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Factors Associated with Receiving Treatment for Dental Decay for Medicaid-Enrolled Children Under 12

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ABSTRACT

Factors Associated with Receiving Treatment for Dental Decay for Medicaid-Enrolled Children Under 12

By Leah Zilversmit

Objectives: Researchers have found that Medicaid-enrolled children face barriers to dental care. Several Medicaid-enrolled children are screened for tooth decay through the IDPH I-Smile program. We identified children younger than twelve with decay and determined the characteristics of children seeking treatment for decay. The purpose of this study is (1) to determine how many Medicaid-enrolled children younger than 12 years who screened positive for decay obtained treatment for dental caries within six months and (2) to identify the factors associated with children not receiving dental treatment.

Methods: We linked program data for screened children to Medicaid claims for dental treatment (N=16,109) and we performed multivariate logistic regression to assess the association of sociodemographic characteristics to receipt of treatment for children who screened positive or negative for decay.

Results: Eleven percent of children had decay and nearly 24% of children with decay had a Medicaid claim for treatment. Being of school age (OR: 1.484, p-value=0.001) and not having a dental home (OR: 1.904, p-value<0.0001) were positively associated with not seeking dental treatment. Of the 14,293 children screening negative for decay, 3.5% had a Medicaid claim for caries treatment and they were more likely to be school-aged (OR: 0.656, p-value <0.0001).

Conclusions: Children older than five and without a dental home are more likely to go untreated for caries. It will be critical that programs such as I-Smile™ link at-risk children to dental homes.

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TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

Dental caries affect children throughout the United States. Approximately 42% of children ages two to eleven years have tooth decay (dental caries) in their primary teeth (1). Dental decay is preventable. Regular visits to the dentist can help diagnose, treat, and prevent dental caries. Preventive pediatric visits include conducting oral exams to assess caries and oral hygiene at twelve months, fifteen months, eighteen months, two years and three years old is an effective method of treating and preventing caries (2). After the age of three children should be advised on oral hygiene, diets, and visits to the dentist. Advice on oral health also includes advice against pacifiers after three years old and thumb sucking after four years old (2). Though suggestions have been in place to prevent caries in children as young as one year old, children still lack the ability to abide be these recommendations.

Health departments have focused their attentions on ensuring low-income families have access to dental care. State health departments have instituted public insurance options to assist children in receiving needed dental care and caries prevention. One-fourth of all children of U.S. and half low-income children receive public coverage (3). About 29 million poor and near-poor children receive Medicaid and six million children receive the State Children's Health Insurance Program (SCHIP) (3). Dental care is also provided through Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) benefit. An issue with public coverage is that SCHIP benefits can be optional. Additionally, dental coverage is vulnerable to cuts in the budget (3). Such budget cuts can increase the likelihood of children facing more barriers to dental care.

Iowa has certain characteristics which may affect low-income children's abilities to receive oral health care. According to the 2010 census, 3,046,355 people live in Iowa (4). The population is not as racially diverse compared to the entire U.S.; 91% percent of residents in Iowa identify themselves as white (83.8% identify themselves as white non-Hispanics) (4). Those identifying themselves as Hispanic or Latino heritage are 5% while 2.9% identify themselves as African American (4). About 6% of Iowans earn less than $25,000 (4). Forty percent of Iowans live in a rural area (5).

Iowa has researched the status of children's dental care. Researchers conducting a ten year evaluation of the Iowa Oral Health Program, a program instituted in Johnson County through the University of Iowa's dentistry school, reported the proportions of children having dental caries. The program concentrated on young children ages one to four years who visit Women Infant Children (WIC) clinics. Out of 1,478 children, 35% were classified as having a high risk of caries while 20% had either severe or general early childhood caries (ECC). Forty-percent of children referred at their first visit were referred for dental treatments (the other 60% were referred for routine dental care) (6).

Additionally, the 2009 Third Grade Oral Health Survey provided descriptive statistics about the state of dental care among Iowa children. According to the survey, 22% of third graders had untreated dental decay (7). Forty-nine percent of third graders had a history of decay and 49% of third graders had a sealant (7). Finding the exact number of children with decay has been an issue, however, as the number of those with untreated decay varies according to the source of the data. The 2009 Head Start/Early Head Start survey in 2009 indicated 14% with untreated dental decay (8). Children included in this survey were mostly four and five years of age and included some children birth to three years.

The 2010 WIC Survey of children five years and younger found that 11% had untreated decay (9). The Head Start/Early Head Start survey in 2009 indicated that 29% had a history of decay while the 2010 WIC survey indicated 15% (8, 9).

Data collected by the IDPH has helped indicate the state of dental services and insurance received by Iowa children. The Third Grade Oral Health Survey revealed that 54% of children had private dental insurance, 19% were self-pay, 20% had Medicaid, and 4% were enrolled in Hawk-I (the state health insurance coverage for Iowa children) (7). Of those enrolled in Medicaid, 51% of children age one to five years received dental services (7). The percentage of children and young adults age one to twenty years that receive dental services was 53% (IDPH Bureau of Oral and Health Delivery Systems, 2010).

Through the Title V maternal and child health program, the Iowa Department of Public Health (IDPH) funds public and private non-profit agencies in the state to develop community-based systems of preventive health care for uninsured, underinsured, and/or low-income pregnant women, children ages zero to 21, and their families. The local agencies ensure access to health services for these at-risk clients, many are Medicaid-enrolled.

As a result, IDPH works closely with the Iowa Department of Human Services, which oversees Iowa's Medicaid program. This relationship has resulted in exchange of data information (e.g. newly eligible children, Medicaid paid claims), enhancement of enabling services (e.g. billable care coordination by Title V staff for clients enrolled on Medicaid), and reimbursement for gap-filling preventive services provided by Title V

agencies to Medicaid-enrolled children (e.g. dental screenings, fluoride varnish applications).

To ensure that Medicaid-enrolled children in Iowa have a dental home, Iowa instituted the I-Smile™ program. I-Smile™ began in December 2006 and is now the oral health component of the state's Title V child health local programs, benefiting low-income, uninsured, underinsured, and Medicaid-enrolled children. Dental screenings are one of the services that may be provided through I-Smile™. In fiscal year 2011, dental hygienists and nurses working for Title V child health agencies conducted 55,089 dental screenings (15). The purpose of this study is (1) to determine how many Medicaid-enrolled children younger than 12 years who screened positive for decay obtained treatment for dental caries within six months and (2) to identify the factors associated with those children not receiving dental treatment.

CHAPTER 2: REVIEW OF LITERATURE

A review of the literature has revealed that U.S. children face several barriers to dental care access. Factors that have been studied and associated as a barrier to care include: insurance status, child's health status, parents' oral health practices, parents' documentation status, place of birth, language spoken, race/ethnicity, gender of child, parents' education, geographic factors (such as the rurality of the residence of the child), and parents' income. Such disparities of care may lead to children having worse dental outcomes, such as dental caries, than children without access barriers. Programs enacted by health departments have shown mixed results in reducing the amount of caries experienced by low-income children. While some researchers have shown that health programs and screenings has helped to reduce barriers to care and have reduced caries incidences, some researchers have found that screenings do not assist children in receiving treatment. Additionally, researchers have found associations between children's sociodemographic characteristics and access to dental care, but little research exists studying the associations of children who receive state-sponsored screenings and whether they receive dental care as a result of screenings. The studies of children's access barriers to dental care have helped to further understand dental access issues of children. However, more research is needed to understand the children who receive treatment after receive a dental screening.

One factor affecting children's access to care is a child's insurance status. In certain studies, children with public insurance (such as SCHIP and Medicaid) have been compared to children without insurance or with private insurance. Researchers have shown that uninsured teens are over twice as likely to not visit a dentist when controlled

for other factors (10). Uninsured children are also less likely to have a usual source of medical care (11). Researchers have found no observable differences between only having health insurance versus also having dental insurance for having a dental check-up, showing that children with some sort of insurance do visit a dentist (12).

Researchers have studied differences between receiving care as well as dental outcomes when comparing publicly insured children and children who are either uninsured or have private insurance. In one such study, uninsured children and children who not classified as poor were less likely to receive recommended well-child care. Children with public insurance were least likely to visit a doctor compared to private and uninsured children (13).When looking at children ages three to five years, children with private dental coverage were more likely than children with public insurance to have a dental visit in the past twelve months (14). In a study of pediatrician referrals for dental care and researchers found that 76% of pediatricians reported difficulties in referring Medicaid-eligible child for dental care as opposed to 38% of all pediatricians nationally (15).

Families have expressed concerns about barriers in public insurance programs. In focus groups conducted in Kentucky, parents not utilizing dental care complained about discrimination received while using Medicaid (16). Of the participants, white parents expressed difficulties finding dentists who accept Medicaid and felt that services were inconvenient (16). Barriers mentioned by parents who had issues with Medicaid included lack of transportation, time needed for appointments, and lack of support from family and friends (16). Additionally, some Medicaid-eligible children do not have Medicaid. In a study of data from 1994 and 1995, about 17.2% of Medicaid-eligible children did not

have insurance (17). However, 27% percent of these children were covered by private insurance (18).

Qualitative evidence from Ohio revealed that Head Start staff found that Medicaid families could not find facilities providing additional services besides examinations and cleanings (19). While two thirds of pediatric dentists in this study were located in urban areas, only 7% of general dentists and 29% of dentists accepted Medicaid without any limitations (limitations included only accepting referred patients. not accepting new patients, and any other limitations of accepting new Medicaid patients). The remaining dentists had at least one limitation to accepting Medicaid (19).

Studies have demonstrated that public insurance is working as protective measure to ensure children are receiving recommended treatment. Publicly insured children were more likely than privately insured children to receive at least one preventive care visit within the last year (20). In fact, children with public insurance, such as Medicaid or SCHIP, were twice as likely to have a dental visit when compared to children without dental insurance (20).

Other factors have a significant association with dental treatment and/or care such as care seeking characteristics, child's health status, and caregiver oral health behavior. For instance, postponing care is likely to be associated with not meeting dental recommendations (13). Health status of the child also is an indicator of whether a child receives care. Adolescents studied as being in the best of health were more likely to have care compared to those of worse health (10). On the other hand those that were less likely to receive care were children that have either fair or poor health status (13, 20). In

addition, caregivers who visited a dentist were more likely to have a child who had visited the dentist (14).

Other sociodemographic characteristics are associated with receiving or not receiving dental care. Undocumented U.S. residents, for example, were less likely to have insurance, physician visits, dental visits, or regular source of care when compared to citizens (21). Even if an individual had documentation, those with documentation were still less likely than citizens to be insured and to have regular source of care when compared to citizens (21). Undocumented children faced more barriers to care than documented children and children with U.S. citizenship (21). Children born outside the U.S., in general, may have less care than those born in the U.S. A study of teens found that teens born outside U.S. are twice as likely to go without an annual dental visit (10).

Race and ethnicity disparities exist for health and dental care. In a study of children seeking medical care, 12.5% of black non-Hispanic children and 17.2% of Hispanic children were not likely to have a usual source of medical care compared to white children (11). In terms of dental care, studies have found that white children have significantly better access to dental care when compared to blacks and Hispanics (10). Black and Hispanic adolescents were twice as likely to not attain dental care when compared to whites (10). The authors of this study also found that most non-whites teens (mainly blacks) failed visit a dentist annually (10). Authors of another study found that Latinos and African Americans were more likely to have longer time intervals between dental visits (22). Other researchers have found that Asian children were least likely than other races to have a preventive dental visit (20). Hispanic ethnicity has also been found to be worse than blacks and non-whites for receiving dental check-ups (12). In this same

study, white children had significantly higher treatment proportions than black children, even though there was not an observed significant difference between black children and Hispanic children (12). Hispanic children, in general, were less likely than non-Hispanic children to receive visits (13). Though other studies have indicated that poor , near poor, and low-income black non-Hispanic children had no significant difference from white non-Hispanic children for dental checkup, but were more likely than Hispanic children to have a dental check-up(12).

Lack of health care, however, could be more associated with language abilities rather than race/ethnicity. Researchers found that Hispanic ethnicity alone did not show significance for care, but found language ability, rather than ethnicity, as a significant barrier to care (11). Hispanics needing an interview in Spanish were only 27% as likely as whites to have usual source of care. The authors did not find significance for white children and Hispanic children who were interviewed in English (11).

Age is another factor affecting dental and medical access. Though the American Dental Association (ADA) recommends children to begin dental checkups by the first year of a child's life, many do not follow through with this request (1). However, some studies have found that older children (ages thirteen to seventeen) were least likely to have usual dental care when compared to younger children (11). Children ages two to five years had longer time interval between dental treatments than children ages ten to eleven years (22). Older teens have also demonstrated less likelihood for receiving dental care compared to younger teens (10). In a study of children under five years old, older children were significantly more likely to have a dental visit compared to younger children (14). Dental check-ups were not seen as a major priority for young children.

Cchildren between one and three years old were more than 30 times more likely to have a medical visit than a dental visit, but children six to seventeen years old did not differ in number of medical and dental visits (23). In fact, 0.4% of children between one and seventeen years old never had a medical visit whereas 13.6% of same cohort of children never had a dental visit (23). Age and Medicaid insurance status has also been found to be interactive (24). Medicaid-insured older children are twice as likely to have a dental visit than uninsured older children and were more than twice as likely to have a dental visit than Medicaid-insured younger children (24).

In a study of 1,251 general practitioners, barriers for age groups, particularly young children, were documented. Nine percent of practitioners surveyed claimed that they did not treat children (25). The authors gave three main reasons for not treating children: the practice was not set up for children (44%), other reasons (31%), and not enjoying children (28%) (25). Of those that treated children, 28% did not treat children ages nineteen months to three years (25). In interviews with Ohio Head Start staff, many indicated dental facilities not accepting young children as a barrier for Medicaid families (19).

Gender has also been significantly associated with having dental care access (10). In a study of adolescents, adolescent males were more likely than adolescent females to have an annual dental visit (10). Older female children have also been found to have more dental visits compared to younger male children (14).

Income is another factor associated with medical and dental access. Low-income children with incomes between 125% and 200% below the federal poverty level (FPL) were less likely to have a source of medical care (11). Parents earning less than $39,999

were six to seven times more likely to have children who do not see a dentist (10). Children with households earning below $60,000 were associated with not visiting a dentist. (10). Children with families earning below 200% FPL were more likely than children from families with higher incomes to not visit a dentist (23). Dental checkup rates for poor, near poor, and low-income children were lower than those advised by a nondentist health provider. This finding was consistent across sex, age, race/ethnicity, education, health status, and insurance (12)**.** Dental checkup rates for medium and high income children were higher than rates for children advised by a non-dentist health provider to have a dental checkup, and this finding the same across sex, age (six to seventeen years), race (white, non-Hispanic), parents having some college, health status (excellent and very good) and insurance coverage(private dental insurance) (12)**.**

Other socio-economic factors play a role in dental care access for children. Parental education and the family structure are factors for children receiving dental care. Nuclear families (where both parents live with the child) are more likely to seek health care for their children (11). Type of parental employment also showed significance for care attainment of the child; parents who worked in home were associated with lack of care for their child (10). Children of more educated parents have been shown to have a usual source of medical care (11). Parents with less than a high school diploma are more likely to have teens that did not ever receive a dental treatment (10). Parents who have completed high school and/or some high school and parents that are over 30 years old have been found to have children that did not receive recommended visits (13). Caregivers' education levels have been associated with having their children five years and younger visit a dentist as well (14).

Area of residence, namely rural versus urban places of residence, have been associated with disparities in children's dental care. In one study, race and rurality were interactive (26). Urban non-white children had less likelihood for preventive dental visits and fluoride varnish when compared to urban white children. Rural white children are also more likely to have less visits and varnish when compared to urban white children. Although urban and rural non-white children without special health needs had no significant difference in dental visits, rural non-white children with special health needs were more likely to have preventive dental visits. Dental health physician shortage areas were not associated with children having more or less dental visits and varnish. Urban non-whites had lower odds of dental home care, while rural non-whites and rural whites higher odds of not having dental home. Rural children had a higher likelihood of using medical settings for dental care. Children less than two years of age were more likely to have negative dental outcomes. Rurality, regardless of special health needs status, had more adverse outcomes except preventive visits among rural nonwhite without special health needs (26).

In an assessment of the dental status of residents in rural areas of eastern Oregon, rural residents presented certain oral health needs. The most common dental needs reported by rural children were cavities and crowns (27). In dental screenings of patients of all ages in rural areas, the most common condition reported was partial edentulism (34.5%) followed by dental caries (12.9%). Dental caries appeared mostly in children five to fourteen years. Those with dental insurance in rural areas had better perceived dental outcomes than those with little or no dental insurance. Those with dental insurance had better odds of having a source of dental care, attempted to see a dentist in the past

year, rated dental health as good or excellent rated and stated no unmet dental need. They did not differ on having a dental visit during the past year (27).

Having a medical home has helped to improve medical screenings for children and has provided a rationale for children having a dental home. Because of the studies that support better health access for children with medical homes, organizations such as the American Academy of Pediatric Dentistry (AAPD) have advocated dental homes as a way to reduce dental access barriers (28). Children with a medical home have a more comprehensive medical screening and have a greater odds of receiving guidance than those without a medical home (29). Although we found limited research on factors influencing children having a dental home, extensive research has been completed on the factors associated with children having a medical home. In a study of demographic characteristics and children with special health care needs (CSHCN), there was no significant difference in medical home between CSHCN and non-CSHCN (30). Children under age twelve as well as families with more children under eighteen years living in the home were more likely than older and children living in a home with fewer children to have a medical home (30). For black children, in less than excellent or good health, living in household with a parent having than a high school diploma and/or an income below 100% FPL, living in a family with other than two parents, and lacking insurance in past twelve months were all associated with not having a medical home (30). Understanding these barriers to medical homes may be transferable to understand the barriers to having a dental home.

Because of the barriers to care, health agencies have tried to use screenings as a way to detect and prevent negative oral outcomes for children who may not have dental care

access. Screenings have found the presence of cavities and other negative dental outcomes among children and have found certain characteristics that put children more at-risk for caries. In screening of school-age children in Canada, about 60% needed dental care in second grade, but less than that, 35.5% had caries (31). The majority of the children in this study with dental needs attended schools in high-risk areas (31).Medicaid children, in particular, typically have more adverse dental outcomes when compared to children who have private insurance. In a different study 73% of Medicaid children reported decay as opposed to 16% of the general population nationally reporting dental decay (15). In a survey of Head Start children in Ohio, about 28% of children three to five years of age had dental caries with 12% of three year olds having caries (32). When comparing ten Head Start studies of enrollees in the past decade, 60% or more of children were recorded as having cavities (33). Although fluoridation is hailed as the prevention measure, it is still not available to all children in the United States (33). Such prevention measures not reaching at-risk populations may account for disparities in caries prevalence.

There are certain factors associated with caries development. Early Childhood Caries (ECC) has been associated with foods consumed and the dental habits of the child (34). Children five years and younger who have a parent with poor oral health have been associated with having negative oral health outcomes (34-36). School water fluoridation concentrations, children's tooth brushing frequency, and data cleaning practices were also significantly associated with children having dental caries (35, 36). Repeat applications of fluoride varnish and provision of oral health counseling around the time of tooth emergence have been found beneficial in reducing caries related treatments (37). In a

study completed on publicly-insured kindergarteners, Brickhouse et al. found that SCHIP had a protective effect on children having dental caries (38). Though SCHIP helped to reduce the prevalence of caries, without controlling for any other variables, children not using Medicaid were less likely than Medicaid-enrolled children to have untreated caries (38).

The most at-risk children for caries possess similar characteristics to children who lack access to health and dental care. In a study of universal dental care in Canada, children with parents having a high school education had a higher mean of tooth surfaces affected by caries than university educated parents (35). If children visited the dentist for a check-up as opposed to a dental concern, then the children were less likely to have dental caries (35). Similarly, having dental caries has been associated with whether the child visits a dentist (35).

In order to improve access to children who are most at-risk for dental caries, state programs have attempted to provide preventive services using dental hygienists and primary medical care providers. A study evaluating North Carolina's Smart Smiles and a Medicaid pilot program (the program connected low-income children to dental providers through their primary medical providers) demonstrated that state programs can possibly benefit children's oral health (39). The study found that with the programs' initiation, the number of dental claims increased from 6,249 visits in 2000 to 38,056 visits in 2002 (39). Follow-up visits also increased from 24% in the first quarter of 2001 to 49% in the last quarter of 2002(39). Preventive services through teledentistry have also helped to prevent caries in a study of primarily Hispanic children through a sealant program (40).

State insurance programs and teledentstry have been used to mitigate barriers to care.

In one description of a program in Central Texas, mobile clinics visited Title I schools and performed dental screening and dental services for all children not opting out of the program (41). Mobile dental vans and dentists screened and provided sealants for the 98% of children at the schools who do not opt out of the program (41). However, a review of literature reveals that while many programs boast of excellent results, they still do not remove all barriers to care.

Programs to assist children in receiving better access to dental treatment and care have reported mixed results. Access to Baby and Childhood Dentistry (ABCD) has reported improvement among Medicaid-enrolled children. In a study conducted in the state of Washington those enrolled in ABCD had 30% higher odds of having a preventive dental visit when compared to children not enrolled in ABCD (42). Asians and Latinos were more likely than white children for preventive dental care visits (42). However, neither children living in the most urban or most rural areas had better odds of a preventive dental visit (42).

Another study conducted in Idaho and Kentucky reported findings of dental visits for children enrolled in CHIP. Younger children under six years of age in both states were twice as likely as older children (ages six to eighteen) to receive a well-child visit in past year, but less likely to receive preventive dental visit (43). In Kentucky, children of non-white races were more likely to receive a well-child visit and less likely to receive preventive dental visit. Idaho non-white children were less likely to receive both a well-child and a preventive dental visit (43). Kentucky dental policy changes were associated with a 6% increase in the probability of annual preventive dental visits (43).

In a study comparing a school based health clinic to a school without a clinic, children attending school based health clinics were more likely to have visited a physician, dentist, counselor, or social worker and less likely to use the emergency department (44). However, children in the school without a clinic were more likely to use dental services than the insured students at the school with the clinic (44).

Into the Mouths of Babies (IMB) in North Carolina has been shown to improve preventive and caries treatment for children six years and younger. In a longitudinal analysis of the program, the reduction in estimated caries treatment over six years were seen with children who had at least 45 dental visits at ages nine, twelve, fifteen, eighteen and 24 months (39). Children with four visits at ages twelve, eighteen, 24, and 35 months also saw a reduction of caries treatment.

Despite many of the successful reports produced by dental programs, there have also been reports of a lack of success in caries reduction and treatment in programs. In a study of school dental screening programs researchers looked at different models of dental screenings in the United Kingdom. In the traditional model, dental clinicians referred children if dental issues are found. In the new model of dental screening, clinicians referred children based on certain criteria. The last model depended on parents to self-refer their children after reading a leaflet on dental screening (45). There were no significant differences observed between children of the different study models (45). Forty-eight percent of children referred in the traditional model attended treatment, but 39% of children not referred in the traditional model also attended treatment within four months of screening. Forty-six percent of children in the new model were referred, with 41% not referred who also attended treatment after screenings. For six to nine year olds

screening positive for decay, little benefit was derived from school dental screening in terms of attending dentists and receiving treatment. The results of the study demonstrated that screenings did not adequately address inequalities (46).

In a qualitative study of the children in the school screening program, parents and teachers initially seemed receptive of the program, but there was an issue when actually treating children screened positive for dental caries. One issue was the lack of follow up of children who received notice of decay. Parents were only required to sign a paper acknowledging the decay. Both parents and teachers complained of other parents who may not bring children in to receive treatment (47).

Other studies have indicated that children do not seek treatment after screening positive for caries. A study conducted in Canada screened 453 children between third and seventh grades who spoke mainly Asian languages and were low-income (48). Of this cohort, 123 children needed treatment for decay (48). Only 42 of the 123 children reported having treatment for the decay, though ten of the children had been lost to follow-up (48).

Although researchers have studied barriers to dental care, little research has been completed to fully understand the effects of programs on children's ability to receive treatment after a child has been found positive for decay. Especially in a condition as widely experienced as dental caries, a state-initiated program for at-risk children is expected to assist the most at-risk populations in finding preventive care and treatment for dental ailments. However, the previous studies have found that this may not always be the case. Understanding the factors of at-risk children, such as Medicaid-enrolled children will help state public health departments understand the children who follow

through with treatment once screened positive for caries. This study intends to understand the characteristics of children that fail to receive treatment for dental caries. We could not find previous research attempting to understand characteristic differences between children who do and do not receive care as a result of a dental screening.

CHAPTER 3: MANUSCRIPT (*Draft for the Journal of Public Health Dentistry)*

Factors Associated with Receiving Treatment for Dental Decay for Medicaid-Enrolled Children Under 12

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Statement of Contribution

Data collection was completed at the Iowa Department of Public Health (IDPH). All analyses, writing, figure/table development was completed by the corresponding author. The additional authors contributed advice and expertise on IDPH programming, data analysis, and editorial support.

Abstract

Factors Associated with Receiving Treatment for Dental Decay for Medicaid-Enrolled Children Under 12

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Objectives: Researchers have found that Medicaid-enrolled children face barriers to dental care. Several Medicaid-enrolled children are screened for tooth decay through the IDPH I-Smile program. We identified children younger than twelve with decay and determined the characteristics of children seeking treatment for decay. The purpose of this study is (1) to determine how many Medicaid-enrolled children younger than 12 years who screened positive for decay obtained treatment for dental caries within six months and (2) to identify the factors associated with children not receiving dental treatment.

Methods: We linked program data for screened children to Medicaid claims for dental treatment (N=16,109) and we performed multivariate logistic regression to assess the association of sociodemographic characteristics to receipt of treatment for children who screened positive or negative for decay.

Results: Eleven percent of children had decay and nearly 24% of children with decay had a Medicaid claim for treatment. Being of school age (OR: 1.484, p-value=0.001) and not having a dental home (OR: 1.904, p-value<0.0001) were positively associated with not seeking dental treatment. Of the 14,293 children screening negative for decay, 3.5% had

a Medicaid claim for caries treatment and they were more likely to be school-aged (OR: 0.656, p-value <0.0001).

Conclusions: Children older than five and without a dental home are more likely to go untreated for caries. It will be critical that programs such as I-Smile™ link at-risk children to dental homes.

Key Words: Dental Home, Oral Health, Dental, Dental Caries, Dental Screening, Medicaid, Medicaid Claims, Tooth Decay, Dental Insurance, Pediatric Oral Health

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Introduction

Approximately 42% of children two to eleven years old have tooth decay in their primary teeth (1). Children from low-income families are more likely to experience decay (2). To ensure optimal oral health, the ADA recommends that children begin dental exams by twelve months of age (3). However, low-income children still face disparities in receiving dental care and have poorer oral health status.

One-fourth of U.S. children and half of low-income children receive public assistance for health care (Medicaid) yet children using Medicaid still face barriers to receiving dental care (4). Researchers found that 73% of medical providers reported decay children weekly for Medicaid-enrolled children compared with 16% of medical providers reporting decay nationally (5). In another study, researchers found that the State Children's Health Insurance Program (SCHIP) had a protective effect on children having dental caries (6).

Other factors have been associated with children accessing dental care. Researchers consistently find that race/ethnicity is associated with lack of dental access (7-12). African-American children were observed to have significant barriers to care compared to other races (8-10). Children of Hispanic ethnicity also experienced less access to dental care, sometimes faring worse than African-American children (7-9). Parent education and income has also been associated with children's receipt of dental care. Parents with higher levels of education attainment typically had children who have seen dentists more often than children with parents with less education (9). Similarly, parents with lower incomes were less likely to have children who have regular dental visits (8-10, 12). Children and parents born outside the U.S. as well as children with undocumented

parents were less likely to seek dental care (8, 13). The same is true for children who do not speak English (9). A child's gender has also been associated with whether a child receives a dental examination (8). Male adolescents were less likely than female adolescents to have had a dental visit in the past year (8). Younger children between two and five years have been associated with having longer time intervals between treatments compared to ten to eleven year olds (10). In contrast, other researchers have found that older children and teens typically have less dental care than younger children (8, 9). Rural white children were less likely to receive fluoride varnish applications and visit dentists compared to urban white children(14). However, rural non-white children and urban non-white children showed no significant differences in dental outcomes (14). Dental caries was also the most experienced dental issue in a study in rural Oregon (15).

Through the Title V maternal and child health program, the Iowa Department of Public Health (IDPH) funds public and private non-profit agencies in the state to develop community-based systems of preventive health care for uninsured, underinsured, and/or low-income pregnant women, children ages zero to 21, and their families. The local agencies ensure access to health services for these at-risk clients, many are Medicaid-enrolled.

As a result, IDPH works closely with the Iowa Department of Human Services, which oversees Iowa's Medicaid program. This relationship has resulted in exchange of data information (e.g. newly eligible children, Medicaid paid claims), enhancement of enabling services (e.g. billable care coordination by Title V staff for clients enrolled on Medicaid), and reimbursement for gap-filling preventive services provided by Title V

agencies to Medicaid-enrolled children (e.g. dental screenings, fluoride varnish applications).

To ensure that Medicaid-enrolled children in Iowa have a dental home, Iowa instituted the I-Smile™ program. I-Smile™ began in December 2006 and is now the oral health component of the state's Title V child health local programs, benefiting low-income, uninsured, underinsured, and Medicaid-enrolled children. Dental screenings are one of the services that may be provided through I-Smile™. In fiscal year 2011, dental hygienists and nurses working for Title V child health agencies conducted 55,089 dental screenings (15). The purpose of this study is (1) to determine how many Medicaid-enrolled children younger than 12 years who screened positive for decay obtained treatment for dental caries within six months and (2) to identify the factors associated with those children not receiving dental treatment.

Methods

The IDPH Child and Adolescent Reporting System (CAReS) is a database that tracks services provided by local Title V child health programs. CAReS captures the type of medical and dental services provided by agency staff in settings such as WIC clinics, schools, and other public health sites. CAReS also captures additional characteristics of a child such as race, ethnicity, parent/guardian education, barriers to dental and medical care, and family characteristics. For those children receiving a dental screening, CAReS also captures three result areas of the screening – presence of decay, presence of a restoration, and presence of a dental sealant.

Having a medical and dental home is determined through certain questions in CAReS. A medical home is defined by the child having a usual source of medical care, having medical care is available 24/7, and having the source of care that maintains the child's record. For the purposes of CAReS, a dental home is defined by the child having a usual source of dental care, having a source of care that maintains the child's record, and having seen a dentist within the past twelve months.

We requested race, ethnicity, language spoken at home, gender, date of birth, county of residence, dental screening results (positive or negative for decay), dental screening date, medical barriers, dental barriers, parents' education levels, Medicaid number, child's name, and whether the child had a developmental delay from CAReS. We also requested the determinations regarding medical home and dental home. We requested data on all Medicaid-enrolled children younger than twelve years because most dental screenings are provided for children up to twelve years of age. Information requested from Medicaid paid claims included race, ethnicity, Medicaid number, client's county of residence, provider location, provider number, procedure code, first and last name, treatment date, and child's date of birth. We originally requested Medicaid paid claims for all D2000, D3100-3499, and all D7000 dental procedure codes performed on the patients D2000 codes are likely procedures for treatment of decay. These procedures are amalgam restorations, filled or unfilled resin restorations, crowns, re-cement inlay, re-cement crowns, prefabricated stainless steel crown in primary and permanent teeth, and prefabricated resin. D3100-3499 codes include pulpotomy and root canal procedures, while D7000 codes are oral surgery procedures. All children who only received a D7000

code were eliminated from the dataset as it is difficult to distinguish which extractions may have been associated with a cavity.

Originally, the CAReS data set totaled 23,949 dental screenings between January and April 2010. As of June 2011, Medicaid received 153,008 claims for dental treatment from January to October 2010. Figure 1 diagrams the process of de-duplicating and linking Medicaid claims and CAReS data. After de-duplicating all screenings using Link Plus, Excel, and manual review, we identified 16,109 children who had one or more screenings in the January to April time period. After de-duplicating all Medicaid claims using Link Plus, Excel, and manual review, we found 26,378 children who had at least one Medicaid claim for the dental procedure codes previously identified. We performed probability matching with Medicaid claims and CAReS data using Link Plus software at the Iowa Department of Public Health. The data was matched using probabilistic linkage on first name, last name, and Medicaid identification number and blocked by birth date. We used the cut-off value of 7 the m-prob was set to 0.97 for last name, 0.96 for first name, and 0.95 for Medicaid identification number. After manual review we found 1,369 matches. The remaining 14,740 records were considered as having no Medicaid claim. All entries were then de-identified. Because the primary author used a de-identified data set for the analysis, this study was exempt from IRB.

Because some of the children had more than one screening in the period we reviewed, we took the results of each child's first screening in order to determine whether a child had decay. If the child's first screening was positive for decay, they were labeled as having been screened positive for dental caries.

Treatment was defined as having had a Medicaid paid dental claim (any D2000 code or D3100-3499 code) within six months of their first screening date. The six month time interval was determined due to the general recommendation by dentists that each child should see a dentist every six months. Children who had a Medicaid claim after the six month time interval were not recorded for having dental treatment.

Variables with less than 80% complete information were excluded; specifically, parents'/guardians' education (72.9%) and whether the child had a developmental delay (72%). In addition, race (84.1%) and language (93.2%) also had many missing values. Although race and language had enough values to perform descriptive statistics, we excluded these variables from the final model as these variables may be subject to more minorities and non-English speakers not being recorded in CAReS. We categorized missing data as 'unknown.'

All independent variables were recoded as categorical variables. The final list of independent variables were public health region of the state (Central, North, Northwest, Southwest, Southeast, East Central, and out-of-state/unknown), rurality (metropolitan standard area excluding central city, central city, rural adjacent to urban, and rural not adjacent to urban), race/ethnicity (White non-Hispanic, Black non-Hispanic, other non-Hispanic, Hispanic all races, and unknown), language (English, Spanish, other, and unknown), medical home, dental home, gender, and age (younger than five years and five years or older). This age categorization considers five years and older to be school aged,

Screening positive for dental decay was considered an effect modifier. Therefore, to assess the associations of the confounders with whether the child received treatment, the data file was stratified by whether the child was screened positive or negative for decay

on their first screening. We first looked at each subset to see if there was a difference in time intervals for children seeking decay, which would indicate a possible link between screenings and children seeking treatment. Both subset datasets were analyzed using SAS 9.3(Cary, NC). Descriptive statistics and chi-square test for association were performed. We used OpenEpi to calculate confidence intervals for the percent of children receiving treatment for each of the characteristics (16). We performed logistic regression on both datasets for the outcome variable for not receiving treatment on all significant variables in the chi-squared analyses (excluding race/ethnicity and language).

We assessed the availability of dentists in low income areas. IDPH provided addresses of licensed dentists for the state of Iowa and we geocoded the addresses using GoogleEarth Pro. Maps were then created using ArcGIS 10 (ESRI; Redlands, CA, USA). Using coordinates of the geocoded addresses and maps and census tract data for family median income retrieved from the Simply Map 2.0 database, we then placed dentist locations on a map of Iowa. The 2010 median family income in Iowa was $48,872 (17). We categorized family income and calculated the number of dentists present in the categories of income by calculating number of family population present per each dentist according to the each income level.

Results

Overall, 1,816 children (11.3%) screened positive for decay during their first screening (Figure 1). The remaining 14,293 were screened negative for decay. Of the 16,109 screened, 935 children (5.9%) had at least one Medicaid claim for dental treatment within six months of first screening. Twenty-four percent of children screening

positive for decay received treatment while close to 4% received treatment that screened negative for decay. Positive for decay was significantly associated with receiving treatment (RR 5.02, CI: 4.6030, 5.4654).

The proportion of children screening positive for decay and receiving treatment seemed to follow a pattern related to the number of months following the screening Between 20.1% and 24.5% received treatment during the first three months after the initial screening. The proportion of children receiving treatment decreased from the fourth month (13.6%) until the sixth month (9.6%). The proportion of children not identified with decay at a screening who received treatment ranged between 16.2% in the first month and 18% in the sixth month showing less variance than for children identified with decay.

In the descriptive analysis (Table 1), the children who screened positive for decay, close to 70% were white, of non-Hispanic ethnicity. Over 70% of those screened negatively for decay were white, non-Hispanic. Over 15% of children screened (both positive and negative for decay) had unknown race/ethnicity. Ninety-two percent of children screening positive for decay and over 95% of children screening negative for decay had a medical home as indicated by CAReS. The majority of children (71.6%) who were screened were younger than five years old.

Bivariate analysis is depicted in Table 2 (children screening positive for decay) and Table 3 (children screening negative for decay). All variables except gender were found to have significant association for receiving treatment within six months of the first screening, for both children with positive decay and negative decay. Children meeting the CAReS criteria for having a dental home showed a high association for receiving

treatment and being negative for decay (p-value=<0.0001). Despite the high proportion of children having a medical home, lack of a medical home was significantly associated with lack of treatment for children screening positive for decay (p-value=0.0103) and screening negative for decay (p-value=0.0103),.

In the full model of children having decay with receiving treatment as the outcome variable, there were two significant variables (Table 4). Children with decay and without a dental home were more likely to have gone untreated within six months after screening (OR 1.904, p-value<0.0001) when compared to children with decay who had a dental home. School-aged children were more likely to not receive treatment when compared to children younger than five years (OR 1.48 p-value=0.001).

When children without decay were modeled for not having treatment (Table 3), children without a dental home were over four times more likely to not receive treatment (<0.0001) when compared to children with a dental home. Unlike the previous model, decay negative school-aged children was protective for not receiving treatment (OR 0.656, p-value<0.0001) when compared to younger children.

Figure 3 depicts locations of dentists compared to median family income. The map demonstrates that dentists are located throughout the state. Areas of less than $30,000 median income had the most number of dentists per unit of family population (537 family population per dentist). However, there were not any dentists residing in two low-income census tracts (total family population of 2,203). Families living in areas earning between $48,872 and $65,000 had 751 families per dentist. Families living in an area with a median income of $80,000 or more had the next highest presence of dentists per family population (842 per dentist). Families living in areas earning between $65,001

and $80,000 had 1,041 per dentist. Families just below the Iowa median income had the worst outcome for dentist per family population (1,166 families per dentist).

Discussion

The results indicate the importance of having a dental home and access to regular care in regards to receiving dental treatment. Although the I-Smile™ program links children with dental homes, having a dental home is not yet the reality for all children in Iowa. I-Smile™ reports show that many more children are receiving care since the program began, but barriers still exist to receiving dental care for some families (18).

Another finding from this study indicates that younger children were more likely to receive care for caries compared to school-aged children, while older children who screened negative for decay were more likely to be treated compared to younger children not identified with decay. This could reflect the fact that younger children are usually screened with their parent/guardian present, allowing the screener to put emphasis on the importance of completing the needed referral. Older children may also more successfully communicate dental issues to caregivers, while younger children may lack ability to express those issues as clearly.

This study had at least four limitations. First, the initial data collection had discrepancies and data linking could have additional flaws. Data collected in CAReS occasionally differed from data collected in Medicaid claims. These included name misspellings, incorrect numbers for Medicaid identification, and possibly additional mistakes in recording sociodemographic characteristics. During the matching process, the data was subjected to one match and could have received additional matches if run

several times. However, the matches that were used were obtained from the matching combination with the highest amount of matches.

Another data collection issue may be related to possible hesitation by some screeners to identify decay. Some hygienists and nurses working for Title V agencies do not consider themselves eligible to diagnose dental disease due to practice act limitations. In turn, this could result in negative decay status entered in CAReS, yetinforming parents/guardians of possible decay. This could impact the number of children found to be decay negative while receiving dental treatment following screening.

Third, children identified in the screening data may have received treatment without using Medicaid for payment. Children that had a recorded residence out of state may have been seen outside of Iowa and not used the state's Medicaid coverage. Children residing in state could have had access to other insurance besides Medicaid or become ineligible prior to receiving treatment. Also, dentists occasionally provide care at no charge.

Lastly, the Medicaid paid dental claims may not be representative of treatment as a result of decay. Because dentistry does not use diagnosis coding, this study inferred that claims for procedure codes D2000-2999 and D3100-3499 were due to presence of decay, yet this cannot be fully determined through the study parameters. The study also infers that the screening initiated a treatment visit. The treatment date could have been coincidental and not a result of findings of the screening. Although there were a greater proportion of children receiving treatment after screening decay positive than those screening negative, this could be coincidental and not associated with screening. In addition, because dentists have a full year following date of service to submit a claim,

some claims may not have been filed when the data matches were done. There were four months remaining until the one year mark (October 2010) when we requested Medicaid paid claims in June 2011. When requesting data, we used the assumption that most Medicaid claims were already submitted for that year as that is the policy followed for using Medicaid claims data when linked to the birth certificate in Iowa.

About 76% of children screening positive for decay did not have a Medicaid claim for receiving dental treatment. Researching whether children received care paid through some other method (private insurance, self pay, etc.) or if a dentist determined the need to not provide treatment immediately (diagnosing insipient decay and preferring to check again at a later date) would help to better clarify how many needed treatment but did not receive it. Identifying why dental treatment was (dentist agrees with the determination of decay from screening or dentist accepts Medicaid) or was not provided (unwillingness to accept Medicaid or to provide care for young children) will benefit future programming (19, 20).

Another area of interest is the different effects of age and treatment. Researchers have found that older children are more likely than younger children, especially those under five years to have regular dental check-ups (10, 21). Researchers have also found an association between teens having more likelihood of receiving treatment than younger children (9). This study does reflect this finding, but more research should be done to find the reasons for these differences.

To uncover the barriers of receiving treatment, more research is needed. A longer study period can help to discover if this study period was just an anomaly to the actual treatment status of children in the I-Smile™ program. Severity of cavities and their

relation to treatment should also be included in future studies. Researchers can use qualitative information such as focus groups and in-depth interviews with caregivers and dentists in order to find access barriers. Continued training of Title V child health staff on the importance of recording all variables in CAReS in order to assist further research, ensure as much consistency as possible in data collection, and ensure quality services for families will also assist children to receive care.

The American Academy of Pediatric Dentistry (AAPD) has supported dental homes, following the models of medical homes (22). AAPD affirms that dental homes should be established within the child's first year in order for a child to receive preventive treatment and oral care (22). Continuing dental screenings as part of the I-Smile™ program, and care coordination to ensure restorative treatment is sought upon screening positive for decay will benefit Iowa children. Older children who are screened may be considered a potential age group that is less likely to receive their follow-up care, and may need enhanced care coordination services. The findings of the study will further assist IDPH and dentists in better understanding the issues facing low-income children in receiving dental care for decay.

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Figures and Tables

Figure 1: Children younger than 12 screened for decay from January to April 2010, outcomes for first screening

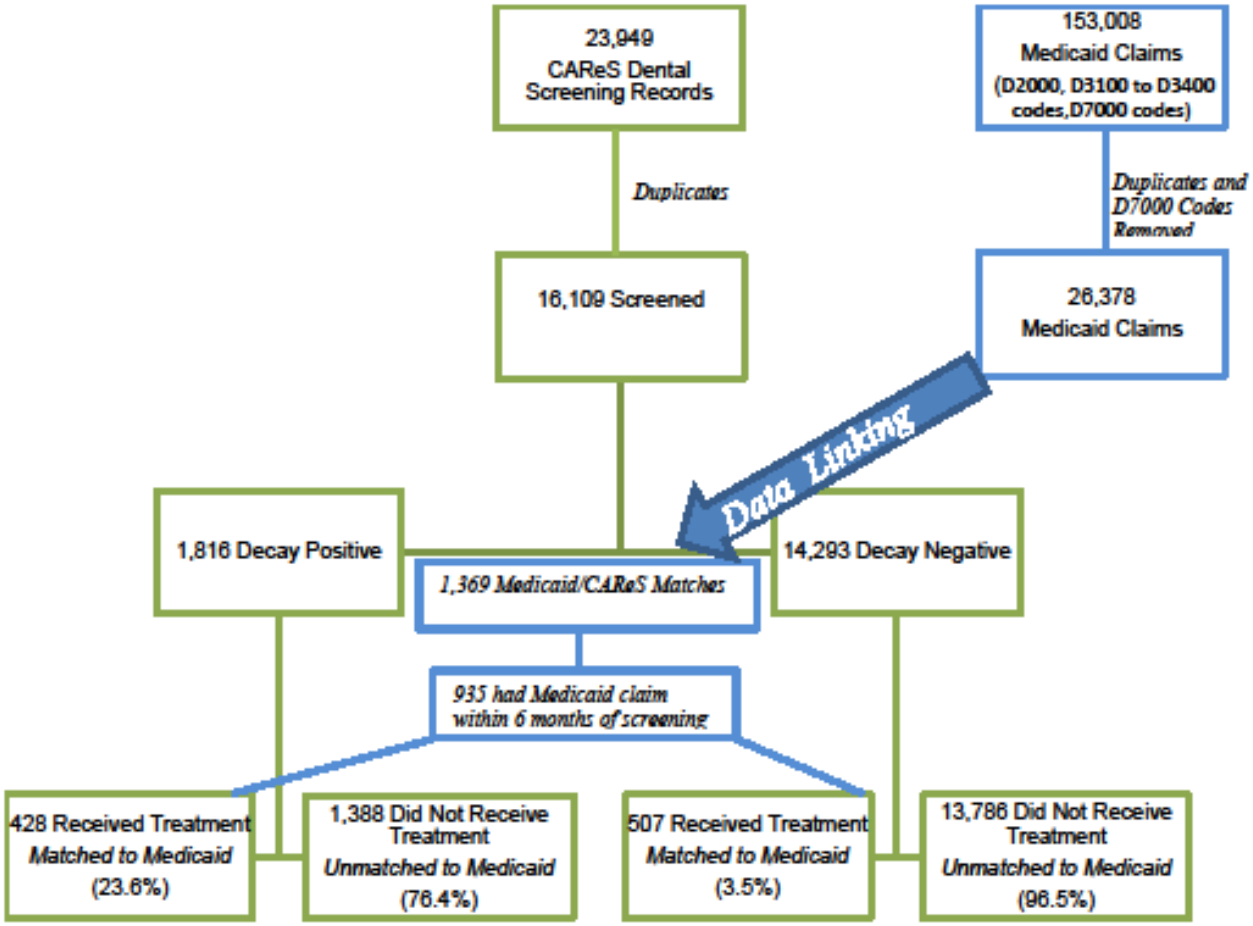


Table 1: Descriptive analysis of children screening positive and negative for decay in first screening

	Decay Positive		*Decay Negative*	
	N=1,816	%	N=14,293	%
Public Health Region				
Central	347	19.1	2,932	20.5
North	187	10.3	1,800	12.6
Northwest	196	10.8	871	6.1
Southwest	137	7.5	974	6.8
Southeast	377	20.8	2,023	14.6
East Central	543	29.9	5,402	37.8
Out of State or unknown	29	29	226	1.6
Rurality				
Central City	571	31.4	4,798	33.6
MSA, excluding central city	246	13.6	2,342	16.4
Rural adjacent to urban	441	24.3	3,754	26.3
Rural not adjacent to urban	529	29.1	3,173	22.2
Unknown	29	1.6	226	1.6
Race/Ethnicity				
White, Non-Hispanic	1211	66.7	10,077	70.5
Black, Non-Hispanic	143	7.9	1,047	7.5
Other	39	2.2	219	1.5
Hispanic, All Races	132	7.3	725	5.1
Unknown	291	16.0	2,198	15.4
Language				
English	1469	80.5	12,179	85.2
Spanish	184	10.1	920	6.4
Other	38	2.1	217	1.5
Unknown	133	7.3	964	6.8
Medical Home				
Has Medical Home	1674	92.2	13,654	95.5
No Medical Home	74	4.1	198	1.4
Unknown	68	3.7	441	3.1
Dental Home				
Has Dental Home	1258	69.3	8,751	61.2
No Dental Home	417	23.0	4,432	31.0
Unknown	141	7.8	1,110	7.8
Gender				
Male	957	52.7	7,127	49.9
Female	845	46.5	7,000	49.0
Unknown	14	0.8	166	1.2
Age				
<5	1031	56.8	10,501	73.5
≥5	785	43.2	3,792	26.5

Table 2: Bivariate analysis of treatment for children screening positive for decay in first screening and receiving treatment

	n	# Treated	% Treated	95% CIs (%)
Public Health Region				
Central	347	88	25.4	21.0 - 30.1
North	187	47	25.1	19.3 - 31.7
Northwest	196	35	17.9	13.0 - 23.7
Southwest	137	21	15.3	10.0 - 22.1
Southeast	377	88	23.3	19.3 - 27.8
East Central	543	146	26.9	23.3 - 30.7
Out of State or unknown	29	3	10.3	2.7 – 25.6
Rurality				
Central City	571	152	26.6	23.1 - 30.4
MSA, excluding central city	246	71	28.9	23.5 - 34.8
Rural adjacent to urban	441	90	20.4	16.8 - 24.4
Rural not adjacent to urban	529	112	21.2	17.9 – 24.8
Unknown	29	3	10.3	2.7 - 25.6
Race/Ethnicity				
White, Non-Hispanic	1,211	293	24.2	21.9 - 26.7
Black, Non-Hispanic	143	48	33.6	26.2 - 41.6
Other	39	10	25.6	13.8 – 41.0
Hispanic, All Races	132	36	27.3	20.2 - 35.3
Unknown	291	41	14.1	10.4 - 18.5
Language				
English	1,469	348	23.8	21.6 - 25.9
Spanish	184	55	29.9	23.6 - 36.8
Other	38	11	29.0	16.3 - 44.7
Unknown	133	14	10.5	6.1 - 16.6
Medical Home				
Has Medical Home	1,674	407	24.3	22.3 - 26.4
No Medical Home	74	15	20.3	12.3 - 30.6
Unknown	68	6	8.8	3.7 - 17.5
Dental Home				
Has Dental Home	1,258	335	26.7	24.2 - 29.1
No Dental Home	417	64	15.4	12.1 - 19.1
Unknown	141	29	20.6	14.5 - 27.8
Gender				
Male	957	216	22.6	20.0 - 25.3
Female	845	212	25.1	22.3 - 28.1
Unknown	14	0	0	0.0 - 19.3
Age				
<5	1,031	278	27.0	24.3 - 29.7
≥5	785	150	19.1	16.5 – 22.0

Table 3: Bivariate analysis of treatment for children screening negative for decay in first screening for receiving treatment

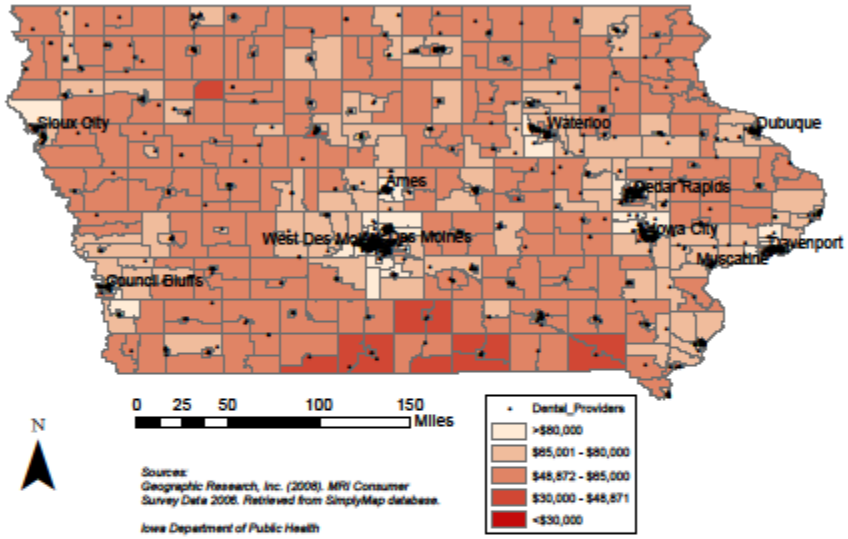
	n	# Treated	% Treated	95% CIs (%)
Public Health Region				
Central	2,932	95	3.2	2.6 - 3.9
North	1,800	53	2.9	2.2 - 3.8
Northwest	871	58	6.7	5.1 - 8.5
Southwest	974	24	2.5	1.6 - 3.6
Southeast	2,023	65	3.1	2.5 - 4.1
East Central	5,402	209	3.9	3.4 - 4.4
Out of State or unknown	226	1	0.4	0.0 - 2.2
Rurality				
Central City	4,798	189	3.9	3.4 - 4.5
MSA, excluding central city	2,342	76	3.3	2.6 - 4.0
Rural adjacent to urban	3,754	137	3.7	3.1 - 4.3
Rural not adjacent to urban	3,173	102	3.2	2.6 - 3.9
Unknown	226	1	0.4	0.0 - 2.2
Race				
White, Non-Hispanic	10,077	341	3.4	3.0 - 3.8
Black, Non-Hispanic	1.047	45	4.2	3.2 - 5.7
Other	219	9	4.1	2.0 - 7.4
Hispanic	725	48	6.6	5.0 - 8.6
Unknown	2,198	62	2.8	2.2 - 3.6
Language				
English	12,179	406	3.3	3.0 - 3.7
Spanish	920	75	8.2	6.5 - 10.1
Other	217	11	5.1	2.7 - 8.6
Unknown	964	13	1.3	0.8 - 2.2
Medical Home				
Has Medical Home	13,654	496	3.5	3.3 - 4.0
No Medical Home	198	4	2.0	0.6 - 4.8
Unknown	441	5	1.1	0.4 - 2.5
Dental Home				
Has Dental Home	8,751	415	4.7	4.3 - 5.2
No Dental Home	4,432	46	1.0	0.8 - 1.4
Unknown	1,110	44	4.0	2.9 - 5.2
Gender				
Male	7,127	253	3.6	3.1 - 4.0
Female	7,000	252	3.6	3.2 - 4.1
Unknown	166	0	0	0.0 - 1.8
Age				
<5	10,501	297	2.8	2.5 - 3.2
≥5	3,792	209	5.5	4.8 - 6.3

Table 4: Regression Model describing odds of not receiving treatment for children screened positive and negative for decay

	Decay Positive		*Decay Negative*	
	OR (Confidence Interval)	p-value	OR (Confidence Interval)	p-value
Public Health Region *(ref=Central Iowa)*				
North	0.88 (0.562, 1.379)	0.585	1.10 (0.757, 1.587)	0.63
Northwest	1.32 (0.826, 2.112)	0.25	0.71 (0.485, 1.041)	0.08
Southwest	1.50 (0.864, 2.591)	0.15	1.30 (0.799, 2.099)	0.29
Southeast	1.01 (0.696, 1.451)	0.98	1.10 (0.784, 1.540)	0.58
East Central	1.01 (0.696, 1.458)	0.97	1.07 (0.762, 1.499)	0.70
Out of State or unknown	3.02 (0.864, 10.575)	0.08	7.96 (1.083, 58.537)	0.04
Rurality *(ref=Central City)*				
MSA not Central City	0.84 (0.549, 1.287)	0.43	1.10 (0.750, 1.613)	0.63
Rural not adjacent to urban	1.24 (0.825, 1.877)	0.30	1.08 (0.756, 1.546)	0.67
Rural adjacent to urban	1.27 (0.891, 1.797)	0.19	1.08 (0.816, 1.424)	0.60
Unknown	.	.	.	.
Dental Home *(ref=Has Dental Home)*				
No Dental Home	1.90 (1.405, 2.579)	<0.0001*	4.07 (2.971, 5.564)	<0.0001*
Unknown	1.27 (0.796, 2.011)	0.32	1.00 (0.699, 1.418)	0.98
Age *(ref≤5)*				
≥5	1.48 (1.172, 1.878)	0.00*	0.66 (0.542, 0.795)	<0.0001*
Medical Home *(ref=Has Medical Home)*				
No Medical Home	0.98 (0.541, 1.790)	0.96	1.36 (0.498, 3.710)	0.56
Unknown	2.87 (1.206, 6.840)	0.02*	3.82 (1.535 9.496)	0.00*

*Significant at $p \leq 0.05$

Figure 2: Median income and location of dental providers in Iowa, 2011



CHAPTER 4: DISCUSSION/POLICY IMPLICATIONS

Discussion

We found that age and dental home are important factors that affect children to receive treatment. Among those who had caries during screening, children younger than five years old were more likely than older children, to obtain treatment for caries within six months. However, among those who did not have caries during screening, children younger than five years old were less likely than older children to receive treatment. Previous studies have substantiated our findings about age. A child's age was variously associated with visiting dentists. In one study, researchers found that a lower proportion of young children (one to three years old) had a dental visit within the past twelve months compared with older children aged four to seventeen years old (21). Based on previous research, our results indicate that screenings could assist children younger than five to receive treatment.

We also found that children not having a dental home were less likely to have received treatment in both the children who screened positive and negative for decay. We mostly found studies which researched medical home and access to dental care. The dental home has been structured like the medical home in the hopes to increase access to dental just as the medical home has increased access to medical care for children (28).The results of the study support that dental homes can help children access dental services.

In similar studies Researchers have found that dental screenings may have little effect in children seeking treatment for decay (46). Researchers found that screened children do seek dental visits after dental screenings (38, 39). Although researchers have analyzed the

effects of state programs on dental access and dental caries incidence, researchers have not fully analyzed the characteristics associated with children seeking treatment for decay after being screened in a state-sponsored program. Our study is unique in that we analyzed the characteristics of children not receiving care after having been screened for decay.

The study has some limitations. First, missing data is common. The CAReS data, in particular, has been subject to missing data on forms. The assessment of missing data demonstrates this. Dental hygienists and dental screeners did not record education information for three-fourths of children, and failed to input information on whether a child has a developmental delay for most entries. In addition, race was commonly not recorded on CAReS data and race was often marked 'unknown' on Medicaid claims data. We had attempted to request information on medical and dental barriers from CAReS, but this information was also left blank on most of the forms.

Based on this analysis, the Iowa Department of Public Health has becomeconcerned about the missing data, especially race and ethnicity information and is seeking to improve reporting. Dental hygienists and other screeners may have been unaware of the usefulness of the data and the importance of data collection to inform research for action to assist children receipt of care and eliminate barriers to care. In their informal inquiries, IDPH found that some screeners feel uncomfortable asking race/ethnicity questions of their patients. the department has discussed the missing race and ethnicity data and has encouraged region directors to obtain more complete race and ethnicity information . However, more trainings may be necessary to inform those filling out the forms the

importance of data collection and its uses. Possibly training on eliciting this information in a sensitive manner will also assist in receiving more complete information.

Another limitation to our study is that we used probabilistic linkage to match Medicaid claims to CAReS screening data. With the issues of data inconsistencies seen in the CAReS file, the linking process may have benefited from more than one run. In retrospect, the matching process would have been strengthened if unmatched data would have been repeatedly matched. The effects of running the unmatched data multiple times using different variables for matching and blocking would probably not yield many more matches. We attempted different combinations of matching and blocking of date of birth, first name, last name and Medicaid number. The amount of matches did not vary greatly, though the match and blocking used for the final match yielded the most matches. There may have been additional combinations of matching and blocking that may have been more effective, but was not explored by the authors.

Only 1,369 children were matched to a Medicaid claim in this study. Of those matched, only 428 were considered to have received treatment for decay (935 total number of children had a treatment within six months of the first screening). The next step in this study is to understand why only three-fourths do not receive treatment or assess using other methods of the children received treatment through other methods besides Medicaid. One way to study whether children received treatment, but did not link to Medicaid file, is to randomly choose a small sample of children entered in this study, possibly 100 children. Steps should be taken to ensure a high participation rate in order to find the best power for such a study. Researchers should establish if children are

receiving treatment, the source of treatment, and if they did what other mechanisms did they use to receive treatment.

Additionally, children who received treatment but did not use Medicaid would not have been recorded in this study. It is important to ask the small sample what mechanism they use when receiving treatments. Examples of other mechanisms to receive dental treatment are paying out of pocket, using private insurance, or receiving public insurance from outside the state of Iowa. Some children listed their county of residence outside Iowa (n=224). Therefore, children could have received public insurance using other states' public insurance options. Understanding where children are receiving treatment or if they are not receiving treatment can tell us if this study accurately portrays dental treatment for decay in Iowa. In order to understand barriers of children receiving treatment for caries, IDPH must assess whether the 76% of children in this study who did not have Medicaid claim after screening positive for decay did or did not receive treatment through some other source.

IDPH could conduct another study to find other sources of treatment for Medicaid-qualified children. Other studies have been conducted to discuss whether linking Medicaid claims to state records are an effective way to assess children's health. One study looked at Medicaid claims for dental procedures and found that they are not the most valuable for identifying at-risk groups for dental issues. The authors suggested using other data collection tools such as census data or school free/reduced lunch eligibility data for studying at-risk groups (53). In this study, children attending screenings may not be considered at-risk. For example, since many Iowans reside in rural

areas, children who do not qualify for Medicaid use screening sites because these sites could be more convenient than locating a dentist.

IDPH can also attempt to conduct a cost-benefit analysis of the I-smile™ program.. Other cost benefit analyses for health screenings have been conducted. In a study of thirteen states analyzed for the feasibility of instituting similar programs for children three to eighteen years. The authors found that states can adequately institute the program financially if Medicaid fees average 61% of the mean private sector fees (54). IDPH would benefit from looking into whether their programs meet this cut-off point. IDPH could also conduct their own cost-benefit analysis to see how much money per treated child the department spends and whether the cost for one child to receive care is worth the cost of the program.

Similarly, a cost benefit analysis could be instituted to see how much it would cost to ensure that more children will receive treatment. Ensuring that all children screened positive for decay to receive treatment within six months would require more manpower at WIC clinics and more staff for screenings in order to continue follow up with positively decayed children. This recommendation may or may not be feasible given budget constraints and other logistical issues in following each decay positive child.

When mapping dentists according to mean family income, we found that dental providers are available to all income levels (Figure 8). Figure 9 (Located in Appendix C) also indicates that dental providers are available in every county. However, not every child in 2010 had a dental home. This could be due to barriers that prevent children from having a regular source of dental care. Although dentists are located in each county of the state, research on whether each county has a dentist that accepts Medicaid and whether

there are any limitations to them accepting Medicaid. Another issue that should be explored is whether each county has a pediatric dentist available. Dentists may not be comfortable seeing children (19).A dentist's acceptance of children, particularly toddlers and infants, could improve the proportion of children treated for dental caries.

Policy Implications

This study provides data for future action for IDPH. The discovery of the dental home's importance for children with decay can be used to strengthen IDPH's programing ensuring all children have a dental home. Ensuring that barriers to having a dental home are overcome can assist in this. One barrier to care that IDPH can explore is whether children are welcome at the nearest dental provider. Dentists have mentioned that they do not always allow children as patients at their practice (25). Either training dentists to work with children or finding options for patients living in an area lacking dentists that specialize in treating children will be helpful to eliminate dental treatment barriers.

Having Medicaid could also be a barrier to dental care because parents have complained about dentists not always providing care to Medicaid-enrolled children (16). IDPH should ensure that all limitations to Medicaid by either talking to or training dentists about the Medicaid process or by again ensuring that children are linked to a dentist without barriers to Medicaid. IDPH can assist in care coordination for those who do not live near dental services providing care to young, Medicaid-enrolled children.

Older children (five to eleven years) were more at risk for having untreated decay when compared to pre-school aged children. Because these children should attend schools, programs in elementary schools may help to ensure children are receiving the care needed. Working with school nurses to link children with dentists providing services

to Medicaid-qualified children can help to mitigate any difficulties in receiving care. Other care coordination measures may need to be instituted as one reason children may not be seen by dentists could be due to parents' lack of transportation and busy schedules (16). Ensuring that these children have dental care may have to be in the form of mobile clinics that visit at-risk schools. Speaking with dentists about scheduling flexibility may also help mitigate issues about working parents having to miss work during the week.

More research should aim to understand the root cause of children not receiving care for dental caries. Focus groups and speaking with local partners/stakeholders (dentists, dental hygienists, parents, schools, etc.) can all help to locate any programmatic weaknesses. Additional data may need to be collected and analyzed about whether children are in fact not receiving care or if they are receiving care through other avenues. Because the I-smile™ program recently began attempting to institute dental homes for all children, additional monitoring for 2011 can help find if the program is beginning to reach more children in providing dental homes. This study is meant to inform IDPH and other state health departments of the factors that prevent Medicaid-eligible children from receiving care after treatment. The results presented in this study can further improve the I-smile™ program and can be used to eliminate further barriers to dental health.

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APPENDICES

Appendix A: Letter of Withdraw from IRB

EMORY UNIVERSITY

Institutional Review Board

September 20, 2011

RE: Determination: No IRB Review Required
Title: Do dental screenings lead to dental caries treatment among Medicaid-enrolled children ages 0-12 years in Iowa?
PI: Leah Zilversmit

Dear Ms. Zilversmit:

Thank you for requesting a determination from our office about the above-referenced project. Based on our review of the materials you provided, we have determined that it does not require IRB review because it does not meet the definition(s) of "research" involving "human subjects" or the definition of "clinical investigation" as set forth in Emory policies and procedures and federal rules, if applicable. Specifically, in this project, you will be conducting a secondary data analysis of de identified data.

This determination could be affected by substantive changes in the study design, subject populations, or identifiability of data. If the project changes in any substantive way, please contact our office for clarification.

Thank you for consulting the IRB.

Sincerely,

Andrea Goosen, MPH
Research Protocol Analyst
This letter has been digitally signed

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Appendix B: Child and Adolescent Risk Reporting System (CAReS) Form[55]

Child Health Demographics Form

Date

Personal Information

Child's name (Last, First, Middle)	Date of Birth
Suffix	S.S.#
Title XIX#	Gender

Referral Source (circle one)

Care coordinator
Child care
Church
DHS
Door to door
Family Planning
Friend/Relative
Hospital
Juvenile court officer
Medical Clinic
Other agency
Other participant
Outreach
Primary care provider
School/AEA
Shelter
Walk-in/Self referral
WIC

Agency home
Admit Discharge

Admission reason

Moved
New
Re-admittance
Requested transfer

Discharge reason

Age restriction
Goals met
Income guideline restriction
Lost to Follow-up
Moved
Non-compliance
Population-Based Service Only
Re-inform unsuccessful
Requested discharge
Selected non-contract HMO
Unreachable/ Unavailable
Refusal of services

Other Programs (circle all that apply)

Before/After school care
CH Specialty Clinics
Child Care
Early Head Start
EPSDT
Family planning
hawk-i
Head Start
School fluoride rinse
School sealant
WIC

Notes:

Ethnicity & Language Information

Ethnicity
Hispanic Not Hispanic

Country of origin

All Races (Select all that apply)

Primary race

American Indian or Alaska Native
Asian
Black or African American
Native Hawaiian or Other Pacific Islander
White

Needs translator
Yes No

Primary Language

Secondary Language

Languages

American Sign Language	Chinese, Cantonese	Greek	Karenni	Oromic	Slovak	Ukranian
Amharic	Chinese, Mandarin	Gujarati	Kikuyu	Pingelap	Somali	Urdu
Arabic	Croatian	Hebrew	Kirundi	Polish	Spanish	Vietnamese
Armenian	Czech	Hindi	Korean	Portuguese	Sudanese	Yiddish
Bambara	Dinka	Hmong	Krahn	Romanian	Swahili	Yoruba
Bengali	Dutch	Hungarian	Kunama	Rundi	Swedish	Other
Bosnian	English	Ilocano	Laotian	Russian	Tagalog	
Burmese	Farsi (Persian)	Indonesian	Luo	Samoan	Thai	
Cambodian (Khmer)	French	Italian	Marshallese	Serbian	Tigrinya	
Chamorro	Ga	Japanese	Nepali	Shan	Tongan	
Chin	German	Karen	Nuer	Shona	Turkish	

Family & Household Information

Address 1	Zip
Address 2	Family size / Monthly income
Primary phone Cellular Emergency Home Pager Relative Work	Secondary Phone Cellular Emergency Home Pager Relative Work

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Child Health Demographics Form (Continued)

Child's name	Date of Birth	Title XIX#

Parent & Guardian Information

Custodial parent's marital status (circle one)
Divorced Married Parent w/ partner Separated Single Widowed

Mother (Last, First, Middle)	Suffix	Education level achieved (circle one) Grade School (or less) Associate's degree Middle School Vocational/Trade school High School Bachelor's degree (or beyond) No Formal Education
Father (Last, First, Middle)	Suffix	Education level achieved (circle one) Grade School (or less) Associate's degree Middle School Vocational/Trade school High School Bachelor's degree (or beyond) No Formal Education
Guardian (Last, First, Middle)	Suffix	Education level achieved (circle one) Grade School (or less) Associate's degree Middle School Vocational/Trade school High School Bachelor's degree (or beyond) No Formal Education

Medical Home Information

Does the client have a usual source of medical care?	Yes No	Primary Care Provider
Is the usual source of medical care available 24/7?	Yes No	Name
Does the source of care maintain the client's record?	Yes No	County of Licensure
Client has medical insurance?	Yes No	Date of last visit (mm/dd/yyyy)

Medical Barriers (circle all that apply)

Child care for siblings	Language	No Medical Home	Unpaid bill at office
Cost	Location of provider	Provider declines insurance	
Fear of medical procedures	No barriers	Transportation	
Hours of appointment	No belief in preventive health care	Unaware of need for well visit	

Dental Home Information

Does the client have a usual source of dental care?	Yes No	Dentist
Does the usual source of dental care maintain the client's record?	Yes No	Name
Has the client seen a dentist within the past 12 months?	Yes No	County of Licensure
Client has dental insurance?	Yes No	

Dental Barriers (circle all that apply)

Child care for siblings	Hours of appointment	No belief in preventive dental care	Cost
Dentist will not see children under 4 years of age	Language	Transportation	
Dentist declines insurance	Location of dentist	Unaware of need for well visit	
Fear of dental procedures	No barriers	Unpaid bill at office	

Dental Risk Assessment

Screening Date	Decayed Teeth Yes No	Filled Teeth Yes No	Sealed Teeth Yes No	Risk Level Low Moderate High

Early ACCESS

Client has a developmental delay or disability?	Yes No	Delay Types (circle all that apply)
Client has a condition known to have a high probability of later delays in development?	Yes No	Adaptive Hearing Cognitive Physical Communication Social Emotional Vision Health Status
Client has an IFSP (Individual Family Service Plan)?	Yes No	

Appendix C: Figures not Included in Manuscript

Figure 3: Public Health Regions, Iowa 2012[56]

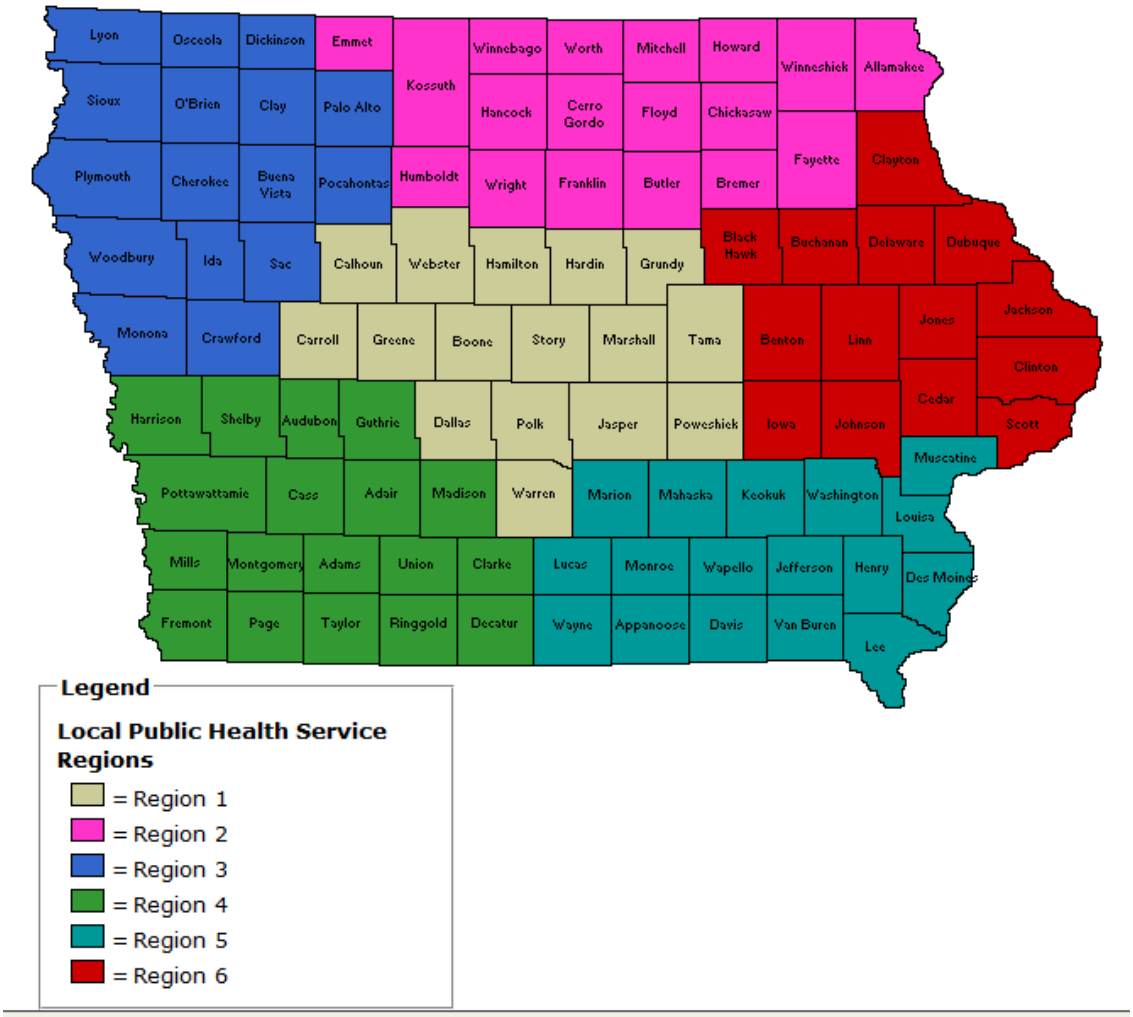
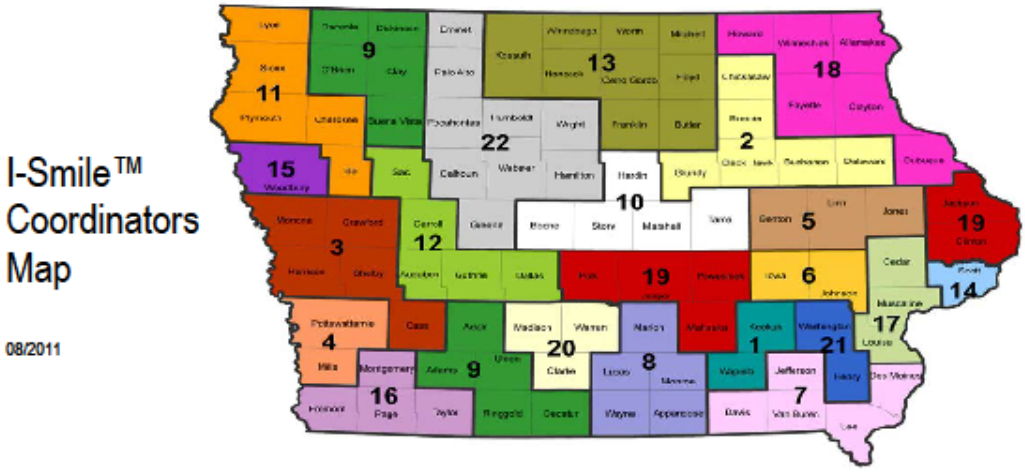


Figure 4: I-Smile™ Coordinators Map[57]



1. American Home Finding
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Figure 5: Median income and location of dental providers in 5 most populated cities, Iowa 2011

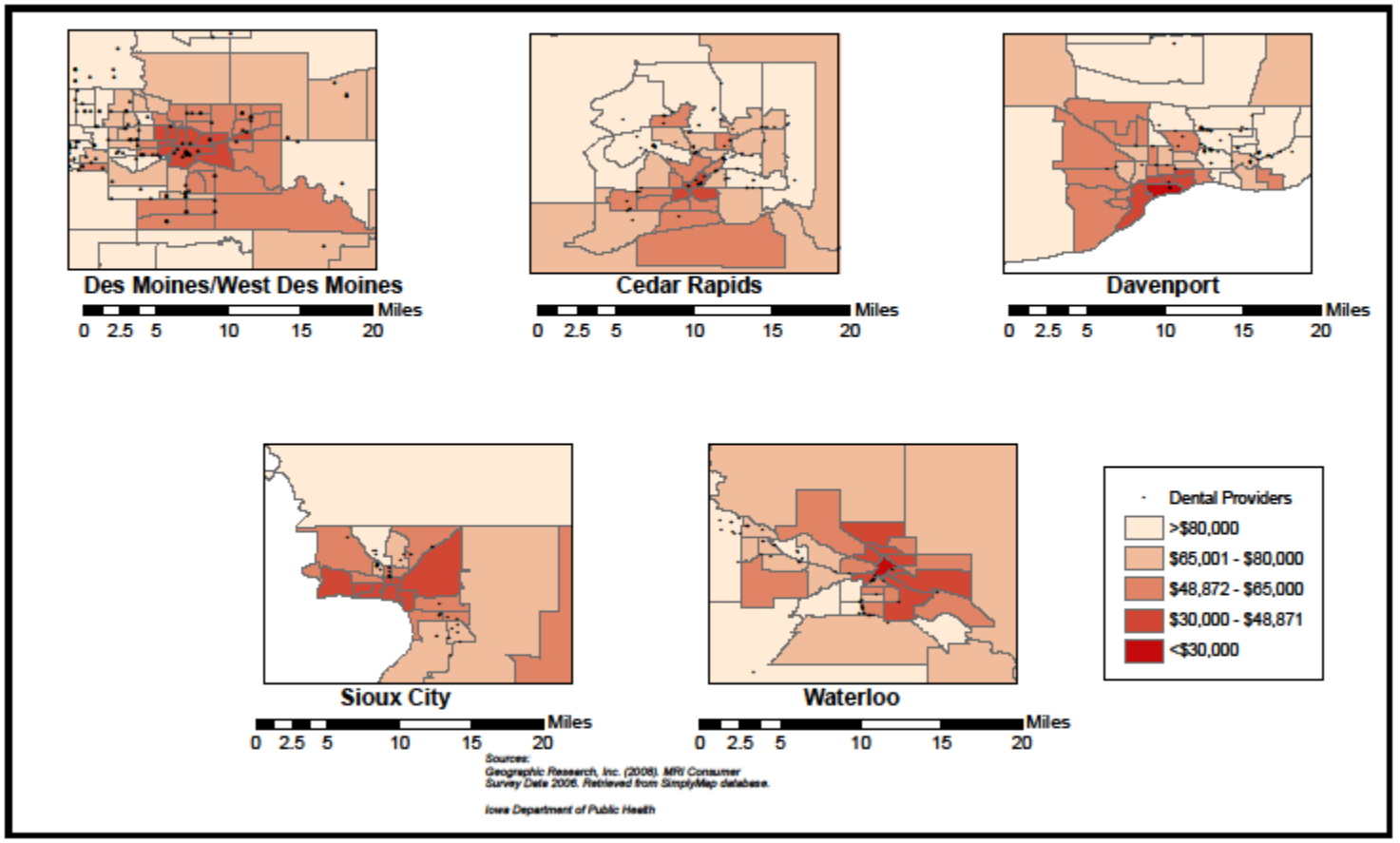

Figure 5

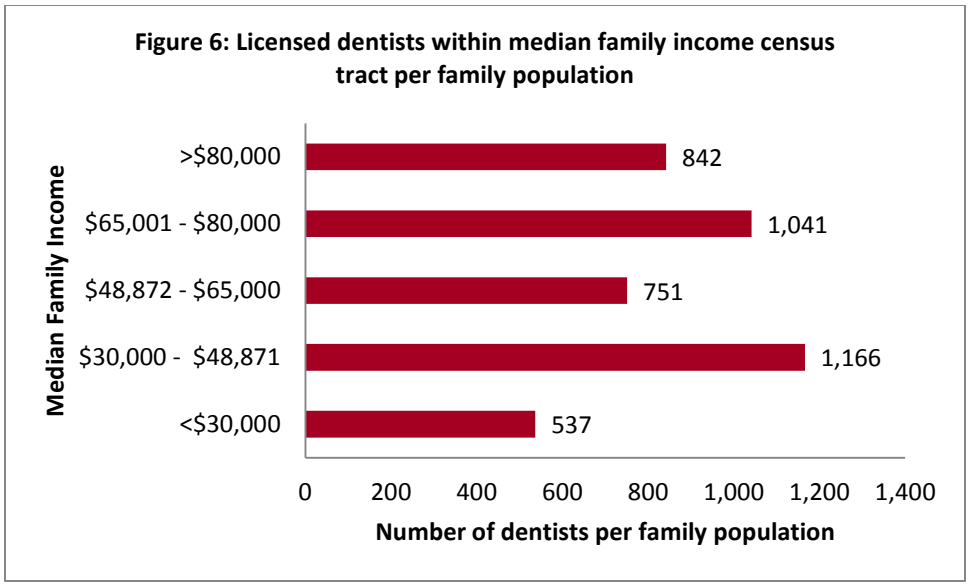
Figure 6: Licensed dentists within median family income census tract per family population
Median Family Income
>$80,000
$65,001 - $80,000
$48,872 - $65,000
$30,000 - $48,871
<$30,000
842
1,041
751
1,166
537
0
200
400
600
800
1,000
1,200
1,400
Number of dentists per family population

Figure 7: Iowa Dentists and Dental Specialists[5]
5

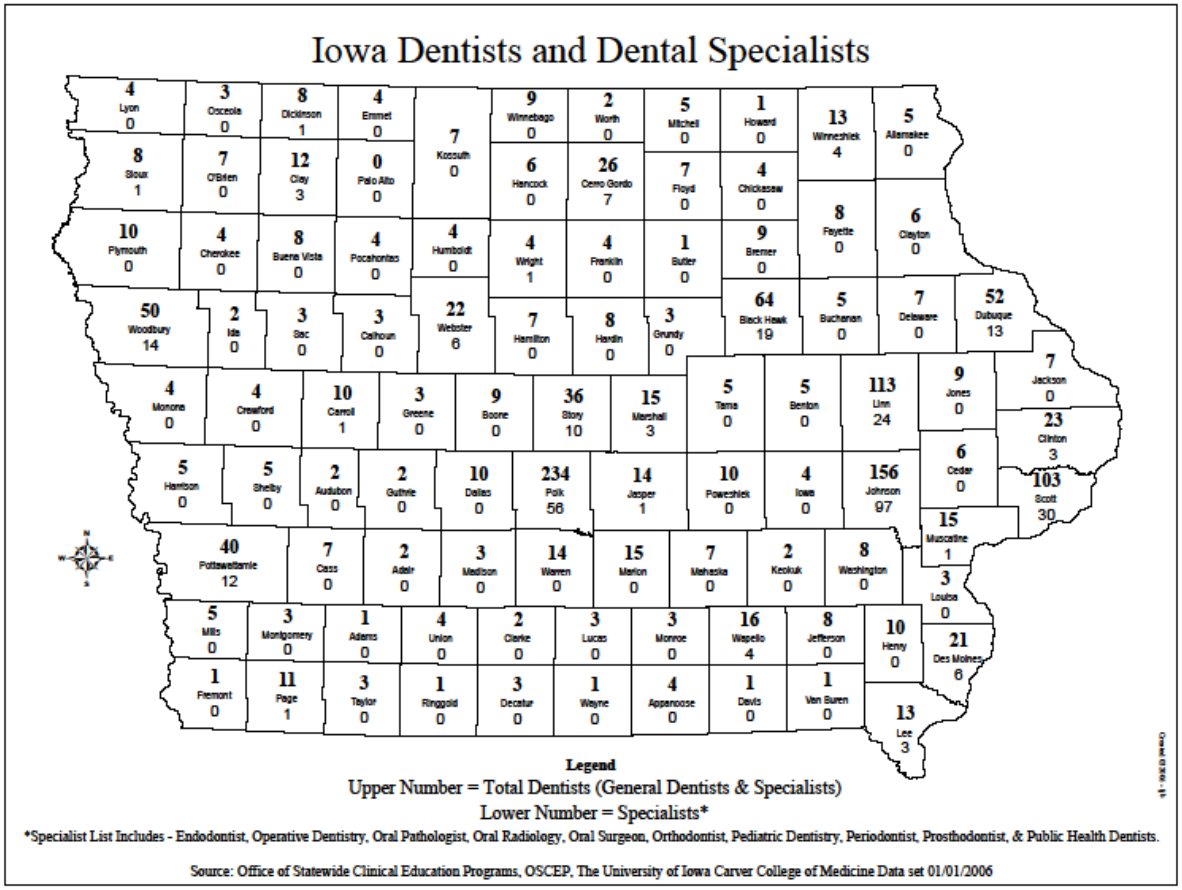

Figure 8: Percent Distribution of time interval for children treated within first six months after screening, by positive or negative for decay, Iowa 2010