield the likelihood (p-value) that differences among groups were because of chance and not because of differences inherent to the groups. All data analyses were performed using Stata 11.0.

Because we had only aggregate state-level data, we considered state and county results to be different only if their confidence intervals did not overlap. This approach is conservative; it is biased toward missing true differences.¹⁰

Tabulated 2010 data are in the appendix.

Elementary School Children

Participants

We examined 1,314 kindergarteners and 1,346 3rd graders from 21 elementary schools in the county. Among the participating schools, 82.6% of enrolled students were screened. Third graders screened were racially similar to all 3rd graders in Pierce County public elementary schools (Figure 1). Somewhat more students in the 3rd grade sample (53.2%) than in all county elementary school students (44.7%) received free or reduced price meals at school. Because poor oral health is associated with free or reduced price meals status, the oral health of children in the sample may be somewhat worse than that of all county children.

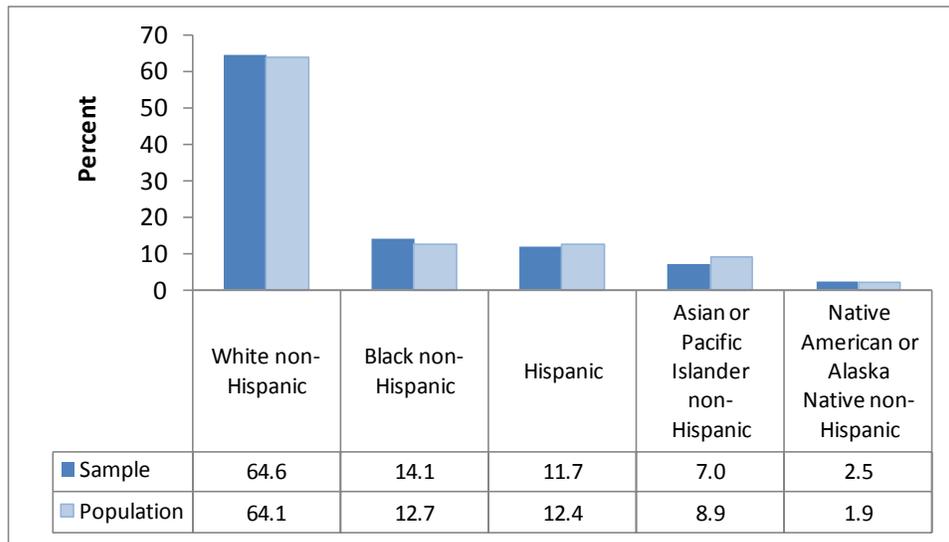


Figure 1 Demographic characteristics of 3rd grade sample and of all Pierce County 3rd graders enrolled in public school

Among 3rd graders, neither untreated decay nor dental sealant rates changed between 2005 and 2010

Untreated decay

Washington State is a national leader in minimizing the percent of children with untreated decay.¹¹ In Pierce County, fewer than one in five children had detectable untreated decay in either primary or permanent teeth in 2010 (Figure 2). This is lower than the Healthy People 2010 objective of 21% for ages 6–8. There was no meaningful difference in untreated decay rates between 2005 and 2010 or between Washington State and Pierce County. These results suggest that children in Pierce County are receiving restorative dental services at or above the national target, but significant numbers of children are still suffering from untreated dental decay.

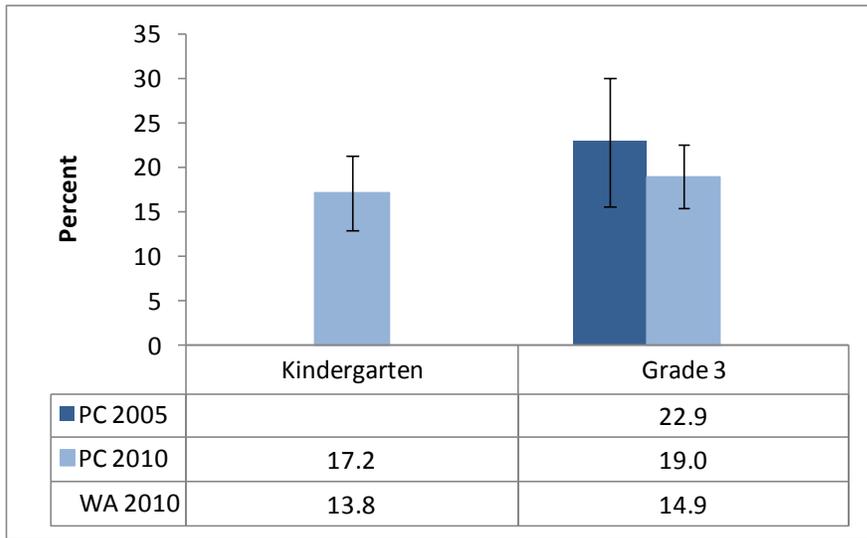


Figure 2 Untreated tooth decay in kindergarteners and 3rd graders, Pierce County, 2005 and 2010

Pit and fissure sealants

Sealants are protective coatings placed on healthy permanent molars. They are highly effective in preventing dental decay. Washington State is a leader in the prevalence of children with sealants.¹² In Pierce County, there was no change in sealant prevalence between 2005 and 2010, and the proportion of children with sealants remained below the Healthy People objective of 50%. Sealant prevalence in Pierce County was lower than that in Washington State, where 51.2% of 3rd graders had sealants.

Sealants tend to be underused in private practice dentistry.¹³ They can be applied in other settings, such as schools, and doing so is recommended in high-risk populations.¹⁴

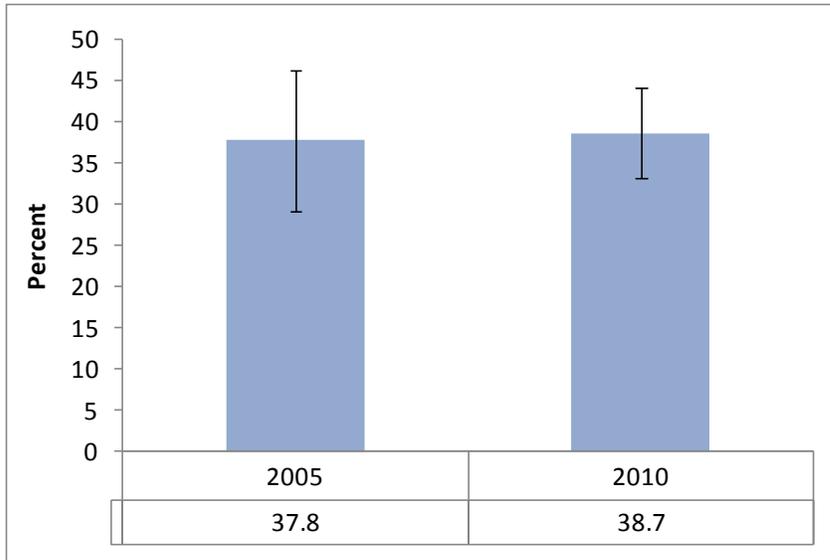


Figure 3 Dental sealants in 3rd graders, Pierce County, 2005 and 2010

History of decay (treated and untreated)

In Pierce County, 62% of kindergarteners were completely free of tooth decay (Figure 4). Among 3rd graders, about 49% were free of decay (Figure 5). This falls short of the Healthy People 2010 objective of 58% for ages 6–8. The distribution of decay in 3rd graders had improved since 2005. In that year, the distribution was bimodal: about 40% of children had no decay, about 40% had widespread decay, and about 20% were in the middle. In 2010 the profile had changed: about half of children had no decay, about 30% had decay in a few teeth and just 21% had widespread decay.

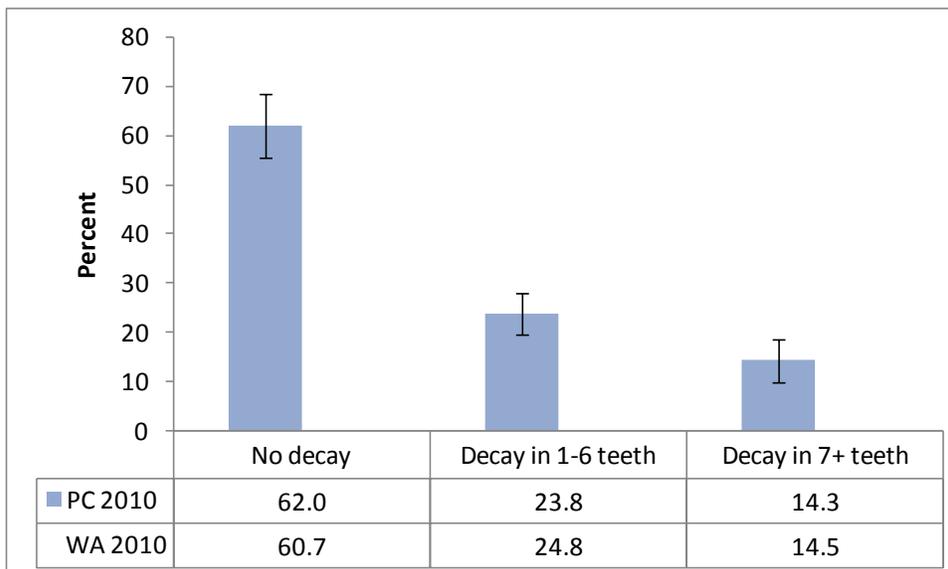


Figure 4 Distribution of decay in kindergarteners, Pierce County, 2010

History of widespread decay (decay in 7 or more teeth) improved

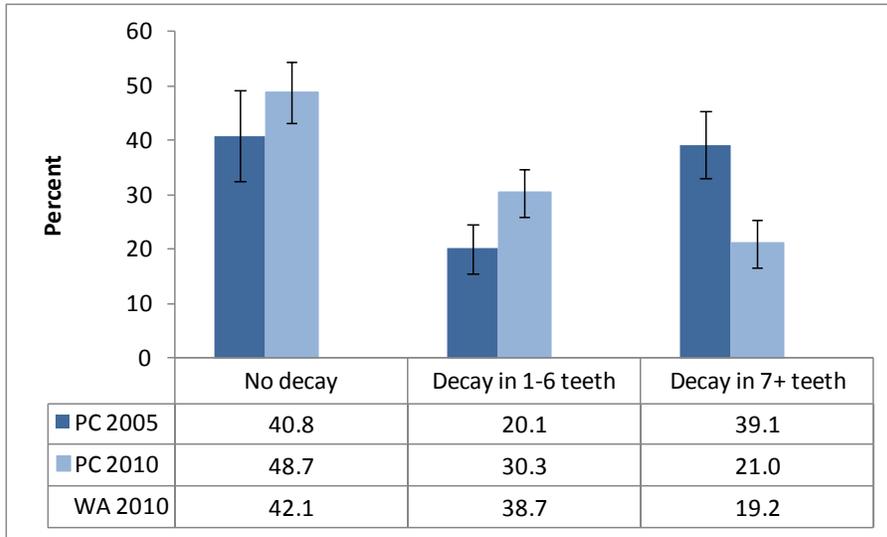


Figure 5 Distribution of decay in 3rd graders, Pierce County, 2005 and 2010

There was no meaningful difference between Washington State and Pierce County in prevalence of decay experience.

Disparities in untreated decay and sealants

Some oral health indicators in Pierce County had improved since 2005 while others had not changed. In this section we explore whether the patterns seen for all children also held true for selected high-risk subgroups of children.

On the whole, there was no change in prevalence of untreated decay in 3rd graders between 2005 and 2010 (Figure 2). The same was true for children grouped by free or reduced price meals status (Figure 6). Children who received subsidized meals were more likely to have untreated decay than children who did not, but decay prevalence in neither group changed detectably since 2005.

The pattern was very different when children were grouped by race (Figure 7). Non-white and Hispanic children experienced significant improvements in untreated decay prevalence. The disparities observed in 2005 had decreased dramatically by 2010. Because this group made up a relatively small part of the entire population, however, its gains had little impact on county-wide estimates.

The results for sealant prevalence were very similar to those for untreated decay. Low-income children were less likely to have sealants than other children and sealant prevalence had not improved detectably for either economic group (Figure 8). Sealant prevalence did not change for white non-Hispanic children, but improved for children of color (Figure 9). The racial disparities in sealant prevalence observed in 2005 were no longer evident.

The similarity of results for untreated decay and for sealants suggests that access to dental care had improved disproportionately for children of color since 2005. There were no detectable gains among white non-Hispanic children, whether or not they were low-income.

Untreated decay

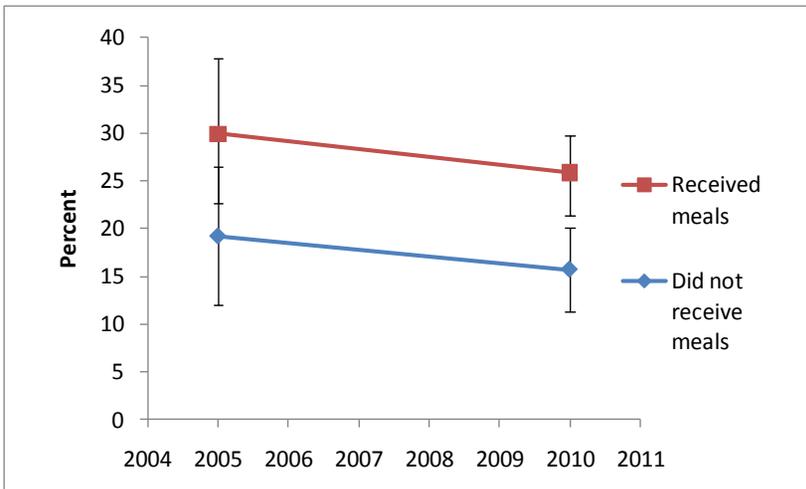


Figure 6 Untreated decay in 3rd graders by free or reduced price meals status, Pierce County, 2005–2010

Sealants

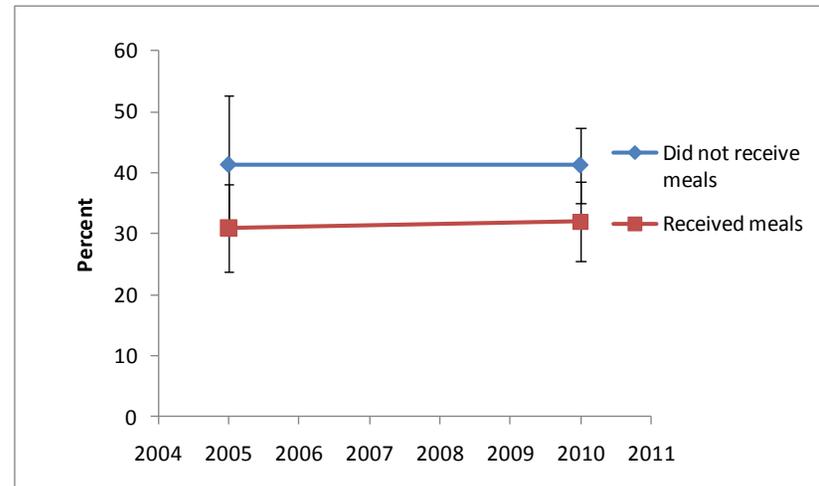


Figure 8 Sealants in 3rd graders by free or reduced price meals status, Pierce County, 2005–2010

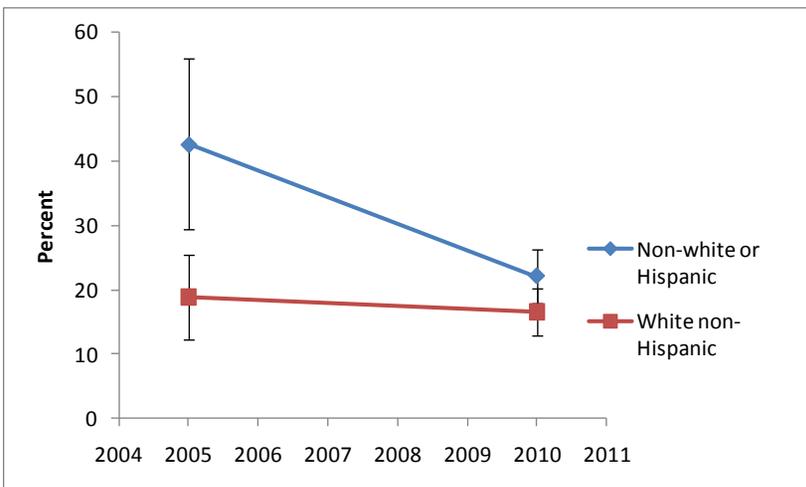


Figure 7 Untreated decay in 3rd graders by race, Pierce County, 2005–2010

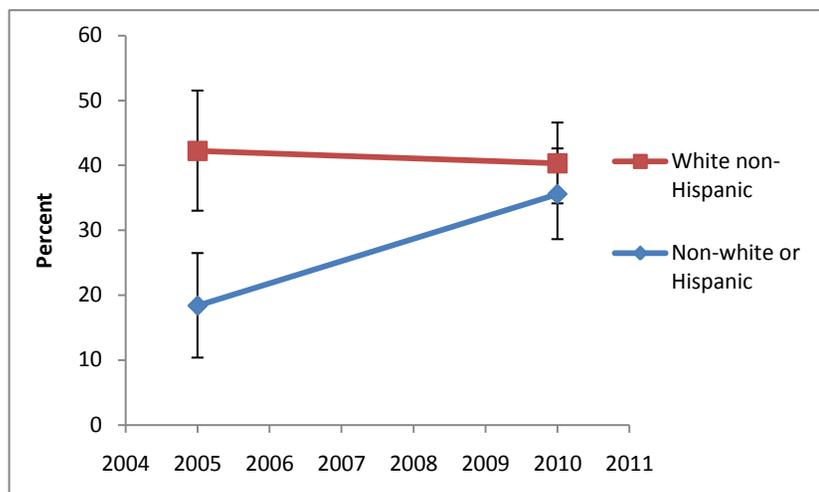


Figure 9 Sealants in 3rd graders by race, Pierce County, 2005–2010

Disparities in widespread decay

Overall, the percentage of 3rd graders with widespread decay declined significantly (Figure 5). That improvement was shared among children of differing socioeconomic status (Figure 10) and race (Figure 11). These results suggest that some unidentified, broad-based factor “lifted all boats,” that is, prevented tooth decay across all demographic and socioeconomic subgroups.

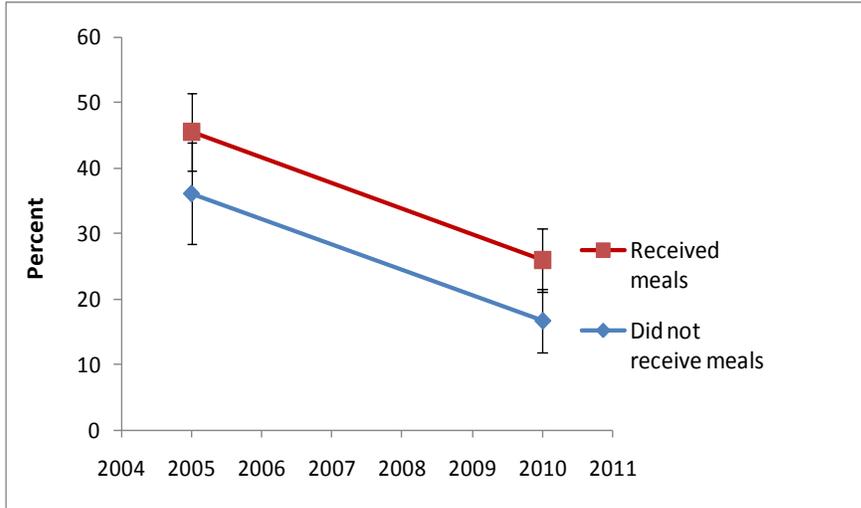


Figure 10 Widespread decay in 3rd graders by free or reduced price meals status, Pierce County, 2005–2010

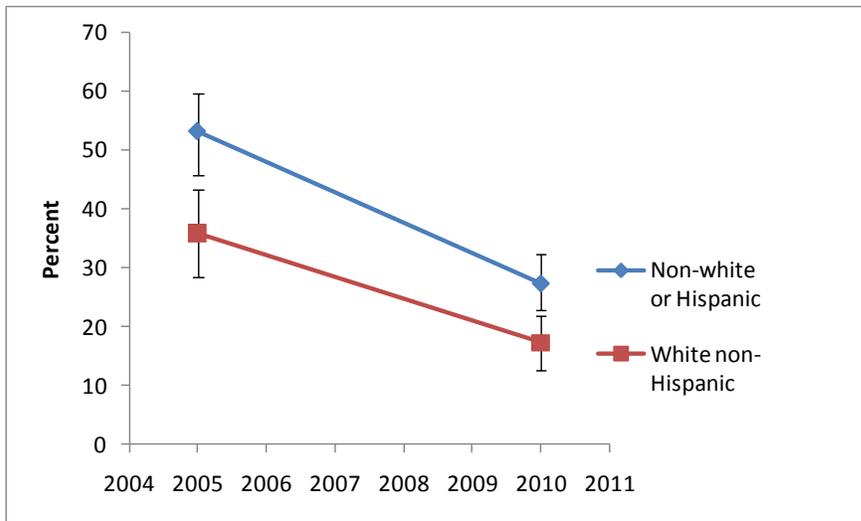


Figure 11 Widespread decay in 3rd graders by race, Pierce County, 2005–2010

Children attending schools with fluoridated water had less tooth decay

Impact of water fluoridation

In the previous section we examined individual, relatively non-modifiable factors that resulted in oral health inequalities—factors like race and family income. Here we consider a modifiable environmental factor—whether a school received community fluoridated water.

Community water fluoridation is a well-documented strategy for preventing tooth decay. Although we were not able to determine whether children had access to fluoridated water at home, we did know that about 25% of children screened attended schools served by fluoridated water systems. The impact of school water fluoridation can only be assessed using statistical models that control for demographic risk factors such as race and family income. These models yield a prevalence ratio, the prevalence of decay among children not attending fluoridated schools relative to the prevalence among children attending fluoridated schools. A prevalence ratio greater than 1 indicates that attending school where water is not fluoridated is a risk factor for tooth decay.

When demographically similar children were compared using statistical models, those attending schools with unfluoridated water were 30% more likely to have experienced untreated decay, 20% more likely to have a decay history, and 50% more likely to have a history of widespread decay (Table 3).

Could differences in water fluoridation account for the improvement in widespread decay history between 2005 and 2010? In 2005, none of the schools sampled received continuously fluoridated water; 6 out of 21 schools sampled in 2010 did so. This difference in access to fluoridated water at school, however, was not large enough to account for the change in prevalence of widespread decay shown in Figures 5, 10 and 11. In addition, the improvement in widespread decay between 2005 and 2010 among children not receiving fluoridated water at school was very similar to that among all children. For these reasons, the improvement between 2005 and 2010 cannot be attributed to differences in access to fluoridated water at school.

Table 3 Prevalence of decay among children attending fluoridated schools relative to children attending nonfluoridated schools, Pierce County, 2010

Oral health indicator	Prevalence ratio* (95% CI)
Untreated decay	1.3 (1.1 – 1.6)
History of decay (treated or untreated)	1.2 (1.1 – 1.3)
Widespread decay (treated or untreated)	1.5 (1.1 – 2.0)

*Prevalence among children attending fluoridated schools relative to prevalence among children attending unfluoridated schools, adjusted for grade, race, subsidized meals status, percent of school receiving subsidized meals

Low-income Preschool Children

Untreated decay improved for low-income preschool children

Participants

We examined 333 children from 14 Head Start or ECEAP preschools. To qualify for these programs, children must live in low-income households. Thus, these children represent children in the county who are living in poverty, not all Pierce County children. The analysis was restricted to children 3–5 years of age.

Untreated decay

About half as many children had untreated decay in 2010 as in 2005 (Figure 12). Roughly the same proportion of children in Pierce County had untreated decay as found state-wide. Unlike for older children, improvements for white non-Hispanic children and for children of color were similar (Figure 13).

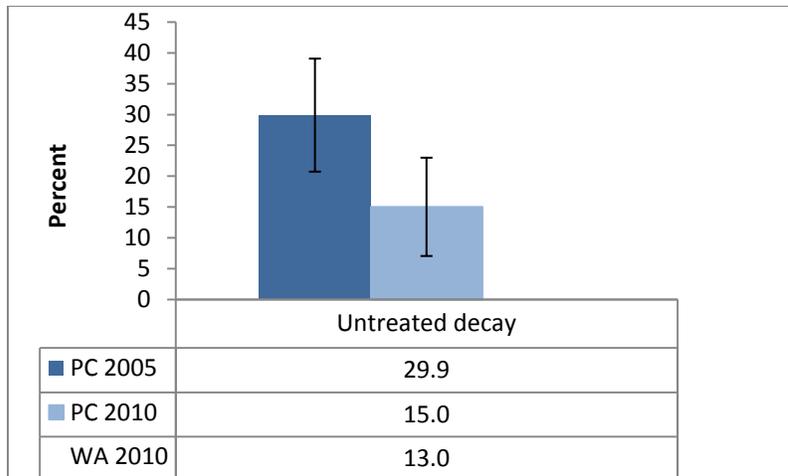


Figure 12 Untreated decay in low-income preschool children, Pierce County, 2005–2010

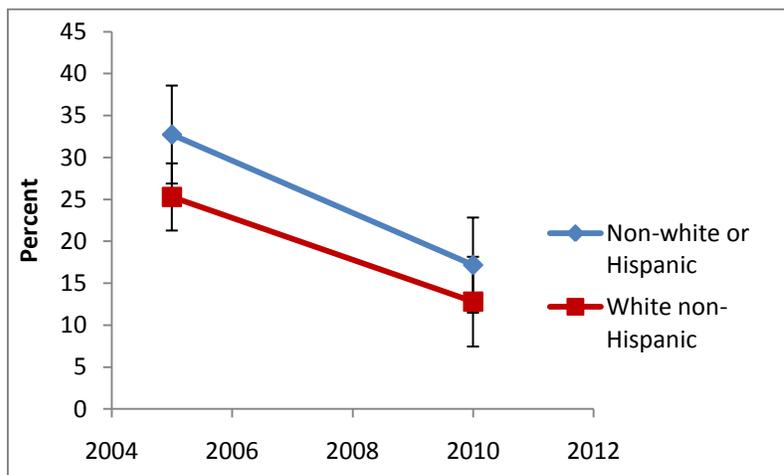


Figure 13 Untreated decay in low-income preschool children by race, Pierce County, 2005–2010

History of decay improved among low-income preschool children

History of decay (treated and untreated)

Low-income preschool children enjoyed significant improvements in decay history since 2005 (Figure 14). Still, far too many, about 35%, of these youngsters had experienced tooth decay. The Healthy People 2010 target for this age group is 11%. There were no meaningful differences between Washington State and Pierce County in history of decay. Trends were similar for children of different races (Figure 15), but non-white and Hispanic children were more likely to have experienced decay than other children.

Feeding practices such as giving a bottle at bedtime, can contribute to tooth decay in young children. Prolonged, frequent contact with milk, juice, or other sugar-containing liquids can result in decay in the upper front teeth. This distinct pattern of tooth decay is called early childhood cavities. In 2010, 8.5% of children in Pierce County had this type of dental decay. This was lower than the 15.5% prevalence in Washington State.

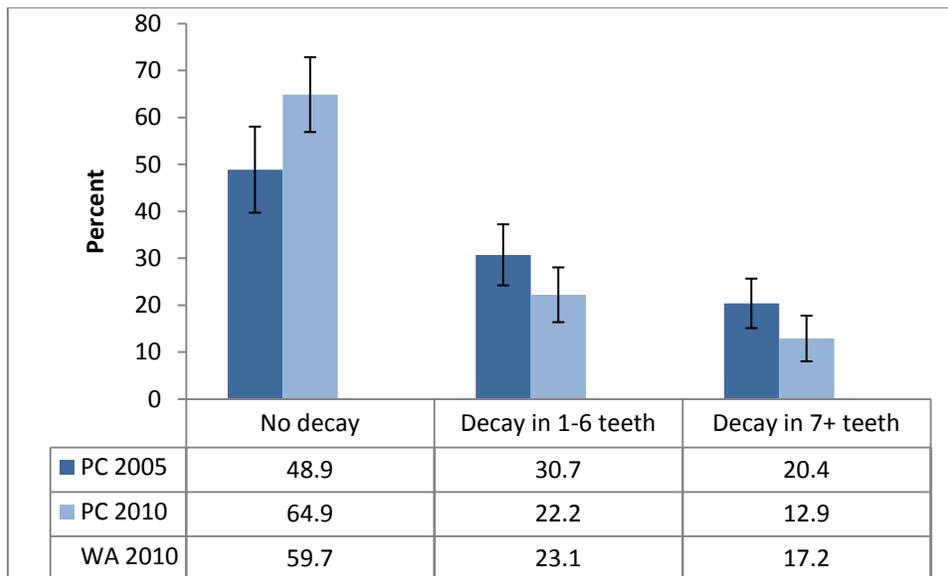


Figure 14 Extent of decay in low-income preschool children, Pierce County, 2005–2010

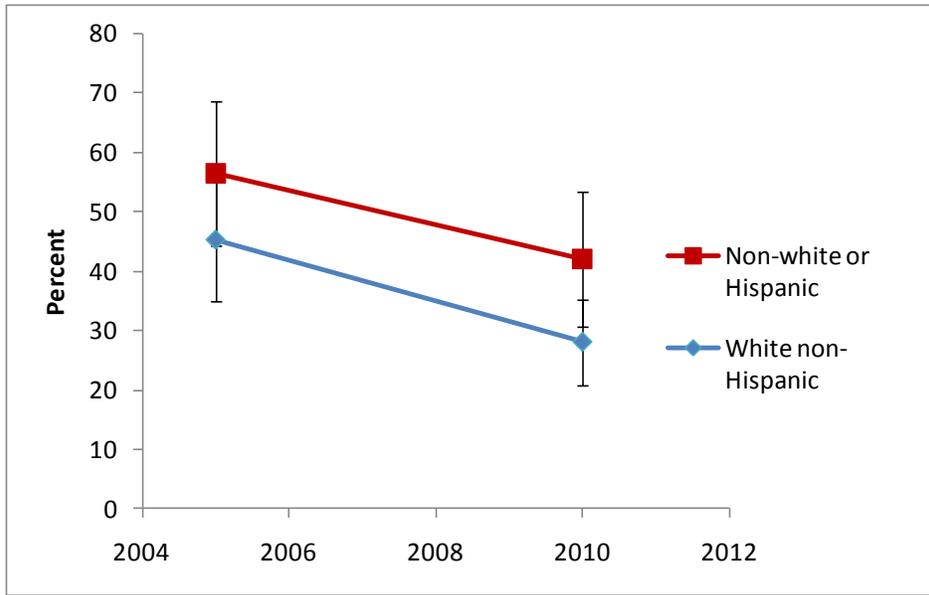


Figure 15 Any history of decay in low-income preschool children by race, Pierce County, 2005–2010

Low-income preschool children in Pierce County experienced significant gains in oral health over the past five years. The prevalence of both untreated decay and decay history declined. The low prevalence of early childhood cavities in 2010 suggests that parents are learning and practicing healthy ways to feed their children. These improvements may, in part, be due to the Access to Baby and Child Dentistry program (see p. 17) which began operating in Pierce County in 2005. This program links young low-income children with specially trained providers.

Oral Health Resources in Pierce County

Although children's oral health in our county is improving, too many of our children are experiencing dental decay, a condition that is very preventable. Tacoma-Pierce County Health Department and community partners provide a family of oral health programs to address the needs of children and their families. These programs include:

- **Access to Baby and Child Dentistry (ABCD)** focuses on securing dental care for Medicaid-eligible children under age six, with emphasis on enrollment by age one. The ABCD program also cross-trains staff to provide family oral health education by outreach workers and trained medical professional staff to increase prevention efforts.
- **School-Based Oral Health** is a coordinated effort in which community dental providers deliver oral health services to students in participating public schools. These services include dental screening and referral, fluoride varnish (a preventive service for primary teeth), dental sealants, and oral health education.
- **The Maternal and Child Health Program**, conducted through the Health Department, educates high-risk families about oral health practices as part of its home visiting programs. This includes encouraging pregnant women to see a dentist in the prenatal period, recommending against sending babies to bed with bottles, avoiding/limiting juice consumption, wiping the gums of infants, as well as the recommendation that babies see the dentist following the eruption of their first tooth or by their first birthday, whichever comes first. In the coming year, fluoride treatments will be included as well.
- **Pierce County Dentists Care**, sponsored by the Pierce County Dental Society and the Pierce County Dental Foundation, provides dental care to underserved adults and children.
- In **Give Kids a Smile**, a program operated through the Pierce County Dental Society, volunteer dentists donate services for uninsured children. For more information, call Jennifer Bunch at (253) 272-1101.
- **Project Homeless Connect**, an annual one-day service fair for the homeless, offers free dental services and referrals for both adults and children.
- **Mentorship** through local colleges to encourage careers in dental public health that ultimately will increase the provider base to address the issues of access to care.
- A list of **Low Cost Dental Providers** in Pierce County can be found at www.tpchd.org.

We anticipate that all of these programs will continue to expand access to dental services, reduce the incidence of dental decay and reduce disparities in oral health in Pierce County. The 2010 Smile Survey results show that our community has made progress in some areas but not in others. A comprehensive, coordinated oral health plan for Pierce County would take us further still in improving oral health in our community.

Appendix

Demographic characteristics of Pierce County samples, 2010

	Percent of Head Start/ECEAP Sample(n=358)	Percent of Elementary Sample (n=2,656)
Sex		
Male	49.6	50.0
Female	50.4	50.0
Age		
3	10.9	
4	55.9	0.1
5	33.2	24.6
6		24.5
7		0.3
8		24.5
9		25.9
10		1.2
Race/ethnicity		
White	49.8	64.1
Black	22.8	14.1
Hispanic (race)	17.9	13.2
Asian	5.5	6.7
Native American or Alaska Native	3.9	2.0
Receiving free or reduced price meals		
Yes		51.1
No		48.9

Oral health status of Pierce County children, 2010

	Head Start/ECEAP (n=333)		Kindergarten (n=1,314)		3rd Grade (n=1,346)	
	Percent	95% CI	Percent	95% CI	Percent	95% CI
History of decay						
In any teeth	35.1	27.2 – 43.1	38.0	31.5 – 44.5	51.3	45.7 – 56.9
In permanent teeth	-	-	-	-	10.5	7.1 – 13.9
In upper front primary teeth (early childhood cavities)	8.5	5.0 – 11.9	-	-	-	-
In 7 or more teeth	12.9	8.0 – 17.8	14.3	9.9 – 18.6	21.0	16.7 – 25.3
Untreated decay	15.0	10.7 – 19.4	17.2	13.1 – 21.4	19.0	15.4 – 22.7
Sealants	-	-	-	-	38.7	32.8 – 44.6

Oral health status of Washington State children, 2010

	Head Start/ECEAP (n=1,552)		Kindergarten (n=2,858)		3rd Grade (n=2,875)	
	Percent	95% CI	Percent	95% CI	Percent	95% CI
History of decay						
In any teeth	40.3	37.0 – 43.8	39.3	35.7 – 42.9	57.9	54.0 – 61.7
In permanent teeth	-	-	-	-	14.9	11.0 – 20.0
In upper front primary teeth (early childhood cavities)	15.5	12.6 – 19.0	-	-	-	-
In 7 or more teeth	17.2	14.6 – 20.2	14.5	12.0 – 17.4	19.2	16.4 – 22.4
Untreated decay	13.0	10.7 – 15.6	13.8	12.0 – 15.9	14.9	12.7 – 17.5
Sealants	-	-	-	-	51.2	45.7 – 56.7

Association between income and oral health status among kindergarteners, Pierce County, 2010

	Children not receiving free or reduced price meals (n=635)		Children receiving free or reduced price meals (n=520)	
	Percent	95% CI	Percent	95% CI
History of decay				
In any teeth	31.5	27.0 – 36.1	50.6	43.9 – 57.3
In 7 or more teeth	11.5	8.8 – 14.3	19.6	13.2 – 26.1
Untreated decay	13.0	8.9 – 17.2	23.7	18.7 – 28.7

Association between income and oral health status among 3rd graders, Pierce County, 2010

	Children not receiving free or reduced price meals (n=492)		Children receiving free or reduced price meals (n=560)	
	Percent	95% CI	Percent	95% CI
History of decay				
In any teeth	46.2	27.0 – 36.1	60.3	56.6 – 64.0
In 7 or more teeth	16.8	11.8 – 21.8	26.0	20.9 – 31.1
Untreated decay	15.7	11.2 – 20.3	25.9	21.9 – 29.8
Sealants	41.3	34.9 – 47.6	32.0	25.5 – 38.5

Association between race and oral health status among low-income preschool children, Pierce County, 2010

	White, non-Hispanic (n=164)		Hispanic or non-white (n=134)	
	Percent	95% CI	Percent	95% CI
History of decay				
In any teeth	28.0	20.8 – 35.3	52.5	36.1 – 69.0
In 7 or more teeth	9.1	4.9 – 13.4	25.4	16.6 – 34.2
Early childhood cavities	7.3	2.2 – 12.5	13.6	4.2 – 22.9
Untreated decay	12.8	7.5 – 18.2	16.9	9.5 – 24.4

Association between race and oral health status among kindergarteners, Pierce County, 2010

	White, non-Hispanic (n=824)		Hispanic or non-white (n=490)	
	Percent	95% CI	Percent	95% CI
History of decay				
In any teeth	32.2	26.4 – 38.0	47.5	39.7 – 55.4
In 7 or more teeth	11.6	7.5 – 15.7	18.7	12.8 – 24.6
Untreated decay	14.5	11.0 – 17.9	21.7	16.3 – 27.1

Association between race and oral health status among 3rd graders, Pierce County, 2010

	White, non-Hispanic (n=864)		Hispanic or non-white (n=440)	
	Percent	95% CI	Percent	95% CI
History of decay				
In any teeth	45.4	38.7 – 52.0	61.8	57.6 – 66.0
In 7 or more teeth	17.3	12.6 – 21.9	27.6	22.6 – 32.6
Untreated decay	16.5	12.7 – 20.3	23.4	19.6 – 27.3
Sealants	40.3	33.9 – 46.7	35.8	29.7 – 41.8

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Contact Information

For information about data collection or about the Tacoma-Pierce County Health Department Children's Oral Health Programs, please contact

Linda Gillis, RDH, BS

Oral Health Program Coordinator

253-798-6579

lgillis@tpchd.org

For information about data analysis or about this report, please contact

Liz Pulos, PhD, MPH

Epidemiologist

253-798-4719

epulos@tpchd.org