

A Comparison of Rural and Urban School-Based Sealant Programs in Illinois

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THESIS

Submitted as partial fulfillment of the requirements
for the degree of Master of Science in Oral Sciences
in the Graduate College of the
University of Illinois at Chicago, 2014

Chicago, Illinois

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ACKNOWLEDGEMENTS

I would first like to thank my entire advisory committee, Drs. Linda Kaste, Shahrbanoo Fadavi, Flavia Lamberghini, and Karen Peters, for their assistance and expertise throughout this project. Without their help, many of the details of the research may have been overlooked and important contacts in the community would not have been made.

Thank you to the Illinois Department of Public Health and Julie Janssen, RDH, MA for their contributions and assistance in contacting program administrators. Without their interest in having the study results and their facilitation with the state sealant program grantees, this research would not have been possible.

Finally, thank you to my husband and family who have supported me over the years of education and have given me a reason to set lofty goals.

ANP

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LIST OF ABBREVIATIONS

AAPD	American Academy of Pediatric Dentistry
ed	education
ESL	English as a Second Language
FRLP	Free or Reduced Lunch Plan
IDPH	Illinois Department of Public Health
PSRR	Permission Slip Return Rate
SBSP	School-Based Sealant Program
SEALS	Sealant Efficiency Assessment for Locals and States
SES	Socioeconomic Status
SPSS	Statistical Package for Social Sciences

SUMMARY

A cross-sectional study of the successes and barriers affecting the school-based sealant programs in Illinois was conducted. The program administrators of the 46 programs funded by the Illinois Department of Public Health (IDPH) were surveyed both in electronic and paper format. Information gathered included geographical information, program characteristics and perceived successes and barriers affecting program implementation. Specifically, programs in rural and non-rural areas were compared with each other.

Out of 46 surveys delivered, 36 were completed in full for a total response rate of 78%. Administrators of programs in rural or collar areas were more likely to respond than those in urban or metro areas. In general, all programs report high Medicaid enrollment and Free or Reduced Lunch Plan (FRLP) eligibility, suggesting School-Based Sealant Programs (SBSP) in Illinois are serving children from low socioeconomic status (SES) families, and are therefore targeting a high-caries risk population.

PSRR was not statistically different based on whether a program was located in a rural or non-rural area. In addition, PSRR was not statistically different for programs reporting a lower Medicaid enrollment compared to those with higher reported Medicaid enrollment. However, a statistically significant increase in PSRR was found for programs in counties without a practicing pediatric dentist.

1. INTRODUCTION

1.1 Background Information

Dental caries is a significant problem worldwide, even in developed countries with established dental care and oral hygiene practices (Bagramian, 1976 and Morgan, 1998). According to a major study on the impact of preventive services on oral health, certain demographic factors are implicated in the progression of dental caries, including low SES, recent immigration status, lack of access to care, and absence of dental sealants (Task Force on Community Preventive Services, 2002).

Dental sealants are a type of resin infiltration into grooves and pits of teeth which has been shown to prevent the colonization of bacteria and the trapping of plaque in the hard to clean areas of the oral cavity (Klein, 1985). They are cited to be a cost-effective and successful preventive measure for caries prevention in posterior permanent teeth after water fluoridation (Task Force on Community Preventive Services, 2002). Although they are most commonly placed on permanent molar shortly after their eruption into the oral cavity, they can be placed on any tooth displaying pits or grooves which may become carious. Disturbingly, however, children in high caries-risk groups are statistically less likely to have dental sealants placed than their lower caries risk peers. The Healthy People 2010 initiative aimed to increase dental sealant prevalence among young people to 50% from a baseline of approximately 20% (United States Department of Health and Human Services, 2010). While recent data indicates that the prevalence of dental sealants among young populations did increase in recent years, it remains around 25%, a far cry from the 50% goal.

One method to combat this disparity is the implementation of SBSP. These programs allow dental professionals to examine and identify young children who would benefit from dental sealants for caries prevention in a school setting, thus bypassing some access to care difficulties the high risk populations may encounter (Siegal, 2009 and 2010). SBSP typically target high caries-risk children by being established in schools with certain financial characteristics, such as high Medicaid or FRLP enrollment of their students. In addition, these programs often target grades where children are likely to have newly erupted permanent molars, as newly erupted teeth are more caries prone than established dentition.

Studies regarding non-dental school-based programs, such as those providing influenza vaccines have found differences in parental acceptance of the program in urban and rural settings (Gargano, 2011 and Wade, 2008). In regard to the IDPH SBSP, despite proposed differences in the populations of urban and rural settings, program implementation is identical in both these settings. Evaluation of SBSP in Illinois is accomplished by evaluating via random checks of sealant retention. In addition, program implementation strategies are left to the particular program's discretion with no IDPH input to what defines a successful or unsuccessful program. Finally, no determinations of what might make a program successful or unsuccessful in varying regions or demographics of the state have been established.

1.2 **Purpose of the Study**

The purpose of this study is to determine if program characteristics exist which may impact provision of dental sealants to high-risk children. In addition, this study aims to determine if program location in a rural or non-rural area might impact the parental acceptance of an SBSP. A review of literature will determine if research supports particular program characteristics that might make a program more successful than another. Finally, the study aims to determine if certain characteristics of an SBSP in Illinois can be related to its success or lack thereof, including its location in a rural or non-rural area.

1.3 **Hypotheses**

Three working hypotheses were developed for the purpose of this study:

1. H_0 : There is no difference in participation rates between SBSPs with high or low Medicaid enrollment
 - H_A : Programs with higher Medicaid enrollment rates experience proportionately lower acceptance than those with higher rates.

2. H_0 : There is no difference in SBSP participation rate between counties with a practicing pediatric dentist and counties with an actively practicing pediatric dentist.
 - H_A : Participation rates are lower in counties where a pediatric dentist practices than in those counties with no pediatric dentist.
3. H_0 : Rural and urban SBSPs do not differ on participation rate at the child level.
 - H_A : Rural SBSPs experience student participation rates, as reported by the program administrator, lower than for urban programs.

2. REVIEW OF LITERATURE

A review of literature was first performed to determine the status of research performed on rural and urban school-based programs in general, as well as SBSP. Before beginning the searches on this topic, inclusion and exclusion criteria were set. Inclusion criteria included research performed regarding school-based programs and dealt with urban or rural populations and which was written in English. Exclusion criteria included any reference which reported only fluoride or caries preventive measures other than dental sealants. General information regarding the results of these literature searches can be found in Table I.

First, MESH terms were formulated to determine the availability of research regarding school-based sealant programs in rural or urban populations. A MedLine via PubMed search of (("Pit and Fissure Sealants"[Mesh]) AND ("Rural Population"[Mesh] OR "Urban Population"[Mesh])) was performed on October 25, 2012. This search returned 11 results, of which three were discarded due to their lack of use of dental sealants as a preventive measure. Of the remaining eight results, none were systematic reviews or reviews of the literature. Equal numbers of retrospective cohort studies and cross-sectional trials were noted (n=3). In addition, one result was a randomized controlled trial while the final result was a prospective cohort study.

Because of the limited availability of data according to these MESH terms, a subsequent search was performed to indicate the availability of literature regarding school-based programs and their impact on rural or urban populations. A MedLine via

PubMed search of (("School Health Services/utilization"[Mesh]) AND ("Rural Population"[Mesh] OR "Urban Population"[Mesh])) was performed on October 25, 2012 and resulted in 21 total studies. Seven results were removed due to their subject matter not pertaining to the access of a school-based health program. Of the remaining 14 results, six were cross-sectional studies, four were intervention studies and three were retrospective cohort studies. The final study was a non-randomized controlled trial.

Next, a Cochrane Review search was performed on November 1, 2012 utilizing the search terms “dental sealant AND school-based program”, as neither of the above MESH term searches revealed any results of Cochrane Reviews. This search resulted in ten results.

It is important to compare the results found here both objectively and subjectively in order to better understand the depth and breadth of the information that is available. The importance of reviewing the literature on this subject lies both in understanding if high-risk children are being targeted by SBSP's and other school-based health programs, as well as determining if literature supports targeting high risk children as a practical and fiscally responsible measure.

Of the 32 relevant results discussed here, ten were based in countries outside of the United States (Cooney, 1994; Demertzi, 2006; Elias-Boneta, 2006; Kharsany, 2012; Messer, 1997; Morgan, 1998a; Morgan, 1998b; Nakamura, 2009; Steiner, 2010; Tai, 2009). In addition, only five of the results compared rural and urban settings directly (Bowman, 1994; Elias-Boneta, 2006; Gargano, 2011; Hillemeier, 2006; Wade, 2008), and one of these was set in Puerto Rico, an area generally regarded as wholly unlike

the contiguous United States (Elias-Boneta, 2006). This is significant because very few studies have compared the efficacy of school-based health programs in rural and urban settings comparable to settings similar to those likely to be encountered by the average United States citizen, as health policy, demographics, and cultural perception of the value of preventive care can all have an impact on the reliability of the results for the purposes presented here. To compound these issues, the two studies in the United States that compared rural and urban geographic areas were regional in nature. For example, one result was a study based in Utah (Bowman, 1994), while another compared rural and urban areas in Kentucky and Ohio (Wade, 2008). The largest urban area studied in these papers was Columbus, Ohio with a population nearing 800,000 (Siegal, 2010). Regional differences as well as differences in policy implementation resulting from large differences in sizes of metropolitan areas may contribute to problems in comparison between subsets of American populations or geographic settings.

In addition to investigating relative differences in the settings of these results, comparing sample sizes and types of studies presented here will allow one to understand better the relative value of individual studies and how they might compare to one another. Of the 22 studies performed in the United States referenced in this paper, 13 had large sample sizes of over 1000 participants (Bagramian, 1976; Bagramian, 1982; Belansky, 2010; Bowman, 1994; Ethier, 2011; Gargano, 2011; Gilman, 1981; Kerns, 2011; Klein, 1985; Magzamen, 2008; Siegal, 2010; Rozier, 1994; Wade, 2008). On the other hand, of the ten international studies presented here, only two had sample sizes of larger than 1000 participants (Messer, 1997; Kharsany, 2012). Smaller sample

sizes in areas that are culturally and politically distinct from the climate of the United States is another issue that must be addressed when attempting to compare results from international studies to those performed in North America.

One interesting discovery is that of the reviewed literature presented here, only the Task Force Review for the Healthy People 2010 campaign is a literature or systematic review (Task Force on Community Preventive Services, 2002). Although this is one area in which the literature can be improved, it may point to a deficiency in both the quantity and quality of available studies on this subject. Of the 32 total studies cited, ten of them were cohort studies, either prospective or retrospective (Armbruster, 1999; Bagramian, 1982; Gilman, 1981; Husky, 2012; Kerns, 2011; Messer, 1997; Siegal, 2010; Steiner, 2010; Wade, 2008). Thirteen of the studies were cross-sectional studies (Bowman, 1994; Demertzi, 2006; Elias-Boneta, 2006; Gillcrist, 1992; Hillemeier, 2006; Keyl, 1996; Kharsany, 2012; Messer, 1997; Rozier, 1994; Selwitz, 1995; Weist, 2000). Surprisingly, five of the sealant studies were randomized control-type studies (Bagramian, 1976; Klein, 1985; Morgan, 1998a; Nakamura, 2009; Tai, 2009). However, these studies were all either performed in other countries or 25 or more years have passed since their publication. Typically, one would assume that sealant studies would not be randomized control studies because it would involve denying one set of participants the opportunity for a proven preventive intervention. The existence of these studies may be due to cultural differences that may exist between the other countries in which these studies were conducted or due to less stringent ethical standards in place in previous years when studies were completed. One study was strictly a cost analysis, but was performed in Australia (Morgan, 1998b). Although a cost analysis of school-

based programs is an important consideration on whether the programs are a practical intervention, analyses conducted out of the United States are likely less applicable than would be liked due to differences in commerce and political differences in how healthcare is delivered. One cost analysis was performed in the United States; however it was performed as part of a randomized controlled trial comparing fluoride rinse to sealant usage in terms of cost effectiveness in preventing caries (Klein, 1985).

Because of lack of significant research in school-based sealant programs, additional searches were conducted detailing pertinent literature regarding school-based health programs of a non-dental nature to bolster results and reveal findings which may parallel those regarding SBSP. Almost half of the results were from this type of search (Armbruster, 1999; Belansky, 2010; Ethier, 2011; Gargano, 2011; Gilman, 1981; Hillemeier, 2006; Husky, 2012; Kerns, 2011; Keyl, 1996; Kharsany, 2012; Magzamen, 2008; Wade, 2008; Weist, 2000; Young, 2001). It is interesting to note that several of the studies comparing rural and urban settings were involving other types of school-based programs than SBSP's (Ethier, 2011; Gargano, 2011; Hillemeier, 2006; Wade, 2008; Weist, 2000). However, it is imperative to research these other programs because they shed light on other, more established types of programs including the successes and failures in terms of participant acceptance, cost effectiveness and ability to target high-risk populations. For example, a study in rural Georgia regarding the implementation of a school-based program to administer influenza vaccines found that outreach and additional educational materials to parents and participants resulted in higher acceptance rates (Gargano, 2011). Theoretically, this type of finding could be used in formulating policies for patient education in SBSP to possibly increase

participant utilization. In addition, a study performed in rural Ohio and Kentucky found that students in rural population settings were more likely to utilize school-based healthcare programs than their urban counterparts (Wade, 2008). This finding could be due to lack of access to care due to proximity to available practitioners. This type of information could be used to determine where SBSP's would be most likely to have the greatest impact on a state or regional level.

One possible deficiency in the studies presented here is the lack of standardized evaluation criteria for the sealant studies. For example, some studies utilized DMFS score (Bagramian, 1976; Bagramian, 1982; Bravo, 1997; Demertzi, 2006; Gillcrist, 1992, Klein, 1985; Morgan, 1998a; Morgan, 1998b; Nakamura, 2009; Steiner, 2010; Tai, 2009); others used sealant presence (Cooney, 1994; Elias-Boneta, 2006; Gillcrist, 1992; Messer, 1997; Selwitz, 1995; Siegal, 2010), and another tracked knowledge about sealants via a survey (Bowman, 1994). These discrepancies can make it difficult to interpret the results of the research as a group. However, there are benefits and disadvantages of each type of scaling system and this finding does not diminish the value of each individual study.

Despite the above analysis, one of the most important goals of a review of the literature on this subject is to determine exactly what the research available determines is the overall finding regarding the implementation of SBSP in rural and urban settings. Although only half of the results broached this subject, some important information can be gleaned from the individual findings. Eleven of the 18 sealant-related studies investigated the effectiveness of sealants on prevention of oral disease (Bagramian, 1976; Bagramian, 1982; Bravo, 1997; Demertzi, 2006; Gillcrist, 1992, Klein, 1985;

Morgan, 1998a; Morgan, 1998b; Nakamura, 2009; Steiner, 2010; Tai, 2009). All of these studies agreed that sealants are an effective and efficient preventive measure. In addition, one study performed in Japan found that the benefit of sealants on prevention of caries extends beyond childhood and into adulthood (Nakamura, 2009). In terms of determining whether SBSP are effective in targeting children at high risk for dental caries, one statewide Ohio study found that SBSP, which targeted school districts with a relatively low average family income, were effective in reaching high-risk children (Siegal, 2010). One of the sealant studies which investigated the differences between SBSP in rural and urban settings found that urban students were more likely to access and utilize preventive services such as obtaining posterior pit and fissure sealants (Elias-Boneta, 2006). Combined with the above-referenced study, which found that rural students were more likely to access their care from a school-based program, it appears that these studies agree that access to care seems to be a larger issue present in rural communities as opposed to urban communities.

Many important findings can be extracted from the literature presented here, including the probability of an increased access to care problem in rural settings and the cost-effectiveness of targeting high risk children via low income school districts. However, the availability of literature on this subject is not abundant, and the quality and reliability of such studies must be questioned due to the diversity in areas and time periods in which the research was conducted. In addition, very few studies investigated the differences in programs set in rural and urban settings. An important consideration, which was not addressed thoroughly in this literature, was the properties of SBSP's which made them successful, and which properties were not cost-effective or successful

in increasing acceptance of the preventive measure. Overall, future research should include systematic reviews regarding the quality of the research available and more studies investigating the role of population setting on the success and efficacy of SBSP's.

TABLE I.
REVIEW OF LITERATURE SUMMARY OF RESULTS

		<u>Sealant</u>		<u>Non-Dental Health</u> (vaccines, asthma education, etc.)	
<u>Study Type</u> <u>(% pub >2002)</u>	<u>Total</u>	<u>US</u>	<u>Non-US</u>	<u>US</u>	<u>Non-US</u>
		Rural vs Urban/ Not Stated	Rural vs Urban/ Not Stated	Rural vs Urban/ Not Stated	Rural vs Urban/ Not Stated
Intervention (50%)	8 (4, 6, 7, 10, 12, 21, 24, 35)	0/0	0/3	1/4	0/0
RCT (40%)	5 (2, 20, 23, 25, 31)	0/2	0/3	0/0	0/0
Prospective Cohort (25%)	4 (1, 3, 22, 33)	0/1	0/1	1/1	0/0
Retrospective Cohort (80%)	5 (14, 16, 17, 28, 30)	0/1	0/1	0/3	0/0
Cross-Sectional (40%)	10 (5, 8, 9, 13, 15, 18, 19, 26, 27, 34)	2/3	0/1	2/1	0/1

3. MATERIALS AND METHODS

A cross-sectional study was performed utilizing grantees from the Illinois State Department of Public Health's Sealant Grantee Program for the 2012-2013 school year. Forty-six (46) total grantees were surveyed, encompassing programs in urban (14), metro (3), collar (3), and rural (26) areas of Illinois. These grantees previously applied for support from the Illinois State Department of Public Health for the sealant program and have surrendered demographic and program-specific information from their applications. In addition, further information regarding program participation, administrative and procedural policies, and perceived student and parental attitudes toward the program have been gathered via a questionnaire sent to the grantees. IRB approval for this study was received via protocol #2013-0990 (Appendix A).

Existing data from the sealant grant applications for the 2012-2013 school year was configured into a research dataset using Microsoft Excel. The IDPH sealant program director, Ms. Julie Janssen, provided the data from the application for use in the study and contact information for program administrators.

The information collected from the application to the IDPH was supplemented by information collected by survey to the grantees (see Appendix B, Questionnaire). Questionnaires were first distributed via electronic survey sent by electronic mail. The electronic mail version of the survey was distributed via RedCap. Grantees were given an opportunity time of two weeks during which they received one reminder email to complete the survey. Any grantees who did not respond within this two week period were then sent a survey via postal mail. A cover letter explaining the nature of the survey and the importance of the data retrieved was formulated and attached to the questionnaire (Appendix C). An addressed and stamped envelope for returning the survey was attached to the survey. For any remaining grantees who did not complete the survey in three weeks following the original mailing date, a second mailing was sent.

Existing and questionnaire data were matched via identifiers and the resultant numeric identifiers from the dataset were removed. Results were analyzed following pairing of the existing data and questionnaire results. A comparison of rural and non-rural program characteristics were analyzed based on existing information and questionnaire answers utilizing bivariate analysis. This information was then reported to the Illinois Department of Public Health to assist in modifying existing program policies.

Statistical analysis of the dataset was performed utilizing the software program Statistical Package for Social Sciences (SPSS) Version 20. Bivariate analysis was performed via crosstabs and statistical significance was determined via Likelihood ratio.

4. RESULTS

The demographics of the programs contacted and the resulting respondents are detailed in Table II. The overall survey return rate was 85%, however, three of the surveys initiated were removed from the dataset as they responded to four or fewer of the 13 questions posed. The survey questionnaire is found in Appendix B for viewing of specific questions posed to program administrators.

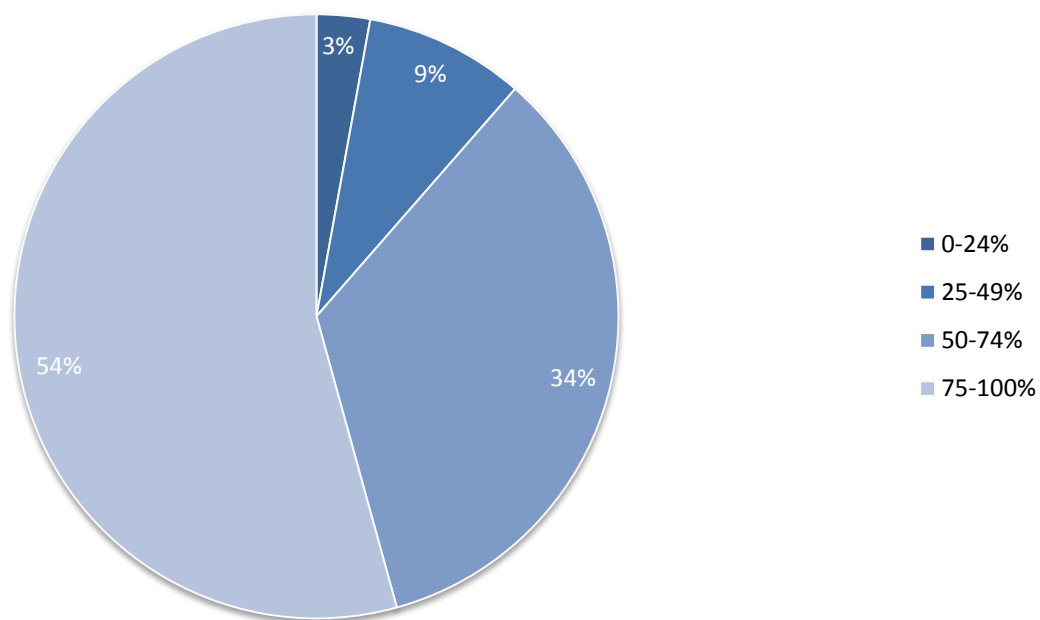
More than half of the surveyed programs were located in rural areas, and similarly more than half of the respondents identified as such. However, a greater percentage of rural and collar programs responded than the surveyed urban and metro programs.

TABLE II.
RESPONSE RATE AND DEMORGAPHIC AREA

	Sent % (n)	Initiated % (n)	Completed % (n)	Total % (n)
Urban	30% (14)	57% (8)	57% (8)	22% (8)
Metro	7% (3)	66% (2)	66% (2)	6% (2)
Collar (Suburban)	7% (3)	100% (3)	100% (3)	8% (3)
Rural	56% (26)	100% (26)	88% (23)	64% (23)
Total	100% (46)	85% (39)	78% (36)	100% (36)

Several of the questions posed to program administrators reviewed financial demographics of the students served by the program, including Medicaid enrollment and FRLP eligibility. Self-reported program statistics are detailed in Figures 1 and 2, indicating the majority of children served by these programs are entitled to services aimed at underprivileged individuals.

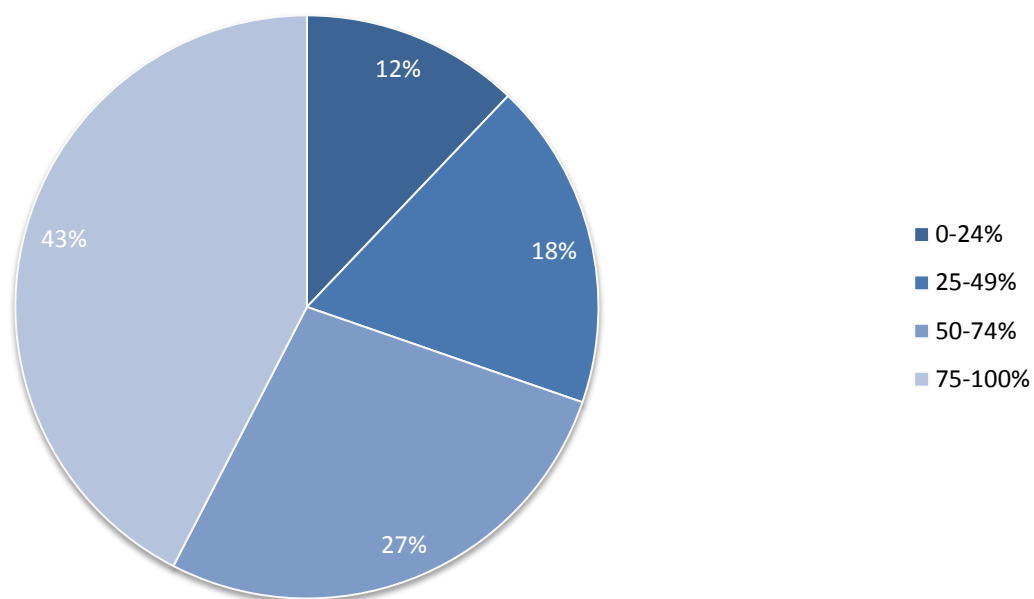
Medicaid Enrollment



	Medicaid Enrollment
0-24%	1
25-49%	3
50-74%	12
75-100%	19

Figure 1. Survey Respondents' Self-Reported Program Medicaid Enrollment

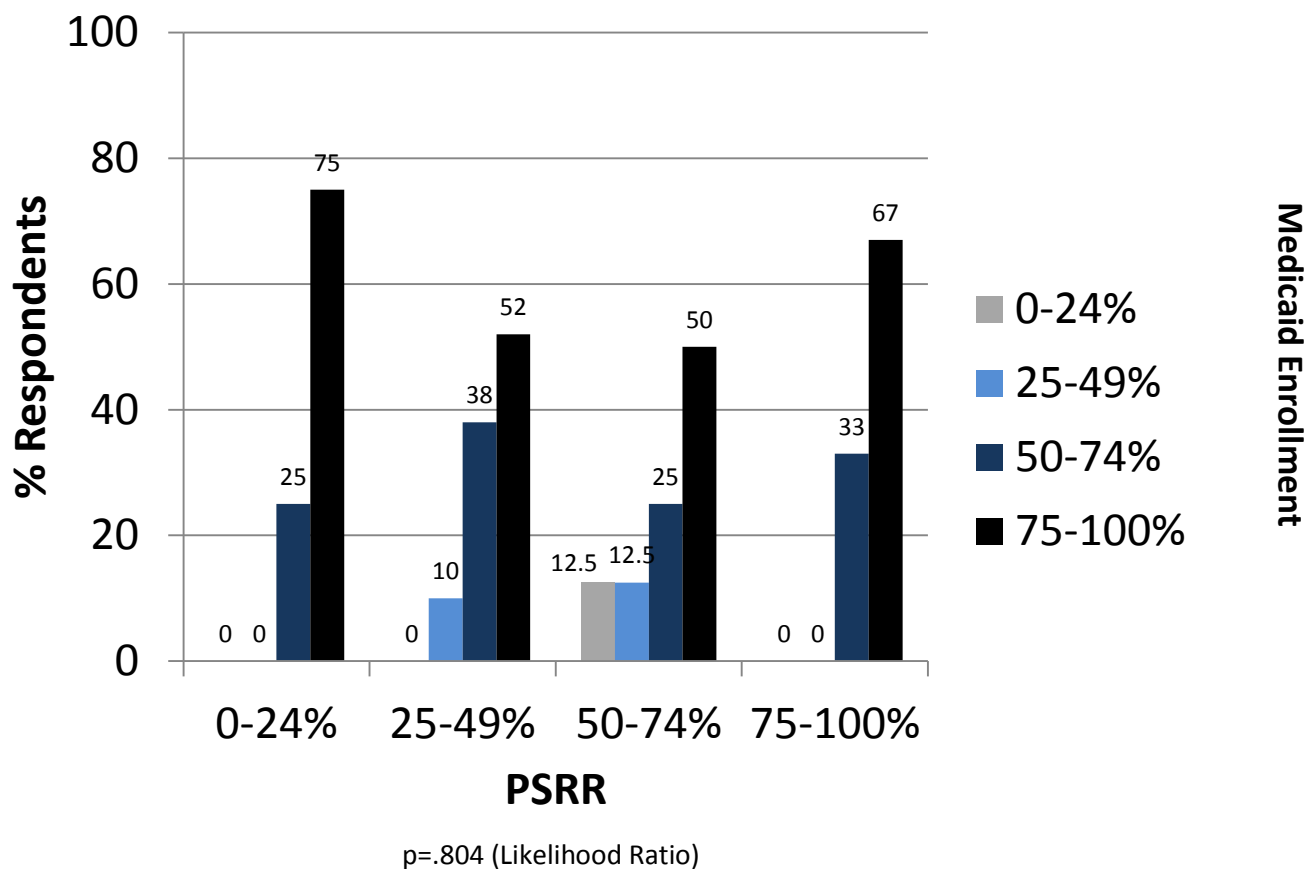
Free or Reduced Lunch Program (FRLP) Eligibility



	Free or Reduced Lunch Program (FRLP) Eligibility
0-24%	4
25-49%	6
50-74%	9
75-100%	14

Figure 2. Survey Respondents' Self-Reported Program FRLP Eligibility

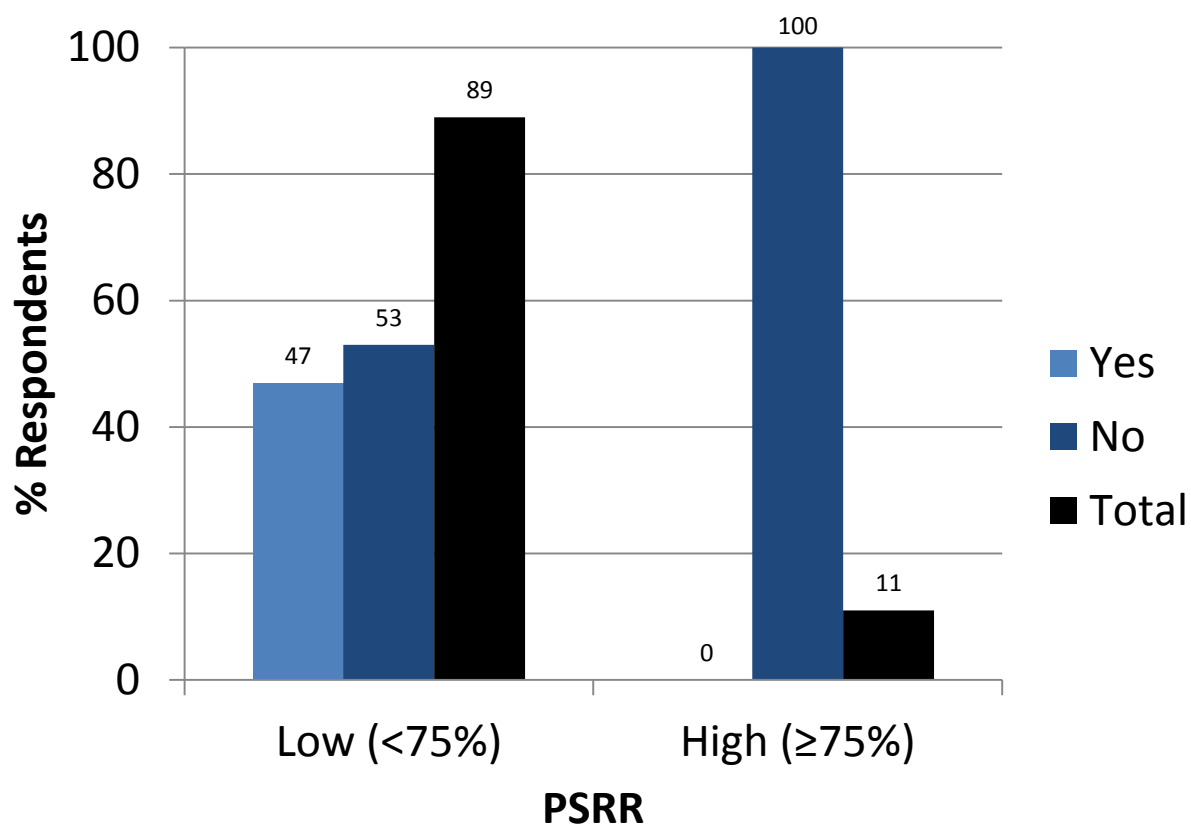
The first hypothesis proposed by the author predicted that programs with higher Medicaid enrollment rates of their students experience proportionately lower acceptance by way of lower PSRR than those with higher rates. Bivariate analysis of these factors indicate that this alternative hypothesis was rejected (Likelihood ratio $p=.804$) and therefore there is no statistical difference between programs with high and low Medicaid enrollment and PSRR (Figure 3).



	Medicaid Enrollment				Total
	0-24%	25-49%	50-74%	75-100%	
0-24%	0	0	1	3	4
25-49%	0	2	8	11	21
50-74%	1	1	2	3	7
75-100%	0	0	1	3	4
Total	1	3	12	20	36

Figure 3. Program Medicaid Enrollment and PSRR

Another consideration to be tested by the author was whether participation rates were lower in counties where a pediatric dentist practices than in those counties with no pediatric dentist. Reported PSRR was cross-checked against the program's location and whether a practicing pediatric dentist was located in that county via an IDPH-generated map which may be viewed in Appendix D. Bivariate analysis indicated that lack of a practicing pediatric dentist resulted in higher PSRR approaching statistical significance, especially when collapsing the data to propose high PSRR as above 75% (Likelihood ratio $p=.031$). Figure 4 shows high and low PSRR programs compared to whether a practicing pediatric dentist is located in the county of which the program identifies, and allows acceptance of the alternative hypothesis.

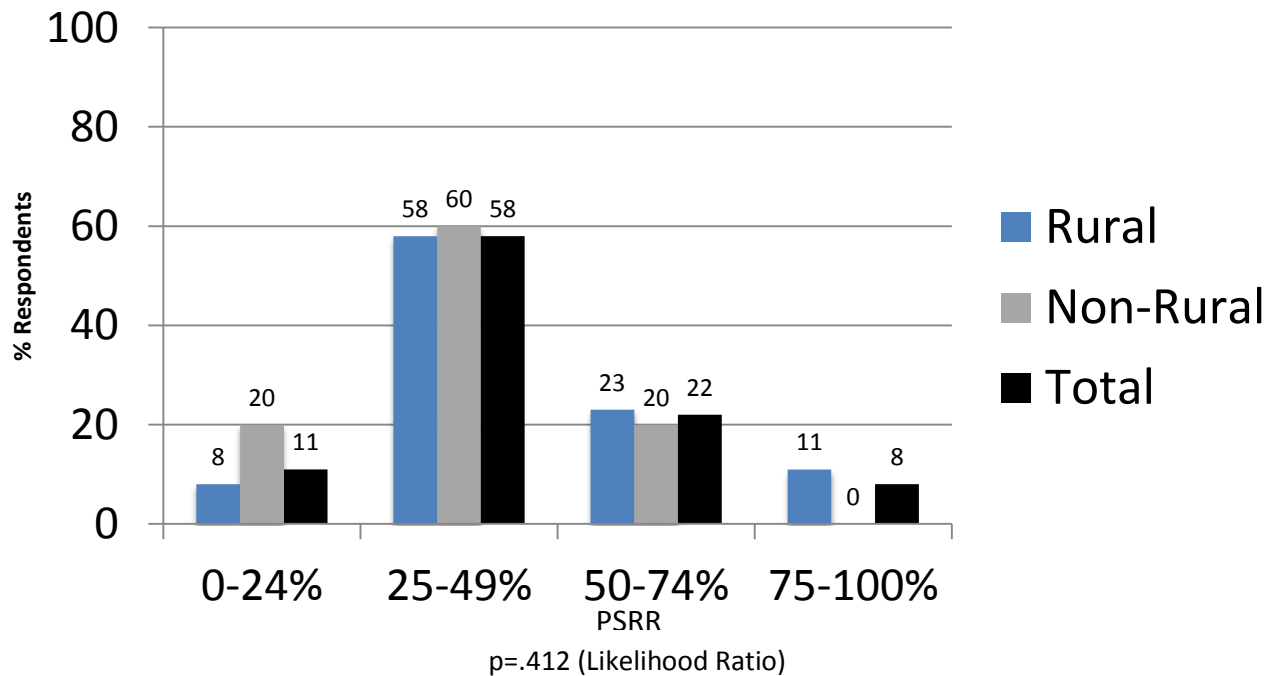


P=.031 (Likelihood Ratio)

	Practicing Pediatric Dentist		Total
	Yes	No	
Low PSRR	13	12	25
High PSRR	2	9	11
Total	15	21	36

Figure 4. PSRR and Presence of Practicing Pediatric Dentist in Program County

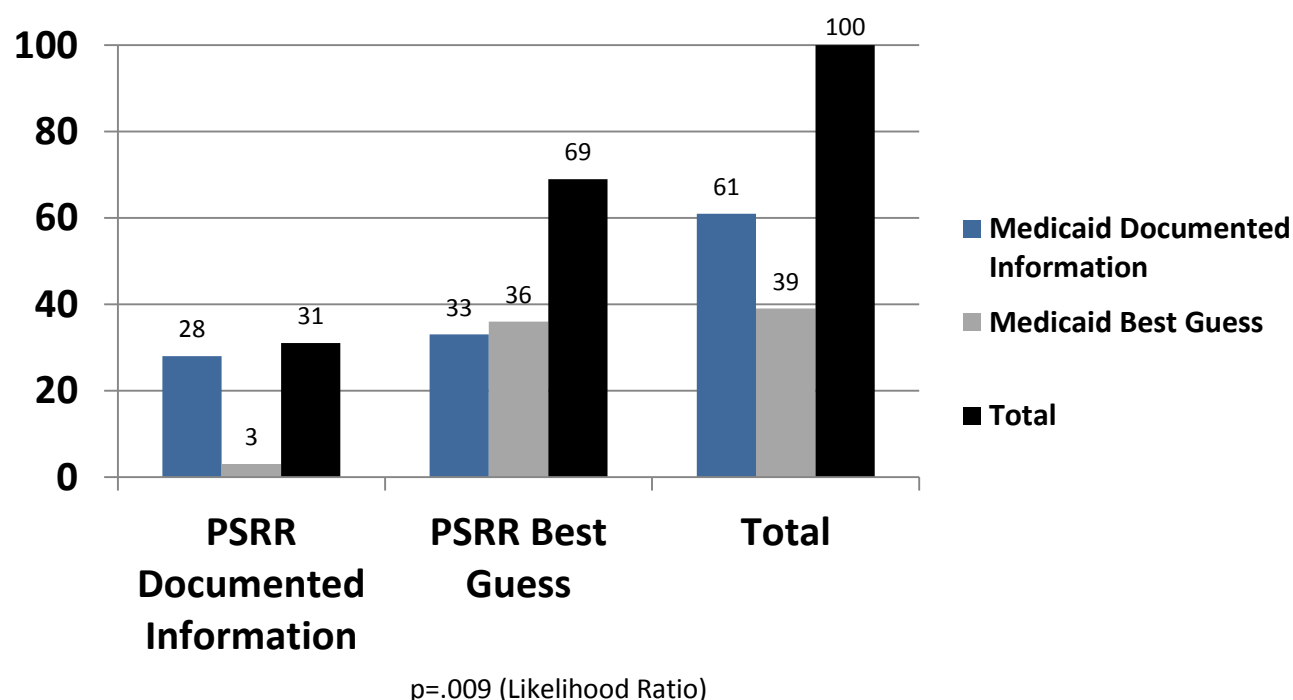
The final proposed hypothesis involved testing whether rural SBSPs experience student participation rates, as reported by the program administrator, lower than for urban programs. Bivariate analysis indicated that no difference exists in PSRR between the two types of demographics, indicated in Figure 5 (Likelihood ratio $p=.412$).



	Rural vs Non-Rural		Total
	Rural	Non-Rural	
0-24%	2	2	4
25-49%	15	6	21
50-74%	5	2	7
75-100%	4	0	4
Total	26	10	36

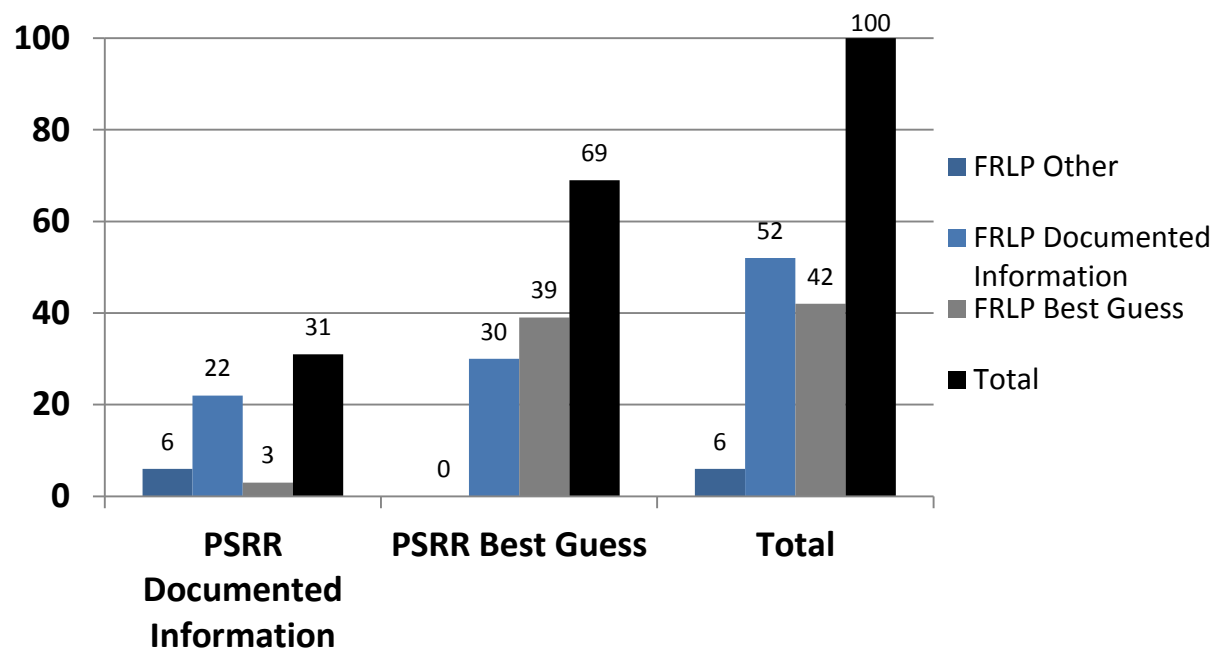
Figure 5. PSRR in Rural and Non-Rural Program Demographics

Several survey questions probed into the data validity of program statistics. Respondents were questioned as to whether self-reported statistics were due to a “Best Guess” or whether they were supported by documented information. Figure 6 indicates that the majority of programs report “Best Guess” for PSRR statistics and “Documented Information” for Medicaid enrollment and FRLP. Bivariate analysis was used to compare the questions for which self-reported data validity was asked. Likelihood ratio analysis indicates that the differences noted between these questions are statistically significant.



	Medicaid Documented Information	Medicaid Best Guess	Total
PSRR Documented Information	10	1	11
PSRR Best Guess	12	13	25
Total	22	14	36

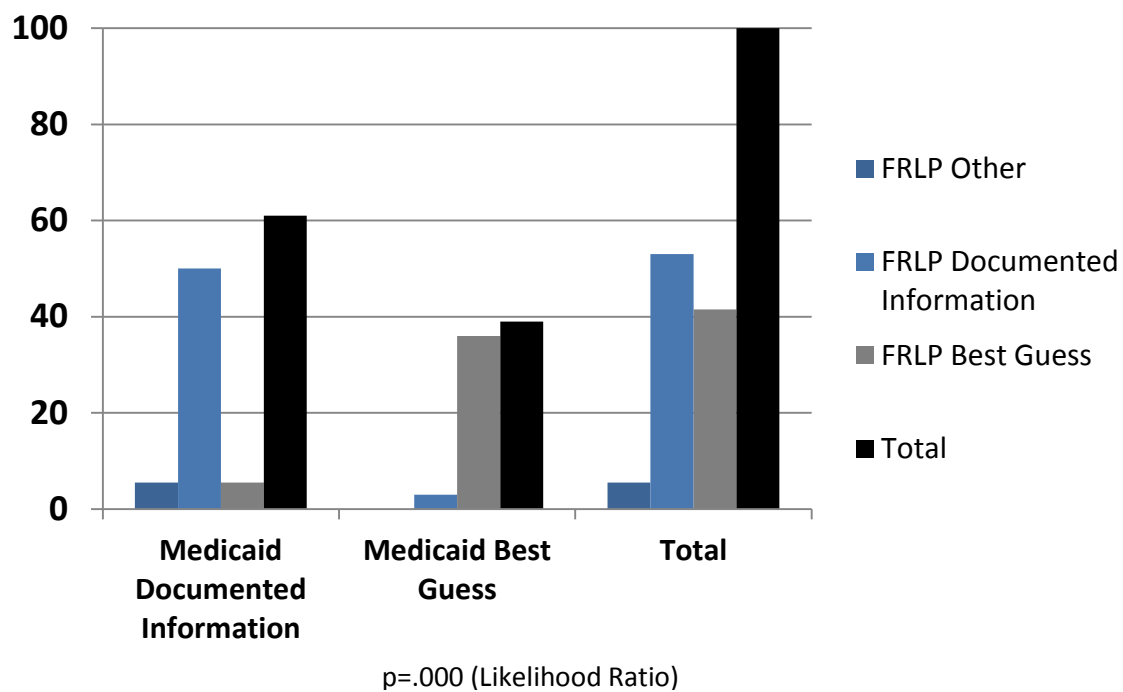
Figure 6. Self-Reported Data Validity



$p=.004$ (Likelihood Ratio)

	FRLP Other	FRLP Documented Information	FRLP Best Guess	Total
PSRR Documented Information	2	8	1	11
PSRR Best Guess	0	11	14	25
Total	2	19	15	36

Figure 6 (CON'T). Self-Reported Data Validity



	FRLP Other	FRLP Documented Information	FRLP Best Guess	Total
Medicaid Documented Information	2	18	2	22
Medicaid Best Guess	0	1	13	14
Total	2	19	15	36

Figure 6 (CON'T). Self-Reported Data Validity

One of the goals of the survey was to determine the perceived successes and barriers affecting program acceptance by patients and parents. Program administrators were questioned as to their particular program's perceived greatest successes and barriers, the results of which are reported in Figures 7 and 8. If a respondent answered more than one answer or detailed their own response not included in the list of possible successes, the question was coded as 'other'. The greatest reported single success was "including information about the program with other paperwork sent home with the child" while the most often reported single barrier to program success was "parental apathy". Over the entirety of the respondents, the mean number of reported successes was 4, with a range of 1 to 10 and a standard deviation of 1.9. On the other hand, the mean number of reported barriers was 3, with a range of 0 to 7 and a standard deviation of 1.6.

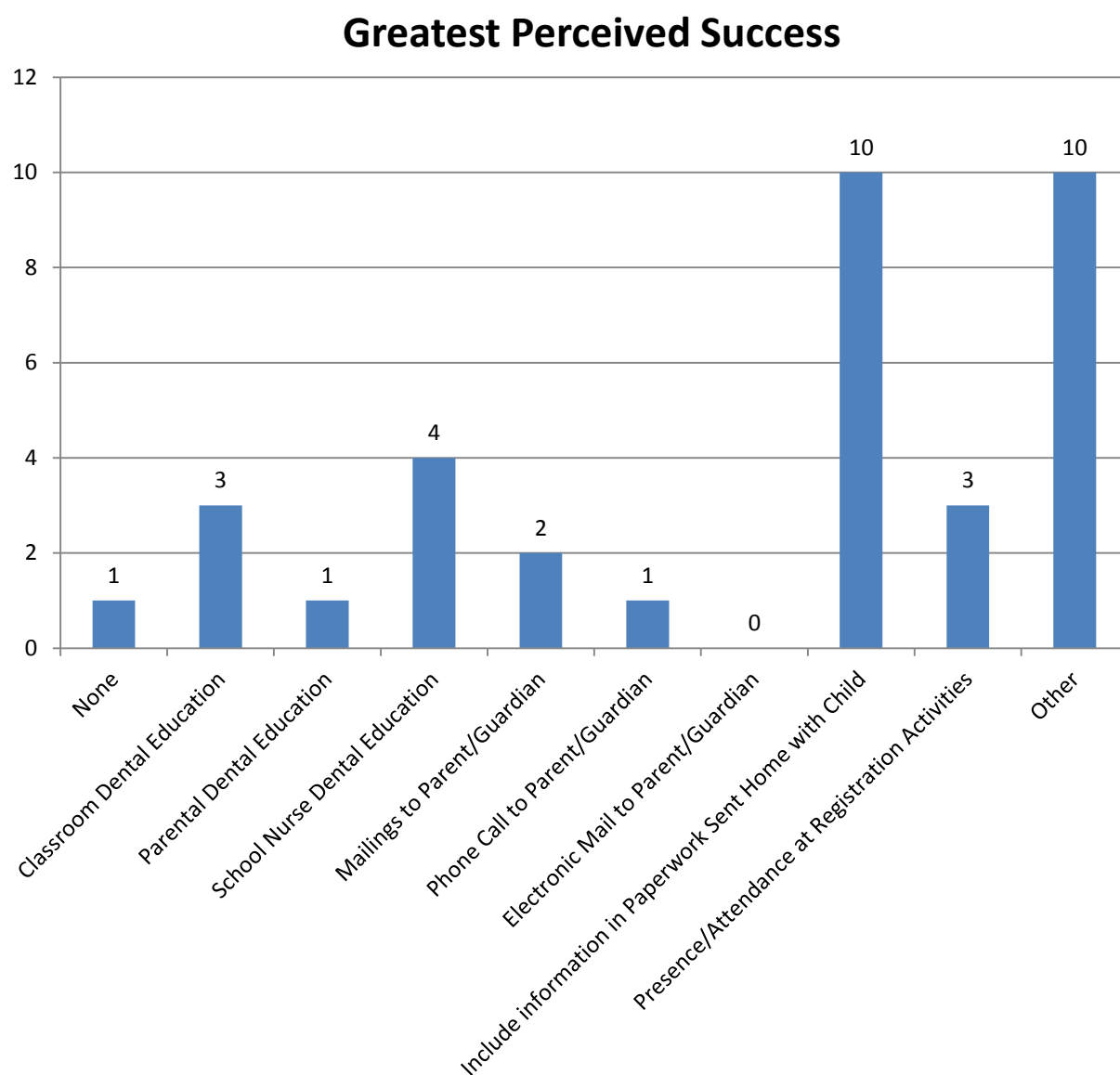


Figure 7. Greatest Perceived Program Success

	N=	%	Rank
None	1	3%	7 (tie)
Classroom Dental Education	3	9%	4 (tie)
Parental Dental Education	1	3%	7 (tie)
School Nurse Dental Education	4	11%	3
Mailings to Parent/Guardian	2	6%	6
Phone Call to Parent/Guardian	1	3%	7 (tie)
Electronic Mail to Parent/Guardian	0	0%	10
Include Information in Paperwork Sent Home with Child	10	28%	1 (tie)
Presence/Attendance at Registration Activities	3	9%	4 (tie)
Other	10	28%	1 (tie)
Total	35	100%	

Figure 7 (CON'T). Greatest Perceived Program Success

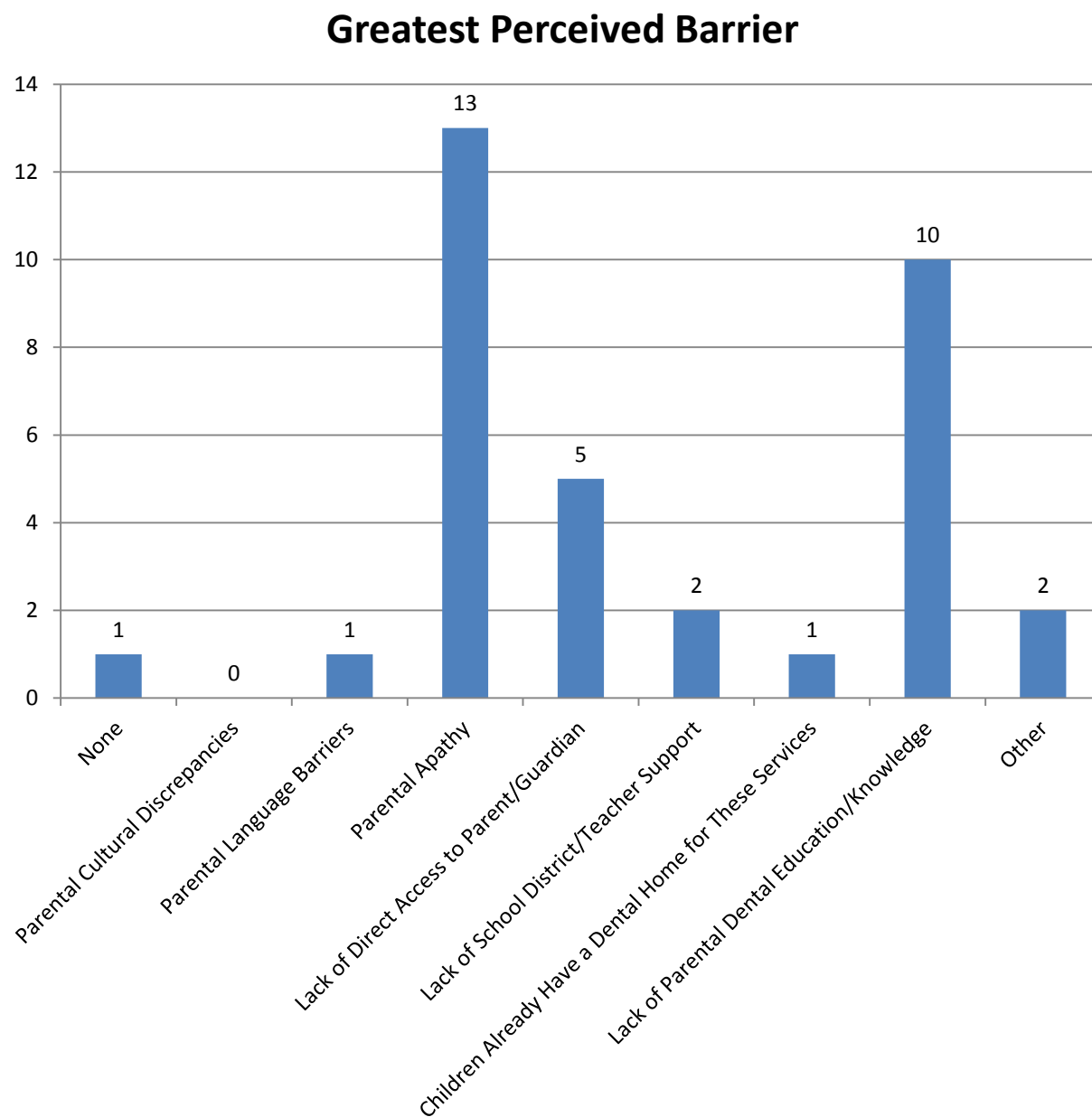


Figure 8. Greatest Perceived Program Barrier

	N=	%	Rank
None	1	3%	6 (tie)
Parental Cultural Discrepancies	0	0%	9
Parental Language Barriers	1	3%	6 (tie)
Parental Apathy	13	37%	1
Lack of Direct Access to Parent/Guardian	5	14%	3
Lack of School District/Teacher Support	2	6%	4 (tie)
Children Already Have a Dental Home for These Services	1	3%	6 (tie)
Lack of Dental Education/Knowledge	10	28%	2
Other	2	6%	4 (tie)
Total	35	100%	

Figure 8 (CON'T). Greatest Perceived Program Barrier

Four of the 36 total respondents indicated their program's PSRR to be 75% or higher. In order to better understand these programs' characteristics which may make them more successful at parental acceptance than other programs, their responses are listed in detail in Table III.

TABLE III.
SURVEY RESPONSES OF THE PROGRAMS WITH HIGH (>75%) PSRR

	1	2	3	4
Descriptor of Geographical Area	Rural	Rural	Rural	Rural
PSRR 2012-2013 School Year	75-100%	75-100%	75-100%	75-100%
Data Validity (PSRR)	Best guess	'Other': Based on daily enrollment	Best guess	Best guess
Medicaid/AllKids Enrollment	50-74%	75-100%	75-100%	75-100%
Data Validity (Medicaid)	Best guess	'Other': Verification of each child with DentaQuest	Documented information	Documented information
FRLP Eligibility	75-100%	---	25-49%	75-100%
Data Validity (FRLP)	Best guess	---	Documented information	Documented information

TABLE III (CON'T).
SURVEY RESPONSES OF THE PROGRAMS WITH HIGH (>75%) PSRR

	1	2	3	4
Response Rate Strategies	*Classroom ed. *School nurse ed. *Mailings to parent *Presence at registration	*Classroom ed. *Parental ed. *Include info with other paperwork sent home *Presence at registration *'Other': Migrant ed. of staff and recruiter	*Classroom ed. *Mailings to parent *Phone call to parent	*Classroom ed. *Parental ed. *Mailings to parent *Phone call to parent *Include info with other paperwork sent home
Greatest Success	School nurse ed.	Migrant ed. of staff and recruiter	Classroom ed.	Phone call to parent
Challenges	*Parental culture *Parental apathy *Children have a dental home	*Lack of parental ed. *Lack of direct access to parent *Children have a dental home	*Lack of parental dental ed.	*Parental apathy *'Other': Sealant program is contracted out
Most Significant Challenge	Parental Apathy	Lack of direct access to parent	Lack of parental dental ed.	Parental apathy
Willing to Share?	Yes	Yes	Yes	No

5. DISCUSSION

This study involved a survey of a census of all SBSP in Illinois funded by the IDPH. However, a small sample size (n=46) meant any lack in response resulted in a relative inability to convey results to a general picture of the state of SBSP in Illinois or the country. Overall, 100% of programs in rural or collar counties at least initiated the survey, and a greater percentage completed the survey than urban or metro counterparts. It is difficult to infer why this may be, although possible reasons may include that more rural programs are less busy or have more staff per student served to take time to answer a survey. Other possibilities include that rural programs are more interested in the improvement or continuance of the funding program.

Another interesting finding was that the majority of respondents chose to complete the paper format of the survey as opposed to the electronic format. More than half (68%) of the total responding programs filled out and returned the paper format after being solicited to complete the electronic version of the survey twice, compared to 12 of the 36 (33%) who responded earlier in the response period via the electronic version. This is consistent with recent research indicating that paper surveys are more likely to be answered in general than online surveys (Funkhouser, 2014). This seems unlikely in an era where electronic communication is seen to be the norm and a measure of convenience for the majority of individuals. In future studies, it may be beneficial to submit paper form surveys to grantees before soliciting electronic responses.

A major component of this study is concluding whether the SBSP in Illinois are successful in reaching high-risk children, especially regarding certain financial

parameters. More than half of the responding programs indicated that over 75% of the children served by their program are enrolled in Medicaid. In addition, a vast majority of programs indicated that more than half of the children served by their program were eligible for FRLP. Encouragingly, a comparable study performed in Ohio found similar results in regards to targeting of high-carries risk children based on financial parameters (Siegal, 2010). As these are the primary indicators for program success in previously performed studies of SBSP in other states, this finding signifies that SBSP in Illinois are correctly and successfully targeting high-risk children via low-income parameters. This is especially important in these types of public health programs due to the fact that high risk children are less likely to have access to care or to providers to place sealants without the presence of SBSP in schools (Task Force on Community Preventive Services, 2002).

Prior to survey distribution, the researchers formulated three key hypotheses in order to determine if certain program characteristics contribute to program success in the form of increased PSRR and therefore parental acceptance of the program. The first hypothesis predicted that PSRR is decreased for programs where Medicaid enrollment is high compared to programs where Medicaid enrollment is lower. Bivariate analysis (crosstabs) indicates that a relationship between PSRR and Medicaid enrollment as reported by the program administrators does not have statistical significance and therefore the null hypothesis was accepted. One possible issue with this finding is that the majority of programs indicated a Medicaid enrollment of greater than 75% of its programs participants, therefore the effect of PSRR on those programs with low Medicaid enrollment is unlikely to be significant in the face of a low sample

size, such as is the case with this study. In the future, a larger regional or national study might assist in comparison of certain program characteristics which were seemingly uniform in this population.

A second hypothesis proposed that PSRR would be higher for programs in counties with no practicing pediatric dentist. Access to care due to a limited number of providers in rural areas or who will provide services to patients covered by Medicaid/AllKids is a significant issue facing a large proportion of the population targeted by SBSP (Task Force for Community Preventive Services, 2002). Because of this, it follows that allowing underserved populations an easier access to care gratis would lead to higher acceptance of the program in question. Program administrators were asked to provide PSRR and program location was cross-referenced with an IDPH-supplied map of counties with and without a practicing pediatric dentist in Illinois (Appendix D). Over half of the 36 responding programs were located in counties without a practicing pediatric dentist ($n=21$), indicating that many of the areas served by SBSP in Illinois have an access to care problem for pediatric dentistry. Bivariate analysis indicates that PSRR differences between programs with and without pediatric dentists in their county approaches significance, especially when the data is collapsed to indicate that “high” PSRR is coded by those programs who report a PSRR of greater than 75% ($p=.031$). However, only four total programs report a “high” PSRR by these standards, therefore again a larger sample size or more uniform distribution of programs with high and low PSRR would have been preferable.

The final proposed hypothesis was that PSRR varied significantly depending on the program's location in a rural or non-rural location. For this question, if programs

were located in urban, metro, or collar areas, they were coded as non-rural. Bivariate analysis of PSRR by way of program location revealed that no significant difference existed between rural and non-rural program location and program acceptance. One reason this could be is that parents may have the same reasons for accepting or not accepting the SBSP goals, regardless of program location. For example, dental education may be low in both rural and non-rural areas leading to a general lack of PSRR. In addition, despite pediatric dentists being concentrated in urban and metro areas, relatively few specialists in Illinois accept Illinois Medicaid and therefore an access to care issue may exist in both demographics, which may result in some parents deciding to accept the program in order to overcome that barrier. A variety of reasons that access to care barriers exist, even in non-rural areas where pediatric dentists are concentrated, may include low Medicaid reimbursement rates, perceived bureaucratic difficulties to overcome by the pediatric dentist to become or maintain the ability to be a Medicaid provider, or misunderstanding and negative overall perception of the behavior of the Medicaid population.

Four of the 36 total responding programs indicated the highest PSRR (>75%), and the programs had several uniform factors. For example, all of these programs were located in rural areas and none of these programs were located in counties with practicing pediatric dentists. In addition, all of the programs reported three or more strategies that were used to improve PSRR and all reported fewer than average barriers to program success. Common to all of these programs were the success strategies of classroom dental education and mailings to parent/guardian, both of which are interventions which may take more effort on behalf of the administration. Organizing

and implementing both education and mailings is a time-consuming process but may be related to the relative program success. Finally, all four of these programs with high PSRR serve populations with high Medicaid enrollment and/or FRLP eligibility. This is at odds with the assumption of some that low-income populations are more likely to have little dental knowledge and not value dental health. Instead, it is possible that in this study, high-risk groups such as low-income individuals tend to be more accepting of public health programs such as SBSP.

One concerning finding was that many of the programs tended to respond with data based on a “best guess” as opposed to “documented information” for program characteristics such as patient Medicaid enrollment or FRLP eligibility as well as PSRR. This is especially true for data concerning PSRR. Documented information certainly would be a more accurate method for assessing program success. In addition, the lack of documented information brings up ethical questions as to whether programs are receiving permission slips for all children who are being treated. Encouraging programs to actively and accurately track this type of information certainly would make studies such as these easier and more accurate, but could also add to the success of the programs themselves. One could postulate that the reason for low reported “documented information” was simply due to the information not being convenient at the time of survey completion. However, by encouraging programs to track all information uniformly, such as through the Sealant Efficiency Assessment for Locals and States (SEALS) software program, this information could be accurately maintained in one convenient database.

Overall PSRR reported by the responding programs was particularly low. The majority of respondents indicated that total response rate was 25-49%. Therefore, while the programs themselves tend to be targeted toward communities where high-risk individuals reside, less than half of those targeted children are actually being served by the program based on responses to this survey. One might think that low reported PSRR may be a survey-wide discrepancy due to many of the respondents solely guessing on PSRR based on the information discussed above. Again, encouraging programs to document this information and maintain it in a convenient manner may result in higher reported PSRR in a future study. In addition, this PSRR is approximately half the PSRR reported in a similar, but interventional study (Bravo, 1997). However, this study did not investigate program characteristics which may have contributed to their high acceptance, and the program was located in Spain where informed consent procedures may be quite different from those required in the United States.

Programs were requested to provide the perceived greatest success and greatest barrier to program implementation. The single highest reported success was “Including information about the program in other paperwork sent home with the child”. In contrast with the successes common to all programs with high PSRR, this intervention is low-cost and highly efficient as it requires little effort on the part of the program administrator. This is supported by similar findings regarding successful interventions in a school-based program to increase influenza vaccination in a high-school population (Gargano, 2011). On the other hand, the greatest reported program barrier was that of “parental apathy”. While the greatest reported success was one

easy to implement, overcoming a barrier involving parental attitudes as opposed to education or language barriers is one that is particularly difficult to manage. While very little can be done to motivate an apathetic parent, one program did propose that one of their success strategies was to provide monetary funds for a classroom party, which may be a motivating factor to urge a child to remind a parent to return a permission slip. Similarly, monetary motivation directly to the parent may contribute greatly PSRR, however, ethical concerns regarding informed consent and monetary gifts may prohibit this type of strategy.

In the future, a larger area or national study investigating these same program characteristics may elucidate more clearly the program characteristics which contribute to program success. In addition, this type of study could evaluate the effectiveness of SBSP on a national level. A notable goal for the IDPH and other state SBSP may be to encourage and successfully regulate the programs' tracking of PSRR, Medicaid/FRLP enrollment and other program characteristics in an accurate, reproducible, and secure manner, such as with the CDC's SEALS software program.

6. CONCLUSIONS

Based on a census survey of the IDPH-funded School-Based Sealant Programs (SBSP) in Illinois, a variety of conclusions can be stated related to the success of the program. Illinois Department of Public Health (IDPH) funded SBSP are targeting at-risk children, by way of personal financial considerations such as Medicaid enrollment and Free and Reduced Lunch Plan eligibility and access-to-care barriers due to a lack of pediatric dentists in rural areas. However, PSRR is statistically unaffected by presence of the program in rural and non-rural areas and program-reported high or low Medicaid enrollment. On the other hand, PSRR and presence of a practicing pediatric dentist in the program's county was significantly related. SBSP in Illinois do not effectively track and maintain records of program characteristics and should be encouraged to do so in order to implement future program policies to improve program implementation. Sending information regarding SBSP goals with other paperwork returned with a student is a relatively low-cost and low-energy intervention perceived to enhance success of a program.

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APPENDIX A

UNIVERSITY OF ILLINOIS
AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612-7227

Exemption Granted

October 17, 2013

Ashley Popejoy, DDS

Pediatric Dentistry

801 S. Paulina Street

M/C 850

Chicago, IL 60612

Phone: (312) 996-5724 / Fax: (312) 413-2610

RE: Research Protocol # 2013-0990
“A Comparison of Rural and Urban School-based Sealant Programs in Illinois”

Sponsors: None

Dear Dr. Popejoy:

Please note that this exemption determination does NOT include approval for Flavia Lamberghini to conduct the research as her Investigator Training period expired on June 1, 2007. Please have Dr. Lamberghini complete Investigator Continuing Education. Once the training has been completed, it will be necessary for you to submit an Amendment adding her as key research personnel for this research study.

Your Claim of Exemption was reviewed on October 17, 2013 and it was determined that your research protocol meets the criteria for exemption as defined in the U. S. Department of Health and Human Services Regulations for the Protection of Human Subjects [(45 CFR 46.101(b))]. You may now begin your research.

<u>Exemption Period:</u>	October 17, 2013 – October 17, 2016
Performance Site:	UIC
Subject Population:	Adult (18+ years) subjects only
Number of Subjects:	50

The specific exemption category under 45 CFR 46.101(b) is:

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

You are reminded that investigators whose research involving human subjects is determined to be exempt from the federal regulations for the protection of human subjects still have responsibilities for the ethical conduct of the research under state law and UIC policy. Please be aware of the following UIC policies and responsibilities for investigators:

1. Amendments You are responsible for reporting any amendments to your research protocol that may affect the determination of the exemption and may result in your research no longer being eligible for the exemption that has been granted.
2. Record Keeping You are responsible for maintaining a copy all research related records in a secure location in the event future verification is necessary, at a minimum these documents include: the research protocol, the claim of exemption application, all questionnaires, survey instruments, interview questions and/or data collection instruments associated with this research protocol, recruiting or advertising materials, any consent forms or information sheets given to subjects, or any other pertinent documents.

3. Final Report When you have completed work on your research protocol, you should submit a final report to the Office for Protection of Research Subjects (OPRS).

4. Information for Human Subjects UIC Policy requires investigators to provide information about the research protocol to subjects and to obtain their permission prior to their participating in the research. The information about the research protocol should be presented to subjects in writing or orally from a written script. When appropriate, the following information must be provided to all research subjects participating in exempt studies:
 - a. The researchers affiliation; UIC, JBVMAC or other institutions,
 - b. The purpose of the research,
 - c. The extent of the subject's involvement and an explanation of the procedures to be followed,
 - d. Whether the information being collected will be used for any purposes other than the proposed research,
 - e. A description of the procedures to protect the privacy of subjects and the confidentiality of the research information and data,
 - f. Description of any reasonable foreseeable risks,

 - g. Description of anticipated benefit,
 - h. A statement that participation is voluntary and subjects can refuse to participate or can stop at any time,
 - i. A statement that the researcher is available to answer any questions that the subject may have and which includes the name and phone number of the investigator(s).
 - j. A statement that the UIC IRB/OPRS or JBVMAC Patient Advocate Office is available if there are questions about subject's rights, which includes the appropriate phone numbers.

Please be sure to:

→ Use your research protocol number (listed above) on any documents or correspondence with the IRB concerning your research protocol.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact me at (312) 355-2908 or the OPRS office at (312) 996-1711. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Charles W. Hoehne
Assistant Director

Office for the Protection of Research Subjects

cc: Marcio Da. Fonseca, Pediatric Dentistry, M/C 850

Linda Marie Kaste, Pediatric Dentistry, M/C 850

APPENDIX B- Questionnaire

Please check one box unless indicated otherwise for the following questionnaire. Please answer to the best of your ability based on the most common circumstances in your program. Thank you for your time!

- 1) Please check the descriptor that most accurately applies to the geographical area in which your school-based sealant program services are performed.

☐ Urban

☐ Metro

☐ Collar (suburban)

☐ Rural

- 2) Which health department is your program associated with? (This information is for internal use only to determine demographics and not to be shared in presentations or publication).
-

- 3) Considering the 2012-2013 school year, what was the approximate permission slip return rate for your program?

☐ 0-24%

☐ 25-49%

☐ 50-74%

☐ 75-100%

4) How was the information from question 3 determined?

- ☐ Documented information
- ☐ Best guess
- ☐ Other (please explain) _____

5) Out of those children with returned permission slips for the 2012-2013 school year, approximately what percentage of children are enrolled in Medicaid/All Kids?

- ☐ 0-24%
- ☐ 25-49%
- ☐ 50-74%
- ☐ 75-100%

6) How was the information from question 5 determined?

- ☐ Documented information
- ☐ Best guess
- ☐ Other (please explain) _____

- 7) Out of those children with returned permission slips for the 2012-2013 school year, approximately what percentage of children are eligible for Free or Reduced Lunch Program?

☐ 0-24%

☐ 25-49%

☐ 50-74%

☐ 75-100%

- 8) How was the information from question 7 determined?

☐ Documented information

☐ Best guess

☐ Other (please explain) _____

9) Which of the following, if any, do you employ in your program? (Please check all that apply):

- ☐ Classroom dental education
- ☐ Parental dental education
- ☐ Phone call to parent
- ☐ Mailings to parent
- ☐ Electronic Response
- ☐ Include permission slip in other paperwork sent home with child
- ☐ Presence/attendance at registration activities
- ☐ School nurse dental education
- ☐ Other (please explain)_____
- ☐ We do not make special efforts concerning parental response rate (skip to question 8)

10) If you employ more than one effort from above, which do you feel has been the greatest success in obtaining parental consent?

- ☐ Classroom dental education
- ☐ Parental dental education
- ☐ Phone call to parent
- ☐ Mailings to parent
- ☐ Electronic response
- ☐ Include permission slip in other paperwork sent home with child
- ☐ Presence/attendance at registration activities
- ☐ School nurse dental education
- ☐ Other (please explain) _____

11) Which one barrier do you feel is the most significant challenge in obtaining parental consent for the area in which your program services are offered?

- ☐ Lack of parental dental education/knowledge
- ☐ Parental cultural discrepancies
- ☐ Parental language barriers
- ☐ Parental apathy
- ☐ Lack of direct access to parent/guardian
- ☐ Lack of school district/teacher support
- ☐ Children already have a dental home to receive these services
- ☐ Other (please explain) _____

12) Which challenges do you feel exist in limiting parental consent for the area in which your program services are offered? (Please check all that apply):

- ☐ Lack of parental dental education/knowledge
- ☐ Parental cultural discrepancies
- ☐ Parental language barriers
- ☐ Parental apathy
- ☐ Lack of direct access to parent/guardian
- ☐ Lack of school district/teacher support
- ☐ Children already have a dental home to receive these services
- ☐ Other (please explain)_____

13) If the opportunity were to become available, would you be inclined to share your experiences in a group setting with other state school-based sealant program administrators?

☐

Yes

☐

No

☐

Other (please explain) _____

APPENDIX C- Cover Letter for Questionnaire

February 18, 2014

Dear Health Department Grantee of the IDPH:

My name is Ashley Popejoy and I am a second year Pediatric Dentistry Resident at the University of Illinois at Chicago. My interests in pediatric dentistry and public health have led me to conduct research on the Illinois state school-based sealant program and the conditions that may make each program independently successful.

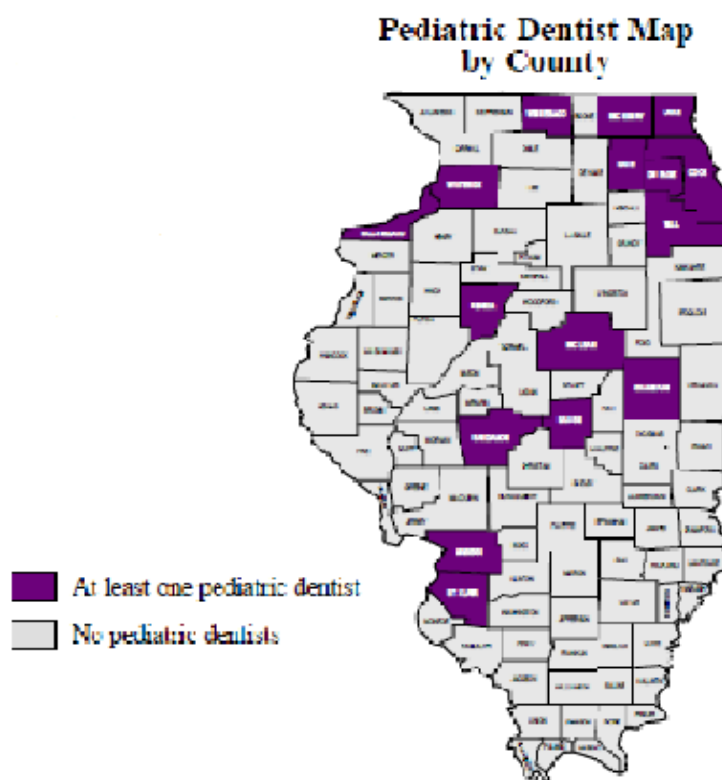
Attached please find a survey of the perceived attitudes, successes, and barriers that have affected your program's school-based sealant activities for the 2012-2013 school year. Please know that your answers will be held in confidence without identification of your health department in public sharing of information gained. Please also know that your participation is voluntary and that there is no compensation for completion of this study. As you are a recipient of the Illinois Department of Public Health sealant program funding, this information will be used to determine if changes should be made to implementation protocol and determine where deficiencies may be present. Your answers are highly valuable and we thank you for the time and effort to making the program successful.

Sincerely,

Ashley Popejoy, DDS

UIC Pediatric Dentistry

Class of 2014

APPENDIX D- Map of Practicing Pediatric Dentists in Illinois

VITA

NAME: Ashley Popejoy

EDUCATION: University of Illinois at Chicago, Chicago, IL
MS Oral Sciences
July 2012 – August 2014

University of Illinois at Chicago, Chicago, IL
Certificate in Pediatric Dentistry
July 2012 – June 2014

University of Missouri- Kansas City, Kansas City, MO
Doctor of Dental Surgery
August 2008 – May 2012

William Jewell College, Liberty, MO
Bachelor of Arts in Molecular Biology
August 2003 – May 2007

EXPERIENCE: Children's Dentistry of Bucktown and Wicker Park
Chicago, IL
May 2013 – June 2014

CERTIFICATION: Basic Life Support
Pediatric Advanced Life Support

PROFESSIONAL MEMBERSHIPS: American Academy of Pediatric Dentistry
American Dental Association
Chicago Dental Society
Illinois Society of Pediatric Dentistry
Illinois State Dental Society