

Descriptive Epidemiology Paper

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INTRODUCTION, NATURE AND EXTENT OF PROBLEM

Dental caries, or tooth decay, is the most prevalent disease affecting American children behind the common cold (U.S. National Library of Medicine [NLM], 2014). Despite being preventable and largely reversible in early stages, it remains the most common chronic disease among children in the United States (Centers for Disease Control and Prevention [CDC], 2013a). More than one-fourth of children ages 2-5 years are affected by early childhood caries, rendering this disease five times more common than asthma in children (CDC, 2012; Surgeon General's Report, 2000). The 1999-2004 National Health and Nutrition Examination Survey revealed that 42% of children between ages 2 and 11 have at least one primary tooth affected by dental caries, while 23% have incidences of untreated disease (U.S. National Institute of Dental and Craniofacial Research [NIDCR], 2014; Griffin et al., 2014). Amongst older children with permanent teeth (ages 6-11), 21% have at least one permanent tooth affected by dental caries,

with 8% remaining untreated (NIDCR, 2014). The average child ages 2-11 has 1.6 decayed primary teeth and 3.6 decayed primary surfaces, while an older child experiences .45 decayed permanent teeth and .68 decayed permanent surfaces (NIDCR, 2014).

Dental caries is an infectious disease caused by breakdowns in tooth enamel by cariogenic bacteria in the mouth (CDC, 2009). As bacteria break down foods into acids, they combine with these acids, food pieces, and saliva to form plaque that adheres to the teeth (NLM, 2014). If left alone, plaque begins to adhere to teeth and damage enamel within 20 minutes of eating (NLM, 2014). 90% of tooth decay occurs in pits and fissures, or the “tiny grooves on the chewing surfaces of the back teeth” (CDC, 2013a; CDC, 2009), and teeth are susceptible to decay as soon as they erupt from a child’s gums (American Dental Association [ADA], 2000a).

Caries is highly virulent and can lead to dental complications such as cavities, tooth fractures, tooth abscesses, and tooth mortality (NLM, 2014; Colak et al., 2013). Untreated caries not only causes persistent and sometimes acute pain, but can affect a child’s speech development and ability to chew, eat, sleep, and smile (Chi et al., 2014; Holt & Barzel, 2013). Caries in very young children is associated with reduced growth due to insufficient food consumption (Colak et al., 2013). Caries has a range of negative emotional effects including decreases in appetite and self-esteem, along with increased rates of depression, irritability, anxiety, fatigue, and withdrawal (Holt & Barzel, 2013). It can complicate the treatment of other medical conditions and, in some cases, can lead to death (Chi et al., 2014; Colak et al., 2013; Clovis et al., 2012).

The effects of untreated caries impede a child’s ability to learn. Caries causes “pain, dysfunction, school absences, difficulty concentrating, and poor appearance—problems that greatly affect a child's quality of life and ability to succeed” (CDC, 2011a). Children with oral health problems are less likely to complete their homework, more likely to have low grade point

averages, and more likely to miss school than children with better oral health (Chi et al., 2014; Holt & Barzel, 2013). Children miss an estimated 51.7 million school hours annually because of a dental problem or visit (Griffin et al., 2014; Surgeon General's Report, 2000).

Americans accrue 500 million dental visits and an estimated \$108 billion on dental services each year (CDC, 2011a). Dental care expenditures comprised almost one-fifth of child health-care expenses in 2009 (Griffin et al., 2014). Unlike the common cold and other infectious diseases, “tooth decay is not self-limiting” and requires professional treatment to resolve (Colak et al., 2013). Delayed treatment results in higher costs, as “a cavity only grows larger and more expensive to repair the longer it remains untreated” (CDC, 2013a). After caries-related symptoms become acute, treatment sought in a hospital or emergency room can reach ten times the price of treatment in a dentist's office and is often ineffective for treating the underlying problem (ADA, 2013; CDHP, 2013). On the other hand, early detection and treatment is less painful, less expensive, and “often saves the tooth” (NLM, 2014).

The most cost-effective public health approach to caries, however, is prevention. According to the CDC (2013b), a combination of dental sealants and fluoride “has the potential to nearly eliminate tooth decay in school-age children.” Daily tooth brushing of fluoride toothpaste is considered “the most cost-effective, self-applied method to prevent caries at practically all ages” and has been shown to reduce caries by 30-70% (Colak et al., 2013). Similarly, fluoridation of drinking water is recognized by the CDC as “one of 10 great public health achievements of the 20th century,” and is estimated to contribute \$4.6 billion in annual savings for national dental care costs (CDC, 2013a). Fluoridated water has been shown to reduce caries by 25% over a child's lifespan (CDC, 2011).

Dental sealants for children, which serve as another preventative strategy for preventing caries in children, “can prevent up to 60% of tooth decay for 5 years” (CDC 2011a). The CDC (2013a) estimates that raising the participation of children at high risk for tooth decay in school-based sealant programs to 50% “would prevent more than half of the caries that these children would otherwise have and save public health dollars.” School-based dental sealant programs across 36 states currently serve 258,000 children, which is “only about 8% of lower income children who could receive sealants” (CDC 2013a).

PERSON (HOST) FACTORS

Biological Person Factors

Any child with erupted teeth is at risk for dental caries (ADA, 2000a). Older children experience higher prevalence and magnitude of caries than younger children, as their teeth “are exposed to the environment and at risk longer.” (NIDCR, 2014; Wang et al., 2012). Girls typically experience higher rates of caries than boys, “mostly due to early eruption of their teeth and food preferences” (Wang et al., 2014). However, recent surveys show that sex is not a significant factor in rates of untreated caries amongst children (CDC, 2011b).

Age of infection of cariogenic bacteria is one of the strongest predictors of future disease severity: infants or toddlers experiencing caries have significantly heightened likelihood of subsequent caries in both primary and permanent teeth (Beil et al., 2014; Colak et al., 2013). On the other hand, children with low infection levels at a young age “subsequently have the lowest level of risk of developing caries” (Colak et al., 2013).

Physical Person Factors

Susceptibility to caries is at least partially inheritable through genes that determine saliva composition and flow, tooth morphology, dietary and taste preferences, and enamel and dentin

formation (Wang et al., 2012). In particular, reduced salivary flow and softer and malformed dentin and enamel are associated with greater genetic risk of caries (Wang et al., 2012). Concurrent experience with malocclusion, or teeth that are crooked or out of alignment, is suspected to make teeth more difficult for a child to keep clean through daily care (ADA, 2000a). In the same vein, any physical impairment that impedes a child's ability to practice good oral hygiene could increase risk of caries.

Cognitive Person Factors

The developmental limitations of early childhood put young children at particular risk for untreated dental caries. The National Institute of Dental and Craniofacial Research (2014) and American Dental Association (2000a) oral hygiene recommendations call for parental supervision or aid in tooth brushing for children under age 7, as young children may be unable to clean their teeth adequately on their own. Younger children's inability to accurately "verbalize their oral pain" can prevent early caries detection and timely treatment (Holt & Barzel, 2013). Additionally, preschoolers with developmental delays have been found by a preliminary study to experience higher prevalence of caries (Chi et al., 2013).

Behavioral Person Factors

Eating behaviors that create a constant supply of enamel-damaging acids in the mouth, such as frequent snacking throughout the day or at bedtime, increase the risk of caries (NLM, 2014; ADA, 2000b). For very young children, these behaviors include prolonged or nocturnal breastfeeding after the eruption of the child's first tooth (ADA, 2000b). Bottle-feeding habits that enable drinking sugary liquids frequently or in bed can result in early childhood caries, commonly known as baby bottle tooth decay (ADA, 2000b). As children grow, risky eating behaviors that increase tooth exposure to acids include unregulated training ("sippy") cup usage,

frequent snacking throughout the day or at bedtime, consumption of chewy foods that stick to the teeth, and overconsumption of fermentable carbohydrates including glucose, fructose, and sucrose (NLM, 2014; Colak et al., 2013; ADA, 2000a).

Preventative oral hygiene behaviors such as tooth brushing are recommended as “necessary to prevent cavities” (NLM, 2014; CDC, 2013b; ADA, 2000a). Delayed introduction of tooth brushing (after 12 months), low frequency of brushing and lack of bedtime brushing have been associated with higher rates of caries in many studies, but have been found to have no association in several others (Hooley et al., 2012). “Difficult” children have been shown to be less likely to have their teeth brushed more than once a day and more likely to experience caries at a younger age than “easy” children (Hooley et al., 2012). Additionally, missed dental appointments, fewer annual check-ups, fewer preventative services, and child behavior management problems at the dentist are associated with higher rates of caries (Hooley et al., 2012).

Social Person Factors

Higher birth order has been associated with higher caries rates, along with correlating factors such as lower levels of medical surveillance and immunization and higher levels of junk food intake (Hooley et al., 2012). Similarly, large family size “can influence the level of resources available to siblings” and has been associated with higher caries rates in some studies (Hooley et al., 2012).

According to the CDC (2013a), children of racial and ethnic minority groups “have twice as much untreated decay in their permanent teeth, but only receive about half as many dental sealants.” Among racial groups, Mexican or Hispanic American children and black non-Hispanic children have the highest rates of caries in the United States (CDC, 2013c; NIDCR, 2014).

Low socioeconomic status is one of the strongest determinants of caries in children (Chi et al., 2014). Children whose families are economically disadvantaged “bear a disproportionate share of dental disease” (ADA, 2014). Children with low-income families are “half as likely as wealthier peers to access preventative dental care and are 2-3 times more likely to have untreated disease (CDHP, 2013). 4 million children and adolescents ages 2-17 had unmet dental care needs in 2012 because their families could not afford care (CDC, 2013d).

One-fourth of American children do not have dental insurance (Griffin et al., 2014). Among low-income children, insurance is a high predictor of utilization. Low-income children with private or public health insurance were three times as likely to have received preventative dental service in 2011, compared to only 12% of uninsured children (*Healthy People 2020*). Rates of unmet dental need in uninsured children are four times that of children with public coverage such as Medicaid, and five times that of children with private health insurance (CDC, 2013d).

ENVIRONMENTAL FACTORS

Relevant Place Comparisons

While international place comparisons of dental caries in children are outside the scope of this paper, older studies note that intra-national differences in dental caries have been observed in the US since 1941, with New England, Northeast, and the Pacific Coast exhibiting the highest rates of caries (Brunelle & Carlos, 1990).

However, as prevalence of caries in children is associated with access to care, urban-suburban-rural comparisons more accurately describe current trends. As identified by the Health Resources and Services Administration, children in rural areas are more likely to be affected by increasing rates of dentist shortages (Guarnizo-Herreño & Wehby, 2014). Additionally, children

in rural areas experience higher burdens of access to care including larger distances, higher transportation cost, lower rates of dental insurance coverage, and lower-quality preventative care (Guarnizo-Herreño & Wehby, 2014; CDC, 2011a). The sprawl of rural areas can further impact rates of caries by impacting ability of the municipality to provide fluoridated water and “high-quality, timely dental services” (CDC, 2011a).

Local comparisons are also relevant to the distribution of caries amongst children different populations, as high rates of caries are associated with many sociodemographic factors that can concentrate within a geographic area. Localities with large populations of non-Hispanic blacks, Hispanics, American Indians, and Alaska Natives (identified by the CDC (2013c) to have the highest rates of caries of any racial or ethnic groups in the country) could be expected to exhibit higher rates of caries among children. In accordance with the factors discussed in previous sections, localities with large populations of low-income, uninsured, under-educated, under-treated, under-fluoridated, and/or undocumented people and children would be expected to have higher rates of childhood caries (Hooley et al., 2012).

Biological Environmental Factors

Relevant biological factors of the child’s environment include the presence of cariogenic micro-organisms and other pathogens such as viruses, bacteria, and yeast, which contribute to caries (Wang et al., 2012). *S. mutans* and *Streptococcus sobrinus* are identified as the two “main cariogenic micro-organisms” related to caries incidence (Colak et al., 2013). The major source of infection for infants is their mothers: active caries and/or high concentrations of cariogenic bacteria in a parent or caregiver can result in vertical transmission to a child through saliva-sharing behaviors such as sharing a spoon or cleaning a pacifier in the mouth (Colak et al., 2013; ADA, 2000b).

Physical Environmental Factors

The physical environment impacts childhood caries in two major ways: access to dental care and fluoridation of water. In addition to the physical impediments to care access discussed in the place comparisons above, nearly 4800 geographical areas of dental care health professional shortage have been identified across the U.S. that comprise almost 50 million Americans, 30 million of whom have no access to a dentist. Dentist shortage is the “leading cause of access problems and gaps in supply and utilization of dental care” in these areas (Guarnizo-Herreño & Wehby, 2014).

Low fluoride exposure is an additional physical environmental risk factor for childhood caries (Griffin et al., 2014). Water fluoridation has characteristics of both the physical and social environment, as fluoridation levels can be either naturally occurring in the water supply or supplemented by public water systems (ADA & CDC, 2006). Only 27 states met the *Healthy People 2010* objective of having 75% of citizens on public water systems with fluoridated water (CDC, 2011). The CDC (2014) indicates that 69% of people on public water systems, or over 184 million people, currently have access to the benefits of community water fluoridation, leaving 3 out of 10 people at higher risk for caries due to low fluoride exposure.

Social Environmental Factors

Parents or primary caregivers are the “primary social force influencing child development” during early childhood (Hooley et al., 2012). Caries in children have been shown to be influenced by the education, employment, income, insurance, marital status, stress levels, self-efficacy, nutrition, snacking habits, breast- and bottle-feeding habits, nocturnal feeding habits, smoking habits, oral health, dental knowledge, and dental utilization patterns of their parents or primary caregivers (Beil et al., 2014, Hooley et al., 2012; Wang et al., 2012, Hanioka et al.,

2011). Similarly, the relevant knowledge and skills of other key adults could affect the prevention and treatment of childhood caries, such as a teacher's ability to recognize behavioral and emotional symptoms of oral pain (Holt & Barzel, 2013), or a dental hygienist's knowledge of up-to-date evidence-based recommendations for preventative care (Clovis et al., 2012).

Beyond the primary caregiver, the social environment impacts children's access to care, which is "thought to be among the main causes of child dental problems and disparities in children's oral health in the United States" (Guarnizo-Herreño & Wehby, 2014). Dental insurance policies, which include higher copayments and lower annual limits than those of medical insurance, put low-income children at greater risk of being uninsured (Griffin et al., 2014; Guarnizo-Herreño & Wehby, 2014). Medicaid policies encouraging timely dental visits in early childhood are loosened in some areas due to dentist shortage (Beil et al., 2014). Quality of available dental care influences family utilization patterns and efficacy of preventative services (Beil et al., 2014; Guarnizo-Herreño & Wehby, 2014; Clovis et al., 2012; Hooley et al., 2012).

TIME FACTORS

Rates of childhood caries have decreased secularly over the four decades, in part due to the increase of multiple sources of fluoride exposure over the same time period (NIDCR, 2014; Colak et al., 2013; National Oral Health Surveillance System [NOHSS], 2006). The 1999-2004 National Health and Nutrition Examination Survey revealed "a small but significant increase in primary decay" in children ages 2-5 (NIDCR, 2014; *Healthy People 2020*). However, more recent 2011-2012 NHNES data reveal a decrease in untreated dental decay in children ages 2-5 since 2004 (*Healthy People 2020*), indicating that conclusions regarding the reversal of secular trends may be premature.

Cyclical, seasonal, and short-term time factors do not appear to be applicable to the rates of caries in children.

PREVENTION STRATEGIES

STRATEGY 1	
Six months of high-dose xylitol in high-risk caries subjects—a 2-year randomised, clinical trial	
Citation	Campus, G., Cagetti, M. G., Sale, S., Petruzzi, M., Solinas, G., Strohmenger, L., & Lingström, P. (2013). Six months of high-dose xylitol in high-risk caries subjects—a 2-year randomised, clinical trial. <i>Clinical Oral Investigations</i> , 17(3), 785–91. doi:10.1007/s00784-012-0774-5
Purpose	To test whether daily use of a high dose of xylitol chewing gum for 6 months would reduce the caries incidence in high-risk schoolchildren after 2 years.
Geographic Setting	Sassari, Italy
Participant Number	204 randomized participants; 157 completed experimental period (74 intervention/83 control); 148 completed follow-up caries assessment after 2 years and were included in final analysis.
Participant Demographics	7-9 years old with 2-3 carious lesions, salivary mutans streptococci concentration of >105 CFU/mL, and presence of all the first permanent molars
Design	Double-blind randomized, placebo-controlled study with two parallel arms; 6-month experimental period and 2-year follow-up period <u>Intervention group</u> : non-sucrose chewing gum containing xylitol (36.6 %) <u>Control group</u> : non-sucrose chewing gum with xylitol replaced by an artificial sugar alcohol
Outcome Measures	Caries status of permanent first molars, salivary mutans streptococci, and lactobacilli concentration after two years.
Intervention Approach	Children chewed two pellets of gum for 5 minutes, 5 times a day, immediately after meals and snacks while supervised by teachers or parents. The total daily intake of xylitol was 11.6 g. During the experimental period, all the subjects received fluoridated toothpaste. Following the experimental period, a questionnaire and a 3-day diet diary tracking caries preventative measures and daily sugar intake were submitted every 6 months. 2 years after the experimental period, children were re-evaluated by two blinded examiners for caries status of permanent first molars, salivary mutans streptococci, and lactobacilli concentration.
Statistical Analysis Methods	Differences between group mean “net caries increment” at baseline and follow-up were evaluated using nonparametric Mann-Whitney <i>U</i> test (p. 788). “Differences in proportion relating to microbiological counts and proportion of decayed first permanent molars at baseline and follow-up were assessed using equality of proportion test” (p. 788).
Results	“Subjects using the xylitol chewing gum showed a significantly lower increment in the number of new carious lesions... The relative risk reduction was 82.1% on the xylitol group compared to the non-xylitol one” (p. 789). No statistically significant decrease in salivary mutans streptococci in either group at follow-up. “A statistically significant decrease in the number of children with a high salivary Lb concentration was found in both groups. However, the effect of chewing gum use on salivary lactobacilli was less

	pronounced in the non-xylitol group” (p. 789).
Conclusions	“A reduction in the sugar metabolism of the oral biofilm has previously been reported in the same group of children as in the present study after both 3 and 6 months’ use and 3 months after the end of xylitol use. Even if a clear antimicrobial effect could be found, this finding demonstrates a prolonged effect of the xylitol on different plaque-related variables. This paper thus appears to confirm the efficacy of xylitol chewing gum in caries prevention” (p. 790).

STRATEGY 2 A Cluster Randomised Trial of Effectiveness of an Educational Intervention in Primary Health Care on Early Childhood Caries	
Citation	Mohebbi, S. Z., Virtanen, J. I., Vahid-Golpayegani, M., & Vehkalahti, M. M. (2009). A cluster randomised trial of effectiveness of educational intervention in primary health care on early childhood caries. <i>Caries Research</i> , 43(2), 110–8. doi:10.1159/000209343
Purpose	“The overall purpose of this cluster randomised trial was to plan an effective oral health educational intervention that can be integrated into the visits of children in general health services in countries with developing oral health systems” (p. 111).
Geographic Setting	Tehran, Iran
Participant Number	242 pairs (A = 77, B = 85, C = 80), 177 of whom (A = 55, B = 59 and C = 63) completed the outcome examinations.
Participant Demographics	12- to 15-month old children and their mothers, contacted at the vaccination offices of public health centers in Tehran.
Design	Double-blind randomized study with three parallel arms (two intervention and one control); 6-month follow-up period. <u>Intervention Group A</u> : Pamphlet on caries prevention, 5 minutes of verbal instruction, and two telephone reminders of instructions. <u>Intervention Group B</u> : Pamphlet on caries prevention only. <u>Control Group C</u> : Received caries prevention pamphlet after outcome examinations.
Outcome Measures	Increments in the number of decayed teeth (dt) or teeth with enamel caries (de), percentages of children developing new dt or de, and the number needed to treat (NNT).
Intervention Approach	“The educational intervention took place by means of a pamphlet created for this present study to cover the main topics relating to caries prevention in infants and toddlers” (p. 112). Health centers were randomly assigned to two intervention (A and B) groups and one control (C) group, each comprising 6 health centers. At baseline, each child underwent a clinical dental examination. Participants then moved to vaccination offices where the vaccination staff provided oral health instruction (pamphlet + instruction or pamphlet only) to all mothers belonging to the intervention groups. 6 months after the intervention, children’s teeth were reexamined.
Statistical Analysis Methods	The Kruskal-Wallis and Mann-Whitney U test were used to measure the significance of the differences in averages, and the χ^2 test for differences in frequencies. “Logistic regression was applied to estimate odds ratios (ORs) and their 95% confidence intervals (95% CIs) of dental caries increments for the intervention groups in comparison with the controls while controlling for the children’s backgrounds. Goodness of fit was assessed by means of the Hosmer-Lemeshow test. A p value of

	less than 0.05 denoted statistical significance. NNT was calculated as $1/ARR$ where ARR = absolute risk reduction, and then rounded up” (p. 113)
Results	Baseline de recovered in 6 of 14 teeth in group A, 5 of 9 teeth in group B and none of 5 teeth in the control group. Group A showed no increment in de and an NNT of 4. Group B showed slightly lowered increments in the number of de and the percentage of children with new de than the controls and an NNT of 9. Compared those in to group B, mothers in group A reported that the pamphlet had significantly more influence on changing their oral health behaviors.
Conclusions	“The present randomised trial demonstrated that an educational intervention to prevent caries implemented by general health staff and targeting mothers of young children was effective in slowing down the development of enamel caries, especially among those motivated by the health staff” (p. 115). This intervention style is therefore an effective solution for countries with developing dental services.

STRATEGY 3	
Caries prevalence four years after the end of a randomised, clinical trial	
Citation	Pine, C. M., Curnow, M. M. T., Burnside, G., Nicholson, J. a, & Roberts, a J. (2007). Caries prevalence four years after the end of a randomised controlled trial. <i>Caries Research</i> , 41(6), 431–6. doi:10.1159/000104800
Purpose	School-based preventative programs were seen as ‘unnecessary’ for most communities as caries rates declined; however, some communities continue to exhibit an unequal burden of caries. This purpose of this intervention was “to determine whether a school-based programme of daily supervised toothbrushing with a 1,000 ppm fluoride toothpaste together with a home support programme designed to encourage twice-daily toothbrushing could reduce dental caries in communities with high levels of caries in children in primary schools” (p. 431).
Geographic Setting	Tayside, Scotland
Participant Number	534 participants; 428 re-examined at end of intervention (30 months); 329 examined 4.5 years later
Participant Demographics	5-year-old children in first year of primary school. At the start of the program, many children had not established a twice-daily brushing habit and therefore had the greatest potential to benefit form the program.
Design	Single-blind, randomized controlled trial with 2 parallel class groups in each school, 4.5 year follow-up period.
Outcome Measures	Caries increment was calculated by D_1FS increment (all carious lesions) and D_3FS increment (only cavitated lesions).
Intervention Approach	The intervention period lasted 30 months from 1997–2000 and included supervised toothbrushing on school days with fluoride toothpaste, as well as provision of toothbrushes and toothpaste for home. At the start of each school holiday, children were given a take-home kit including “a letter to parents advising on the importance of twice-daily toothbrushing, toothbrush and toothpaste, a brushing chart split into morning and night, and paper stars to stick on the brushing chart” (p. 432). Children were examined at 6-month intervals during the 30-month trial.
Statistical Analysis	“Examiner reliability was measured using Cohen’s k [Fleiss, 1981] on a surface basis. The baseline balance in number of children with unerupted first permanent molars

Methods	between groups was tested using Pearson's X^2 test with Yates' correction. The significance of differences in mean caries experience on deciduous teeth was tested using t tests. The above analyses were undertaken using SPSS for Windows software. The non-parametric 2-sample Permutation Test [Good, 1995] was utilised to assess the statistical significance of the difference in net caries increment (reversals included) on first permanent molars between the intervention and non-intervention group, as the distribution was highly skewed" (p. 433)
Results	Children in the intervention group experienced 39-40% less cavitated lesions in first permanent molars than children in the control group at the 84-month follow-up. "Seven years after the start of the trial and 4.5 years after its cessation, children in the intervention group had developed significantly less caries in their first permanent molar teeth than those in the non-intervention group" (p. 434).
Conclusions	"The results of this study support recommendations made by Burt [1998], proposing that prevention should be aimed at the whole population first, in this instance, recommending twice-daily toothbrushing with a fluoridated toothpaste. However, in selected areas where caries levels are high, specific cost-effective preventive programmes should be targeted to all the children in the area, for example, on a whole classroom basis as undertaken in this study... This study has recorded, for the first time in modern populations, a significant long-term benefit in the dental health of children 4.5 years after the cessation of a supervised toothbrushing programme using a 1,000 ppm fluoride toothpaste" (p. 435).

HEALTH NEEDS ASSESSMENT SUMMARY

The burden of dental caries in American children remains disproportionately concentrated in already-vulnerable communities due to mediating factors such as low socioeconomic status and reduced access to care (ADA, 2014; Chi et al., 2014; Guarnizo-Herreño & Wehby, 2014; NIDCR, 2014; CDC, 2013c). Due to the virulence of the disease (Colak et al., 2013), the severity associated with age of infectivity (Beil et al., 2014; Colak et al., 2013), the associated developmental and schooling outcomes of untreated caries (Chi et al., 2014; Griffin et al., 2014; CDC, 2011a), and the effectiveness and widespread availability of fluoride toothpaste (Colak et al., 2013), the most pressing health need seems to be connecting at-risk communities with proper oral health education surrounding prevention, and adequate oral health and dental resources for prevention and early treatment.

Mohebbi et al. (2009) demonstrated that a small dose of oral health education to parents regarding caries prevention in infants and toddlers can significantly reduce caries incidence in children after 6 months. More importantly, this study tested a non-dental model for disseminating this health information, by recruiting children and implementing the intervention within vaccination offices of public health centers. This to me represents a viable alternative model for connecting the parents of young children in vulnerable communities with basic dental education and resources. If dental insurance and dentist supply fall short of securing this connection (Beil et al., 2014; Guarnizo-Herreño & Wehby, 2014), dental offices should not be the exclusive (or majority) source of education and screening available to vulnerable communities. Adding oral health education and basic screening components to alternative health locations that serve parents of infants and toddlers, such as vaccination offices, has the potential to broaden the pool of parents (and therefore high-risk children) reached during the critical years of early childhood.

My second priority in addressing this disparity would be to expand school-based sealant programs to reach a much larger portion of at-risk children than the current 8% (CDC, 2013a). The precedent for free or subsidized lunch programs in schools on the basis of student sociodemographics is now well established; how could this structure be engaged to address oral health needs for at-risk children? Broadening the geographic reach of the dental sealant program could reduce a large portion of caries incidence during a five-year time span (CDC, 2013a). Combining these two strategies, however, by complementing the sealant program with a targeted education component for children (and ideally, parents) regarding at-home caries prevention could reduce the need for this program in the future.

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