STATE OF IOWA DEPARTMENT OF Health and Human services

2022 Iowa Third Grade Oral Health Survey Report

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Acknowledgements

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Glossary

Decay: Readily observable breakdown of a tooth's enamel surface (cavitated lesion) or dark pits or fissures of primary (baby) molars.

Demineralization: Tooth enamel, adjacent or close to the soft tissue margin, appearing chalky and white. No clinically visible or irreversible loss of enamel or break in enamel surface is present.

Filled Teeth: The presence of any type of restoration, including a temporary filling, or a tooth that is missing because of extraction as the result of tooth decay.

Sealed Teeth: The presence of any type of dental sealant on a permanent molar.

History of Decay: The presence of decayed and/or filled teeth.

Referral Need (refer to Appendix E):

- Immediate: Child has suspected abscess, pain, or large amount of decay;
- Within 3 Months: Child does not meet any of the above criteria and (a) has suspected decay or (b) dark pits or fissures on primary (baby) molars;
- Within 6 Months: Child does not meet any of the above criteria and has any of the following: (a) demineralization, (b) poor oral hygiene practices, (c) deep tooth pits or fissures, (d) restorations, (e) orthodontia (has braces or tooth irregularities), (f) dry mouth, (g) qualifies for Medicaid or Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), or free and reduced lunch, (h) has less than annual dental visits, or (i) has frequent exposure to juice or sugar/carbohydrates;
- Within 12 Months: Child does not meet any of the above criteria and has shallow tooth grooves, fluorosis, and no history of decay (no filled or decayed teeth).

Metropolitan: (1) Having at least one urbanized area of 50,000 population or more and (2) may include adjacent counties with a minimum of 25% of workers commuting to the central counties of the metropolitan statistical area. As of 2020 in Iowa, these counties are: Benton, Black Hawk, Boone, Bremer, Dallas, Dubuque, Grundy, Guthrie, Harrison, Jasper, Johnson, Jones, Linn, Madison, Mills, Polk, Pottawattamie, Scott, Story, Warren, Washington and Woodbury.

Micropolitan: (1) Having at least one urban cluster of 10,000 or more but less than 50,000 population and (2) may include adjacent counties with a minimum of 25% of workers commuting to the central counties of micropolitan statistical area. As of 2020 in Iowa, these counties are: Buena Vista, Carroll, Cerro Gordo, Clay, Clinton, Davis, Des Moines, Dickinson, Jefferson, Keokuk, Lee, Mahaska, Marion, Marshall, Muscatine, Wapello, Webster and Worth.

Rural: (1) Not having an urban cluster of 10,000 population or more and (2) having less than 25% of workers commuting to central counties of micropolitan or metropolitan areas. As of 2020 in Iowa, these are the remaining 60 counties not listed in the metropolitan or micropolitan descriptions.

Percent Change (percent increase/decrease): is calculated by subtracting the original value from the new value and dividing the difference by the original value. For example, if a rate changed from 53% (original) to 46% (new), the percent change would be (.46 - .53) = -.07 / .53 = -13%, equaling a 13% decrease.

List of Acronyms

DOE	lowa Department of Education
HHS	Iowa Department of Health and Human Services
MCAH	

Report

Introduction

A child's oral health is an important factor in overall health, school readiness, and even self-esteem. In lowa, the I-SmileTM and I-SmileTM @ School programs work to assure optimal oral health for children by facilitating access to care and providing preventive services for at-risk children and families. I-SmileTM @ School provides preventive dental services to children ages 6-14 with parental consent attending schools with free-reduced lunch rates of 40% or greater.

The lowa Department of Public Health coordinated an oral health survey of children enrolled in selected lowa third grade classrooms from October 1, 2021 through May 31, 2022. (In July, the Departments of Public Health and Human Services merged to form what is now known as the lowa Department of Health and Human Services.) This report describes the importance, survey methods and results of this oral health survey, in addition to the impact of I-Smile[™] on children's oral health in Iowa.

Background

Oral health surveys provide an understanding about oral health status and dental disease prevalence among a selected population. Understanding the prevalence of dental decay is crucial, as it is the most common chronic illness among children and affects a child's ability to eat, sleep, learn, and function at their full potential at home and school.^{1,2} Dental decay can be painful and is irreversible. Unless properly treated, decay leads to infection of the teeth and gums, ultimately leading to tooth loss or infections in other areas of a child's body. Additionally, the aesthetics of dental decay can negatively affect a child's social development and self-esteem.² Furthermore, dental decay can influence a child's school attendance and performance.³

The Department of Health and Human Services (HHS) manages the I-Smile[™] program, which includes I-Smile[™]@ School, to assure optimal oral health of Iowa's children, especially those at highest risk for dental disease. As the oral health component of the statewide Title V Maternal, Child, and Adolescent Health (MCAH) program, I-Smile[™] connects children and families with dental, medical and community resources to ensure a lifetime of health and wellness. Each of Iowa's 23 Iocal Title V MCAH contractors has a dental hygienist who serves as the I-Smile[™] Coordinator for designated service areas and manages the I-Smile[™] @ School program. The coordinators carry out I-Smile[™] @ School strategies, focusing on preventing dental disease through dental screenings, fluoride varnish applications, and dental sealant applications; identifying ways to help families receive care from dentists; and promoting the importance of oral health within the communities they serve.

I-Smile[™] @ School prioritizes serving children who may face barriers to receiving dental care, including those with Medicaid health and dental coverage, those uninsured, or those that are underinsured. I-Smile[™] @ School serves 92 of Iowa's 99 counties; similar programs exist in the other seven (Polk, Dallas, Wapello, Keokuk, Scott, Clinton and Jackson Counties).

This is lowa's fourth third grade oral health survey, with the most recent prior survey completed in 2016⁴. The results from the 2022 third grade oral health survey allow for comparison across 6, 10 and 16 years and among demographic populations, as well as the ability to consider impact of I-Smile[™] and I-Smile[™] @ School. Available resources, such as the I-Smile[™] @ School infrastructure and requirements, partnerships, and consistent and meaningful data collection, resulted in minimal additional staff time or funding needed to complete this survey.

Objectives

This oral health survey fulfilled two important goals:

- 1. To acquire an understanding of dental disease prevalence among third grade children enrolled in an lowa third grade classroom; and
- To evaluate dental disease prevalence among third graders in comparison with the 2016 and 2009 third grade oral health surveys and the potential impact of I-Smile™ @ School.

Methods

Sample

A stratified random sampling method was used to complete this survey. Iowa Department of Education (DOE) data from the 2020-2021 school year was used to inform and create the sample dataset. The preschool through grade 12 enrollment file was merged with the free and reduced lunch file as well as the public and non-public school building directory information file to create a master dataset. The following data were added to the dataset based on the county within which the school building is located: if the school participates in the I-Smile[™] @ School program, the Title V service area of the county in which the school building is located, and urbanity (metropolitan, micropolitan, or rural).

Through DOE enrollment data, an estimated 37,419 students were enrolled in third grade for the 2020-2021 school year. Iowa third grade schools were included in the sampling frame if they are a private or public school, students were educated on-site, and have at least 15 children enrolled in third grade. The decay rate and the response rate from the 2016 third grade oral health survey were used in conjunction with the number of third graders in Iowa to calculate the needed sample size and, as a result, number of schools to be included in the sample. It was determined 5,600 third graders would need to be sampled in 92 schools – 4 schools per Title V service area.

To prepare the sample dataset, the master data file was sorted by (1) non-white enrollment (descending), (2) urbanity (metropolitan, micropolitan, and then rural), and then (3) by Title V service area (ascending). A sampling interval was calculated per Title V service area by dividing the total number of third grade students enrolled in the service area by 4 (the total number of schools needed per strata). A random number was then generated through random.org with the minimum number being '1' and the maximum number being the value of the sampling interval per each strata. The random number was then used to select the schools. The generated random number was compared to the cumulative total enrollment by each school in the Title V service area and the school in which that number fell was selected (i.e. if the random number generated was '29', and the enrollment of the first school 'X' in the list was 15 and the enrollment of the second school 'Y' on the list was 33 (15+33=48), the second school 'Y' would be selected because 29 is greater than 15 but less than 48). The random number was then added to itself (i.e. 29+29=58) to select the second school and the process repeated until four schools were selected within each Title V service area. The 92 selected schools contained 6,107 enrolled third grade students. Forty-five of the 92 selected schools regularly participate in the I-SmileTM @ School program.

Due to the COVID-19 pandemic and changes from the 2020-2021 school year to the 2021-2022 school year, 10 of the 92 selected schools refused to participate in the survey. When this occurred, the school was replaced by selecting a school within the same Title V service area using the same sampling methodology. After all initially refused schools were replaced, the final sample included 92 selected schools enrolling 6,270 third grade students. Of the 92 selected schools, 48 regularly participate in the l-

Smile[™] @ School program. I-Smile[™] Coordinators were asked to serve all selected third grade schools within their service area from October 1, 2021 through May 31.

I-SmileTM Coordinators gave consent forms to 6,364 third graders to participate in the survey; 2,892 returned a consent form (45%) and 2,150 returned a *positive* consent form (34%). Through this survey, 2,014 students were screened, a response rate of 32%.

Data Collection

All third graders selected as a part of the third grade survey were screened from October 1, 2021 through May 31, 2022. Using I-Smile[™] program data entry standards, data were entered in the data system in place for MCAH Title V and I-Smile[™] (**signify**community). This allowed HHS staff to use regularly collected data to achieve the survey objectives, thus reducing overall costs for the survey.

To assure consistency among the dental hygienists who provide dental screenings at selected third grade schools, a calibration training was recorded by HHS and released to dental hygienists work in the I-Smile[™] program in September 2021. All I-Smile[™] dental hygienists who would be providing dental screenings as a part of the third grade survey were required to watch the recorded calibration training and complete an online calibration quiz prior to screening third graders. The quiz also helped to recognize inconsistencies across screeners as explained by the required webinar training.

Dental hygienists provided dental screenings to children enrolled in a selected third grade school, using previously approved program forms (I-Smile[™] @ School consent and screening forms for schools participating I-Smile[™] @ School and I-Smile[™] consent and screening forms for schools not participating in I-Smile[™] @ School). Four screening indicators (decay, filled, history of decay, and sealed permanent molars) and two consent form indicators (payment source for child's dental care and child's last dental visit) were the focus for this survey, along with demographic information (race, ethnicity, age, gender and county of service). While screening indicators were collected on the day of screening, consent indicators and race, ethnicity, and gender could be collected up to 12 months prior to the day of screening, following program protocol. The I-Smile[™] and I-Smile[™] @ School consent forms were used to collect demographics and consent indicators. These indicators were addressed in the calibration training and required to be collected for every child screened.

Lastly, a newly created data entry dashboard in **signify**community, along with monthly to biweekly emails, allowed contractors to make necessary and timely data entry corrections. This facilitated error correction for both the contractors and HHS staff.

Statistical Analyses

The final dataset is weighted to represent third graders in Iowa and help adjust for non-response bias. The weight is calculated per selected school based on the sampling design. It is calculated by dividing the sampling interval for each Title V service area by the number of children screened for each school. All analyses are run with the strata as the Title V service area, the cluster as the school identifier (ID), and the weight as the calculated weight per school. Microsoft Excel is used to calculate the weight per school and SAS is used for descriptive analyses. SAS-callable SUDAAN was used for log-binomial regressions to determine statistical difference within categorical variables for oral health outcomes.

Children screened and enrolled in selected third grades are included in all analyses. Missing responses to pertinent variables were excluded from cross-tabulation analyses.

Percent change (percent increase/decrease) is calculated by subtracting the original value from the new value and dividing the difference by the original value. For example, if a rate changed from 53% (original) to 46% (new), the percent change would be (.46 - .53) = -.07 / .53 = -13%, equaling a 13% decrease.

Consent/Demographics

Consent form indicators and demographic information used a multiple-choice format for data collection. Additionally, the consent form indicator "child's last dental visit" was asked as a multiple-choice question with the answer options: within the past 6 months/I year/3 years/5 years/Never.

The race and ethnicity questions on the paper consent form have slightly different response options than the **signify**community values. A crosswalk of appropriate **signify**community values to be entered per consent form value is standard for the I-Smile[™] @ School program based on set guidelines. Racial and ethnic categories are condensed due to small numbers. If the ethnicity field on the consent contained "Hispanic/Latino," the child was reported as "Hispanic." If the ethnicity field indicated they were "Not Hispanic/Latino," the child was reported within one of the following race categories. "White" is reported if the only race selected is "White." "Black" is reported if the only race selected is "Black or African American.". Finally, "Other" is reported if the race selected on the consent is another race not described in the above list (i.e. Asian or Pacific Islander, American Indian or Alaska Native, Other). Additionally, 5% of participants did not indicate a race or ethnicity.

Geographical classification is determined based on county of school location due to the autofill nature of county of residence. Iowa counties considered "metropolitan" by the U.S. Office of Management and Budget are: Benton, Black Hawk, Boone, Bremer, Dallas, Dubuque, Grundy, Guthrie, Harrison, Jasper, Johnson, Jones, Linn, Madison, Mills, Polk, Pottawattamie, Scott, Story, Warren, Washington and Woodbury. Counties determined "micropolitan" are: Buena Vista, Carroll, Cerro Gordo, Clay, Clinton, Des Moines, Dickinson, Jefferson, Lee, Mahaska, Marion, Marshall, Muscatine, Wapello, Webster and Worth. The remaining 61 counties are considered "rural" (refer to Appendix F).⁹

Screening

Three of the four primary screening indicators are yes or no questions, "yes" indicating the indicator is present, and "no" that it is not present. The definition of 'decay' changed for this survey from the 2016 survey to include 'dark pits and fissures on baby teeth'. In 2016, decay only was defined as a cavitated lesion.⁴ History of decay is calculated with "yes" representing that either a filled tooth and/or decay are present, and "no" demonstrating neither a filled tooth nor decay is present in the child's mouth. Referral need illustrates the timeframe in which a child needs to see a dentist for either follow-up or treatment. This is based on a number of factors including oral health status, oral health access, behaviors, and social determinants of health using the I-Smile[™] Decay Risk Assessment which provides criteria for referrals as: "Immediate", "Within 3 Months", "Within 6 Months", or "Within 12 Months" (refer to Glossary).

Descriptive statistics were calculated for each demographic, consent and screening indicator as well as cross-tabulation rates among screening indicators and demographics. A Pearson chi-square test was used to determine statistically significant associations between screening indicators and demographics. Relationships with p-values greater than 0.05 are not statistically significant and are noted in the corresponding table in Appendix G. Additionally, statistical difference was calculated using log-binomial regression models in SAS-callable SUDAAN to assure rates between categories are statistically significant (i.e. decay rates in rural counties and metropolitan counties).

Results

Overall

The sample of children screened is diverse across gender, race and ethnicity, and geographical classification. Sixty-seven percent of third graders are reported as White, 14% reported as Hispanic, 5% as Black, 5% reported as more than one race ("Multiracial"), 3% reported as Asian or Pacific Islander, 0.6% reported as another ("Other") race, and 6% did not report their race and/or ethnicity (refer to figure 1).

Males and females were equally represented, with 48% male and 52% female. Finally, geographical classification was represented with 67% of children receiving the screening in metropolitan counties, 18% in micropolitan counties, and 15% in rural counties (refer to Figure 1; refer to Appendix G, Table 2).



Figure 1: Sample is Diverse across Demographics (%)

Consent form indicators include "My child's most recent dental visit was within the past... 6 months/I year/3 years/5 years/Never" and "How do you pay for your child's routine dental care?." Half of third graders (51%) use private dental insurance to pay for their regular dental care, followed by Medicaid or Pre-Ambulatory Health Plan (Medicaid/Title XIX, 34%), out-of-pocket (self-pay, 7%), Hawki – Iowa's children's health insurance program (6%), and other source (2%). Seventy-three percent reported a previous dental visit within the past 6 months, and an additional 18% within the past 1 year, 5% within the past 3 years, 1% within the last 5 years, and 2% reporting they never had a dental visit (refer to Figure 2).

Figure 2: More than 9 in 10 Third Graders have been to a Dentist in the Past Year



Screening indicators include decay, filled teeth, sealed permanent molars, history of decay and referral need. Seventeen percent of third graders had untreated decay, with an average of 2.3 teeth decayed per child with decay. Forty-two percent of children had filled teeth, with an average of 3.7 filled teeth per child with filled teeth. Sealed permanent molars were present in 43% of children. A history of decay (decay and/or fillings) was present in 51% of participants, and 5% had an immediate referral need (due to pain, abscess, extensive decay, or swelling), 13% within 3 months, 79% within 6 months, and 3% within 12 months (refer to Table I; refer to Appendix G, Table 4).

Table	1:	Screening	Indicators
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Decay	Filled	Sealed Perm Molar	History of Decay	Referral Need
17.0%	42.0%	42.8%	51.2%	5.5% Immediate 12.6% Within 3 Months 79.0% Within 6 Months 2.9% Within 12 Months

Decay

Disparities exist across school location, race and ethnicity, payment source for dental care, and timing of their last dental visit in lowa third graders. Children attending third grade in a rural county have 1.66 times the prevalence of decay compared to children attending third grade in a metropolitan county (24% and 14%, respectively) (refer to Figure 3). Children reported with a non-white race or ethnicity, including black, Hispanic, Asian or Pacific Islander, Native American or American Indian, or other race have 1.69 times the prevalence of decay than those reported as white (24% and 14%, respectively). Decay rates also differed by how a third grader pays for regular dental care. Third graders with Medicaid as their regular payment source for dental care have 2.52 times the prevalence of decay than those reported using private dental insurance (26% and 10%, respectively). Lastly, decay rates differed if a child

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had a dental visit in the past year. Third graders without a dental visit in the past year have 3.45 times the prevalence of decay compared to children with a dental visit in the past year (47% and 13%, respectively). These relationships are statistically significant at the 0.05 level (refer to Appendix G, Table 5).

Filled

Disparities exist across school location among lowa third graders. Children attending third grade in a rural county have 1.23 times the prevalence of filled teeth compared to children attending third grade in a metropolitan county (49% and 40%, respectively) (refer to Figure 3). These relationships are statistically significant at the 0.05 level (refer to Appendix G, Table 6).

Sealed Permanent Molar

Disparities exist across school location, gender, if the school served by I-Smile™ @ School, and the child's reported last dental visit among presence of sealed permanent molars in lowa third graders. Children attending third grade in a rural county have 1.58 times the prevalence of sealed permanent molars than children attending third grade in a metropolitan county (60% and 38%, respectively) (refer to Figure 3). Gender also plays a noteworthy role in predicting sealed permanent molars. Children reported as female have 1.33 times the prevalence of sealed permanent molars than children reported as male (49% and 37%, respectively). Additionally, the presence of the I-Smile™ @ School program at a school with third grade has a positive relationship with sealed permanent molars. Third gradersat a school served by I-Smile™ @ School have 1.60 times the prevalence of sealed permanent molars than children in third grade at a school that is not served by I-Smile[™] @ School (55% and 35%, respectively). Lastly, third graders with a dental visit in the past year have 1.50 times the prevalence of sealed permanent molars than third graders without a dental visit in the past year (45% and 18%, respectively). These relationships are statistically significant at the 0.05 level. It is worth noting there is no difference in sealed permanent molars among payment source for regular dental care (43% among those reported to use Medicaid, 41% among those reported to use private dental insurance) (refer to Appendix G, Table 7). These relationships are statistically significant at the 0.05 level.

History of Decay

A child is considered to have a history of decay if they have at least one filled tooth or at least one tooth with decay. Disparities exist in history of decay across school location and payment source for regular dental care among lowa third graders. Children attending third grade in a rural county 1.27 times the prevalence of a history of decay than children attending third grade in a metropolitan county (61% and 48%, respectively) (refer to Figure 3). Additionally, Medicaid-enrolled third graders have 1.31 times the prevalence of a history of decay than third graders reported to pay with private dental insurance for regular dental care (59% and 45%) (refer to Appendix G, Table 8). These relationships are statistically significant at the 0.05 level.

Referral Need

The referral need of the child is based upon multiple factors, including oral health status, oral health access, behaviors, and social determinants of health. Of Iowa third graders, 18% had a referral need to a dentist within 3 months or sooner, and 82% had a referral need of 6 months or later. Disparities exist in early referral need across school location, race and ethnicity, participation in the I-Smile™ @ School program, and how the third graders pay for regular dental care. Children attending third grade in a rural

county have 1.87 times the prevalence of needing an early referral (within 3 months or sooner) than children attending third grade in a metropolitan county (28% and 15%, respectively) (refer to Figure 3). Children reported with a non-white race or ethnicity, including black, Hispanic, Asian or Pacific Islander, Native American or American Indian, or other race have 1.81 times the prevalence to have decay than those reported as white (26% and 15%, respectively). Children who attend third grade in a school that participates in I-Smile[™] @ School have 1.74 times the prevalence of needing an early referral than children attending third grade in a school that does not participate in I-Smile[™] @ School (24% and 14%, respectively). Lastly, third graders reported to use Medicaid to pay for regular dental care have 2.63 times the prevalence of needing an early referral than third graders reported to use private dental insurance to pay for regular dental care (27% and 10%, respectively). These relationships are statistically significant at the 0.05 level (refer to Appendix G, Table 9).

Figure 3: Children Attending Third Grade in Rural Counties have Higher Rates of Poor Oral Health Outcomes And Higher Rates of Prevention than Third Graders in Metropolitan Counties



Comparison to 2016 Survey

Differences in definition from 2016 to 2022 could have caused decay rates to be artificially higher. The definition of 'decay' in 2022 is 'dark pits and fissures on baby teeth or a cavitated lesion'. In 2016, decay only was defined as a cavitated lesion.

- Even with the expanded definition of decay, decay rates remain steady from 2016, with 17% of lowa third graders having decay in 2022 and 16% in 2016.
- The prevalence of having filled teeth has decreased, where 47% of lowa third graders were found to have filled teeth in 2016 compared to 42% in 2022, an 11% decrease. This may be considered an improvement, assuming less need for restorations due to decay. It may also indicate a reduced availability to restorative care. It should also be noted a larger decrease in restoration rates was evident in third graders enrolled in a school participating in I-Smile™ @

School (52% in 2016 to 46% in 2022) than in third graders enrolled in a non-participating school (42% in 2016 to 39% in 2022).

- The presence of a sealant on a permanent molar decreased from 2016, from 59% to 43%. However, a substantial decline in sealed permanent molars is seen among third graders enrolled in a school that does *not* participate in I-Smile[™] @ School, with 59% having a sealed permanent molar in 2016 down to just 35% in 2022. The number of children able to receive dental sealants, either through I-Smile[™] @ School or their regular dentist, may have been affected in the previous two years by the COVID-19 pandemic hiatus in the I-Smile[™] @ School program and temporary dental office closures.
- Finally, the prevalence of having a history of decay has remained stable from 54% among lowa third graders in 2016 to 51% in 2021. (refer to Figure 4).



Figure 4: Filled Teeth and History of Decay Improved Among Iowa Third Graders Since 2016

^N The 2016 survey limited its definition of 'decay' to 'cavitated lesion' rather than additionally including 'dark pits and fissures of primary molars', likely causing rates to be artificially lower than more recent years.

Discussion

While multiple oral health status indicators for lowa third graders improved or remained stable since 2016, disparities are evident among school county classification, socioeconomic status, payment source for regular dental care, dental visit within the past I year and gender. Additionally, more must be done to help get third graders to a dentist, as rates of dental sealants worsened overall since 2016 but particularly worsened among third graders attending schools not participating in the I-Smile[™] @ School program by 42%.

The statewide infrastructure of the I-SmileTM @ School program, which expanded from 27 counties to 92 counties in 2013, is likely related to improvements. In 2022, presence of decay remained steady while the presence of restorations or filled teeth decreased by more than 10% (47.1% to 42.0%) from 2016.

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Much of this may be due, in part, to dental sealants and other preventive services (e.g., fluoride varnish applications) and oral health education provided to children and parents/guardians through I-SmileTM @ School. The follow-up care coordination provided through I-SmileTM @ School also helps families make dental appointments and access regular and restorative care.

The overall rate of decay is stable from the 2016 survey. Considering the newly expanded definition to include 'dark pits and fissures of primary teeth', as well as a hiatus in in-school services through the COVID-19 pandemic, this is a victory for I-Smile[™] @ School and Iowa third graders. We will continue its work with school administrators, principals, nurses, and teachers to determine "best practice" strategies to help reach more children in rural counties and children of a non-white race or ethnicity with early preventive care and education to reduce incidence of dental decay and a need for restorative care. Additionally, encouraging children and their families to return I-Smile[™] @ School consent forms to receive preventive oral health services may help not only reduce decay, but their overall health.

While the rates of children with a sealed permanent molar decreased from 59% in 2016 to 43% in 2022, children of high socioeconomic status (attending third grade in a school that does not participate in I-Smile[™] @ School) saw the most substantial decrease, from 59% in 2016 down to just 35% in 2022, a 41% decrease. Comparatively, rates also declined among children of low socioeconomic status (attending third grade in a school that participates in I-Smile[™] @ School), although only by 10% (61% in 2016 to 55% in 2022). Interruptions to dental services in the past two years are likely due to the COVID-19 pandemic. Moving forward, I-Smile[™] and I-Smile[™] @ School will continue to strengthen partnerships with dentists to encourage them to take referrals and apply dental sealants in their offices. This is particularly important in areas with schools that have lower free and reduced lunch rates that are not served by I-Smile[™] @ School.

There are great differences regarding oral health between lowa third graders in rural counties and those in urban counties. Third graders in rural counties have higher rates of decay, filled teeth, having a history of decay, and needing early referral due to abscess, pain or decay than those in metropolitan counties, potentially leading to poorer oral health outcomes. Based on a survey completed every six months by I-Smile™ Coordinators, 49 of Iowa's 99 counties do not have a dentist taking new Medicaid referrals, 40 of which are rural - creating significant barriers to dental care through lack of a provider, cost, and transportation.⁶

Based on this survey evaluation, providing preventive dental services through I-Smile[™] @ School is successful in improving oral health outcomes of Iowa third graders. Continuing the partnerships between I-Smile[™] @ School and school districts is important to continue to improve the health of Iowa children at risk of dental disease, and thus support the overall health of Iowans by strengthening opportunities for oral health access.

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³Jackson, S. L., Vann, W. F., Jr, Kotch, J. B., Pahel, B. T., & Lee, J. Y. (2011). Impact of poor oral health on children's school attendance and performance. American journal of public health, 101(10), 1900–1906. doi:10.2105/AJPH.2010.200915

⁴Iowa Department of Public Health, Oral Health Bureau. 2016 Third Grade Oral Health Survey Report.

⁵State Library of Iowa (2020). *Metropolitan, Micropolitan, and Combined Statistical Areas*. Institute of Museum and Library Services: The U.S. Office of Management and Budget. https://www2.census.gov/geo/maps/metroarea/us_wall/Mar2020/CBSA_WallMap_Mar2020.pdf

⁶Iowa Department of Public Health, Bureau of Oral and Health Delivery Systems. I-Smile[™] Coordinator Bi-annual Dental Referral Survey. June 2022.

Appendix A – I-Smile[™] Consent Form (Parent NOT Present)

The state of the	Template	e Screening a	nd 'Other'	Servi	ce – Par	ent NOT P	resent	
hild's Name:			Age:		1	Date of Bir	th:	
ddress:			Cell Phon	e:				
	Passa		Other Pho	one:		Ethnicity		
] Female	White Black/African American	tific Islander nerican		Other	Ethnicity:			
hild's Physician:	• •		Child's De	entist	:			
fapplicable, child's N	Medicaid ID number:							
YES, I give permis If gcapbas will be prov conditions. NO, I do not give	ision for my child to receive a vided, more detailed medical history of permission for my child to rec	dental screeni questions must be ceive a dental :	ing and fluor added to evalu screening ar	nde va uate a n nd fluo	arnish ap dient's risk oride var	plication. for bacterial e nish applica	ndocardit	is or other
Please answer th	ne following questions:							
1. How do you pa	ay for your child's dental ca	re? (please c	heck one)					
🗆 Self 🛛 🗅 N	Medicaid/Title XIX	awki	Private	dent	al insura	ance	0 Ot	her
2. My child's mos	st recent dental visit was w	ithin the past	t: (please cl	neck	one)			
6 months	□ 1 year □ 3 yea	rs 🛛 5	years	🗆 ha	s never	seen a der	ntist	Unknown
3. Does your chil	d have medical insurance?			Yes				
4. My child's mos	st recent medical visit for a	well-child/ad	iolescent e	xam	was wit	nin the pas	t:	
□ 3 months		onths L m	nore than 1	year		L unkno	wn	
5. Are your child	s immunizations up to date	er		res		Explain:	<u> </u>	
6. Is your child cu	urrently taking any medicat	ions?		Yes		Explain:	<u> </u>	
7. Does your chil	d have any allergies?			Yes	LINO	Explain:		
8. List any concer	rns you have about your ch	ild's mouth o	or teeth:					
consent to insert ager	cy name use of email and tex No Email address:	ting to send m	ie schedulin	g and	child hea	alth service:	inform	ation.
I was offered a Notice o I understand that this o I understand that the se I understand that these I understand records or I understand that the in Medicaid Enterprise, or	of Privacy Practices. onsent for services is valid for one (1) ervices that will be received do not ta services are provided under the low eated and maintained as part of this iformation from these records may b designee for audit and quality impco) year unless with ke the place of re a Department of F program are the p e shared with the wement purposes	drawn in writin gular dental ch Public Health, M property of the lowa Departm or other legall	g by pa eckups faterna lowa D ent of F y autho	arent, guard at a denta al and Child Public Healt prized purp	dian or client (i l office. l & Adolescent of Public Heal th and its agen oses.	f of legal a Health Pr th. ts and Titl	age}. ogram. e V contractors, io
arent/Guardian Sigr	nature				Date			
voluntarily authorize	Insert your agency name	to re	lease, obtain the followin	n, or e	xchange le V MCA	informatio	n manua	illy and/or
IN ALL RECUDING DISTO	physicians, dentists, Head Sta	rt. This	release doe	s not	authoriz	e disclosure	ofmate	erial protected
st possibilities here -				or other la				
st possibilities here – y federal and/or state	law applicable to substance a	abuse, mental	health and/	or AIE)S-relate	d informatio	on.	*************

Appendix B – I-Smile[™] @ School Consent Form

	Templa	onsent ate Scree	t and Rele ning, Varnis	ease of Inf h +Sealant –	Parent NC	on OT Prese	nt
Child's Name:				Age:		Date of	Birth:
Address:				Cell Phone:	:		
				Other Phor	ie:		
] Male	_		ity:				
] Female	Black/African Arr	nerican	Asian/Pac Native Ac	cific Islander	Other	□ Not	t Hispanic/Latino
chool:	D black/strical st	Teacher'	s Name:	nencan		L na	Grade:
hild's Physician:				Child's Den	tist:		
applicable, child's i	Madicaid as Hawki I	Doumbo					
applicable, child si	Medicald of Hawkin	ID NUMBE					
YES, I give permis	ssion for my child to r	eceive a d	ental screen	ing, fluoride v	arnish appli	cation an	id sealants.
If gaspitos will be pro-	vided, more detailed medic	cal history qu	estions must be	added to evaluat	te a client's ris	k for bacte	rial endocarditis or other
conditions.	·····						
NO, I do not give	permission for my ch	ild to rece	erve a dental	screening, fluo	oride varnis	h applica	tion and sealants.
Please answer	the following quest	tions:					
1. How do you	pay for your child's	dental ca	re? (please	check one)			
□ Self □ I	Medicaid/Dental We	ellness Pl	an Kids	🗆 Hawl	ci 🗌 🗆 Pri	vate der	ntal insurance 🕴 🗆 Othe
2. My child's m	ost recent dental vis	sit was wi	ithin the pa	st: (please ch	eck one)		
□ 6 months							
	; 🗆 i year 🛛 💡	3 year	rs 🖂 5	years 🗌 🗆	has never	seen a o	dentist 🛛 Unknown
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Rev. 5.21

Appendix C – I-Smile[™] Screening Form (Parent NOT Present)

Smile Chil reening and 'Ot rent NOT Prese	d Oral He her' Services nt	ealth S	ervice	25	Risk Level	Low D0601	Moder D060	rate)2. min	High D0603		Filleo Seale Dem	ay: d: ed: in:	yes yes yes	no no no	#
											10000	×6			
Client Name:						N	//edicaid/	Client ID):						
DOB:	Age:		Service S	iite:						Date o	of Serv	ice:			
Medical history	reviewed	□Yes □I	No	Notes:											
Franslator need	led 🛛 Yes	IN0			<u> </u>						,				
Oral Screening	D019000	(Initial)	D D019	0 (Periodic)	0.001	L45 (Oral Eya	ото 👔	Modifie	er (Nurs	e provi	ded}	Dura	tion:		min
Condition of h	ord tissue		Docume	ntation		Conditi	ion of soft	t tissue			Do	cumer	ntatio	n	
Divious decay (or					Gum redne	ss, bleedi	ng (e.g.							
Decay history (f	n illings,				\rightarrow	Swelling or	lumps		+						
visible plaque						Trauma or i	injury								
Stained fissures defects, trauma	, enamel or injury					Other									
Sealed teeth						Findings of noted on Co	Parent Co	oncern a	5						
Topic(s) of oral Notes: Products recom	health educa	ition provi	ded:	D teethin de D reg D Toothb	g/erupti ular den orush	on Onor tal visits C	n-nutritiva Disealants	e suckin s D ir	g 🗆 njury pr	home eventi nse	care on	D bott	dieta le/sip Micro	y habi py cup bial Ri	use nse
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Topic(s) of oral Notes: Products recom Service Fluoride Varnish	health educa mended or d Type: D Not provid	ispensed:	ided:	D teethin de D reg D Toothb D Salt wa	orush ocumentic	on non tal visits [Flos: Non ntion/Notes Concentration	n-nutritiva sealants s e	e suckin s Dir	g D njury pr ride Rin Other	home (eventi nse	care on	D bott	dieta le/sip Micro	y habi py cup bial Ri Duratio	ts use nse m:
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Appendix D – I-Smile[™] @ School Screening Form

LSmile @ School Screening Form	Dick	Low	Moderate	e High	[Decay:	yes	no	#	
Forme @ School Screening Form	Loval	D0601	D0602	D0603		Filled:	yes	no	#	
TEMPLATE	LEVEI	Duration:		min		Sealed:	yes	no		
					1	Demin:	yes	no		

ID# N	Name Coun				County #	County # DOB						Age				
Sex	Scho	ool Dist	rict					School							Grade	
Date of Ser	vice		Race				I	Translator needed?				Med	dicaid	ID#		
								□Yes		No						
Has a denti:	dentist? Free/Reduced Lunch? Most recent visit? Payment so						Payment source	ce?								
	□Yes □No □Yes □No □6m □12m □3y □5y □N □U □Self □XIX								Hawk		sцо	ther				
Oral Scree	ning	Eviewe	a from co	nsent: Li	es L	INO	Duration	(mi	n			То	oth	Fxam	Seal
Visible plan			 ⊡light	 □moder:	ta F	lheavy		_i					1	/	Exern	2001
visible plaq	Jue. 1												2			
Soft Tissue	es:											ight	3	[
□no proble	ems	□gin	givitis: loc	alized	/gene	eralized						er R	4	A		
□trauma		□lesi	ons 🛛 🗆 s	swelling	1							d d	5	В		
Describe:												1	6	с		
													7	D		
Hard Tissu	Jes:												8	E		
□no proble	ems (□chip		∃stained p	oits/fis	sures							9	F		
□decay	□de	eminera	alized	☐ □othe	r:								10	G		
Describe:												焦	11	н		
				·								L L	12	(I _		
D1351 Sea	alant	Applic	ation:	□Yes	□No	<u> </u>	Duration [m	in (Date:		dd	13	1		
Products us	sed: (e	ex: 40%	Phospho	ric Acid Et	ch Ge	& Clinpro	Sealant)					2	14	[
													15			
						-,,		- <u>.</u>	·				16			
D106 Fluo	ride	Varnis	h Applica	ation	□Yes	🗆 No	Duration		mi	n			17	ļ.		
Product use	ed: (e)	c Varni	sh Americ	a 0.25mL								-	18	<u>,</u>		
Fluoride co	ncent	ration:	(ex: 5% Na	aFI2 varni	sh)							eft	19			
.												erL	20	<u>к</u>		
Education	Give	n: L	IYes LI	NO								NO	21	L .		
Dietary		lome C	are ¦ L	Fluoride		Other						-	22	M		
							(· · · · · · · · · · · · · · · · · · ·	· · · ·		·		23	N		
D1330 Ora	al Hyg	giene I	nstructio	ni⊡Ye	5 [[No	Duration		mi	n 	İ		24	0		
Notes:												-	25	P		
												, t	20	R		
Referral to:	: [Ri	28	5		
Referral ne	ed (ba	ased on	risk asses	isment):								Mei	29	Т		
HIGH D Imn	media	te 🛛 W	ithin 3 mo	onths I	NODE	RATE D Wit	hin 6 month	IS LO	owE	J With	in 12 months	2	30			
Provider Na	er witt ame/C	redent	ials:	uons givei	TOP	; 🗆 van	nish ¦ 🗆	sealants	5	.i		-	32			
Provider Sis	enatu	ne:									<u> </u>					

Recording Key

RACE		<u>COL</u>	NTY CODE (enter service area counties)
1	White	01	County A
2	Black	02	County B
3	Hispanic	03	County C
4	Asian/Pacific Islander	04	County D
5	Native American		
6	Other		
7	Undetermined		

CARI	ES PREVALENCE
0	Unerupted / congenitally missing permanent tooth
1	Sound permanent tooth
2	Filled permanent tooth
3	Questionable permanent tooth
4	Decayed permanent tooth
5	Crowned permanent tooth
а	Sound primary tooth
b	Filled primary tooth
с	Questionable primary tooth
d	Decayed primary tooth
e	Crowned primary tooth
S	Sealed permanent or primary tooth

Appendix E – I-Smile[™] Decay Risk Assessment

I-SMILE[™] DECAY RISK ASSESSMENT FORM

Oral Screening Indicator	Risk Level	Dental Referral	I-Smile™ Follow Up	
Abscess, pain, or large decay	High	Immediate	Care coordination	
Untreated decay	High		Follow up with parent/guardian within 3 months to confirm completion of treatment from a dentist	
Dark pits/fissures on primary molars	High	Within 3 months		
Demineralization (white spot lesions)	Moderate			
Poor oral hygiene	Moderate			
Deep pits/fissures	Moderate			
Restorations	Moderate			
Orthodontia	Moderate	Within 6 months	Care coordination	
Dry mouth	Moderate		Care coordination	
Qualify for Medicaid, WIC, or free and reduced lunch	Moderate			
Dental visits – less than annual	Moderate			
Frequent exposure to juice or sugar/carbohydrates	Moderate			
Shallow grooves, fluorosis, and/or no history of decay	Low	Within 12 months	Care coordination, as needed	

Assign risk level according to the highest oral screening indicator identified (high \rightarrow low).

Iowa Department of Health and Human Services, Bureau of Oral and Health Delivery Systems

Appendix F – Iowa County Geographic Designations (2020)

2020 County Geographic Designations



Appendix G – Survey Frequencies

Table 2: Demographics

Variable	Ν	Weighted %	Weighted CI
Race/Ethnicity			
White	1396	66.86	59.73-73.99
Black	77	5.47	3.41-7.53
Hispanic	294	3.9	7.32-20.51
Asian/Pacific Islander	53	2.56	1.14-3.98
Multi-racial	73	4.59	3.07-6.12
Other	15	0.59	0.096-1.09
Unknown/Missing	106	6.01	4.24-7.78
Gender			
Male	967	48.37	44.80-51.95
Female	1047	51.63	48.05-55.20
Geographical Classification			
Metropolitan	1010	67.38	62.10-72.67
Micropolitan	362	8.	13.14-23.09
Rural	642	14.50	8.69-20.31
I-Smile™ @ School Participant			
Yes	995	60.19	51.67-68.71
No	1019	39.81	31.29-48.33

Table 3: Consent Indicators					
Variable	Ν	Weighted %	Weighted CI		
Last Dental Visit					
Within 6 Months	1390	72.98	67.00-78.96		
Within I Year	364	18.50	13.14-23.85		
Within 3 Years	110	5.26	3.57-6.95		
Within 5 Years	18	1.11	0.23-1.99		
Never	31	2.15	1.02-3.29		
Payment Source for Regular					
Dental Care?					
Self-Pay	172	6.97	5.49-8.44		
Medicaid/Title XIX	701	34.29	26.55-42.02		
Hawki	138	5.67	4.39-6.96		
Private Insurance	901	50.74	43.16-58.33		
Other	42	2.33	1.10-3.56		

Variable	Ν	Weighted %/Mean	Weighted CI
Decay			
Yes	454	17.04	80.16-85.77
No	1560	82.96	14.23-19.84
Average Number of			
Decayed Teeth		2.26	
Filled			
Yes	879	41.99	39.65-44.33
No	1135	58.01	55.67-60.35
Average Number of			
Filled Teeth		3.67	
Sealed Permanent Molar			
Yes	1025	42.80	38.48-47.13
No	989	57.20	52.87-61.52
History of Decay			
Yes	1113	51.19	47.87-54.52
No	901	48.81	45.48-52.13
Referral Need			
Immediate	142	5.47	3.93-7.01
Within 3 Months	340	12.65	10.29-15.01
Within 6 Months	1438	79.00	76.12-81.88
Within 12 Months	94	2.88	1.89-3.87

Table 4: Screening Indicators

Table 5: Decay by Demographics				
Variable	N	Weighted %	Weighted CI	P-Value [⊤]
Race/Ethnicity				0.005 I
White	267	14.04	11.54-16.55	
Non-White	162	23.77	16.33-31.22	
Gender				0.8376*
Male	219	17.28	13.39-21.18	
Female	235	16.80	13.38-20.22	
School County Classification				0.0065
Metropolitan	210	14.34	10.79-17.90	
Micropolitan	86	21.64	14.48-28.81	
Rural	158	23.79	19.12-28.46	
I-Smile™ @ School Participant				0.0070
Yes	268	22.10	16.88-27.31	
No	186	13.69	10.31-17.07	
Dental Visit Within Last 1 Year				<0.0001
Yes	346	13.66	11.25-16.07	
No	71	47.18*	32.94-61.41*	
Payment Source for Regular				
Dental Care?				<0.0001
Self-Pay	43	17.07	10.05-24.10	
Medicaid/Title XIX	207	25.67	19.06-32.28	
Hawki	26	17.26	7.31-27.21	
Private Insurance	146	10.19	7.78-12.59	
Other	17	31.13*	16.41-45.86*	

Table 5: Decay by Demographics

*Interpret with caution (p-value > 0.05 OR CI > 20)

TP-value calculated from a chi-square test

		weighted %		P-value
Race/Ethnicity				0.4104*
White	603	41.77	38.86-44.69	
Non-White	240	44.51	38.96-50.07	
Gender				0.9443*
Male	426	42.17	36.31-48.02	
Female	453	41.83	36.99-46.67	
School County Classification				0.0130
Metropolitan	410	40.22	37.11-43.32	
Micropolitan	153	42.66	37.33-47.99	
Rural	316	49.40	44.72-54.09	
I-Smile™ @ School				
Participant				0.0133
Yes	496	46.31	42.34-50.28	
No	383	39.13	35.67-42.60	
Dental Visit Within Last 1 Year				0.0102
Yes	798	43.64	40.57-46.71	
No	43	25.55*	14.73-36.37*	
Payment Source for Regular				
Dental Care?				0.5818*
Self-Pay	63	35.83*	25.13-46.52*	
Medicaid/Title XIX	337	44.17	40.47-47.87	
Hawki	68	44.75*	33.45-56.06*	
Private Insurance	369	41.22	37.02-45.43	
Other	21	48.32*	28.53-68.11*	

Table 6: Filled Teeth by Demographics

*Interpret with caution (p-value > 0.05 OR CI > 20)

2022 Iowa Third Grade Oral Health Survey Report

Variable	N	Weighted %	Weighted CI	P-Value [⊤]
Race/Ethnicity				0.7279*
White	721	43.42	37.42-49.41	
Non-White	261	42.04	36.84-47.24	
Gender				<0.0001
Male	459	36.57	32.11-41.04	
Female	566	48.64	43.14-54.14	
School County Classification				0.0003
Metropolitan	441	38.16	32.17-44.14	
Micropolitan	157	46.07	39.42-53.67	
Rural	427	60.33	50.10-70.57*	
I-Smile™ @ School				
Participant				<0.0001
Yes	617	55.23	49.19-61.28	
No	408	34.58	28.17-40.99	
Dental Visit Within Last Year				<0.0001
Yes	944	45.30	40.31-50.28	
No	42	18.14	11.89-24.39	
Payment Source for Regular				
Dental Care?				0.1551*
Self-Pay	88	50.47*	38.49-62.46*	
Medicaid/Title XIX	355	42.80	37.11-48.50	
Hawki	86	53.63*	41.02-66.24*	
Private Insurance	458	40.88	35.21-46.56	
Other	15	32.40*	15.27-46.52*	

Table 7: Sealed Permanent Molars by Demographics

*Interpret with caution (p-value > 0.05 OR CI > 20)

Variable	N	Weighted %	Weighted CI	P-Value [⊤]
Race/Ethnicity				0.0603*
White	738	48.90	45.24-52.56	
Non-White	321	57.55	49.34-65.77	
Gender				0.7378*
Male	541	52.07	45.13-59.12	
Female	572	50.37	45.27-55.47	
School County Classification				0.0027
Metropolitan	519	48.24	43.72-52.75	
Micropolitan	198	53.99	47.09-60.90	
Rural	396	61.44	56.45-66.44	
I-Smile™ @ School				
Participant				0.0133
Yes	624	56.77	51.73-61.82	
No	489	47.50	42.67-52.34	
Dental Visit Within Last 1 Year				0.0122
Yes	953	49.72	46.44-53.00	
No	97	62.73*	52.54-72.93*	
Payment Source for Regular				
Dental Care?				0.0012
Self-Pay	86	46.17*	34.58-57.76*	
Medicaid/Title XIX	446	59.49	52.98-66.00	
Hawki	82	55.45*	43.60-67.31*	
Private Insurance	440	45.41	41.02-49.80	
Other	27	60.70*	42.55-78.85*	

Table 8: History of Decay by Demographics

*Interpret with caution (p-value > 0.05 OR Cl > 20)

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Table 9: Referral Need Immediate or Within 3 Months by Demographics						
Variable	N	Weighted %	Weighted CI	P-Value [⊤]		
Race/Ethnicity				0.0013		
White	276	14.59	12.02-17.16			
Non-White	181	26.43	18.69-34.16			
Gender				0.9064*		
Male	229	17.97	14.03-21.91			
Female	253	18.26	14.73-21.80			
School County Classification				0.0005		
Metropolitan	220	14.91	11.37-18.46			
Micropolitan	88	22.20	14.91-29.49			
Rural	174	27.94	23.38-32.49			
I-Smile™ @ School						
Participant				0.0011		
Yes	291	24.38	19.05-29.71			
No	191	13.98	10.63-17.34			
Dental Visit Within Last 1 Year				<0.0001		
Yes	355	52.45	11.59-16.46			
No	82	14.02*	38.54-66.35*			
Payment Source for Regular						
Dental Care?				<0.0001		
Self-Pay	47	19.15	12.16-26.14			
Medicaid/Title XIX	221	27.43	20.56-34.29			
Hawki	28	l 8.98*	8.65-29.32*			
Private Insurance	150	10.44	8.01-12.87			
Other	18	32.47*	18.08-46.86*			

Table 9: Referral Need Immediate or Within 3 Months by Demographics

*Interpret with caution (p-value > 0.05 OR CI > 20)