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ORIGINAL ARTICLE

Effectiveness of preventive oral health care in Hispanic children living near US–Mexico border

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Abstract
Objective The effect of preventive oral healthcare on dental caries in Hispanic children in a school district near the US–Mexico border in Texas was studied.
Methods We collected socioeconomic and demographic data for enrolled students through a written survey of parents. The information was linked to screening data for students in the same school that had been collected during a previously completed teledentistry demonstration project. The presence of dental sealants served as a proxy for preventive oral healthcare. We compared the effect of sealant presence on caries. The student population was 97.5% Hispanic and 82% were economically disadvantaged.
Results Forty-four percent of the children in our study sample had caries. The prevalence of sealants was 19%; 32% is the national average. The results of regression models confirm the hypothesis that preventive services significantly reduce the occurrence of dental caries (OR = 0.241, $P < 0.01$). Higher household income (OR = 0.437, $P < 0.05$) and parent health insurance (OR = 0.497, $P < 0.05$) were also associated with reduced caries incidence.
Conclusions Our study suggests that preventive services reduce the incidence of caries in Hispanic children in the study population.

Keywords Dental caries · Sealant · Oral health · Hispanic children · Teledentistry

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Introduction

While there is much rhetoric about promoting preventive care as a long-term solution to controlling healthcare costs in America, healthcare allocations and healthcare reforms usually do not reflect such emphasis. This lack of focus on prevention is particularly evident in oral health. A few years ago the American public was shocked when a 12-year-old boy died of complications of a tooth abscess in Maryland in 2007 (Otto 2007). Though the boy had a toothache, he could not visit a healthcare practitioner because his single mother could not afford to pay for the visit. The spread of the infection to his brain resulted in his death. The health care system ended up providing services worth a quarter of a million dollars for complications of a case of preventable tooth decay. The incident highlighted the shortcomings, particularly in preventive oral health, of a healthcare system that spends far more than any other in the world and yet fails to provide basic preventive services to many of its poor children (Reinhardt et al. 2004).

Dental caries—tooth decay—is the most common chronic disease of childhood in America and disproportionately affects low-income groups, Hispanics, and children living in underserved areas (Flores et al. 2002). According to the Surgeon General of the United States, 4–5 million children and adolescents' daily activities are affected by tooth decay and about half of the children between 5 and 9 years have untreated tooth decay (US Department of Health and Human Services 2000b). The cost of dental disease to the life of individuals, to the productivity of the economy, and to the overall health of the population has also been well-documented (Quandt 2007; Selwitz et al. 2007; US General Accounting Office 2000). Though government policy, as stated in the *Healthy People* 2010 objectives, clearly identifies preventing and

controlling oral and craniofacial diseases as a goal (US Department of Health and Human Services 2000a), oral health continues to be overlooked in public health debates at the national level.

Dental caries is quite easily prevented with regular preventive services and adoption of healthy dental behaviors (Terpenning and Shay 2002). A systematic review on preventive oral health conducted by the US Task Force on Community Preventive Services found strong evidence for the effectiveness of two public health approaches for dental caries: community water fluoridation and dental sealant application (Truman et al. 2002). The relative median decrease in dental caries in the ten studies selected for the review was 60%, ranging from 5 to 93%. Only four of the ten studies took place in the United States (Bagramian 1982; Horowitz 1977; Klein 1985; Selwitz 1995), but mean caries reduction in both US and non-US studies was found to be the same (60%) (Truman et al. 2002). The results varied depending on the length of the follow-up. For instance, three studies that measured the decrease over a period of 4 years found the relative decrease to be 65% (Bravo 1997; Klein 1985; Selwitz 1995). All three studies involved children aged 6–17 years and measured caries in both primary and permanent teeth. None of the US studies looked at the special case of Hispanic children, as proposed by our study.

The two public health strategies—fluoridation and dental sealants—found to be most effective by the Task Force on Community Preventive Services act in different ways to prevent dental caries. Fluoridation, which has been credited with much of the decrease in dental caries in the population over the past several decades, mainly acts through remineralization of teeth to prevent decay (Petersson and Bratthall 1996). Fluoride provides protection against caries to all teeth, particularly caries that may occur on smooth surfaces of teeth.

The second strategy found to be effective for preventing dental caries is the application of dental sealants, which is the focus of this study. Most dental caries today are found on the chewing surfaces of teeth, particularly the pits and fissures on these surfaces (Selwitz et al. 2007). Food particles and bacteria that are impacted in these fissures are hard to remove by simple rinsing or brushing of teeth. Dental sealant, which is a plastic coating applied to these pits and fissures, covers these grooves and keeps food from reaching into these crevices, thus preventing decay. If applied on a healthy tooth, dental sealants should prevent caries for as long as the sealant remains in place (Truman et al. 2002). A systematic review conducted by Cochrane Collaboration evaluated the effectiveness of pit-and-fissure sealants for preventing dental decay in permanent teeth (Ahovuo-Saloranta et al. 2004). Dental sealants were found to reduce caries in permanent teeth by 86% within 1 year of application. Yet, less than one-third of children (32%) in the United States have sealants on their teeth (Centers for Disease Control and Prevention 2005).

While scientific evidence on the effectiveness of sealants for prevention of dental decay is well-established, little work has been done to evaluate the effect of dental sealants in Hispanic children in underserved areas. Hispanics are reported to have lower rates of dental sealants than whites (Flores et al. 2002). The existence of a gap in dental treatment between non-Hispanic white and Hispanic children is supported by Centers for Disease Control and Prevention's (CDC; 2005) report on dental caries in the United States. According to this report, Hispanic children have a higher prevalence of dental caries compared to either non-Hispanic whites or blacks and also have a higher prevalence of untreated tooth decay. Non-Hispanic white children and those from higher income families are also 60% more likely to have received a sealant than ethnic minority children and those from lower income families. These disparities are also seen in terms of utilization of dental services nationally (Edelstein 2002). Hispanic children have the lowest rate of receiving preventive dental services among all racial and ethnic groups (61 vs. 77% for whites and 67% for blacks) (Lewis et al. 2007). Hispanic children are also reported to experience barriers to dental care more often than faced by other ethnic groups (Flores et al. 2002). In addition to these national trends, Hispanic children on the US–Mexico border bear a disproportional burden of poverty and deprivation. With twice the national child poverty rate, three times the school drop out rates, and significant shortage of dental professionals, Hispanic children in the border area are at increased risk for having untreated dental caries (Annie E. Casey Foundation 2005). It is, therefore, of interest to policy makers and public health professionals to understand the effectiveness of sealant application in preventing dental caries in Hispanic populations in the border areas.

Methods

We studied the effect of sealant application on dental caries in a population comprising mainly Hispanic children near the US–Mexico border in Texas. Our target population comprised all students in the Lyford School District (LSD) in Willacy County, Texas. The county has a population of about 20,000, of which 85% are of Hispanic ethnicity (US Census Bureau 2000). The LSD has a population of roughly 1,500 students from pre-kindergarten to 12th grade. Most of the children are Hispanic (97.5%) and many are from low-income families. Almost 82% of the school district population of children is classified as economically disadvantaged (Texas School Performance Review 2002).

We selected this school district for our study because we collaborated with a teledentistry demonstration project that had earlier completed a screening of students in this school. The teledentistry project employed a dental hygienist who screened students during school hours in the school clinic. Dental images and examination reports were sent digitally via a dedicated Internet connection to a dentist at his clinic which was several miles away. The teledentistry project obtained consent from parents over the period of about a year and screened students whose parents consented. The reports of the examinations were sent to the supervising dentist who contacted those students who needed restoration or further treatment. The teledentistry project could not continue—mainly due to financial constraints—after it completed screening the students at LSD. The project collected caries and sealant data for 67% of students enrolled at the time in LSD. The rest of the students (33%) either did not get consent from their parents for the examination or were absent on the days of the screening. The screening identified which students had dental caries on any of the surface of any tooth and also recorded whether there was evidence of sealant application on the pits and fissures.

To understand the effect of sealant application on the occurrence of caries in Hispanic students of this school, we needed additional information about the socioeconomic and demographic characteristics of the students. We designed a 48-question survey based on the best practices in the conduct of health care research surveys identified by McColl et al. (2001) and questions used in national surveys. Community support for the survey was achieved through a series of meetings with school administrators, parent groups and community leaders. We collected these data for the school children through a questionnaire sent home to their parents. The survey packets were sent home with all students and it included consent form, the 48-question survey instrument in Spanish and English, and a cover letter explaining the research.

Our main outcome variable was whether a student has dental caries in any tooth. A one (1) was assigned for any caries and a zero (0) for none. Our unit of analysis was therefore the child or student rather than a tooth. This selection approach helped us study the effect of preventive care on presence of any dental caries in a student. We used caries prevalence as a measure of oral health in the study population.

From a public health perspective increasing dental sealant application in children is likely to decrease the probability of dental caries. We, therefore, selected the application of sealants as our key policy variable to study the impact of preventive care on dental caries in Hispanic children. We got the number of students with evidence of application of sealants on any tooth from the screening data.

In addition to the preventive services, we expected socioeconomic and demographic factors to have an impact on dental caries incidence. Due to the sensitivity of income information instead of asking for the exact household income in the survey, we had only asked parents to identify income ranges in which their household income would fall. We used household income as a binary variable with a cut-off at $25,000 annual income, which is roughly equal to the Federal Poverty Guideline for a medium-sized family (Federal Poverty Guidelines 2007). We also included education variable which reflects the education level of the parent completing the survey. To keep the survey instrument simple and relatively short, we only asked for education of the parent who was completing the survey rather than to ask for the educational level of both parents. As used in previous studies on oral health, the education variable had three categories: less than high school diploma (as the baseline), completion of high school diploma, and any post-high school education (Cohen and Manski 2006).

Based on other studies, we also included several other variables as listed in Table 2. For example, certain ethnic groups have higher prevalence of dental caries and lower dental services utilization than other ethnic groups (US General Accounting Office 2000). Hispanic children are the most likely ethnic group to have never visited a dentist (13 vs. 4% for whites) (US Department of Health and Human Services 2000a). Disparities in caries incidence are also noticed across all age groups among racial/ethnic groups. So we included age, sex and race/ethnicity variables.

We used Stata version 9.0 (Stata Corp., College Station, Texas) for statistical analysis which included using ordinary least squares, logit, and logistic regression multivariate models. We used Chi-square tests to compare two groups for statistically significant differences and other diagnostic tests such as F test, Wald's test and Ramsey's omitted-variables specification regression error test. We used maximum likelihood approach in regression analysis to address missing data (Little and Schluchter 1985).

Results

We received over 800 questionnaires from the currently enrolled students. After we deleted duplicates and those with illegible entries, 760 completed surveys remained for a response rate of 51% for the parent survey among enrolled students. However, the study sample was further reduced after linking survey data with screening data. This reduced the number of students with both dental screening data and completed survey data to 245, which is about 25% of those screened by the teledentistry program. The mean age of the sample is a little above 12 years old, almost 98%

of the students are Hispanic, and there are slightly more female students than male students in the sample. When household income is treated as a binary variable, almost 66% of students in our sample come from a household with income below $25,000—a level close to 100% of federal poverty guidelines of $24,130 for a mid-size family (Federal Poverty Guidelines 2007). The distribution of other variables is shown in Table 1.

Forty-four percent of children in our sample had caries. Nationally, 42% of the 6- to 19-year-olds report caries on their permanent teeth (Centers for Disease Control and Prevention 2005). However, the prevalence of dental sealants in our sample was 19%, which is only 60% of the national average of 32% (Centers for Disease Control and Prevention 2005). Almost half (49%) of the students with no sealant had caries, while only 19% of those with sealants had any caries. Less than 10% of those with a sealant had any caries in their teeth. We found a difference, at the 95% significance level, in occurrence of caries between those with sealants and those without ($P < 0.01$). Since our policy variable is the presence of any sealant on any tooth, it is not measuring the protective effect of sealant on a single tooth. Instead, the sealant variable is measuring the effect of a preventive visit, as shown by *any* sealant on any tooth, on the prevention of any caries on any tooth in a student. It is therefore reasonable to assume that the actual effect of sealant on preventing caries in the tooth to which it is applied will be stronger than what is seen in our analysis. A comparison between the group with any caries and that without any caries shows statistically significant differences for sealant presence, parent health insurance status, household income, child dental insurance status, and parent crossing the US–Mexico border for seeking dental services. Table 2 describes the differences between these two groups for the study sample. However, we will explore these variables in more detail using regression models so we can study the effect of each variable while keeping other variables constant.

Regression analysis

We run a series of regression models to identify the factors that may explain the variation in outcome variable in our sample. Simple Ordinary Least Squares (OLS) regression assumes a normal distribution of the dependent variable; however, our outcome variable is dichotomous. We therefore use binary regression models as the statistically recommended approach. Because coefficients from binary regression models such as logit regression are hard to interpret without transformation, we use marginal coefficient effects or $\mathrm{d}Pr(y = 1|x)/\mathrm{d}x$ to measure change in the dependent variable for unit change in independent

Table 1 Characteristics and descriptive statistics for 245 students at Lyford School District, 2006

Variable	Mean	SD	Min	Max
Any caries (yes = 1)	0.433	0.497	0	1
Any sealants (yes = 1)	0.192	0.395	0	1
Age	12.218	2.421	8.271	18.741
Sex (male = 1)	0.445	0.498	0	1
Race (non-Hispanic = 1)	0.025	0.157	0	1
Parent education (<HS = 0, HS = 1, >HS = 2)[a]	1.009	0.699	0	2
Annual household income >$25k (yes = 1)	0.314	0.465	0	1
Parent dental insurance status (yes = 1)[b]	0.202	0.402	0	1
Parent health insurance status (yes = 1)[b]	0.401	0.491	0	1
Child dental insurance status (yes = 1)	0.410	0.493	0	1
Child dental insurance status (yes = 1)	0.624	0.485	0	1
Crossing border for parent dental care (yes = 1)[b]	0.279	0.449	0	1
Crossing border for child dental (yes = 1)	0.091	0.288	0	1
Stay in Willacy County (>5 years = 1)	0.870	0.337	0	1
Country of birth of child (outside USA = 1)	0.037	0.190	0	1
Country of birth of parent (outside USA = 1)[b]	0.209	0.408	0	1
Language spoken at home (English = 1)	0.904	0.295	0	1
Knowledge of Medicaid eligibility of child (yes = 1)[b]	0.791	0.499	0	1
Knowledge of teledentistry project at school (yes = 1)[b]	0.354	0.479	0	1

[a] Variable is defined as the education of the parent who responded to the written survey; it has three categories: those who do not have high school diploma, those with high school diploma and those with more than high school education

[b] Status of the parent who responded to the survey

Table 2 Group differences in means between those with and without dental caries in 245 students at Lyford School District, 2006

Variable	With caries [*N*, Mean, SD]			No caries [*N*, Mean, SD]			*P* value
Any sealants	106	0.085***	[0.280]	139	0.273***	[0.447]	<0.001
Age	106	12.379	[2.565]	138	12.003	[2.210]	0.231
Sex (male = 1)	106	0.406	[0.493]	139	0.475	[0.501]	0.282
Parent education[a]	103	0.99	[0.674]	137	1.022	[0.720]	0.727
Household income > $25k	97	0.245**	[0.432]	126	0.367**	[0.484]	0.042
Parent dental insurance[b] (yes = 1)	104	0.125***	[0.332]	139	0.259***	[0.440]	0.010
Parent health insurance[b] (yes = 1)	104	0.308**	[0.464]	138	0.471**	[0.501]	0.010
Child dental insurance (yes = 1)	94	0.351	[0.480]	128	0.453	[0.450]	0.128
Child health insurance (yes = 1)	93	0.548	[0.468]	128	0.680	[0.468]	0.047
Crossing border for parent dental[b] (yes = 1)	94	0.340*	[0.476]	128	0.234*	[0.425]	0.082
Crossing border for child dental (yes = 1)	92	0.076	[0.267]	129	0.101	[0.302]	0.530
Stay in Willacy (>5yrs = 1)	104	0.846	[0.363]	135	0.890	[0.315]	0.332
Transport for dental visit (yes = 1)	81	0.074	[0.264]	111	0.063	[0.244]	0.766
Country of birth of child (outside USA = 1)	80	0.05	[0.219]	107	0.028	[0.166]	0.437
Country of birth of parent[b] (outside USA = 1)	104	0.173	[0.380]	135	0.237	[0.427]	0.230
Language spoken (English = 1)	103	0.903	[0.298]	137	0.905	[0.294]	0.955
Knowledge of Medicaid eligibility[b] (yes = 1)	101	0.791	[0.409]	137	0.792	[0.408]	0.987
Knowledge of teledentistry project[b] (yes = 1)	95	0.337	[0.475]	128	0.367	[0.484]	0.641

*** $P < 0.01$, ** $P < 0.05$, * $P < 0.1$

[a] Variable is defined as the education of the parent who responded to the written survey; it has three categories: those who do not have high school diploma, those with high school diploma and those with more than high school education

[b] Status of the parent who responded to the survey

variables or regressors. We use combinations of variables shown in Table 1 that could in theory influence dental caries in children. Some of these variables cannot be ignored in such a model irrespective of their statistical significance in the empirical results. For others, where the theoretical basis for inclusion was not strong, we relied on empirical results. For instance, we dropped variables related to Medicaid because the basis of eligibility is related to household income which is already a variable in our model. Table 3 reports marginal coefficient estimates and standard errors for logit models. The marginal effect of sealants in the logit model on dental caries is -0.299 ($P < 0.01$) with a standard error 0.077. Thus, for the discrete change of the variable (*sealant*) from 0 to 1, i.e., if a student has a sealant, the probability that this student will have any dental caries is decreased by about 0.3.

We conduct sensitivity analysis of our model by running a logistic regression model with only Hispanic children (98% of children in our study) and find unchanged results as shown in Table 3. The logistic regression results, reported as odds ratios, show a similar preventive effect of sealant application on dental caries (OR = 0.241, $P < 0.01$) as seen in logit models. We use demographic, socioeconomic and health-related variables along with the policy variable (*sealant*) to understand the variability in the dependent variable (*caries*). Age, sex, parent education, country of birth of the parent, and language spoken at home did not have statistically significant effect; however, household income (OR = 0.437, $P < 0.05$) and parent health insurance status (OR = 0.497, $P < 0.05$) had statistically significant effect on dental caries in students.

Discussion

The results demonstrate that the presence of sealants in our study sample (245 students in Lyford School District) leads to reduced likelihood of caries in children. This confirms the hypothesis that preventive services, as measured by application of sealants on teeth of children, significantly reduce the occurrence of dental caries. This result further emphasizes the need for preventive care in underserved Hispanic populations, such as seen at Lyford School District.

We use the presence of any sealant in a child as an evidence of a prior preventive dental visit because a sealant is not usually applied in any other setting than during a dental visit of some type. While students may have other preventive care without having a dental sealant application, it is unlikely that they had a dental sealant without having a dental visit. Therefore, our use of dental sealant as a proxy for preventive dental care is a valid measure for studying

Table 3 Logit estimation model results for dental caries in the study sample and logistic estimation with only Hispanic students in the sample

Variables	Logit regression (all students in sample)		Marginal coefficients of logit regression		Logistic regression (Hispanic students only)	
	Coefficient	[SE]	Coefficient	[SE]	Coefficient	[SE]
Any sealant (yes = 1)	−1.419	[0.464]***	−0.299	[0.077]	0.241	[0.114]***
Age	0.030	[0.064]	0.007	[0.015]	1.003	[0.068]
Sex (male = 1)	−0.096	[0.296]	−0.023	[0.072]	0.862	[0.258]
Parent education = high school (yes = 1)	0.225	[0.403]	0.055	[0.098]	1.352	[0.550]
Parent education > high school (yes = 1)	0.394	[0.486]	0.097	[0.120]	1.617	[0.802]
Household income >$25,000 (yes = 1)	−0.726	[0.336]**	−0.170	[0.075]	0.437	[0.150]**
Parent with health insurance (yes = 1)	−0.726	[0.341]**	−0.172	[0.078]	0.497	[0.171]**
Stay in Willacy county (>5 years = 1)	−0.234	[0.440]	−0.053	[0.109]	0.666	[0.296]
Country of birth of parent (outside USA = 1)	−0.662	[0.439]	−0.153	[0.096]	0.499	[0.221]
Language spoken (English = 1)	−0.355	[0.611]	−0.088	[0.152]	0.712	[0.440]
Constant	0.588	[0.986]				
observations		227				220
McFadden R^2		0.094				
Pseudo-R^2						0.004
F statistics		0.005				

*** $P < 0.01$, ** $P < 0.05$, * $P < 0.1$

the effect of preventive care. Any inadequacy in the estimation of the protective effect of such prevention on dental caries due to other types of prevention (such as fluoride treatment) is likely to result in an underestimation of the effect of sealants. That is to say that the group without dental sealants, assumed not to have preventive care, may show protective effect from other types of prevention. Similarly, we are also assuming that the effect of nutrition or natural fluoride levels in surface water (which are below optimal concentration) in Willacy County will be the same on all children in the study.

A somewhat surprising result from our data is that parent education level does not seem to have a significant impact on dental caries in their children. This holds true both when the variable is a categorical variable with different levels of education (less than high school, high school diploma, and post-high school education) and when it is a binary variable (1 is high school diploma or higher and 0 is less than high school diploma). The coefficients for parent education variable become slightly higher when other related variables like language and country of birth of the parent are taken out of the model. However, this is in contrast to national survey data that show a correlation between low parental education and higher prevalence of dental caries in younger aged children (Edelstein 2002; Ersin et al. 2006).

National surveys often use the highest educational level attained by any of the two parents in a two-parent family to measure parent education (Cohen and Manski 2006). For simplicity and accuracy of self-reported data, we used the educational level of the parent completing the survey to measure parent education, which can explain the divergence between our results and other studies (Edelstein 2002). It is also likely that our study population is more homogenous culturally than the national population thus mitigating any effect of difference in parental education levels on dental outcomes in children as seen in national survey data. It is possible that other variables in the model such as household income and language are capturing the differences in parent education in the sample. However, when we drop these variables (regressors) from our model, education still does not become statistically significant. Another plausible explanation of this result is the difference between formal schooling and what has been termed as "dental IQ". Dental IQ has been used to describe dental education and awareness and is argued by some to be a more direct determinant of dental behavior than years of schooling (Moore 1978). Parents who have less schooling might not necessarily have a lower dental IQ. Formal education and dental IQ may not track together. A different variable could be based on some sort of an evaluation of the dental IQ of parents, which would have allowed us to measure if a parent's education about preventive dental care helps prevent caries in their children.

Even when we control for other variables, household income is strongly related to dental caries in our data, and an increase in household income reduces the probability of caries in the children. The marginal effect of household income on caries is −0.170 ($P < 0.05$) in logit regression model, thus a child in the low-income category has a higher

probability for caries than someone in a high income household.

The significant effect of household income on dental caries in Hispanic populations supports similar results found in general populations in the United States (Mouradian et al. 2000; Manski et al. 2001). Poverty is the single most important indicator of disparities in dental care (Ryan 2003). However, the unique feature of our result is that household income effect seems to be strong despite no significant effect of educational status of the parents. Most dental studies on caries and socioeconomic factors have found these to go together (Edelstein 2002). Our results suggest that family income level may explain a great deal more of the variation in dental caries in such underserved Hispanic populations than in the general population.

Parent's health insurance status also affects the occurrence of caries in the model and this effect is statistically significant (at the 95% level of confidence). Interestingly, this effect disappears when we used child health or dental insurance status. The marginal effect of parent's health insurance on caries incidence is -0.172 ($P < 0.05$) in logit regression model. This is a rather interesting and apparently puzzling result. There is some discussion in the literature about the difference between insurance (or coverage) and utilization (or access) in medical and dental care (Ryan 2003; Mouradian et al. 2000).The impact of dental insurance on dental utilization is less apparent than the impact of medical insurance on dental utilization. First, dental insurance is difficult to get on an individual basis in America and is usually so expensive for an individual that they are better off paying out-of-pocket for incidental expenditures. Dental insurance coverage is mostly offered only as part of a group plan so that risk is distributed over a larger number of individuals. Secondly, even when dental insurance is present, the copay and deductibles are often higher than those for medical visits. The lack of correlation between dental insurance status and dental utilization may therefore partly explain this result. The effect of parent's health insurance status on dental caries in children may be due to two reasons: first, parent's health insurance may be a proxy of how important health is to the parents or it could be a proxy to the parent's socioeconomic or health awareness status; second, parent's health insurance in some cases may provide basic dental examination for children which would increase the likelihood of preventive care among children whose parents have health insurance.

Study limitations included absence of information about the non-participant children's dental status, time lapse between examination and survey collection, and self-reported data. Unfortunately we had no way to compare the outcomes or health characteristics of our sample with those of the children for whom we did not receive consent. There is no study in our knowledge that has estimated these factors for such population in Willacy County or nearby area that we could have used as proxy for comparison. Having such information would have helped in our analysis. However, to check for any systematic selection bias in the study sample (comprising students who were screened and also had a parent complete the survey), we tested the representativeness of the matched list of students ($n = 245$) with the larger group in survey data ($n = 760$). We used a Chi-square test on variables such as age, sex, household income, parent education, and stay in Willacy County, to test for any difference between the two groups and found no statistically significant results. Although the teledentistry screening data did not collect similar sociodemographic information as in our survey data, we compared the dental sealant and caries occurrence rates between all students who were screened a year ago and the matched list of students. We found no statistically significant difference between the two groups either.

The time lapse of almost a year between the dental examination and the survey completion may have led to higher attrition among students than would be expected had the two activities been conducted simultaneously. Self-reported data from parent survey, among other limitations, may be subject to recall bias, where a parent may not accurately remember some facts about past occurrences. Since the survey was to be completed by mostly low-income, Hispanic parents, the reading level was kept below 8th grade and responses were grouped as options rather than left open-ended. This meant that we had few continuous variables to use in our regression models which could have enriched our statistical analysis.

In conclusion, despite limitations of data in working with underserved school children, our study clearly shows that preventive oral healthcare as measured by the presence of dental sealants can significantly reduce the occurrence of dental caries in Hispanic children in underserved areas such as the US–Mexico border in Texas. Other significant results of our study confirm the strong effect of low household income and lack of health insurance in increasing the likelihood of dental caries in children. The old adage that prevention is better than cure applies to dental health as much as to any other public health issue. Hispanic populations and low-income families such as the ones included in our study can benefit from a policy that promotes sealant application in children.

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