

Sonoma County Smile Survey

An Oral Health Assessment of Sonoma County's Kindergarten and Third Grade Children

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Karen Milman MD MPH, Public Health Officer, Sonoma County DHS
Kim Caldewey PA MPH, Health Program Manager, Sonoma County DHS
Susan Cooper DDS, Community Action Partnership, Sonoma County
Kathy Kane RDHAP, Community Action Partnership, Sonoma County

Prepared by
Jenny Mercado MPH, Epidemiologist
Sonoma County DHS



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KEY FINDINGS

Dental disease among Sonoma County kindergarten and third grade students is prevalent. More than one in two (51%) students have tooth decay experience and almost one in five (18%) have untreated decay.

Children need dental care and are not getting it. About 18% of Sonoma County kindergarten and third graders are in need of dental care, with 4% needing urgent treatment.

Disparities in dental health exist in Sonoma County. Tooth decay, untreated decay and the need for urgent dental treatment are more common among children in schools with a higher proportion of students enrolled in Free and Reduced Price Lunch programs and Hispanic/Latino children.

Improvements in sealant coverage have occurred but most third graders aren't protected. There has been a significant increase in the proportion of third graders with dental sealants; nonetheless, the majority of students are not protected.

Some, but not all, Healthy People 2020 objectives for oral health among Sonoma County children have been met.

Definitions

Decay experience is the presence of either untreated or treated tooth decay or a permanent molar tooth that is missing because it was extracted as a result of decay.

Dental sealants are thin, plastic coatings applied to the chewing surfaces of the back of the teeth. Sealants are applied on first molars during first and second grade and second molars during sixth or seventh grade.

Free and Reduced Lunch Program (FRLP) provides subsidies for free and reduced-price lunches to students based on family income and size. Eligibility is determined by an application process which parents complete and submit annually. Children from families below 130% of the poverty level (\$30,615 for a family of four) are eligible for free meals and those between 130 to 185% of the poverty level (\$30,616 to \$43,568 for a family of four) are eligible for reduced-price meals. (US Department of Health and Human Services, 2013). Eligibility for FRLP is often used as an indicator of overall socioeconomic status. Information on individual participation in the FRLP was not available; however, the percentage of children participating in the program in each school was known.

Need for dental care refers to the level of treatment urgency that the child is classified as determined by his/her oral health status. *Urgent care* is needed when the child has pain, infection or swelling (abscess), and therefore needs to see a dental professional in 24 to 48 hours. *Early care* is needed when the child has untreated decay but has no pain or infection and needs to see a dentist within the next two weeks or before their next regularly scheduled dental appointment. A child with a broken or missing filling but no other untreated decay would be classified as needing early dental care. *No need for dental care* indicates that the child shows no obvious problems and can wait until the next regular dental checkup.

Tooth decay, also called dental cavities or dental caries, is the destruction of the outer surface (enamel) of a tooth.

Untreated decay is tooth decay that has not received appropriate treatment, either a dental filling or restoration such as a crown.

INTRODUCTION

Purpose

In 2009 the first Sonoma County Smile Survey was conducted, assessing 1483 kindergarten and third grade students from randomly sampled schools. Among the key findings was the fact that about one in two kindergarteners and six out of ten third graders had experienced tooth decay and over 16% of them had untreated decay. About 4% of those examined had urgent dental problems - abscesses, inflammation and pain. Dental sealants were present in only 17% of third graders. These findings spurred the community to develop countywide strategies to confront dental disease. To update our understanding of the prevalence of tooth decay and the continued need for dental disease prevention and treatment among Sonoma County children, a second countywide oral health screening was conducted in the spring of 2014. This report describes the findings and implications of the 2014 Sonoma County Smile Survey.

Background

Tooth decay is one of the most common diseases among children and poses an immediate and long-term threat not just to the teeth of young children, but to their overall health and development. It is caused by a bacterial infection that is transmitted via saliva (e.g. from parent or caregiver to infant). Approximately one in four children ages 2 to 11 years in the United States has at least one primary tooth with untreated decay and one

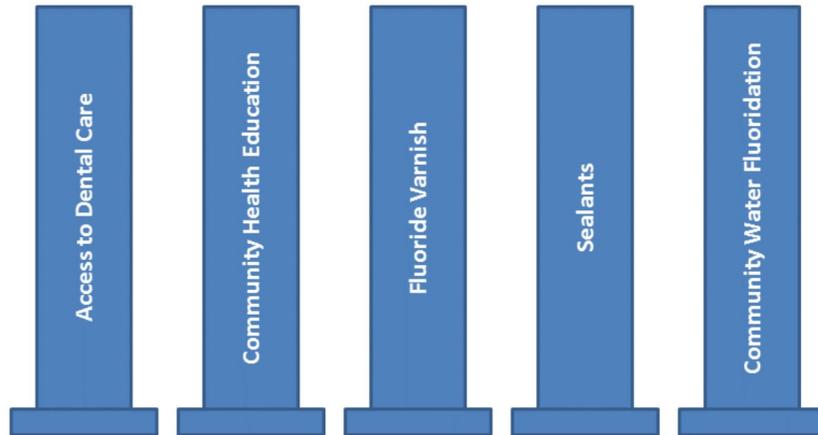
in five adolescents ages 12 to 19 years has at least one permanent tooth with untreated decay (Dye BS, 2007). Some children are disproportionately affected by dental disease. It is estimated that 80% of tooth decay is found in 25% of children ages 5 to 17, primarily those from low income households (The Kaiser Commission on Medicaid and Uninsured, 2008). Nationally, prevalence of untreated tooth decay in primary or permanent teeth among children from lower income households is more than twice that among children from higher income households. The prevalence of untreated tooth decay is also higher among Mexican/American and black children than among white, non-Hispanic children (Dye BS, 2007).

If left untreated, tooth decay can cause pain and infection as well as lead to problems with eating, speaking, and learning (US Department of Health and Human Services, 2000). It can have consequences that hinder a child's physical growth and quality of life (Clarke M, 2006) (Sheiham, 2006). Furthermore, tooth decay is a risk for medical complications, especially for children who are the least able to afford or access professional care. Unless arrested in its earliest stages, tooth decay becomes irreversible. Without appropriate treatment tooth decay will lead to infection of the teeth and gums as well as tooth loss. Tooth decay can become severe enough to require emergency room treatment. Poor oral health often

continues into adulthood and research shows relationships between poor oral health and heart and lung disease, diabetes, stroke and births that are preterm and low birth weight (US Department of Health and Human Services, 2000).

Dental care is the most prevalent unmet health service need among children in the United States (Newacheck PW, 2000). Limited access to oral health care contributes to both poor oral health and disparities in oral health (US Department of Health and Human Services, 2000). Children in low income households suffer disproportionately high levels of dental disease but are less likely to receive dental care. Nearly half (49.9%) of California children under age 21 enrolled in Medi-Cal did not have even one dental visit in 2011 (The Children's Partnership, 2013).

Tooth decay and other oral diseases that can affect children are highly preventable. According to the Centers for Disease Controls Division of Oral Health, the combination of dental sealants and fluoride has the potential to nearly eliminate tooth decay in school-age children (Centers for Disease Control and Prevention Division of Oral Health, 2013). Prevention of tooth decay and dental disease in a population requires a multi-faceted approach at the child, family and community levels (Fisher-Owens, 2007). The Department of Health Services has identified five key strategies, or pillars, to improve oral health in Sonoma County.



1. **Access to Dental Care**

Regular visits to a dental health professional are a cornerstone to disease prevention and early treatment.

2. **Community Health Education**

Educating people about the importance of dental health to overall health and about good dental hygiene and dietary practices is essential.

3. **Fluoride Varnish**

Applied to all teeth several times yearly by a health professional, fluoride varnish prevents disease, especially in those at medium to high-risk for decay (Centers for Disease Control and Prevention, 2001).

4. **Sealants**

Dental clinician applied sealants to the chewing surfaces of permanent molars, provide long-term protection against tooth decay (US Dept of Health and Human Services, 2000).

5. **Community Water Fluoridation**

Water fluoridation is the most effective, least costly prevention effort with the broadest community reach (Centers for Disease Control and Prevention, 1999).

In addition to these vital pillars, surveillance of the oral health of the community is necessary for gauging the magnitude of oral health disease as well as monitoring progress of prevention work. Oral health screening of school-aged children is an important surveillance effort that provides information on prevalence of tooth decay and need for dental treatment among kindergarten and third grade students in the county.

METHODS

To update our understanding of the prevalence of tooth decay and the continued need for dental disease prevention and treatment among Sonoma County children, a second countywide oral health screening was performed in 2014.

An electronic data file of all public elementary schools in Sonoma County was obtained from the California Department of Education. The data file, which was for the 2012-2013 school year and the most current at the time of sampling, contained Free and Reduced Lunch Program (FRLP) and school total enrollment data by school. Grade-specific enrollment data, also from the California Department of Education, were matched to the FRLP data file. These data were used to select a systematic probability sample from public elementary schools with at least 20 children in kindergarten and third grade. The sample was stratified by the percent of students enrolled in FRLP with one out of ten schools with less than 50% of students in FRLP selected and one out of four schools with 50% or more students in the FRLP selected. Of the fifteen elementary schools randomly selected for inclusion, one school declined to participate and another school was randomly chosen from the same FRLP stratum as a replacement (Table 1).

In spring of the 2013-2014 school year oral health screenings were completed at the fifteen selected schools. Children in participating

schools were given a letter of explanation and a treatment declination form. If parents returned the treatment declination form, the child was excluded from screening (passive consent). A trained dental examiner completed all screenings by visually inspecting the oral cavity using gloves, a LED headlight and disposable mouth mirrors to detect the presence or absence of specific oral conditions using the Basic Screening Survey developed by the Association of State and Territorial Dental Directors. Four oral health indicators were collected for each child screened:

- presence of tooth decay,
- presence of treated tooth decay - *cavity, restoration, extraction of a molar,*

- presence of dental sealants - *at least one sealant on a permanent molar,*
- need for dental care – *no dental care, early dental care or urgent dental care needed.*

Direct data entry using an iPad and data entry software occurred at each screening location. Data analysis was completed using SAS 9.3 (Cary, ND). The complex sample survey design was incorporated into the analysis. All percentages were computed as weighted averages. All estimates reflect the weighted average for each grade over the entire county.

Table 1. Schools in Sample by Percent in FRLP, Number of Children Screened and Response Rate*

School	Students on FRLP Percent	Total Enrolled	Total Screened	Response Rate Percent
Apple Blossom	23.9	141	105	74.5
Biella	77.5	162	87	53.7
Brook Hill	90.9	179	133	74.3
Dunbar	72.2	76	61	80.3
Flowery	62.3	120	82	68.3
Healdsburg Charter	40.5	69	59	85.5
Kawana	88.8	142	103	72.5
Mark West Elementary	56.2	128	100	78.1
Meadow	13	124	124	100.0
Meadow View	84.6	122	111	91.0
Monroe	94.5	127	114	89.8
Monte Vista	44.5	209	164	78.5
Proctor Terrace	32.6	138	109	79.0
Sunridge Charter**	6.8	70	0	0.0
Thomas Page	67.6	126	115	91.3
Village Elementary	50.8	122	112	91.8

*Response rates based on enrollment for previous year

**Sunridge Charter refused participation.

RESULTS

In the spring of 2014, 1582 kindergarten and third grade students were screened for the Sonoma County Smile Survey. Table 2 describes the demographics of children screened in the sampled schools. White and Hispanic/Latino children represented 87% of those sampled. Due to the relatively small sample size of other racial/ethnic groups, analysis by race/ethnicity was limited to white and Hispanic/Latino students.

Decay Experience

More than one in two (51%) Sonoma County kindergarten and third grade students had decay experience (Figure 1). Third graders were significantly more likely to have decay experience than kindergarteners (56% compared to 46%). The proportion of Hispanic children with decay experience was significantly higher than white children (64% compared to 34%). Additionally, children in schools where a higher percentage of students were enrolled in the FRLP (lower income) were significantly more likely to have decay experience than children in schools where a lower percentage of children were enrolled in the FRLP (higher income) (Table 3).

Table 2. Demographic Characteristics of Participating Children

	Kindergarten	Third Grade	Total
Number Screened	810	772	1582
<i>Race/Ethnicity</i>			
White	32.2%	37.4%	34.8%
Hispanic/Latino	54.4%	49.7%	52.1%
African American/Black	2.3%	2.5%	2.4%
Asian	2.1%	1.7%	1.9%
Pacific Islander	0.9%	1.0%	0.9%
American Indian	0.4%	0.3%	0.3%
Multi-racial	5.1%	4.8%	4.9%
Unknown	2.6%	2.6%	2.6%
<i>Gender</i>			
Male	52.1%	51.6%	51.8%
Female	47.9%	48.3%	48.1%

Figure 1. Percent of Sonoma County Kindergarten and Third Graders with Decay Experience

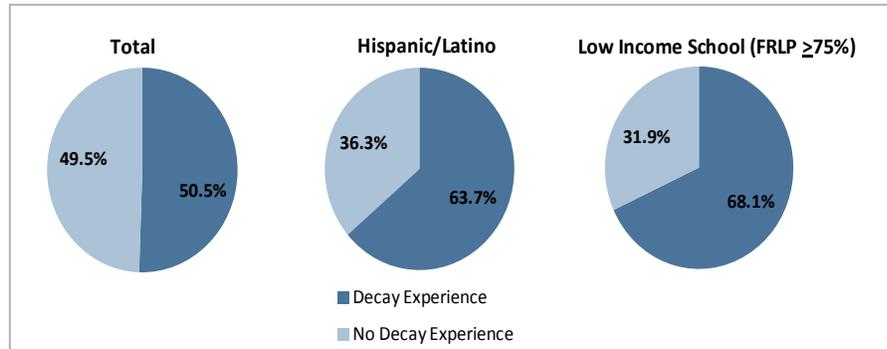


Table 3. Percent of Sonoma County Kindergarten and Third Graders with Decay Experience

	Number Screened	Percent	95% Confidence Interval (CI)
Total	1582	50.5	(45.2-55.9)
Kindergarten	810	45.8*	(39.2-52.5)
Third Grade	772	55.5	(50.3-60.7)
<i>Race/Ethnicity</i>			
White, non-Hispanic	550	34.2*	(30.9-37.4)
Hispanic/Latino	825	63.7	(59.1-68.2)
<i>Percent of children in FRLP</i>			
<25%	230	32.8^	(30.7-34.8)
25-49%	332	39.5	(33.9-45.1)
50-74%	470	54.5	(45.4-63.6)
≥75%	550	68.1	(63.4-72.9)

*Chi-square test of independence significant at p<.05

^Chi-square test of linear trend significant at p<.05

Untreated Decay

Approximately 18% of students screened had untreated decay (Table 4). There was not a significant difference in the prevalence of untreated decay between kindergarten and third graders (19.5% compared to 15.5%).

Hispanic/Latino children were significantly more likely than white children to have untreated decay (21.5% compared to 11.0%). The proportion of students with untreated decay increased as the percentage of students enrolled in the FRLP increased (Figure 2).

Need for dental treatment

Any dental treatment

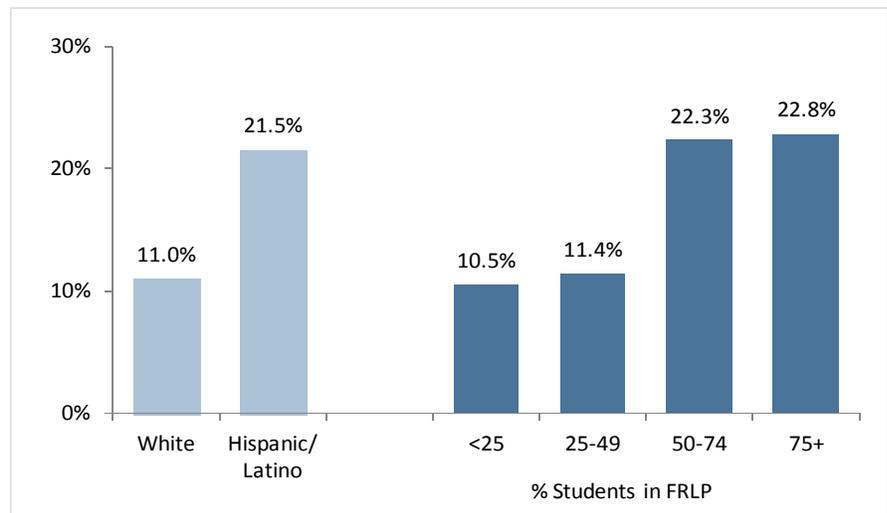
About one in five students (18%) was in need of early or urgent dental treatment (Table 5). Kindergarteners were significantly more likely to need dental treatment than third graders (20.1% compared to 15.8%). Hispanic/Latino children were significantly more likely than white children to need dental treatment (21.9% compared to 11.2%). The proportion of students in schools with a higher percent of students in the FRLP (lower income) with a need for dental treatment was significantly higher than for students in schools with a lower percent in the program (higher income).

Table 4. Percent of Sonoma County Kindergarten and Third Graders with Untreated Decay

		Number Screened	Percent	95% CI
Total		1582	17.6	(13.8-21.3)
	Kindergarten	810	19.5	(14.6-24.5)
	Third Grade	772	15.5	(12.5-18.5)
<i>Race/Ethnicity</i>	White, non-Hispanic	550	11.0*	(7.5-14.5)
	Hispanic/Latino	825	21.5	(16.8-26.3)
<i>Percent of children in FRLP</i>	<25%	230	10.5^	(4.5-16.5)
	25-49%	332	11.4	(8.6-14.2)
	50-74%	470	22.3	(12.6-32.1)
	>=75%	550	22.8	(16.5-29.1)

*Chi-square test of independence significant at p<.05
 ^Chi-square test of linear trend significant at p<.05

Figure 2. Percent of Sonoma County Kindergarten and Third Graders with Untreated Decay



Early dental treatment

Approximately 14% of students were in need of early dental treatment. There was no significant difference in the percent that needed early treatment by grade level. Hispanic/Latino children were significantly more likely than white children to need early dental treatment (15.8% compared to 8.7%). The need for early dental treatment increased as the percent of children in the FRLP increased. Children in schools with a higher

proportion of students enrolled in the FRLP were more likely to need early treatment than children in schools with a lower proportion of students in the program (Figure 3).

Urgent dental treatment

More than 4% of students were in need of urgent dental care. Kindergarteners were significantly more likely to need urgent dental care than third graders (5.6% compared to 3.2%). Hispanic/Latino children were significantly

Table 5. Percent of Sonoma County Kindergarten and Third Graders Who Need Dental Treatment

	Number screened	Any (early or urgent) treatment		Early Treatment		Urgent Treatment	
		Percent	95% CI	Percent	95% CI	Percent	95% CI
<i>Total</i>	1582	18	(14.2-21.8)	13.6	(10.7-16.5)	4.4	(3.2-5.6)
Kindergarten	810	20.1*	(15.1-25.2)	14.6	(14.6-18.0)	5.6*	(3.2-7.9)
Third Grade	772	15.8	(12.6-18.9)	12.6	(9.5-15.6)	3.2	(2.4-4.1)
<i>Race/ethnicity</i>							
White, non-Hispanic	550	11.2*	(7.6-14.8)	8.7*	(5.4-12.0)	2.5*	(1.1-3.9)
Hispanic/Latino	825	21.9	(17.3-26.6)	15.8	(12.8-18.7)	6.2	(4.3-8.2)
<i>Percent of children in FRPL</i>							
<25%	230	10^	(4.6-15.4)	8.3^	(2.7-13.9)	1.7^	(1.5-1.9)
25-49%	332	12.6	(7.6-17.6)	9.3	(5.4-13.2)	3.3	(2.2-4.4)
50-74%	470	23.1	(13.7-32.5)	16.7	(9.8-23.6)	6.4	(3.6-9.2)
>=75%	550	23.1	(17.2-29.1)	17.7	(13.6-21.9)	5.4	(3.3-7.4)

*Chi-square test of independence significant at p<.05

^Chi-square test of linear trend significant at p<.05

more likely than white children to need urgent treatment (6.2% compared to 2.5%). The need for urgent dental treatment increased as the percent of children in the FRLP increased. Children in schools with a higher proportion of students enrolled in the FRLP were more likely to need urgent treatment than children in schools with a lower proportion of students in the program (Figure 3).

Sealants

Almost 44% of third graders had at least one dental sealant in place on a permanent molar. Hispanic/Latino third graders were more likely to have dental sealants in place than white third graders (53.1% compared to 36.9%). Third graders in schools with the highest proportion of children in the FRLP were significantly more likely to have sealants in place than children in schools with the lowest proportion of children in the FRLP (50.7% compared to 32.9%). However, no significant difference in sealant coverage was seen for

Figure 3. Percent of Sonoma County Kindergarten and Third Graders Who Need Dental Treatment

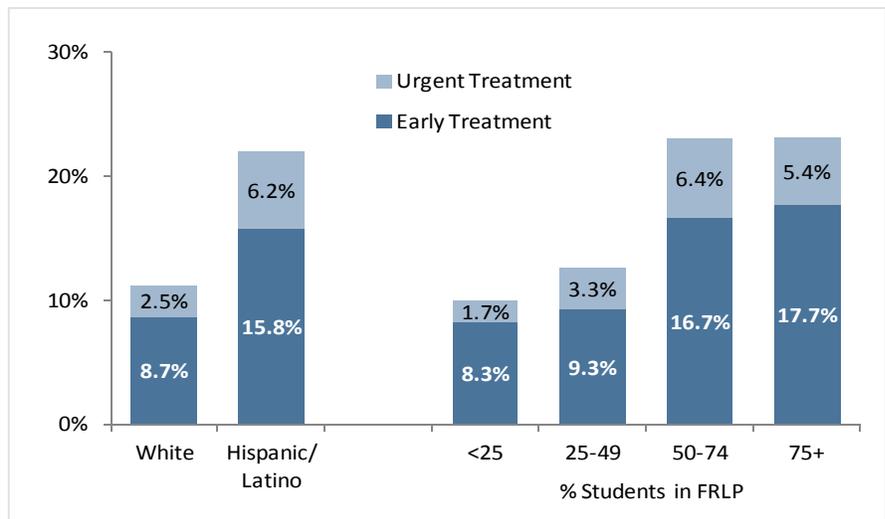


Table 6. Percent of Sonoma County Third Graders With Dental Sealants

	Number screened	Percent	95% CI
<i>Total</i>	772	43.8	(36.5-51.0)
<i>Race/ethnicity</i>			
White, non-Hispanic	289	36.9*	(26.1-47.9)
Hispanic/Latino	384	53.1	(43.9-62.2)
<i>Percent of children in FRPL</i>			
0-25%	117	32.9*	(29.6-36.3)
25-49%	154	48.9	(34.4-63.4)
50-74%	239	41.5	(32.9-50.1)
>=75%	262	50.7	(38.2-63.1)

*Chi-square test of independence significant at p<.05

third graders from schools with 25 to 49% or 50 to 74% of children in the FRLP compared with each other

or to the highest and lowest income schools (Table 6).

KEY FINDINGS AND DISCUSSION

Dental disease among Sonoma County kindergarten and third grade students is prevalent. More than one in two (51%) students have tooth decay experience and almost one in five (18%) have untreated decay. Tooth decay is a concerning health problem among children, affecting 56% of the county's school children by the time they reach the third grade. Additionally the prevalence of tooth decay and untreated decay in Sonoma County children remains high. The 2014 Sonoma County Smile Survey found 51% of kindergarten and third graders had decay experience and 18% had untreated decay. These levels are similar to those seen in the 2009 survey in which 52% of students had decay experience and 16% untreated decay.

Children need dental care and are not getting it. About 18% of Sonoma County kindergarten and third graders are in need of dental care, with 4% needing urgent treatment. By extrapolating to the more than 70,000 students in Sonoma County public schools and weighting by race/ethnicity, an estimated 11,600 Sonoma County children are in need of dental treatment, more than 2,900 of which are in need of urgent treatment. Since a comprehensive dental exam using diagnostics x-rays was not completed during the screening, it is reasonable to assume that these numbers underestimate the proportion of children in Sonoma County needing dental treatment.

Disparities in dental health exist in Sonoma County. Tooth decay, untreated decay and the need for urgent dental treatment are more common among children in schools with a higher proportion of students enrolled in FRLP and Hispanic/Latino children. Compared to children from higher income schools in the county, children in schools where 75% or more children were eligible for the FRLP had significantly higher prevalence of decay experience, untreated tooth decay and need for urgent dental treatment. Hispanic/Latino kindergarten and third grade students had significantly more decay experience, untreated tooth decay and urgent need for dental treatment than white, non-Hispanic students. Approximately 82% of Hispanic/Latino children screened were in schools with 50% or more children participating in FRLP. Barriers to care are multifaceted, influenced by economics, culture, education and geography. Disparity in the provision of care to low income communities is complex and related in large measure to very low state Medi-Cal reimbursement for services. The necessary capacity to provide care to the over 33,000 pediatric Medi-Cal enrollees does not currently exist in Sonoma County.

Improvements in sealant coverage have occurred but most third graders aren't protected. There has been a significant increase in the proportion of third graders with dental sealants; nonetheless,

the majority of students are not protected by this well-accepted clinical intervention to prevent tooth decay on molar teeth. The proportion of third graders who had at least one sealant applied to a permanent molar increased from 17% in 2009 to 44% in 2014; however, the criteria for measuring sealant coverage is only based on whether a child has had a sealant placed on at least one tooth. To experience the full value of this preventive treatment for decay reduction, all of a child's permanent molar teeth would need to be sealed. In this screening, the number of molars each child had sealed was not assessed.

The increase in sealant placements occurred in direct response to the 2009 Smile Survey findings. After the prior survey, community oral health programs such as St. Joseph's Mighty Mouth program, Community Action Partnership's Give Kids a Smile and the School Smile Program, and the Community Dental Clinics increased their efforts to place sealants on vulnerable children. The focus of these programs was low income children who receive insurance benefits from public funds. Their benefits cover one hundred percent of the sealant procedures, while private insurance may have a copayment or not cover sealants. This is a possible explanation for why low income children had a higher rate of sealant placement than their higher income peers.

Some, but not all, Healthy People 2020 objectives for oral health among Sonoma County children have been met. Healthy People is a national initiative, led by the US Department of Health and Human Services, whose core feature is a set of measurable, science-based, ten-year national objectives. The initiative is based on the principle that setting national objectives and monitoring progress can motivate state and local action (US Dept of Health and Human Services). The following Healthy People 2020 oral health objectives for children six to nine years of age were assessed in the Sonoma County Smile Survey:

- Increase the proportion of children receiving dental sealants on one or more first permanent molars to 28.1%.
- Reduce the proportion of children with untreated tooth decay in their primary and permanent teeth to 25.9%.
- Reduce the proportion of children with dental caries (decay) experience in the primary and permanent teeth to 49%.

Two of the three objectives have been met in the county. Sonoma County has increased to 44% the proportion of children who have received dental sealants and reduced to 18% the proportion of children with untreated tooth decay. The county has not met the objective to reduce the proportion of children with dental caries (decay) experience. Prevention of

tooth decay requires a combination of community, professional and individual strategies. At the community-level, best practices for prevention of tooth decay include health promotion interventions, community water fluoridation, school-based and school-linked dental sealant programs and school-linked screening and referrals (US Department of Health and Human Services, 2000). While sealant coverage is increasing due to the expanded efforts of programs and clinics in the community, this strategy alone is unlikely to significantly reduce the proportion of children who get tooth decay.

Moreover, the Healthy People objectives represent the minimum target for achieving optimum oral health in the community. Planning and evaluation efforts should look to these benchmarks as a starting point with the goal of exceeding these targets and making progress toward further improvement at each assessment period.

Limitations

The findings in this report are subject to several limitations. First, these screenings were conducted without the help of diagnostic x-rays. Therefore, results will likely differ from those observed by office clinicians. Second, tooth decay measures in the oral health screening were based on only presence or absence of decay, not on the extent or severity of the decay. A child who had relatively small amounts of decay would be

considered to have decay experience as would a child who had extensive decay. Third, the possibility of selective participation, meaning not all parents permitted their children to participate, may have caused bias. Finally, the cross-sectional study design does not allow the identification of whether dental sealant placement occurred before or after the occurrence of decay experience. Additionally, first permanent molars usually erupt into the mouth between the ages of six and seven so most of our data are based on the third grade students. Decay reduction from sealants would be manifested over time in children and be seen in children older than third grade.

RECOMMENDATIONS

Increase Oral Health Surveillance

The ultimate purpose of surveillance is to provide actionable health information to guide public health policy and programs (Smith PF & Group, 2013). Public Health experts recommend creation of an oral health surveillance system, which routinely collects data on health outcomes, access to care, risk factors and intervention strategies (Council of State and Territorial Epidemiologists, 2013). Sonoma County should develop a county-wide oral health surveillance plan which includes informative and available indicators and agreed upon data sources. In addition, expanding primary data collection through enhanced screening in schools and clinics would provide important information on the effectiveness of programs and strategies in reducing dental disease in the community.

Increase Efforts to Prevent Decay

Just over one half of Sonoma County children have experienced tooth decay by the time they are in third grade. This is an unacceptably high level. Prevention efforts need to be increased to lower this level. Four out of the five Pillars of Dental Health are decay prevention measures:

- Community water fluoridation is unique as the single strategy that provides the greatest potential to prevent decay for those who have access to fluoridated drinking water. It is a well-documented, effective public health measure to decrease disparities. Sonoma County should continue efforts

to investigate the feasibility of water fluoridation for the area served by the Sonoma County Water Agency as this would provide a significant opportunity to reduce decay, reduce dental costs and increase health equity.

- Fluoride varnishes are ideally applied to all teeth from toddlers to adults, twice yearly. This low-cost procedure can be performed by ancillary health professionals in dental, medical and even school settings. Particularly, in the absence of countywide community water fluoridation, there should be an increased effort to ensure all individuals have access to fluoride varnishes as is medically indicated. Although the School Smiles and the Women Infant and Children (WIC) programs are both promising models for expansion, there will also need to be a concurrent increase in fluoride varnish use by dental and medical service providers.
- There should be a continued push to increase the proportion of children in Sonoma County who have sealants. While expansion of place-based programs such as the School Smiles program is underway, the impact of this strategy will be enhanced with increased sealant placement in traditional dental settings.
- Multiple community agencies should provide community health education about the effect of dental disease on overall health and effective personal prevention behaviors so that there is a consistent,

county-wide message. Incorporating dental health education in schools curriculum and integrating it into well-child, prenatal and routine medical assessments will require greater collaboration and coordination to achieve the broadest reach.

Increase Access to Dental Care

Although access to dental services in Sonoma County has been improved by the building of new or expansion of existing clinics since the 2009 Smile Survey, the number of dental chairs available for treatment is still inadequate to meet the needs of the community. Existing resources which serve at risk populations are operating at their maximum levels. Continuing efforts should focus on expanding beyond the traditional dental clinic:

- Increase the use of place-based services. By using mobile clinics or mobile dental equipment, bring preventive services and oral health education to high risk children in schools, WIC sites, primary care settings, Head Start and early childhood preschool programs.
- Utilize midlevel providers such as Registered Dental Hygienists in Alternative Practice, Registered Nurses, and Medical Assistants to provide services and education to parents and children.
- Emphasize the importance of oral health to general health and integrate oral health education and services into routine medical care. Medical personnel should emphasize the importance of getting

REFERENCES

- Centers for Disease Control and Prevention Division of Oral Health. (2013, September). *Children's Oral Health*. Retrieved October 2014, from Centers for Disease Control and Prevention Division of Oral Health: www.cdc.gov/oralhealth.children_adults/child.htm
- Centers for Disease Control and Prevention. (1999). Achievements in Public Health, 1900-1999; Fluoridation of Drinking Water to Prevent Dental Caries. *MMWR*, 48 (41), 933-940.
- Centers for Disease Control and Prevention. (2001). Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States. *MMWR*, 50 (RR14), 1-42.
- Clarke M, L. D. (2006). Malnourishment in a population of young children with severe early dental caries. *Pediatric Dent*, 28 (3), 254-9.
- Council of State and Territorial Epidemiologists. (2013). *State-Based Oral Health Surveillance Systems Conceptual Framework and Operational Definition*. Retrieved October 2014, from Association of State and Territorial Dental Directors: www.astdd.org
- Dye BS, T. S. (2007). Trends in oral health status: United States, 1988-1984 and 1999-2004. *Vital health Stat 11*, 1-92.
- Fisher-Owens, S. G. (2007). Influence of children's oral health: a conceptual model. *Pediatrics*, e510-e520.
- Newacheck PW, H. D. (2000). The unmet health needs of America's children. *Pediatrics*, 105 (4 pt 2), 989-997.
- Sheiham. (2006). Dental caries affects body weight, growth and quality of life in pre-school children. *British Dental Journal*, 201 (10), 625-6.
- Smith PF, H. J., & Group, C. S. (2013). "Blueprint version 2.0": updating public health surveillance for the 21st century. *Journal of Public Health Management Practice*, 231-9.
- The Children's Partnership. (2013, January). *Fix Medi-Cal Dental Coverage: Half of California Kids Depend on It*. Retrieved October 2014, from The Children's Partnership.
- The Kaiser Commission on Medicaid and Uninsured. (2008). *Filling an Urgent Need: Improving Children's Access to Dental Care in Medicaid and SCHIP*. Retrieved July 2014, from The Henry J. Kaiser Family Foundation: www.kff.org/medicaid/7792.cfm
- US Department of Health and Human Services. (2013). *2013 Poverty Guidelines*. Retrieved October 2014, from Office of the Assistant Secretary for Planning and Evaluation: <http://aspe.hhs.gov/poverty/13poverty.cfm>
- US Department of Health and Human Services. *Office of Disease Prevention and Health Promotion. Healthy People 2020: Oral Health*. Retrieved July 2014, from HealthyPeople.gov: www.healthypeople.gov/2020/topics-objectives/topic/oral-health
- US Department of Health and Human Services. (2000). *Oral Health in America: A report of the Surgeon General*. Rockville : National Institute of Dental and Craniofacial Research, NIH.