Oral Health Status of Low-Income Children in Pennsylvania: A Rural-Urban Comparison

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EXECUTIVE SUMMARY

This research analyzed the oral health care delivery system for low-income children in Pennsylvania, focusing on the differences between rural and urban areas. The overall goal was to develop recommendations for public policy to improve the oral health status of low-income children residing in rural Pennsylvania.

Specifically, the research, conducted in 2018-2019, analyzed: (1) the oral health component of the Medical Assistance (MA) program for children in Pennsylvania, (2) the Children's Health Insurance Program (CHIP), (3) a variety of additional oral health programs and services, (4) the school oral health program, (5) the supply and geographic distribution of dentists in Pennsylvania, and (6) the overall oral health care delivery system for low-income children in rural Pennsylvania.

The research used data from the U.S. Census Bureau, the Pennsylvania Department of Human Services, the Pennsylvania Department of Health, and the American Dental Association.

Research Results

The Supply and Distribution of Dentists

- The overall supply of dentists in Pennsylvania is sufficient to meet current demand under the assumption of equal access for all residents.
- Geographic access is not equal as urban dentist supply rates are nearly twice that of rural rates. Market mechanisms are likely to maintain this inequality.
- Access inequalities also exist between areas of higher socio-economic status and those of lower socio-economic status.

- Considering these inequalities and the overall dentist supply, an importance public policy issue is the geographic distribution of dentists. The issue of overall supply also should be considered.

The Supply and Distribution of Dentists Participating in the MA Program

- In 2017, there were 2,280 dentists providing service to MA-insured children at 3,441 unique locations. Many providers offered service at multiple locations.
- The number of service delivery sites for MA-insured children increased 21.7 percent between 2014 and 2017. The number of unique dentists serving MA-insured children increased 14.6 percent between 2014 and 2017.
- Fifty percent of dentists contributed less than 7 percent of a full-time equivalency (FTE) to treating MA-insured children. Only a small percentage of dentists predominately served MA-insured children.
- Dental specialists provided MA service in all urban counties but provided service in only about half of rural counties.
- Relatively large contiguous rural areas had no MA dental service in 2017. These occur in the Northern Tier and throughout the rural central region of Pennsylvania.
- In 2017, there was no MA dental service provided in 48 percent of rural school districts, and 24 percent of urban districts.
- Dental service is higher in urban counties, counties with higher median family incomes, and counties with more dentists.

Utilization Patterns Among Medical Assistance Child Enrollees

- The MA program is the largest insurer of children in Pennsylvania. About one in three children and the majority of low-income children are enrolled in the MA program. The MA program has generous dental benefits for children.
- Dental care utilization has been increasing over the past decade for all children.

- Children insured by MA have lower annual use rates than those insured by commercial insurance plans (privately insured), but this difference has been decreasing in recent years.
- In 2017, among the 53.5 percent of enrollees who had a dentist visit, 89 percent had at least one preventive/diagnostic visit.
- Between 2014 and 2017, 68 percent of MA enrollees with a dentist visit visited two or more dentists (many visited several). This pattern is not consistent with the recommendation of establishing a dental home. A dental home is an approach to oral health care that is patient-centered and prevention-focused, rather than one that is disease-centered.
- There are wide variations in the number of visits per enrollee: 15 percent had only one visit, while 12 percent had 10 or more visits.
- In 2017, the ratio of visits to enrolled children in Pennsylvania was 1.10 to 1. This ratio varied considerably by county.
- In 2017, the urban visits-to-enrollee ratio was 35 percent higher than the rural ratio. This difference has been slightly decreasing since 2014.
- Overall, MA-insured children have a yearly dentist visit at rates less than that of their privately insured counterparts. Among those who have a visit, they tend to use preventive services at rates near recommended levels; however, they tend to not establish a dental home.

CHIP and Other Programs in Pennsylvania

- CHIP provides coverage for uninsured children who do not meet the income eligibility requirements of the MA program. CHIP is offered at three levels: free, reduced premium, and full-cost premium.
- About 6 percent of all children age 18 or younger are enrolled in CHIP.

- CHIP is similar to the MA program in several important respects. First, dental coverage is quite comprehensive in both programs. Second, both programs are administered through managed care contracts. Third, both are joint federal-state programs.

- Among other programs for low-income children, the Community Health Center (CHC) program is the most important. CHCs are comprehensive health clinics that receive a federal grant to partially cover costs and receive favorable federal and state reimbursement for the services that they provide. They are designed to serve the Medicaid, low-income, and uninsured populations. There are 264 CHC clinical sites in Pennsylvania; 84 percent of which have on-site dental services and the remainder have a contract with an outside dentist. Thirteen percent of CHC patients were uninsured and 51 percent were insured by MA in 2016.

- While not required to offer oral health services, many Rural Health Clinics (RHCs) have started to integrate oral health and coordinate care for their patients. RHCs were federally authorized in 1977 to address physician shortages for patients with Medicare in rural areas through the use of non-physician providers. RHCs are paid an all-inclusive rate for preventive and primary care services.

- A variety of other programs offer service to the low-income population including Head Start, Sealant Saturday, free clinics, and others.

School Health Program

- The oral health component of the school health program mandates examinations or screenings for children entering school and in Grades 3 and 7. School districts can choose to participate in the Mandated Dental Program (MDP) or the Dental Hygiene Services Program (DHSP). Both programs encourage students to obtain a dental examination from their family dentist and provide an examination or screening in the school for those who do not visit or have a family dentist.

- Most districts have chosen the MDP.

- There is evidence that the vast majority of students in mandated grades are being examined or screened.

- Students in rural districts more frequently receive their dental screening or examination at school.
- Fluoride programs are more frequently offered in rural school districts.
- The school health program is an important gateway to oral health care, as there is no other program that is open to almost all children in Pennsylvania, regardless of socio-economic status, geographic location, or health status.

The Oral Health Care System for Low-Income Children

- When one considers the MA program, CHIP, the school health program, and the other points of entry for low-income children into the oral health system, it is clear that the oral health care system is complex and difficult to navigate. The managed care delivery system of the two major insurers for low-income families, MA and CHIP, adds to the complexity. The beneficial aspect of this system is that care is being offered from many points of entry. The disadvantages are that finding the proper entry point and identifying a sustainable source of care is very complicated.

Policy Considerations

Despite the broad scope of the oral health care delivery system for low-income children, it is complex and difficult to navigate. As a consequence, the researchers suggest that before any new policy is implemented, it should be first determined how it would affect system complexity.

Complexity is important because it makes navigation of the system difficult for the user and can limit sources of care. The researchers suggest that the Pennsylvania Department of Human Services (DHS) and the DHS Office of Medical Assistance Programs (OMAP) consider allowing enrollees to see any dentist participating in the MA program regardless of their and their dentist's Managed Care Organization (MCO) membership. A transfer payment methodology within OMAP can direct reimbursement to the proper destination. The system can be made transparent to enrollees and providers.

The school health program stands alone in its inclusiveness as a contact point between children and the oral health care system. The universal availability of oral health screenings and examinations in the school setting allows for care navigation and is the first step in securing

sustainable care for all students, regardless of socioeconomic status, insurance status, and geographic location. Including preventive oral health services and education in the school setting will facilitate equal opportunity for all children to access routine services. However, the current reimbursement incentives for school-based oral health screenings and examinations are insufficient to encourage full compliance. Consideration should be given to altering the current reimbursement in an effort to encourage more complete compliance. This is especially important in school districts where the population-to-dentist ratio is in low supply. In these districts complete coverage is more important since opportunities for care outside of the school system are more limited.

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GLOSSARY

Acronyms Used in the Report:

ADA	American Dental Association
AUN	Administrative Unit Number (School Code)
CCTC	Comprehensive Career and Technology Center
CHC	Community Health Center
CHIP	Children's Health Insurance Program
CRP	The Center for Rural Pennsylvania
CSDH	Certified School Dental Hygienist
DHS	Pennsylvania Department of Human Services
DHSP	Dental Hygiene Services Program
EPSDT	Early and Periodic Screening, Diagnostic, and Treatment
FIPS	Federal Information Processing Standards
FQHC	Federally Qualified Health Center
FTE	Full-Time Equivalent
GIS	Geographic Information System
HPSA	Health Professional Shortage Area
HRSA	Health Resources and Services Administration
MA	Medical Assistance
MCO	Managed Care Organization
MDP	Mandated Dental Program
MUA	Medically Underserved Area
NCHS	National Center for Health Statistics
OMAP	Office of Medical Assistance Programs
PD	Preventive and/or Diagnostic Dental Visit or Procedure
PDHA	Pennsylvania Dental Hygienists' Association
PA DOH	Pennsylvania Department of Health
PHDHP	Public Health Dental Hygiene Practitioner
PORH	Pennsylvania Office of Rural Health
PRE	Percentage Reduction in Error (measure of association)

RHC	Rural Health Clinic
RT	Restorative and/or Treatment Dental Visit or Procedure
SHARRS	School Health Annual Reimbursement Request System

Definitions of Technical Terms Used in the Report:

Area Health Education Center (AHEC) Program	The purpose of the AHEC Program is to develop and enhance education and training networks within communities, academic institutions, and community-based organizations. These networks support strategic priorities to increase diversity among health professionals, broaden the distribution of the health workforce, enhance health care quality, and improve health care delivery to rural and underserved areas and populations.
Blended School District Method	An alternative to the simple population-to-dentist ratio in which the ratio is calculated for an area larger than the area of interest but considered to be the ratio for the area of interest.
CHIP	Children's Health Insurance Program. The joint federal-state program offering medical insurance to low-income children who do not qualify for Medicaid.
Dental Hygiene Services Program	An alternative to the Mandated Dental Program in which students in mandated grades receive services from a school dental hygienist.
Dentist-to-Population Ratio	A simple ratio using the number of dentists in the area as the numerator and the population in an area in the denominator. Often expressed per 1,000 population. Used as a substitute for the population-to-dentist ratio when there are areas with no dentists.
Early and Periodic Screening, Diagnostic, and Treatment	EPSDT is an MA benefit that provides children enrolled with comprehensive and preventive health care services, including dental and mental health services.
Eta-squared	A measure of association between two variables. The value of eta-squared is equal to the percentage reduction in error gained by knowing the value of the independent variable when compared to only knowing the mean of the dependent variable.
Mandated Dental Program	A program that is part of the school health program which requires that every student entering school and in the third and seventh grade receive a dental examination. Examinations can be performed by the school dentist or a family dentist.
Mean	The common average of an array of numbers.

Measure of Association	A class of statistics whose value indicates the degree of connectedness between two variables. A value of 0 indicates no connectedness or statistical independence. A value of 1.0 or -1.0 indicates perfect connectedness or association. Eta-squared and the Pearson Correlation Coefficient are measures of association.
Median	The value that splits an ordered array of numbers into two equal halves.
Medicaid	The joint federal-state program offering health insurance to the low-income population.
Medical Assistance	The name of the Medicaid program in Pennsylvania.
Mode	The most frequent value in an array of numbers.
Pearson Correlation Coefficient	The most commonly used measure of association used with two variables that have numeric values. A negative value indicates an inverse association and a positive value indicates a direct or positive association.
Percentile	A measure indicating the value below which a given percentage of observations in an ordered array falls. The median is the 50th percentile.
Population-to-Dentist Ratio	A simple ratio using the population in an area in the numerator and the number of dentists in the denominator.
PRE Measure of Association	Percentage reduction in error. A class of association measures for which the numeric value is equal to the percentage reduction in error gained by knowing the value of the independent variable when compared to only knowing the mean of the dependent variable.
School Health Program	A series of medical diagnostic and treatment programs authorized by Pennsylvania statute for children enrolled in school. Dental services are among the services authorized.

CHAPTER 1: INTRODUCTION

The connection between oral health and systemic health is well documented. Dental caries, also known as cavities or decay, continue to be the most common chronic disease in children and adolescents between the ages of 6 and 19, according to the Centers for Disease Control and Prevention (CDC) (2016). CDC data indicate that income level is a significant factor in determining a child's risk for developing dental caries. The lower the household income, the higher the rate of untreated dental caries. Historically, low-income Americans, regardless of age, are more likely than their higher income peers to have dental disease (U.S. Senate Committee on Health, Education, Labor & Pensions, 2012). This disproportionate incidence of disease can be attributed to barriers to care often experienced by low-income individuals, including high costs of care, lack of dental insurance, lack of transportation, and difficulty in arranging child care or time away from work.

When children experience dental caries at a young age, they are at a higher risk for dental caries throughout their lifetime (American Academy of Pediatric Dentistry, 2016). To help prevent dental disease, individuals are encouraged to eat a healthy diet and brush and floss their teeth regularly. In addition to home-based prevention, access to professional preventive services is essential. Recommended preventive services include a dental prophylaxis (cleaning) to remove hard debris (tartar) and soft debris (biofilm/plaque) at least once a year. Removal of such debris decreases the amount of bacteria present in the oral cavity, thereby reducing the risk of dental caries and periodontal (gum) disease. Unlike other components of physical health, which can typically be prevented through diet and exercise, oral health requires regular access to a dental provider.

Dentists tend to be most concentrated in suburban areas whereas significant patient need exists in inner cities and rural locations (U.S. Senate Committee on Health, Education, Labor & Pensions, 2012). Patterns in Pennsylvania are similar to these nationwide patterns. According to the Pennsylvania Department of Health's (DOH) publication *2015 Pulse of Pennsylvania's Dentist and Dental Hygienist Workforce* report (Pennsylvania Department of Health, 2018), which presents the results of the 2015 dentist and dental hygienist licensure renewal surveys, 19 percent of dentists licensed in the Commonwealth practiced in rural Pennsylvania. Forty-eight of Pennsylvania's 67 counties are defined as "rural" by the Center for Rural Pennsylvania. The report indicated that in 2015, the rate of dentists providing direct patient care per 100,000 residents was 33.6 in Pennsylvania's rural counties as compared to 52.1 in Pennsylvania's urban counties. These patterns inform the primary questions addressed in this research: What is the role of public policy in addressing oral health disparities among low-income children residing in rural Pennsylvania and how can public health be served by policy?

Medicaid is a health care program that assists low-income families with the costs associated with medical care. Medicaid is a jointly funded federal-state program administered at the state level. The federal government establishes program requirements, but states may choose the populations that are covered, the services covered, and the method of administration within the federal guidelines. In Pennsylvania, the Medicaid program is administered through the Pennsylvania Department of Human Services' (DHS) Office of Medical Assistance Programs (OMAP) and is known as Medical Assistance or MA. The state's MA program uses a managed care delivery system known as HealthChoices.

The Children's Health Insurance Program (CHIP) is a medical coverage source for individuals under age 19 whose parents earn too much income to qualify for Medicaid but are uninsured. The program is funded jointly by states and the federal government and in Pennsylvania, is administered by DHS.

Schools in Pennsylvania are required to certify or arrange for a dental exam for students upon entry into school (Kindergarten or Grade 1) as well as in Grade 3 and Grade 7, in accordance with 28 PA Code (regulations) 23.3(a) (Pennsylvania Department of Health, 2017). This mandate is fulfilled through the more inclusive school health program. If a child is able to receive an examination from a family dentist, then the mandate is fulfilled in that manner. For children unable to access a family dentist, schools are required to provide dental examinations free of charge upon entry to school and in the mandated grades. The school health program and the two public insurance programs, MA and CHIP, serve as the financial foundation for the oral health care delivery system for low-income children.

In 2017, Pennsylvania released its first oral health plan since 2009. With input from the Pennsylvania Coalition for Oral Health and its stakeholders, the Oral Health Program Administrator at the Pennsylvania Department of Health created a state oral health plan for 2017-2020. The priorities of the new plan include improving access to oral health care and prevention, oral health workforce development, and the development of oral health infrastructure, including the identification and establishment of oral health leadership that includes a state dental director.

There are many components that constitute the oral health care delivery system for low-income children. The ideal delivery system would include equal access for all children regardless of income or residence. It is clear that disparities still exist, particularly for Pennsylvania's low-income children. Research conducted by the Pew Center on the States in 2011 found that only 44 percent of children enrolled in Medicaid receive dental services and that access to dental care is a serious problem nationwide, particularly for low-income households. The report estimated that 16.5 million children go without basic dental care each year. The Pew Center scored each state in the nation based on eight benchmarks in 2010, and again in 2011. Pennsylvania scored an "F" in 2010, and a "D" in 2011. No further reports or grades have been released since 2011.

In 2003, the Pennsylvania Office of Rural Health conducted an assessment for the Center for Rural Pennsylvania to evaluate the status of oral health in Pennsylvania. The research found that a low supply of dentists and an uneven distribution of dental providers contributed to a lack of access to dental care.

The distribution of health and educational resources in rural areas has long presented a different set of challenges than that found in urban areas. These challenges include the distribution of providers, resources within the MA program, the distribution of federally-funded primary care clinics, and the economies of scale that characterize rural areas. Lower population density in rural areas and the absence of public transportation result in travel challenges when compared to urban areas.

This research explored and analyzed the oral health care delivery system for low-income children in Pennsylvania and focused on differences in this delivery system between rural and urban areas. The overall goal was to develop recommendations for public policy to improve the oral health status of low-income children in rural Pennsylvania. The research analyzed the following: (1) the oral health component of the MA program for children in Pennsylvania, (2) the Children's Health Insurance Program (CHIP), (3) a variety of additional oral health programs and services, (4) the school oral health program, (5) the supply and geographic distribution of dentists in Pennsylvania, and (6) the overall mosaic that constitutes the oral health care delivery system for low-income children in rural Pennsylvania.

CHAPTER 2: GOALS AND OBJECTIVES

The goals and objectives of the research are outlined below.

GOAL 1: Document the scope of the school dental screening programs during the 2015-2016 school year.

***Objective 1.1*:** Calculate the percentage of children in grades K/1, 3, and 7 who had dental examinations during the 2015-2016 school year by urban/rural status.

***Objective 1.2*:** Calculate the number of school districts that have Mandated Dental Programs and the number that have Dental Hygiene Services Programs. Determine which program is more prevalent in both urban and rural areas.

Objective 1.3: Compare the level of completeness of exams between Mandated Dental Programs and Dental Hygiene Services Programs.

Objective 1.4: Report the manner in which school districts are providing dental examinations to students who do not have an exam completed by a family dentist, and, in turn, need the exam completed in school (mobile dental van, contracted dentist with mobile equipment in-school, contracted dentist seeing patients in office, etc.).

GOAL 2: Determine how many children were referred for follow-up dental care/treatment based on the school screening.

Objective 2.1: Calculate the percentage of these children with documentation of a completed referral within the same school year.

GOAL 3: Determine what systems, if any, are in place to track the completion of recommended referrals/follow-up treatment.

GOAL 4: Identify the number of school districts that have school-based dental sealant programs.

Objective 4.1: Determine if schools with school-based preventive dental services, including school-based dental sealant programs, have lower rates of dental referrals as compared to schools with examination/screening services only.

Objective 4.2: Identify what challenges, if any, exist in school-based dental sealant programs.

Objective 4.3: Determine what infrastructure might be necessary to incorporate additional school-based dental sealant programs in rural and urban areas.

Objective 4.4: Calculate the number of children the Sealant Saturday programs served from 2008-2013.

GOAL 5: Describe the dentist workforce in Pennsylvania, with an emphasis on those who provide services to MA recipients, CHIP recipients, and children.

Objective 5.1: Report the number of dentists who treat MA and CHIP patients (based on the availability of the data) as of 2015. Report the number of dentists accepting new patients.

Objective 5.2: Calculate the supply and geographic distribution of dentists in the Commonwealth by urban/rural status. Present the results in tables and maps.

Objective 5.3: Calculate the supply and geographic distribution of *pediatric* dentists in the Commonwealth by urban/rural status. Present the results in tables and maps.

GOAL 6: Analyze MA dental claims submitted for children ages zero to 12 years old to determine the extent and nature of dental services provided for this population.

Objective 6.1: Calculate the percentage of the eligible/enrolled population accessing oral health services.

Objective 6.2: Develop a typology of dental histories that includes the presence or absence of preventive visits and the number of visits per year.

GOAL 7: Develop policy recommendations for the Pennsylvania General Assembly that focus on legislative and policy initiatives that can be undertaken at the state level to support access to high quality oral health services in rural areas in the state and increase the oral health status of residents of the Commonwealth.

CHAPTER 3: METHODOLOGY

The research is based on three sources of data: (1) Pennsylvania Office of Medical Assistance Programs data, (2) data describing Pennsylvania's school health dental program, and (3) American Dental Association data.

Office of Medical Assistance Programs (OMAP) Data

The most significant insurer of dental care for low-income children in Pennsylvania is the Medical Assistance (MA) program, the state's Medicaid program. The program is administered by the Office of Medical Assistance Programs (OMAP) in the Pennsylvania Department of Human Services (DHS). To aid in the administration of the program, OMAP maintains data on program services and participating providers. To contribute to the project's analysis of the MA program, the project team requested archival dental service data from OMAP. The range of data available to the project was limited by the data that OMAP maintains and by the need to protect confidentiality of the beneficiary.

The research team obtained two types of data files: (1) a claims file and (2) a provider file. The claims file included one record for each claim for reimbursement made by a dental provider through a managed care organization (MCO) to OMAP.[1] MCOs are designed to manage health care costs, utilization, and quality. They receive a per-member, per-month payment from OMAP and are charged with keeping their members healthy while managing the associated costs (Centers for Medicare and Medicaid Services, undated). The claims file describes all dental

[1] Nearly all enrollees receive Medical Assistance (MA) through membership in a Pennsylvania Department of Human Services (DHS) contracted Managed Care Organization (MCO). There are some transitional enrollees who receive services via a traditional fee-for-service model. In those cases, the claims were made to DHS (OMAP) directly by the provider.

services received by program enrollees. Four claims files were obtained, one file for all claims received in each of the calendar years 2014 through 2017. The provider (participating dentists) file included one record for each MA participating provider. Those data included selected characteristics for each participating provider.

The OMAP data, although simple in structure, required a significant amount of restructuring to fulfill the analytical goals of this research. As a consequence, the discussion of the methods related to these data is quite technical. In this chapter, only a brief summary of those methods is presented. A more complete discussion of the methods is included in Appendix 1.

The four claims files included 16,980,320 claim records. Each claim record included the procedure for which reimbursement was being sought, an ID number for the provider, an ID number for the enrollee, the date of service, and the age of the enrollee. No location data were included in the records. Location was determined by matching the claims record with a record for the provider from the provider file. Consequently, locations represent the site of service and not the address of the enrollee.

Individual claims are submitted for very specific procedures and by themselves do not describe the nature of a patient visit. On average, 3.3 claims were submitted per visit. All claim records submitted on the same day by the same provider for the same enrollee were treated as claims from the same visit. The claims representing a visit were combined into a new record and a new file, the visit file. Records on the visit file included the procedures performed (up to 10

procedures), the provider's location, a unique ID for the enrollee, and the enrollee's age at the time of service.

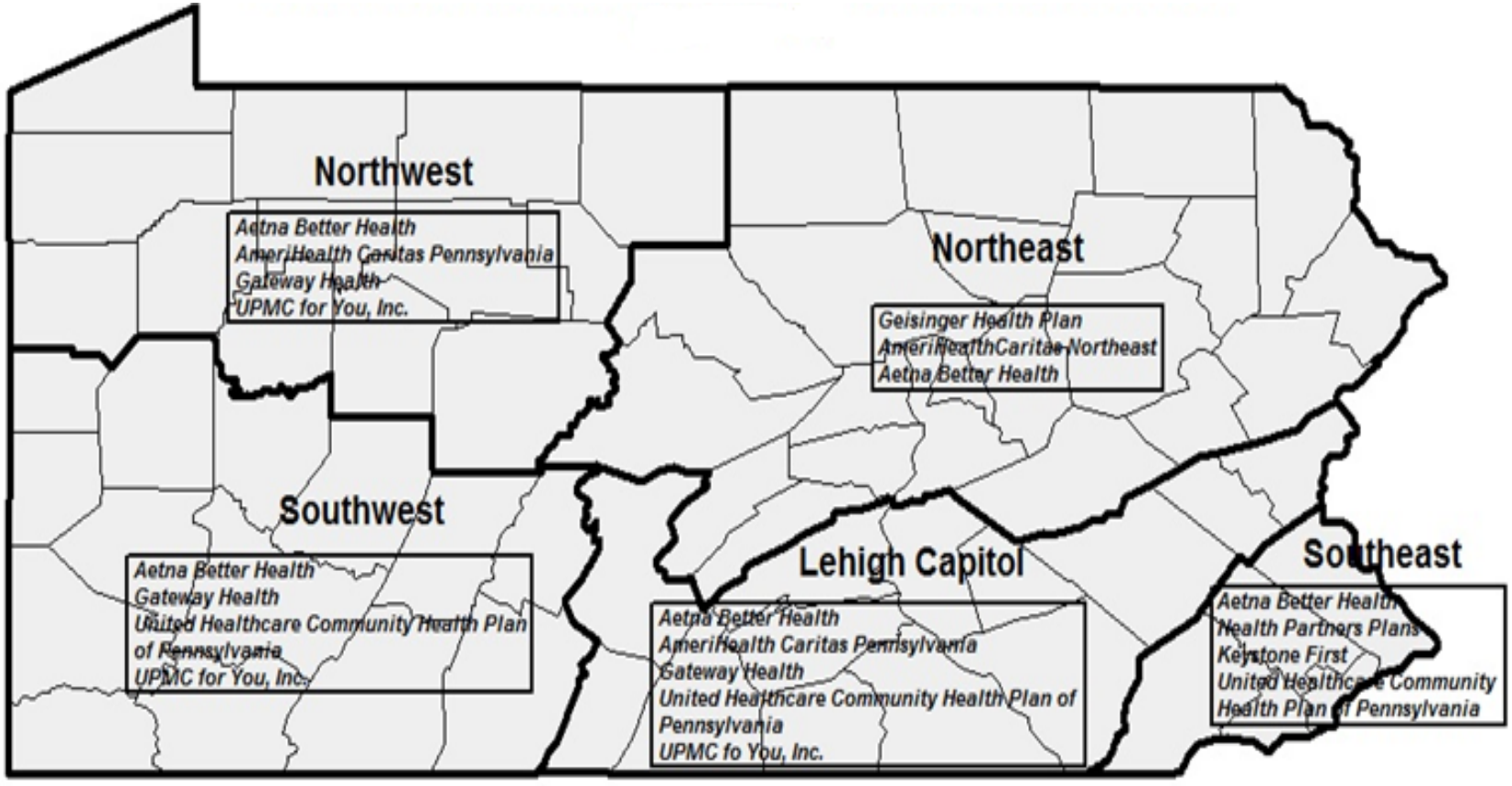
The procedures performed during a visit were used to define the type of visit. Three types of visits were defined: (1) preventive/diagnostic, (2) restorative/treatment, and (3) a combination of the two. Federally Qualified Health Centers (FQHC) and Rural Health Clinics (RHC) are reimbursed differently from other dental offices. They receive one all-inclusive payment for a visit regardless of the procedure(s) performed. In some analyses, FQHC and RHC visits constituted a fourth category.

In addition to describing enrollee visits, a substantive interest of the research was to describe an enrollee's history of visits, i.e., their utilization pattern over time. To accomplish this, all visits for a specific enrollee were combined, based on the enrollee's ID, into a new record, an enrollee service history record. All enrollee service history records were collected into a new file, the enrollee service history fil*e*. Each enrollee service history record included the visit type, the provider and location, and the date for all visits that the enrollee had. A record in this file constituted the visit history for an individual enrollee. From these data, several characteristics of an enrollee's utilization pattern were assigned including (1) a single visit user vs. a multiple visit user, (2) a single provider user vs. a multiple provider user, (3) a preventive/diagnostic user only, a restorative/treatment user only, or a mixed user.

These three files, (1) the visits file, (2) the enrollee service history file, and (3) the provider file, formed the basis for most of the MA program analyses.

Geographic analyses, especially rural-urban comparisons, constitute a major focus of this research. The provider's address was the only geographic information included in the three files. Originally included only in the provider file, file merging procedures allowed this address to appear in all three files. For analysis, the urban-rural status, the county, the OMAP region, and the school district location of the address were required to be assigned. This was accomplished through a process known as geocoding, a procedure in which an address is compared to a master list of all addresses. The master list included the geographic coordinates of all known addresses. The comparison allowed geographic coordinates to be assigned to addresses in the project's three files. That was the first step in the geocoding process. The second step in the process was to identify the political and administrative units in which the addresses were located. After geographic coordinates were assigned to addresses, the points representing the addresses were compared to outline maps of Pennsylvania school districts, Pennsylvania counties, and OMAP regions (Figure 1). Using Geographic Information System (GIS) programming methodology, a municipality, school district, county, and the OMAP region of the address were assigned to each record in the three files. After merging these data with U.S. Census Bureau (Census) and Center for Rural Pennsylvania data, the rural-urban status of the address also was assigned. The Census merging also associated any related socio-economic attributes with the address.

Figure 1: OMAP (HealthChoices) Regions and Managed Care Organizations in Each Region



A more detailed discussion of the OMAP data methodology is presented in Appendix 1, which includes the data cleaning procedures performed, a description of anomalies that appeared in the data, and more details on the construction and merging of data files.

School Health Archival Data

Two specific programs within the larger school health program were analyzed for this research: the Mandated Dental Program (MDP) and the Dental Hygiene Services Program (DHSP). These programs are the means by which oral health services are delivered within the school system. Each school district, private school, charter school, or comprehensive career and technology center (CCTC) administers one of the two programs. The Pennsylvania Department of Health (PA DOH) reimburses school districts for services provided in the program, primarily based on the percentage of student enrollment receiving a screening or examination. It is important to note that the reimbursement school districts receive is far less than the usual and customary charges in a dental office. PA DOH requires school entities to report program activities using the School Health Annual Reimbursement Request System (SHARRS) and uses information from that system for calculating reimbursement to the school entities. School entities report detailed program activities using electronic SHARRS forms and PA DOH aggregates these individual forms to both the school district and county levels.

The analyses presented here are based on the aggregated data calculated and supplied by PA DOH. The researchers used data for the academic years 2013-2014 through 2015-2016.

Some data anomalies were discovered during the data analysis. The researchers reported these to PA DOH. It was determined that a large percentage of the data were double-counted, resulting in incorrect numbers in most of the aggregated data. This problem characterized all reporting years dating back to the initial data release over a decade ago. PA DOH corrected the data errors and re-released the data, which was then analyzed by the research team. As a consequence, the researchers made the decision to report only the data from the most recent school year reported, 2015-2016.[2]

Some of the detail included on the individual forms was not retained in the aggregated counts. The detail exists only on in-office worksheets and individual forms. This resulted in some uncertainty in the meaning of some of the aggregated counts produced by PA DOH. This is elaborated in more detail in the results section.

For two specific reasons, the data used in the project focused on data for public school districts only. This decision was based on the absence of a defined geographical basis for many charter schools and the duplication of geographies for private schools, and on the marginal role that full-time CCTC students have in the aggregations.

Data are presented in this report for both school districts and for school district data aggregated to the county level. The former is the unit at which these programs operated and the analyses at this level were undertaken to describe the nature and patterns in the program. The latter was

[2] All years were analyzed but there were no notable differences by year to report.

included to aid in policy and administrative activities that may be based on this research and executed at the county level.

School district SHARRS data were assigned key identification codes to match them to socio-economic data for the district (obtained from the Center for Rural Pennsylvania) and enrollment data (obtained from the Pennsylvania Department of Education). Pennsylvania school identification code (AUN) and Federal Information Processing System (FIPS) codes were the identifiers used. The SHARRS data were merged with socio-economic data to assist in the discovery of patterns in program activities by school district social and economic attributes. The SHARRS data were merged with enrollment data to norm the raw SHARRS counts to the size of the school district. Statistical measures reported included means (averages), difference of means, and measures of association (correlation coefficients and eta-squared). Descriptions of the interpretation of these statistics are included in the results section.

School Health Survey

The intent of the school survey was to add context to the quantitative school oral health program data received from PA DOH. The survey was designed as a semi-structured survey. The primary goal of the survey was to gain insight about school oral health programs from those who work within the programs on a day-to-day basis. Specific areas of interest were as follows:

- How the existing oral health program was selected;
- The perceived benefits and challenges of the program;
- Perceptions of opportunities and challenges within the program;
- Program staffing; and
- Follow-up and referral activities.

The researchers understood that school nurses and school dental hygienists were not likely to be involved in program staffing and administrative decisions. As the survey was being developed, it became evident that several of the survey questions would be best answered by a school district administrator (principal, superintendent, or school board member). Several questions designed for district administrators were added to the survey as well as a question for the school nurse/dental hygienist to provide contact information for the person within the district responsible for administrative decisions regarding school health. As surveys were administered to school nurses and dental hygienists, participants were asked to identify administrators who could provide additional insight into the program from an administrative perspective. Attempts to obtain contact information for school administrators were repeatedly unsuccessful. School nurses and school dental hygienists participating in the survey often stated that the district

administrators were either too busy or would be unable to provide additional details about the program.

The sample was designed to include school districts from both urban and rural areas and school districts using MDPs and DHSPs. In April 2018, the Pennsylvania Office of Rural Health (PORH) participated in the 2018 Pennsylvania Association of School Nurses and Practitioners (PASNAP) Conference as an exhibitor. More than 100 school nurses from across Pennsylvania were present. As nurses visited PORH's exhibit, the project and survey were explained and nurses were asked to provide their contact information if they were interested in participating in the survey.

To include school districts using a DHSPs in the sample, the researchers located contact information for dental hygienists employed by districts listed as having a DHSP by PA DOH on school district websites. In September 2018, school nurses who provided their contact information at the PASNAP conference and school dental hygienists identified by the research team were contacted via e-mail regarding the survey. In total, 68 individuals were contacted via e-mail to solicit participation. The e-mail provided a brief overview of the project and the survey. The implied consent form (Appendix 3) that was approved by the Institutional Review Board at the Pennsylvania State University was attached to the e-mail. Those interested in participating were instructed to reply to the e-mail to schedule a date and time to participate in the survey. The sample was not a probability sample but relied on willing participants.

In total, 27 surveys (Appendix 4) were conducted, representing 24 school districts and one Intermediate Unit (IU). All but one respondent was either a school nurse or a school dental hygienist. The respondent who was neither a school nurse nor a school dental hygienist was a district health services coordinator. In two instances, two school dental hygienists or a school nurse and school dental hygienist from the same school district were surveyed. One respondent represented two school districts, working as a part-time school certified dental hygienist in each district, and therefore, completed one survey for each district. Of the districts and the IU surveyed, 11 had Mandated Dental Programs and 14 had Dental Hygiene Services Programs. Nine of the districts with MDPs were considered to be urban, while two were considered to be rural. Eleven (11) of the DHSPs were considered to be urban districts and three were considered to be rural.

Some of the questions were multiple choice while others were open-ended. Inter-rater reliability of the content analysis was accomplished by having two research team members independently code the open-ended questions and then jointly resolve any differences in judgement. The content analyzed and coded open-ended questions and the pre-coded, multiple choice questions were entered into a dataset. Data were then analyzed using SPSS software, generating frequencies for the total sample and frequencies by the location of the school district (urban/rural) and type of oral health program (DHSP/MDP).

The Supply and Distribution of Dentists: American Dental Association (ADA) Data

The American Dental Association's (ADA) Masterfile served as the primary data source for the analysis of the supply and distribution of dentists. These data were merged with Census data and with American Community Survey (U.S. Census Bureau) data. Additional dentist characteristics were obtained from the report, *2015 Pulse of Pennsylvania's Dentist and Dental Hygienist Workforce*, published by PA DOH. Additional data elements were extracted from on-line datasets supplied by the Health Policy Institute of the ADA.

The ADA Masterfile is a regularly updated registry of dentists in the United States. It is constructed from a variety of sources and is the ADA's most complete collection of data on dentists. For this research, an extract from the Masterfile was acquired from an ADA data vendor. The extract included all dentists listed as having a Pennsylvania address or who graduated from a Pennsylvania dental school. The extract included the following data items: name, address, address type, dental school, graduation year, specialty, and current practice type.

Most analyses were performed on a subset of dentists in the extract file, which consisted of dentists providing direct patient care (active clinical dentists) with a Pennsylvania address. The subset was defined as all dentists with a Pennsylvania address who listed their current practice type as either full-time practice, part-time practice, government other than military, hospital staff, or part-time faculty/part-time practice. Using these criteria, 6,741 dentists were classified as active clinical dentists in Pennsylvania. Ninety-six (96) percent of these active clinical dentists listed their occupation as full- or part-time practice. This number can be compared to an estimate derived from the *2015 Pulse of Pennsylvania's Dentist and Dental Hygienist Workforce* report.

Numbers reported in that publication are counts of completed surveys attached to the dentist license renewal form. The count of clinical dentists from completed surveys was 5,975. Since not all dentists completed the survey, that number was adjusted for the overall rate of non-response. The adjusted estimate is 7,469. The most accurate estimate is likely to be between those two numbers because the non-response rate of active clinical dentists in Pennsylvania is likely to be significantly less than the overall non-response rate, a group which includes non-Pennsylvania and inactive dentists. Consequently, the ADA estimate used in this report and the estimate derived from the survey used in the workforce report are quite similar.

The most significant source of potential error in the ADA data is a misidentification of clinical sites represented by the addresses reported in the data file. The ADA reports a single address for each dentist. This address may be of several types. The frequency of address types for active clinical Pennsylvania dentists is presented in Table 1.

Table 1: Address Type of Active Clinical Pennsylvania Dentists in the ADA Masterfile

Address Type	Number	Percent
Alternate	28	0.4
Billing	1	0.0
Business	3,992	59.2
Home	2,443	36.2
Home/Office	8	0.1
Home2	17	0.3
Mailing	6	0.1
Office2	62	0.9
Office3	2	0.0
Other	18	0.3
P.O. Box	160	2.4
Shipping	4	0.1
Total	6,741	100.0

Approximately 60 percent of addresses are unequivocally the dentist's primary clinical address; the majority of the remainder are home addresses. Other addresses are classified as clinical/business sites with less specificity about the location of the address. The assumption is that home addresses will be geographically close to practice sites. For some, this may not be true and error will be introduced into geographic analyses. Since most of the analyses will be presented at the county level, this type of error is most significant when the home address is in a different county than the clinical address.

For most analyses, this type of error has little effect. The exception is when the geographic aggregations are for small areas or when the counts of dentists are small. In those cases, a geographic misclassification can be quite significant. As a consequence, dentist counts that are small in number or counts for small geographic areas should be considered as an estimate that

has a margin of error. It is best to consider patterns in the data rather than focusing on a single data item or area when this type of error is most likely.

All dentist addresses were geocoded. Geocoding is a Geographic Information System (GIS) procedure in which an address is matched to a master list of all addresses supplied by the Census. The master list includes an exact latitude and longitude (coordinates) for each address. Matching a dentist's address with the master list associates a set of coordinates with each dentist's address. Using the GIS program Atlas GIS, the coordinates were overlaid with outline maps of counties and school districts. This allowed an assignment of a school district and county to each dentist's location. This, in turn, allowed aggregating dentist counts for each county and school district. These aggregated counts were the basis for the calculation of dentist supply rates for geographic areas.

Not all addresses found an exact match with the master address file. In those cases, the coordinates of the block on which the address was located or the centroid of the address' ZIP Code was assigned. Eighty-three percent of addresses were exactly matched or matched to the block. The remainder were ZIP Code matches.

Incorporating GIS analyses in the research had important advantages beyond the calculation of geographic rates and the display of thematic maps. The procedures produced geographic codes that could be matched with geographic codes from other datasets, thus permitting merging datasets from different sources and different units of analysis. Consequently, the research was

able to analyze dentist supply (ADA) data simultaneously with school health program data, Census, and other socio-economic data, as well as, MA program data.

Techniques

In addition to the GIS and the data manipulation techniques discussed above, the research included several basic statistical measures. These included univariate statistics such as means, modes, and percentiles. The mean is the common average. The mode is the most frequent value of an array of numbers. A percentile is a measure indicating the value below which a given percentage of observations in a group of observations fall. Multivariate statistical techniques were not used in this research, but several bivariate measures of association were. A measure of association is a statistic that measures the relationship between two variables. The greater the value of a measure association, the more "connected" the two variables are. A value greater than 0 (a positive value) indicates that as the value of one variable increases, the value of the second variable also increases. The former is called a negative association, the latter a positive association.

CHAPTER 4: RESULTS

The research results presented in this chapter are organized by the three major data sources analyzed in this research: OMAP data, data describing Pennsylvania's school health dental program, and ADA data.

The presentation in this chapter begins with the results of analyses of the OMAP data. This subsection of the results is further partitioned into two sections: dentists participating in MA programs and visit histories of those enrolled in MA programs. The OMAP results are followed by a brief discussion of other programs and efforts to deliver dental care to rural and low-income children.

The next section presents results from the analysis of the school health dental program. This sub-section is also divided into two parts: results from the archival data maintained by PA DOH and results from the analysis of survey data of school district personnel serving in the program.

The third section presents results from analyses of ADA data. It includes a description of the supply and distribution of Commonwealth dentists and puts it in historical context. The chapter concludes with an integrative summary.

Dentists Participating in the Medical Assistance Program

MA oral health services are, in large part, dependent on the maintenance of an active and geographically dispersed panel of dentist providers. The maintenance of such a panel has historically been a challenge. Reimbursement for services within the MA program are considerably lower than that which dentists typically receive in a patient-pay transaction and from private insurance. This, and the existence of a view among many dentists that patients enrolled in Medicaid are less compliant (Logan, et al., 2014), has resulted in low participation rates. The importance of an adequate panel of dentists participating with MA has become even more relevant in recent years. The expansion of Medicaid eligibility authorized under the 2010 Patient Protection and Affordable Care Act (ACA) resulted in a 28 percent increase in total enrollment in Pennsylvania's MA program between 2014 and 2017 (Pennsylvania Department of Human Services, 2017). By 2017, 22 percent of all Pennsylvanians were enrolled in the MA program. As a consequence of reforms instituted prior to the introduction of the ACA, the number of children enrolled had previously increased. From 2014 to 2017, child (0-20 years old) enrollment increased by only 10 percent.

Assessing the size and distribution of the panel of dentists in Pennsylvania participating in MA programs is complex. Some dentists in the panel treat many patients enrolled in MA, while others participate at marginal levels, and some see only one or just a few patients enrolled in MA during the course of a year. With respect to the marginal participants, their participation in the program offers a point of service for enrollees but they may only treat the occasional patient who presents with an emergency and may be unwilling to add them to their patient panel, or they may be unwilling to accept any new patients with MA insurance.

The complexity associated with service levels is accompanied by a complexity of service location. Many dentists treat patients at more than one location, sometimes in many locations. It would underestimate the geographic range of the dentist panel if they were counted only at their primary location and it would overestimate the size of the panel if they were counted at all of their service locations.

A third complexity also exists and is associated with the limitations of the provider data OMAP is able to provide. The OMAP data include multiple data entries for individual providers at the same location, included for reimbursement purposes. At the same time, providers billing from multiple locations are included separately for each billing site. They can be linked only by their name, the spelling of which can vary from site-to-site. Moreover, some of the multiple locations are proximate to one another, separated by a few blocks or less and, in a practical sense, do not constitute separate sites. These exigencies required the researchers to develop an algorithm to analyze the data, which maximized the answer to the question, “How many and where?” The resulting research methodology for estimating the size of the panel of dentists accepting MA and distribution of these dentists is more fully described in Appendix 1.

The research team employed two “active” provider definitions in the research. One measures the points-of-service available to enrollees; the other reflects the number of unique individuals providing service. Providers participating in MA are considered to be “active” in a given year if they provided one service to at least one patient aged 0 to 20 years old enrolled in MA in that year. The point-of-service indicator is defined as a unique provider providing service within a

ZIP Code (see Table 2).[3] In that indicator, a provider is counted only once in a specific ZIP Code, even if they provided service at multiple locations within the ZIP Code. They can be counted multiple times if they provided service in different ZIP Codes. The count of unique providers indicator was defined as a unique name in the data set of providers (see Table 2). Each provider was assigned to the location from which he/she performed the most service. Each provider was counted only once.[4]

Tables 2 and 3 present counts of dentists participating in MA using the two indicators described above. Table 2 displays points-of-service. There has been a significant increase in the number of points-of-service between 2014 and 2017. The number of points increased from 2,827 in 2014 to 3,441 in 2017, an increase of 21.7 percent. This is proportional to the increase in total MA enrollment during the time period (22 percent) but exceeds the increase in child enrollment (10 percent). In 2017, 702 (20 percent) of the points-of-service were points at which fewer than 10 visits were performed. Some of these can be considered to be marginal points, that is, just serendipitous service, while others may be fulfilling a need in a sparsely populated area. Table 3 indicates a similar increase with respect to unique providers. The number of unique providers increased by 14.6 percent between 2014 and 2017. This is slightly less than the 20 percent

[3] Some ZIP Codes are geographically quite large, especially in rural areas. In those cases, it is quite possible for a provider to offer services in two locations separated by a significant distance and be counted as only one point-of-service. Smaller geographic partitions would eliminate this problem but was not a feasible approach considering the accuracy of the geocoding and the development of decision rules concerning how far apart two locations should be to be considered as different.

[4] The data on which this report are based are maintained by OMAP to aid in the administration of reimbursement to providers. As such, anomalies will emerge when the data are being used to estimate the size and scope of the dentist panel and the quantity of service provided. In some cases, a small minority of dentists will be credited with more service than they clinically provide. This can arise since non-dentist providers may perform services that are billed through their supervising dentist and because of other complexities in the administration of the program. Although few, these anomalies may produce outliers that skew the data distribution. Because of this, the data presented here should be considered to be estimates.

increase in points-of-service. About 15 percent of these unique providers offered services at a marginal level (fewer than 10 visits). This is less than the equivalent percentage for points-of-service (20 percent) and is mathematically constrained to be so. In the points-of-service percent, a single provider can be split between two or more points, while in the unique provider percent, a provider can be counted only once.

Table 2: Number of Unique Provider Name and ZIP Code Combinations for Pennsylvania MA Providers by Activity Level by Year[5]

Activity Level	Year			
	2014	2015	2016	2017
10 or fewer MA visits by provider in ZIP Code	567	596	710	702
More than 10 MA visits by provider in ZIP Code	2,260	2,373	2,569	2,739
Total	2,827	2,969	3,279	3,441

(Source: Medical Assistance claims and provider files)

Table 3: Number of Unique Provider Names for Pennsylvania MA Providers by Activity Level by Year[6]

Activity Level	Year			
	2014	2015	2016	2017
10 or fewer MA visits by provider name	279	286	322	336
More than 10 MA visits by provider name	1,710	1,755	1,859	1,944
Total	1,989	2,041	2,181	2,280

(Source: Medical Assistance claims and provider files)

An alternative way of assessing the size of the MA provider panel is presented in Table 4. In this table, enrollee visit counts have been converted to (FTE) dentists. The number of patient visits a

[5] Includes only providers who can be identified and for which a Pennsylvania location can be assigned.
[6] Includes only providers who can be identified and for which a Pennsylvania location can be assigned.

dentist typically performs in a year varies by practice characteristics and by the number and type of other providers present (dental assistants and dental hygienists).

Similar to Tables 2 and 3, Table 4 indicates that there was an increase in the supply of dentists from 2014 to 2017. The FTE supply increased 15.7 percent, somewhat more than the increase in child enrollment (10 percent) over the same period. This difference indicates a modest increase in the quantity of service per enrollee over the time period.

The conversion of patient visits to FTE dentists can be used to describe another feature of the panel of dentists participating in MA. This is presented in the bottom portion of Table 4. The last row in the table represents the proportion of an FTE that participating dentists offered in service to the program. Twenty-five (25) percent of the participating dentists contributed one percent (0.0132) of an FTE or less, 50 percent of dentists contributed 7 percent of an FTE or less, and three-quarters of the dentists contributed 23 percent of an FTE or less. The average was 23 percent.

Table 4: FTE Equivalents of Provider Service to Child MA Enrollees
for all MA Providers by Year*

	Year			
	2014	2015	2016	2017
Service by identified providers in geocoded Pennsylvania counties	452.06	484.14	510.32	533.02
Service in which a provider could not be identified or out of state address	20.38	24.68	14.67	14.09
Total	472.44	508.82	524.99	547.11
Percentiles/Mean FTE per Provider	25th	Median	75th	Mean
	0.0132	0.0734	0.2316	0.2338

(Source: Medical Assistance claims and provider files)
* The numbers presented in this table represent service to children (0-20 years old) enrolled in the MA program. Dentist's service to all ages will be greater.

Tables 5 and 6 summarize the specialty of the active dentists participating in the MA program. There was a greater percentage of specialists in the MA panel than in the Commonwealth as a whole; 18 percent of the MA panel and 10 percent in the Commonwealth as a whole (Pennsylvania Department of Health, 2018). This might be expected given the age of the enrollee population. Pediatric dentists primarily treat children and orthodontists disproportionately do so. On average in the MA panel, the typical specialist conducted more visits annually than did general dentists. The mean number of child MA enrollee visits for specialists was 1,009 and the median was 331. The mean number of child MA enrollee visits for general dentists was 331 and the median was 179. Nationally for all patients, specialists conduct more visits than general dentists. Table 6 displays the number of specialists by the county of their primary practice site. There were no specialists offering services to children enrolled in MA in 23 of Pennsylvania's 67 counties. All of these 23 counties are rural. These findings are consistent with the finding that Medicaid enrollees have difficulty finding a Medicaid specialist dentist (Logan et al., 2015).

These data suggested that specialists participating in MA were available in more urban areas while unavailable in more rural areas.

Table 5: Medical Assistance Active Provider Specialty, 2017

Specialty	Frequency	Percent
Endodontist	21	0.9
General Dentistry	1,868	81.9
Oral/Maxillofacial Surgeon	111	4.9
Orthodontist/Dentofacial Orthopedist	120	5.3
Pediatric Dentist	153	6.7
Periodontist	4	0.2
Prosthodontist	3	0.1
Total	2,280	100.0

Source: Medical Assistance Provider File

Table 6: Number of Specialist and General Dentists Who Are Active MA Providers by County (county of primary practice site) and County Rural Status, 2017

County	General Dentist or Specialist		Total	Rural Status
	General Dentist	Specialist		
Adams	2	2	4	Rural
Allegheny	205	49	254	Urban
Armstrong	10	0	10	Rural
Beaver	11	4	15	Urban
Bedford	10	1	11	Rural
Berks	39	7	46	Urban
Blair	17	3	20	Rural
Bradford	10	1	11	Rural
Bucks	62	13	75	Urban
Butler	40	12	52	Rural
Cambria	33	2	35	Rural
Carbon	2	1	3	Rural
Centre	11	10	21	Rural
Chester	38	29	67	Urban
Clarion	1	0	1	Rural
Clearfield	14	1	15	Rural
Clinton	8	0	8	Rural
Columbia	9	0	9	Rural
Crawford	18	1	19	Rural
Cumberland	15	6	21	Urban
Dauphin	40	1	41	Urban
Delaware	61	15	76	Urban
Elk	4	0	4	Rural
Erie	39	5	44	Urban
Fayette	28	0	28	Rural
Franklin	16	2	18	Rural
Fulton	10	0	10	Rural
Greene	11	1	12	Rural
Huntingdon	4	1	5	Rural
Indiana	7	1	8	Rural
Jefferson	11	0	11	Rural
Juniata	1	0	1	Rural
Lackawanna	45	6	51	Urban
Lancaster	49	23	72	Urban
Lawrence	17	4	21	Rural
Lebanon	10	2	12	Urban
Lehigh	49	14	63	Urban

County	General Dentist or Specialist		Total	Rural Status
	General Dentist	Specialist		
Luzerne	59	7	66	Urban
Lycoming	6	0	6	Rural
McKean	6	0	6	Rural
Mercer	22	3	25	Rural
Mifflin	3	0	3	Rural
Monroe	9	2	11	Rural
Montgomery	136	36	172	Urban
Montour	11	10	21	Rural
Northampton	16	27	43	Urban
Northumberland	13	0	13	Rural
Philadelphia	436	82	518	Urban
Pike	2	0	2	Rural
Potter	4	0	4	Rural
Schuylkill	7	1	8	Rural
Snyder	2	0	2	Rural
Somerset	20	0	20	Rural
Sullivan	4	0	4	Rural
Susquehanna	3	0	3	Rural
Tioga	6	0	6	Rural
Union	3	0	3	Rural
Venango	4	1	5	Rural
Warren	5	0	5	Rural
Washington	32	4	36	Rural
Wayne	9	2	11	Rural
Westmoreland	46	11	57	Urban
Wyoming	3	0	3	Rural
York	44	9	53	Urban
Total by Type	1,868	412	2,280	

In Table 7, three measures of provider supply, the number of child enrollee visits, child enrollment in the MA program, and the ratio of child visits to child enrollment are presented for counties for 2017. As previously explained, FTE counts are a linear function of visits (visits/2,500). Visits and FTE counts are those which occurred within the county. The patients

treated in these visits are not always county residents. The counts and ratios are not based on county residents-enrollees, but on enrollees treated in the county.[7]

There are some counties with very high visit-to-enrollment ratios. Of note are Montour (6.17), Union (5.28), Chester (3.02), Centre (2.72), Butler (2.54), and Wayne (2.51) counties. The high ratios are most likely a consequence of non-county enrollees commuting to the county for service. In 2017, the Geisinger Dental Clinic in Danville, Montour County, served enrollees from across a 22 county region. Centre County is a central place in a rural region and that is the likely basis for its high ratio. Wayne Memorial Hospital operates Community Health Center dental clinics in Honesdale, Wayne County and in Lords Valley, Pike County. The three dentists in Pike County are billing through a Honesdale address. In addition, they operate a mobile dental clinic staffed by a Public Health Dental Hygiene Practitioner (PHDHP). Counties with low ratios like Snyder, Clarion, and Cameron are likely sending enrollees to nearby counties.[8]

Also noteworthy in Table 7 are counties in which the count of unique providers is considerably less than the count of points-of-service. Most notably among these is Westmoreland County where many dentists offer services in the county at multiple locations and some have their primary service site in another county.

[7] This will only be the same as the counts and ratios for county resident-enrollees if the net migration to receive service sums to zero.

[8] The data also revealed a few dentists who were billing for oral health education. The number of claims for these services far exceeds the number of clinical visits the dentist could accommodate. This was the case for Union County.

A benchmark for minimal service in a population may aid in evaluating a measured level of service. One might consider the recommended level of utilization by oral health advocates. Of all the possible benchmarks, the number “one” is most appealing, since it has a clear meaning as a baseline comparison. One represents an average of one visit per enrollee per year. This is expressed as a visit-to-enrollment ratio of 1.0.

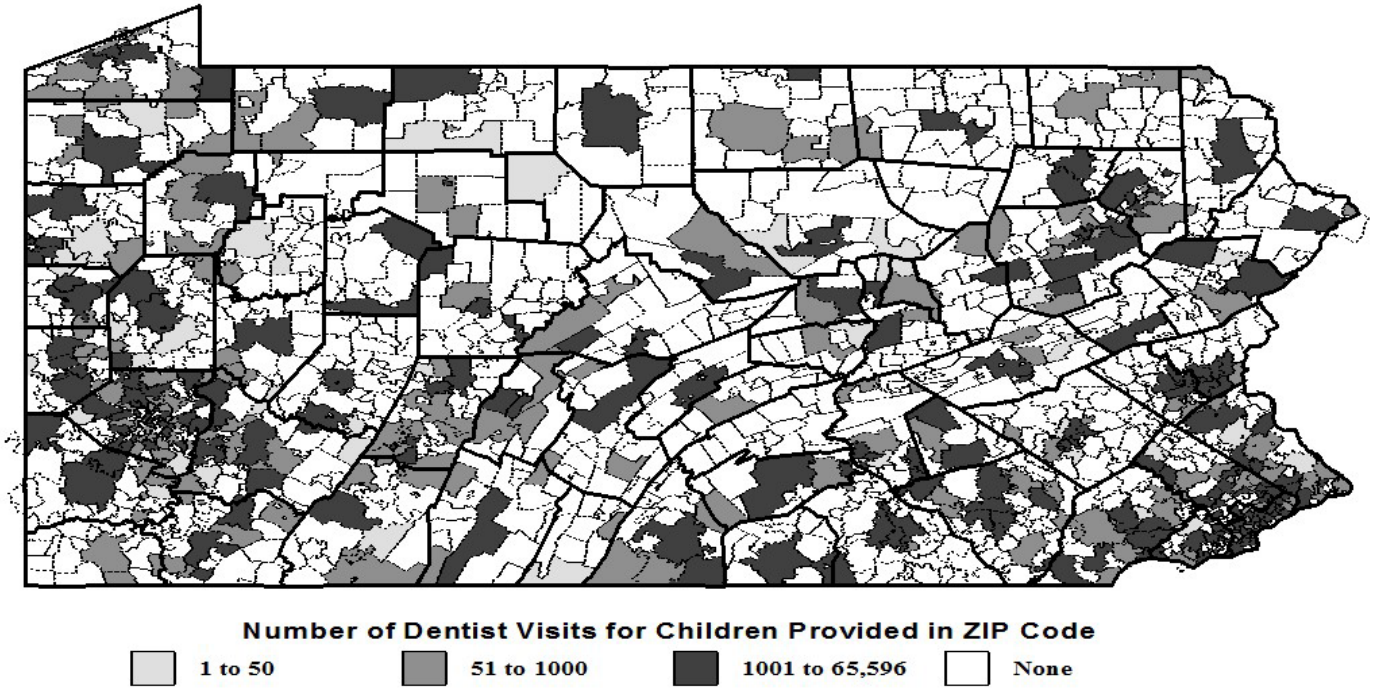
It also is important to identify large geographic areas in which no MA dental services are provided. Figures 2 and 3 display these areas. Figure 2 includes the quantity of service in the ZIP Code. Figure 3 depicts Points-of-Service for dental care in 2017. Although service is being provided in some of the most rural areas of the Commonwealth, based on ZIP Codes, the largest contiguous areas of no service are in rural Pennsylvania. Figure 4 illustrates the same pattern when a school district geography is used.

Table 7: Summary of MA Active Provider Supply, Program Enrollment, and Program Service by County, 2017

County	Unique Provider Name and ZIP Code Count	Unduplicated Count of Providers (primary site in county)	FTE Providers	Visits	Visits to Child Enrollment Ratio 2017	Child Enrollment 2017
No Match/Out of State	NA	NA	14.10	35,246	NA	NA
Adams	4	4	1.36	3,401	0.44	7,654
Allegheny	416	305	37.71	94,283	0.98	96,198
Armstrong	15	9	0.95	2,376	0.39	6,113
Beaver	43	17	4.51	11,271	0.77	14,696
Bedford	14	13	1.93	4,829	1.10	4,384
Berks	67	67	13.39	33,483	0.75	44,539
Blair	30	22	5.46	13,648	1.03	13,200
Bradford	13	11	0.94	2,351	0.39	5,955
Bucks	152	124	18.94	47,350	1.34	35,288
Butler	76	51	11.73	29,331	2.54	11,565
Cambria	37	36	4.33	10,836	0.81	13,354
Cameron	3	2	0.01	35	0.06	553
Carbon	5	5	0.60	1,501	0.26	5,840
Centre	22	22	6.29	15,727	2.72	5,781
Chester	95	81	32.40	80,993	3.02	26,795
Clarion	1	1	0.00	9	0.00	3,189
Clearfield	15	15	2.89	7,232	0.93	7,777
Clinton	8	8	1.07	2,666	0.76	3,485
Columbia	10	10	1.33	3,320	0.66	5,011
Crawford	25	22	3.39	8,472	1.03	8,228
Cumberland	28	24	7.09	17,730	1.17	15,142
Dauphin	55	42	10.98	27,454	0.89	30,755
Delaware	154	108	17.07	42,687	0.81	52,757
Elk	6	3	0.68	1,705	0.67	2,543
Erie	68	42	11.18	27,939	0.81	34,498
Fayette	39	28	4.55	11,383	0.72	15,837
Forest	0	0	0	0	0.00	324
Franklin	27	21	5.27	13,178	0.99	13,295
Fulton	14	8	0.26	648	0.47	1,378
Greene	25	14	0.79	1,987	0.52	3,851
Huntingdon	6	5	0.64	1,608	0.40	4,064
Indiana	8	5	1.43	3,578	0.52	6,843
Jefferson	14	14	2.07	5,181	1.14	4,530
Juniata	1	1	0.17	418	0.24	1,748
Lackawanna	51	51	13.66	34,148	1.51	22,583

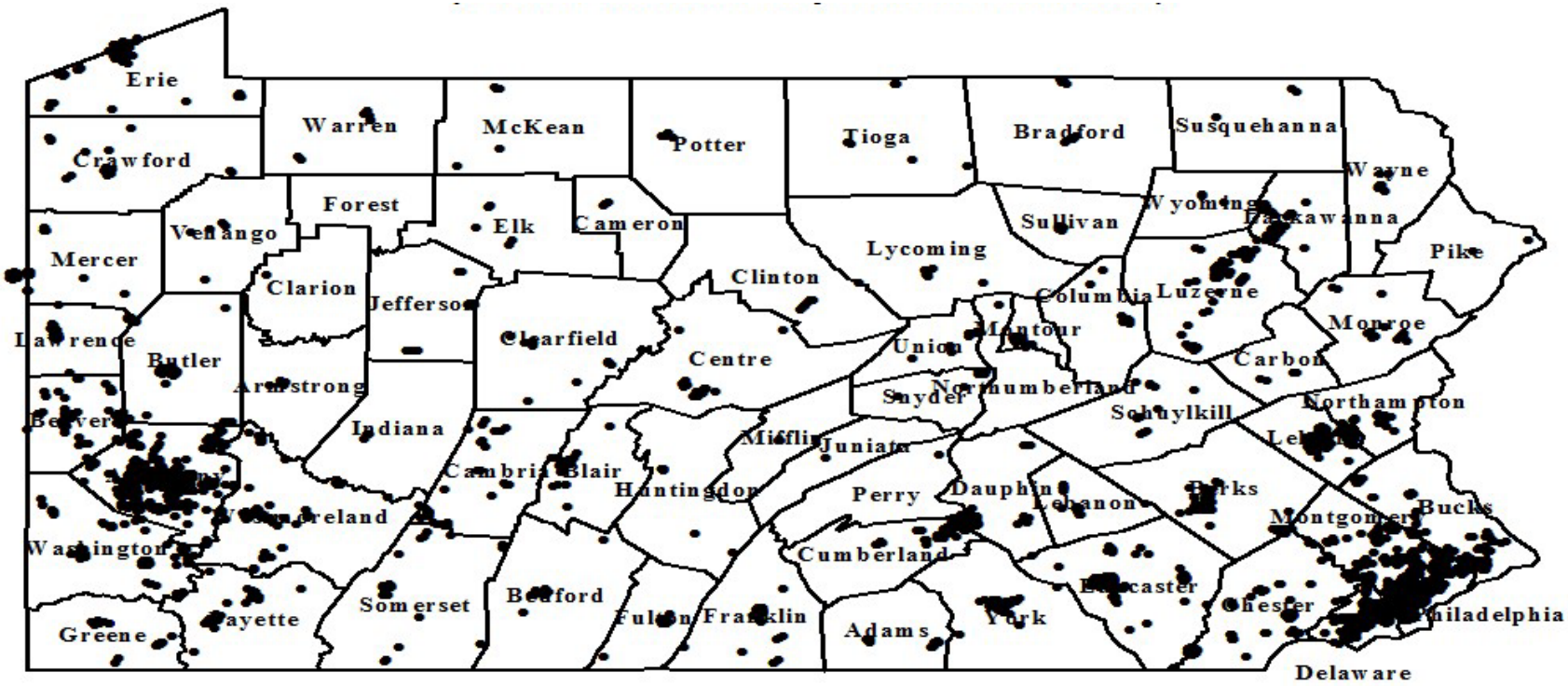
County	Unique Provider Name and ZIP Code Count	Unduplicated Count of Providers (primary site in county)	FTE Providers	Visits	Visits to Child Enrollment Ratio 2017	Child Enrollment 2017
Lancaster	126	78	18.02	45,060	1.03	43,616
Lawrence	26	17	1.82	4,558	0.51	9,023
Lebanon	16	10	2.61	6,513	0.49	13,249
Lehigh	104	65	13.26	33,145	0.83	39,726
Luzerne	83	65	17.69	44,220	1.18	37,451
Lycoming	9	8	2.55	6,365	0.59	10,865
McKean	6	5	0.83	2,074	0.44	4,675
Mercer	29	19	5.69	14,230	1.25	11,408
Mifflin	3	2	0.51	1,277	0.30	4,289
Monroe	15	11	3.41	8,517	0.52	16,435
Montgomery	301	167	32.15	80,385	1.67	48,174
Montour	23	21	2.89	7,213	6.17	1,169
Northampton	56	34	10.93	27,328	1.12	24,472
Northumberland	14	12	2.79	6,963	0.79	8,764
Perry	0	0	0	0	0.00	3,569
Philadelphia	771	407	146.96	367,392	1.36	269,858
Pike	2	2	0.61	1,532	0.32	4,764
Potter	6	4	0.74	1,842	1.01	1,823
Schuylkill	14	8	1.48	3,690	0.27	13,811
Snyder	2	2	0.10	252	0.09	2,872
Somerset	26	14	4.00	10,003	1.64	6,083
Sullivan	4	2	0.13	325	0.85	384
Susquehanna	3	3	0.36	910	0.25	3,594
Tioga	6	6	0.88	2,197	0.55	3,986
Union	3	3	5.37	13,423	5.28	2,540
Venango	5	4	1.17	2,925	0.52	5,600
Warren	7	5	0.93	2,327	0.62	3,726
Washington	56	23	4.23	10,577	0.68	15,491
Wayne	11	11	4.25	10,627	2.51	4,230
Westmoreland	103	32	9.63	24,079	0.91	26,318
Wyoming	3	3	0.53	1,324	0.53	2,509
York	61	46	11.42	28,538	0.71	40,318
All Counties	3441	2280	533.02	1,332,569	1.10	1,214,545

Figure 2: Medicaid Dentist Visits for Children (0-20 years old) by ZIP Code, 2017



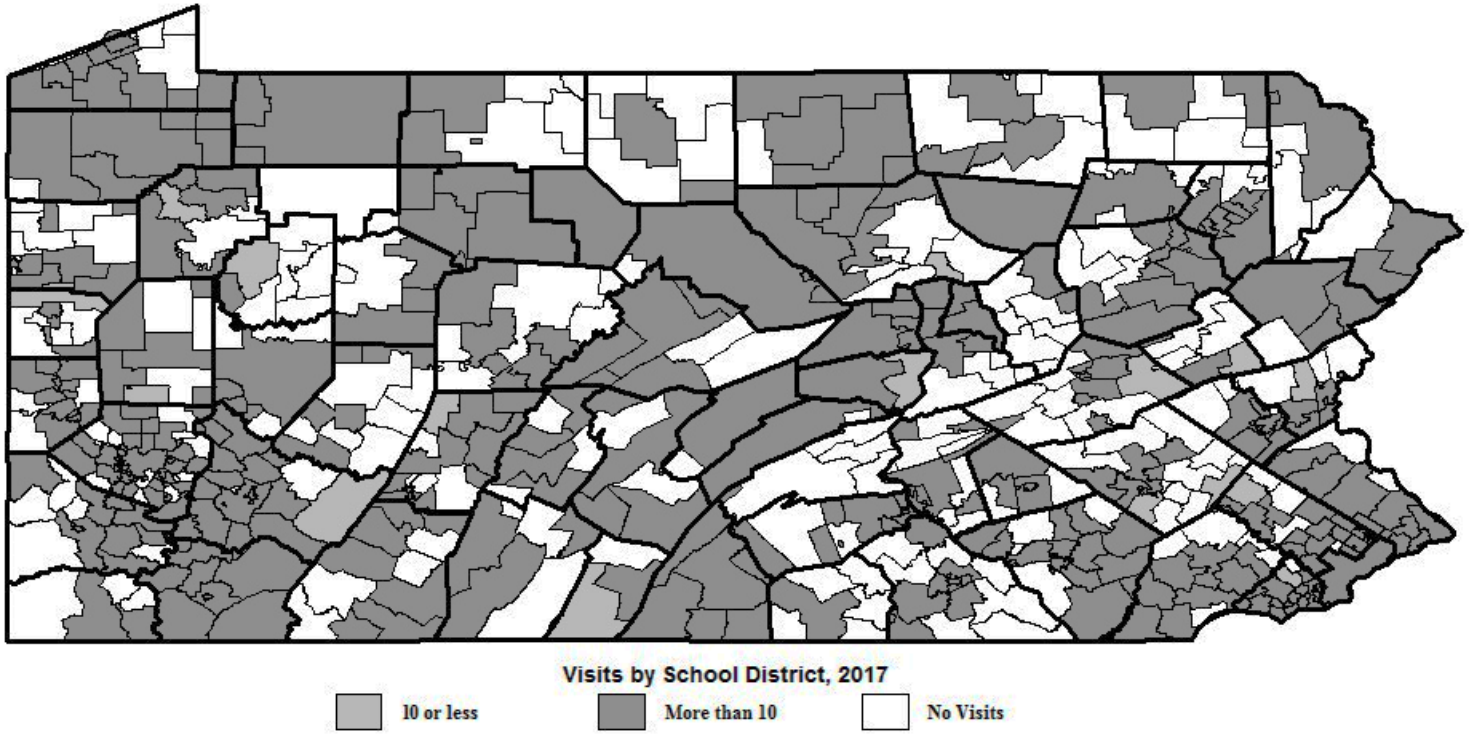
(Source: Medical Assistance claims and provider files)
(ZIP Codes extending beyond Pennsylvania indicate ZIP Codes that cross state lines.)

Figure 3: Dentist Points-of-Service for Pennsylvania MA Children (0-20 years old), 2017
(Providers can appear in more than one ZIP Code, but each provider is only shown once in a ZIP Code)



(Source: Medical Assistance claims and provider files)
(For presentation purposes, the dots representing providers were dispersed so that all dots could be viewed. Consequently, some providers appear outside Pennsylvania. In addition, some ZIP Code centroids may cross state borders.)

Figure 4: MA Child (0-20 years old) Dental Visits by School District, 2017



(Source: Medical Assistance claims and provider files)

Rural and urban (defined at the county level) visit-to-enrollment ratios were compared for the years 2014 through 2017. These comparisons are presented in Table 8. One approach to making these comparisons is to treat each county equally. In that case, each county would have the same weight, e.g., Philadelphia County would have the same weight as Elk County. An alternative approach was used in Table 8. County ratios were weighted by the number of children enrolled in the MA program. When this approach was used, the ratios presented in the table represented the overall ratio for all rural and urban areas (defined by the rural and urban status of counties).

Ratios for both rural and urban areas increased between 2014 and 2017. In all years, the ratio for urban areas were significantly larger than the ratio for rural areas. In all years, the ratio for urban areas were greater than 1.0 and the ratios for rural areas were less than 1.0. In 2017, the urban ratio was 35 percent higher than the rural ratio. A decomposition of this difference is not possible with these data, but some of the differences are due to greater utilization in urban areas and some was a consequence of enrollees in rural counties traveling to urban counties to seek care.

Table 8: Visits-to-Child Enrollment Ratio by Rural and Urban County Status (county ratios are weighted by child enrollment and are equivalent to all rural and urban defined by county)

CRP Rural Status	Visits to Child Enrollment Ratio, 2017	Visits to Child Enrollment Ratio, 2016	Visits to Child Enrollment Ratio, 2015	Visits to Child Enrollment Ratio, 2014
In Urban Counties	1.1719	1.1416	1.1149	1.1057
In Rural Counties	0.8674	0.8059	0.7596	0.7758
Rural-Urban Difference	0.3045	0.3357	0.3553	0.3298
Total	1.0972	1.0590	1.0279	1.0249
Est. F-Ratio[9]	*3.841*	*6.209*	*7.525*	*6.667*
Est. Significance	*0.054*	*0.015*	*0.008*	*0.012*
Eta-Squared	*0.056*	*0.087*	*0.104*	*0.093*

An alternative method of comparing rural and urban provider availability and, concomitantly, enrollee utilization, is presented in Table 9. School districts served as the base geography in Table 9. Rural school districts were compared to urban school districts with respect to the presence of an active program provider who was providing service within the district. In 2017, service was provided in 51.9 percent of rural school districts and in 75.8 percent of urban school districts. This difference is statistically significant.

[9] The interpretation of the statistical test is ambiguous since the data are weighted. Although counties were originally used in the calculation of ratios, the weighting of the data is equivalent to calculating only two ratios instead of 67. The tests are based on 67 cases. In either case, the difference of ratios is significant for all four years at the 0.10 level. The eta-squared can be interpreted in a conventional fashion.

Table 9: Presence of Dental Service to Children Insured by MA
by School District and Rural-Urban Status, 2017

		Rural-Urban Status (2010)		
		Rural School Districts	Urban School Districts	Total
Presence of Service in School District	No providers, no visits	48.1%	24.2%	35.4%
	At least 1 provider and 1 visit	51.9%	75.8%	64.6%
Total		100.0% N=235	100.0% N=265	100.0% N=500
Chi-square=31.2 degrees of freedom=1 sig=0.000				

Summary Dentists Participating in the Medical Assistance Program

This section of the report has documented the size and geographic distribution of dentists actively participating in Pennsylvania's MA program. It is a definitional matter that the supply of dentists participating in the MA program needs to be large enough to meet the needs of enrollees for the program to be fully successful. In a geographic area as large as Pennsylvania, it also is important that these dentists are geographically distributed in a manner that provides for reasonable access for all enrollees. An adequate panel in and of itself is not the ultimate goal. The ultimate goals are twofold. First, the size and distribution of the panel should contribute to oral health equity between populations who are enrolled in MA and those who are not. Second, the size and distribution of the panel should not discourage or prohibit enrollees in the MA program from utilizing care. These two goals are difficult to assess and are beyond the scope of the data available for this report. Nevertheless, there are intermediate benchmarks that can be assessed with respect to both the size and distribution of the dentist panel.

There are some considerations that should frame the relationship between the ultimate goals described above and the size and distribution of the MA dentist panel. First and arguably the most important is the MA program's managed care delivery system. While an MCO delivery system returns benefits to the Commonwealth with respect to risk assumption and administrative burden, it also limits accessibility for many enrollees and adds significant complexity to the use of services for all enrollees.

Another factor that needs to be considered when evaluating the size of the provider panel is that most participating providers limit the number of patients with MA they serve. This is not only true in Pennsylvania but is true in other states (Hughes, Damiano, Kanellis, et al., 2005). When inspecting counts of participating providers, it is important to understand that many are not offering service to a significant number of enrollees. The rate of provider participation in the program is low (about one in three dentists) and is compounded when providers participate at minimal service levels. Provider counts and points-of-service counts are important because they reflect potential service locations but do not necessarily reflect contributions from full-time dentists.

Finally, research results are mixed with respect to the relationship between dentist supply and population oral health (Feng, et al., 2017). Some research indicates positive results, while other research indicates no significant relationship. "Specifically, not much is known about how dentist supply is related to different aspects of children's oral health and whether any association is driven by dentist selection in locating into areas with certain population economic and demographic characteristics that in turn affect children's oral health or by potential benefits to

children's oral health" (Guarnizo-Herreno, Carol, and Wehby, 2014). There are several reasons for these mixed research results. As previously discussed, establishing a set of mutually exclusive areas for which supply indicators are calculated is problematic. Smaller areas tend to blend into one another and larger areas are characterized by heterogeneity within the area. It also is difficult to assess the effect that commuting for service has on oral health and if, and when, commuting substitutes for a shortage of local providers. All of this notwithstanding, an intuitive understanding of the supply-health relationship would lead to the assumption that a more abundant supply would have some effect on oral health. Research on the end goal does indicate that among adults, oral health is poorer among those insured by Medicaid but that there is no difference between the oral health of Medicaid insured children and other children (Yarbrough, Cassandra, Kamyar, Nasseh, and Vujicic. 2014a). With these data caveats and framing concerns in mind, the following is a summary of the major findings from this section of the report:

- As a consequence of the ACA, overall enrollment in the MA program across the Commonwealth increased by over 20 percent since 2014 (10 percent for children). This precipitous enrollment increase heightens the importance of the size and distribution of the provider panel.
- In Pennsylvania, the number of points-of-service for children with MA increased 21.7 percent between 2014 and 2017. The number of participating dentists serving children with MA increased 14.6 percent between 2014 and 2017.
- Total service to children with MA in Pennsylvania (as measured by FTE dentists) increased 15.7 percent between 2014 and 2017. Fifty percent of MA participating dentists contribute 7 percent of an FTE or less to treating children enrolled in MA.

- Specialists provide service to children with MA in all of the urban counties but in only about half of the rural counties.
- In 2017, the ratio of visits to enrolled children in the Commonwealth was 1.10 to 1. This ratio varied considerably by county. There are two rural counties (Forest and Perry) with no service and some counties that have visits-to-enrollment ratios that are multiple times that of the Commonwealth as a whole.
- Relatively large contiguous rural areas had no service in 2017. These occur in the Northern Tier and throughout the rural central region of the state.
- Many providers offer service at multiple locations and some in multiple counties.
- In 2017, the urban visits-to-enrollee ratio was 35 percent higher than the rural ratio. This difference has been decreasing since 2014.
- In 2017, there was no service provided in 48 percent of rural school districts (113 districts), while no service was provided in 24 percent of urban districts (64 districts).
- In 2017, county visits-to-enrollment ratios were positively correlated with median family income and total dentist supply. Service was higher in counties with better socio-economic conditions and overall dentist supply. These correlations were relatively high overall and were higher within rural and urban counties than they were for the Commonwealth as a whole.

Visit History for Individuals Enrolled in the Medical Assistance Program

The use of oral health care by children (0-20 years) enrolled in MA in Pennsylvania can be described by answering a series of questions. Do enrollees use care? How often? What type of care do they receive, i.e., what is their use pattern? Do enrollees use MA only for treatment of

acute problems or do they also seek care that includes preventive and diagnostic services? Do enrollees establish a dental home?

Historically, the uninsured disproportionately use hospital emergency departments for health care (Zhou, et al., 2017) and disproportionately visit emergency rooms for oral health problems (Sun, et al., 2015). This is not surprising since it is rational to access health care via the service points which are most readily available. This pattern tends to persist when the uninsured transition to Medicaid (Sun, et al., 2015). In the presence of the recent Medicaid expansion, the transitioning population assumes a greater importance. Untreated oral health problems are at the top of the list of new enrollees' plans to use care (Hom, et al., 2016). These conditions suggest an additional question: "Do enrollees only seek treatment for an acute problem and seek additional care only when a subsequent acute problem arises or do they mix such care with preventive and diagnostic services?"

The question, *Do enrollees use care?* is addressed in Table 10. In that table (and elsewhere in this report), the distinction is made between preventive/diagnostic (PD) visits and restorative/treatment (RT) visits. A PD visit includes only preventive and diagnostic procedures. It may include a dental prophylaxis (cleaning), a dental examination, a diagnostic image, the application of sealants, oral health education, and/or other PD procedures. RT visits are any visits in which a treatment is included which may include some PD procedures. The distinction between PD and RT visits is an important one to make. The public health community stresses the importance of PD visits to one's oral health and assume a position at the center of strategies to improve population oral health. In this report, the PD-RT distinction will be used as the central

organizing dimension in classifying enrollees' utilization patterns. Classifying utilization in this manner enables the research to distinguish enrollees who use the system solely to take care of acute problems from those who use the system to seek preventive oral health care. Public health wisdom favors the latter over the former (University of Illinois at Chicago, 2016).

Dental use rate estimates for the nation vary significantly. Estimates derived from self-reports, such as those from the National Center for Health Statistics (NCHS) (2018), tend to be higher. The NCHS estimate is quite high, indicating that 84.6 percent of children had at least one dental visit during 2016. Estimates based on archival records (records of service), such as those reported by the Health Policy Institute (a research institution associated with the American Dental Association) (2018), are considerably lower, which indicates that 50.4 percent of children enrolled in Medicaid and CHIP and 67.1 percent of privately insured children had at least one dental visit in 2016. It also reports that 46.1 percent of children enrolled in Medicaid and CHIP had a preventive visit.

The estimates presented in Table 10 are similar to those reported by the Health Policy Institute. In 2017, 53.5 percent of the children enrolled in MA in Pennsylvania had at least one dental visit, an increase from 51.1 percent in 2014. Although increasing, the proportion of children in Pennsylvania enrolled in MA and having at least one dental visit annually is significantly less than the percentage of children in Pennsylvania with private insurance who had a dental visit (67.1 percent). The gap between the two has been decreasing over the past decade (Health Policy Institute, 2018b).

Of some note is the increase in the percentage of enrollees[10] who had an RT visit but no PD visit. The percentage was small in all years, but the increase was significant—from 1.82 percent in 2014 to 5.78 percent in 2017. The increase, with some time lag, coincided with the increase in enrollment in the MA program. A reasonable hypothesis is that this increase is a result of new enrollees seeking care for problems that were untreated prior to their enrollment in the MA program. They may not have been in the system long enough to develop a pattern of both PD and RT care and it is possible that they will "catch up" with other enrollees as their time in the system increases. This tendency may be responsible for the percentage of enrollees who had only a PD visit decreasing during the time period. It also may contribute to the decrease in the total percentage of enrollees who had a PD visit.

[10] All of the data and tables in this report describe enrollees in the MA program between the ages of 0 and 20 years. Sometimes they will be referred to as children enrolled and sometimes just as enrollees.

Table 10: Percent of Child (0-20 years) Enrollees with Any Dental Visit and with a Preventive/Diagnostic Visit for Pennsylvania by Year

Year	Category	Count of Enrollees	Percent of Enrollees	Total Enrollment for Year
2014	Had a Preventive/Diagnostic Visit	543,129	49.25	1,102,756
2014	Had a Visit but No Preventive/Diagnostic Visit	20,108	1.82	1,102,756
2014	Any Visit	563,237	51.08	1,102,756
2015	Had a Preventive/Diagnostic Visit	586,223	49.78	1,177,514
2015	Had a Visit but No Preventive/Diagnostic Visit	21,521	1.83	1,177,514
2015	Any Visit	607,744	51.61	1,177,514
2016	Had a Preventive/Diagnostic Visit	563,612	46.78	1,204,763
2016	Had a Visit but No Preventive/Diagnostic Visit	65,100	5.40	1,204,763
2016	Any Visit	628,712	52.19	1,204,763
2017	Had a Preventive/Diagnostic Visit	580,168	47.77	1,214,545
2017	Had a Visit but No Preventive/Diagnostic Visit	70,157	5.78	1,214,545
2017	Any Visit	650,325	53.54	1,214,545

The remaining tables in this section are based on enrollees who had their first visit on or before December 1, 2016 and describe an enrollee's treatment history. This data restriction eliminates those enrollees who had less than one year of participation in the MA program since, if included, they would bias the results toward less utilization. The participation of enrollees in the tables varies from a minimum of one year to a maximum of four years. The length of participation varies from enrollee to enrollee.

Nearly 15 percent (14.7) of enrollees (with at least one visit) had only one visit and 11.8 percent had 10 visits or more (see Table 11). The median was four visits. A minority of those receiving care had only one or two visits.

Only 6 percent of enrollees did not have a PD visit, while 22.9 percent had only one PD visit (see Table 12). The median is three PD visits. Almost 35 percent (34.6) of enrollees did not have an RT visit and 22.9 percent had only one RT visit (see Table 13). The median is three RT visits.

Table 11: Total Number of Dentist Visits per Child Enrollee (0-20 years) in Pennsylvania (only includes enrollees whose first visit occurred on or before December 1, 2016)

Total Number of Visits	Frequency	Percent
10 or more	111,354	11.8
9	37,704	4.0
8	49,964	5.3
7	63,507	6.7
6	77,013	8.1
5	93,012	9.8
4	110,860	11.7
3	128,151	13.5
2	137,166	14.5
1	138,817	14.7
Total	947,548	100.0

Table 12: Enrollee's Number of Preventive/Diagnostic Dentist Visits
(0-20 years) in Pennsylvania
(only includes enrollees whose first visit occurred on or before December 1, 2016)

Number of Preventive/Diagnostic Visits	Frequency	Percent
10 or more	2,985	0.3
9	6,650	0.7
8	20,186	2.1
7	41,555	4.4
6	60,327	6.4
5	83,931	8.9
4	115,176	12.2
3	154,404	16.3
2	188,971	19.9
1	216,521	22.9
None	56,842	6.0
Total	947,548	100.0

Table 13: Enrollee's Number of Dentist Visits with Some Treatment
(0-20 years) in Pennsylvania
(only includes enrollees whose first visit occurred on or before December 1, 2016)

Number of Treatment/Restorative Visits	Frequency	Percent
10 or more	29,238	3.1
9	9,461	1.0
8	12,485	1.3
7	15,659	1.7
6	22,722	2.4
5	34,835	3.7
4	54,335	5.7
3	85,813	9.1
2	137,407	14.5
1	217,444	22.9
None	328,149	34.6
Total	947,548	100.0

One of the questions of interest in this section of the report is, "What type of care do enrollees receive, i.e., what is their utilization pattern?" In Tables 12 and 13, PD visits were differentiated

from RT visits. The former directs attention to "well care" rather than "sick care." The latter is largely a response to oral health problems[11], whether they be self-diagnosed or a consequence of diagnostic dental visits. The distinction between PD visits and RT visits yields three groups and three use patterns. The first group consists of those who receive PD care only. The second consists of those who receive RT care only and the third are those who receive a combination of the two types of care. The distribution of these use patterns is presented in Table 14.

The largest group of enrollees (59.4 percent) used both types of visits. When considering lifetime utilization, this is the most typical utilization pattern in the larger population. The current study documents enrollees' experience over a time period shorter than a lifetime. Some enrollees who, during the course of their lifetime, may receive both types of visits will have only received one type of visit during the time period documented in this research. The 59.4 percent represents the proportion of the enrollees who had at least one visit who received both PD and RT visits. There was a significant number of enrollees who did not have any visits. An unduplicated count of the no-visit enrollees for this varying time period is not mathematically defined, since the time period varies from enrollee to enrollee. However, an estimate of the no-visit population for a defined year can be calculated. During the time period that these tables describe, the estimate of the no-visit population ranged from 47.5 percent to 49 percent, depending on the year. It would be expected that a comprehensive and unduplicated count for the time period that the tables describe would be similar but marginally smaller. With that in mind, one might estimate that 45 percent of MA enrollees received no visits during this time period. Under that assumption, 32.7 percent of *all* enrollees would have had both PD and RT visits, 19.0 percent would have had only

[11] This category also includes cosmetic dentistry and services rendered to decrease risk of future complications.

an RT visit, and 3.3 percent would have had only an RT visit, while (by assumption) 45 percent would have had no visit.

Table 14: Enrollee Type (Utilization History) for Pennsylvania Child Enrollees (0-20 years) (only includes enrollees whose first visit occurred on or before December 1, 2016)

Enrollee Type	Frequency	Percent
Preventive/Diagnostic Visits Only	328,032	34.6
Restorative/Treatment, or CHC* Visits Only	56,725	6.0
Both Types of Visits	562,674	59.4
Total	947,431	100.0

*Reimbursement claims from Community Health Centers (CHC) do not include the procedure codes; rather the provider gets the same rate for all visits and visit types cannot be differentiated.

The second largest utilization type group are those who received PD visits only (34.6 percent). This group included those that did not require follow-up care but could also have included those who did not seek follow-up care as prescribed. The smallest (6.0 percent) utilization type group are those that only received RT visits. The history of uninsured and publicly insured patients suggests that many only seek care when problems become so acute that they interfere with the activities of daily living (Sun, Benjamin. et al., 2015). Those that practiced that utilization pattern are included among the 6 percent. The increase in the number of RT visit only enrollees after Medicaid expansion (shown in Table 10) is consistent with this trend. Including the estimate of no-visit enrollees in the calculation, 19.0 percent of all enrollees had PD visits only and 3.3 percent had RT visits only.

The public health community recommends that everyone should receive a PD visit annually and some advocates recommend a visit every six months (National Committee for Quality Assurance, 2019). Individual providers will base their recommendation on the patient's oral

health needs. The Pennsylvania MA program authorizes reimbursement for two dental cleanings each year.

The arithmetic base that one chooses in calculating the timing between PD visits has tremendous effect on the resulting calculated percentage. Some enrollees didn't visit the dentist at all, some had only one PD visit, and some had two or more PD visits. Each of these groups can be the base of a timing percentage and each returns different results. The consumer of this information should always be aware of the base used in the calculation. The estimate was calculated using three different bases (see below).

For enrollees who had at least two PD visits, the median number of days between PD visits was 217 (about 7 months). Almost three-quarters of enrollees (73.8 percent) had their second visit within a year of their first. At the same time, 28.8 percent of enrollees who visited a dentist did not have two PD visits. It follows then that 52.5 percent of all enrollees who visited an MA dentist had a second PD visit within a year of their first.[12] When including the hypothetical estimate of the proportion of enrollees without any visit (discussed above), the percentage of all enrollees who had a second PD visit within a year of their first is only 28.9.[13] These widely varying estimates suggest that interpreting these numbers must be conducted with considerable care. The first estimate would suggest that a high percentage of enrollees were in compliance with recommendations for PD visits. The last would suggest a low percentage were in compliance as the different estimates address different questions. A summary is provided below:

[12] (1.0 - 0.288) = 0.712 and (73.8 X 0.712) = 52.5.

[13] This number is calculated by multiplying the following quantities serially: a) 73.8 (the percent of those with two PD visits who had a second visit within a year), b) 0.712 ((1-0.288) the percent who had one visit but not two PD visits), and c) 0.55 ((1 - 0.45) the percent who had a visit).

Of the enrollees who had two PD visits, what percent had the second PD visit within a year from the first?	73.8%
Of the enrollees that used MA for dental (at least one visit of any kind), what percent had a second PD visit within a year from the first?	52.5%
Of all enrollees (including those who never used MA for dental), what percent had a second visit within a year from the first?	28.9%

The first question restricts the estimate to those for whom a timing estimate can be calculated. The second question best describes the degree to which MA, *considered as a system of dental care provision*, encourages compliance with the recommendation. The third question describes the degree that MA, *considered as an insurance system*, encourages compliance with the recommendation.

In 2004, the American Academy of Pediatric Dentistry endorsed a policy encouraging the establishment of a dental home. A dental home is an approach to oral health care that is patient-centered and prevention-focused, rather than one that is disease-centered. It is one in which a single dentist treats and coordinates care for a patient. It is structured by an approach in which a single provider resides at the center of the home. It is in contrast to a disease-centered approach in which a patient finds a dentist, any dentist, to treat an acute disease problem. With a dental home, the patient has an established dentist whose care is comprehensive, continuously accessible, and coordinated (American Academy of Pediatric Dentistry, 2019). A dental home has been shown to result in better health for pediatric patients (American Academy of Pediatric Dentistry, 2004; Robertson and Phelps, 2005). For patients enrolled in MA, the use of a dental

home can be assessed by inspecting the number of different dentists that an individual enrollee uses for care. The greater the number of dentists, the less likely that a dental home has been established. Tables 15 and 16 present the number of different dentists that enrollees have used for care.

On average, patients visited two dentists during the time period covered by these data. The time period varied from enrollee-to-enrollee, varying from one year to four years. About 32.5 percent of enrollees visited only one dentist, 67.5 percent visited two or more, 41.6 percent three or more, 21.4 percent four or more, and 13.5 percent five or more. Table 15 displays the number of different dentists an enrollee saw, classified by their total number of MA dental visits. As would be expected, the greater number of visits, the less likely that the enrollee visited only one dentist and the more likely that they visited several dentists.

Table 15: Child (0-20 years) MA Enrollees Using More than One Provider and Number of Different Provider Statistics
(only includes enrollees whose first visit occurred on or before December 1, 2016)

Number of Providers	Frequency	Percent
Only one	308,071	32.5
Two or more	639,396	67.5
Total	947,467	100.0
Mean		2.61
Median		2

	Number of Different Dentists	Percent
Percent Visiting Specified Number of Different Dentists or Visiting a Greater Number of Different Dentists	1	100.0
	2	67.5
	3	41.6
	4	24.1
	5	13.5
	6	7.3
	7	3.8
	8	1.9
	9	0.9
	10	0.4

Table 16: Number of Different Providers by Enrollee's Number of Visits for Enrollees with 10 Visits or Fewer
(only includes enrollees whose first visit occurred on or before December 1, 2016)

		Number of Visits										Total
		1	2	3	4	5	6	7	8	9	10	
Number of Different Providers	1	100.0%	44.4%	27.3%	20.1%	16.6%	14.3%	12.8%	11.7%	9.7%	8.5%	35.1%
	2		55.6%	41.9%	31.4%	25.3%	21.2%	19.1%	16.8%	15.5%	14.1%	27.2%
	3			30.9%	31.2%	27.2%	24.0%	21.3%	18.9%	17.9%	16.6%	17.6%
	4				17.2%	21.3%	20.8%	19.1%	18.1%	17.3%	17.0%	10.1%
	5					9.6%	14.4%	15.5%	15.3%	14.9%	14.3%	5.5%
	6						5.3%	9.1%	11.1%	11.5%	11.8%	2.7%
	7							3.1%	6.3%	8.1%	9.1%	1.2%
	8								1.8%	4.0%	5.7%	0.5%
	9									1.1%	2.4%	0.1%
	10										0.5%	0.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

There are a few scenarios that might explain why an enrollee may visit more than one dentist. An enrollee may be referred for specialty care and, consequently, see a specialist dentist as well as a general dentist. An enrollee may be in the process of establishing a dental home, and in so doing, visits more than one dentist to find the dentist that best meets their oral health needs. Both of these reasons are not necessarily inconsistent with having a dental home or the pursuit of one. In contrast, an enrollee may be seeking care on an acute-need basis and visit any dentist to fulfill that need. Enrollees may change the MCO in which they have membership and are permitted to do so as often as once per month. Often, MCOs offer enrollees incentives to change from one MCO to another, making the change enticing. Just because a dentist participates with one MCO does not mean that they participate with all MCOs in a HealthChoices region. Therefore, if an enrollee changes MCO membership, they may not be able to continue to visit the dental office in which they had previously established care. Dentists also may choose to discontinue their participation with an MCO at any time, which could mean that they will not continue to see the members of that plan. Further, the provider who the enrollee first visited may not encourage a return visit or offer a dental home to the enrollee. These last four reasons are inconsistent with establishing a dental home or, at minimum, are a hindrance to it.

More than half of all enrollees with two visits saw two different providers for those visits. For enrollees with three visits, 72.7 percent had seen more than one provider and that percentage increases for each successive number of visits. Such a distribution is not consistent with this population routinely establishing a dental home.

Summary of Enrollee Visit History

The series of questions posed at the beginning of this section can be reduced to two general questions: How much utilization exists? What type of utilization exists? Two different approaches can be assumed when addressing these questions, each with a different policy significance. The first approach uses all who are enrolled in the MA program as its statistical base. That approach describes how well the population insured by MA, considered as an insurance system, is being served. The second approach uses only the enrollees who received some dental care as its statistical base. That approach is a response to how the MA dental care system functions after an enrollee enters the system. The first approach leans toward coverage policy and the second approach toward service policy.

Overall, slightly more than half (53.5 percent) of all child enrollees had visited a dentist at least once in 2017. Most (89 percent)[14] of these enrollees had at least one preventive/diagnostic visit. Although 89 percent are most of the enrollees who have entered the system, it is only 47.8 percent of all enrollees. These are important distinctions for policy, since it is commonly understood that PD service is critical to the overall oral health of the population. The approach that considered all enrollees returned a modest number, less than 50 percent. The approach that considered only those who entered the care system returned a more encouraging number, 89 percent or greater. Public health advocates recommend that patients should receive a PD visit at least once a year. Among the entire MA child population, only 28.9 percent were in compliance with this recommendation and among those that received some care, 54.5 percent were in

[14] The 89 percent was an annual estimate for 2017. When considering enrollees' multi-year histories, the percentage was 94 percent.

compliance. The first approach returned a less than encouraging number, the second approach a more encouraging, yet still modest, number.

The history of the uninsured and Medicaid populations tells a story of non-integrated, non-continuous health care, an unpredictable and haphazard process of care as the population transitions from one insurance status to another. Both medical and dental health advocates encourage a "home" for the patient, which functions to provide comprehensive and continuously accessible care. In medicine, it is the medical home and in dentistry, it is the dental home. As discussed previously, the dental home is a model for care in which a patient secures a single provider to provide patient-centered care. When a dental home is established, a patient will only or predominately visit their primary provider. The number of different providers a patient or enrollee visits is an indicator of whether a dental home has been established. About one-third of enrollees who received care used one and only one provider. The other two-thirds saw two or more providers, sometimes many more. Seeing two or three providers is compatible with securing a dental home if the additional providers are specialists or are part of a search for a primary provider. Nevertheless, the frequency of single provider use is a reasonable indicator of the establishment of a dental home. The population enrolled in MA programs scored low with respect to establishing a dental home.

Overall use for children insured by MA was less than the privately insured, but the difference was slowly decreasing (Munson and Vujicic, 2016b; Nasseh, 2013; Ku, 2013; U.S. Health and Human Services, 2017). Once in the system, the level of PD care was reasonable with respect to receiving any such care, but low with meeting PD visit recommendations. Continuity of care also

was low within the program when measured by conditions facilitating the establishment of a dental home.

The Children's Health Insurance Program

The MA program provides dental coverage for low-income children and adults, while the Children's Health Insurance Program (CHIP) provides coverage for uninsured children who don't meet the income eligibility requirements of the MA program. Any child under 19 years of age who is uninsured, and a U.S. national, citizen, legal alien, or permanent resident, with a family income too high to qualify for MA is eligible for one of the three levels of CHIP:

- A child is eligible for *Free CHIP* if the child's household income is no greater than 208 percent of the federal poverty level.
- A child is eligible for *Low-Cost CHIP* if the child's household income is no greater than 314 percent of the federal poverty level. The premium subsidy varies by household income. For a family of four, the maximum income to be eligible for the subsidy is $77,244.[15]
- A child is eligible for *Full-Cost CHIP* if the child's household income is greater than 314 percent of the federal poverty level. The rate charged to the child's family is 100 percent of the rate negotiated by the state with the MCO in which the child is enrolled.

CHIP is similar to the MA program in several respects. First, dental coverage is quite comprehensive in both programs. Second, both programs are administered through managed care contracts by DHS. Third, the program is a joint federal-state program. Pennsylvania's CHIP

[15] Eligibility for free and reduced CHIP varies slightly by the age of the child.

program predates the federal program by 5 years. It was authorized in 1992 and served as a model for the federal program.

CHIP enrollment is typically effective for a 1-year period from the date of enrollment with annual re-enrollment required. There are no copays for routine PD dental visits for all three levels of CHIP. CHIP covers one routine PD visit every six months.

CHIP is considerably smaller than the MA program. For Pennsylvania as a whole, child enrollment in MA is nearly seven (6.8) times greater than enrollment in CHIP. There is considerable variation from county-to-county in the relative size of the two programs (see Table 17). County MA-to-CHIP enrollment ratios range from 3.9 (Adams County) to 12.3 (McKean County). Age eligibility is slightly broader in the MA program. The MA program defines a child as 20 years old or younger and the CHIP program defines a child as 18 years old or younger.

The percentage of the total population enrolled in CHIP also varies considerably by county. The smallest percentage is in Forest County (0.5 percent) and the largest in Franklin County (2.1 percent). For the Commonwealth as a whole, the percentage is 1.4. Using only the age-eligible population as the denominator, the percent enrolled increased by almost five-fold. Between 6 and 7 percent of the age-eligible (0-18 years) population is enrolled in CHIP. That compares to about 35 percent of the age-eligible (0-20 years)[16] population enrolled in MA. Overall, and in every county, the MA program is much larger than the CHIP program. The ratio of MA enrollment to

[16] All ages are potentially eligible for MA; however, benefits vary by age. Children are eligible for a greater range of services than are adults.

CHIP enrollment is included in the table to indicate the relative size of the two programs and how it varies by county.

Table 17: CHIP Statistics by County, 2018

County	October 2018 CHIP Enrollment	MA Child (0-20 years) Enrollment, 2017	Ratio of MA Enrollment (2017) to CHIP Enrollment (2018)	Center for Rural Pennsylvania Rural Status
Adams	1,944	7,654	3.9	Rural
Allegheny	13,516	96,198	7.1	Urban
Armstrong	985	6,113	6.2	Rural
Beaver	2,171	14,696	6.8	Urban
Bedford	950	4,384	4.6	Rural
Berks	7,424	44,539	6.0	Urban
Blair	1,841	13,200	7.2	Rural
Bradford	801	5,955	7.4	Rural
Bucks	8,567	35,288	4.1	Urban
Butler	2,070	11,565	5.6	Rural
Cambria	1,707	13,354	7.8	Rural
Cameron	47	553	11.8	Rural
Carbon	901	5,840	6.5	Rural
Centre	1,085	5,781	5.3	Rural
Chester	5,848	26,795	4.6	Urban
Clarion	608	3,189	5.2	Rural
Clearfield	1,096	7,777	7.1	Rural
Clinton	459	3,485	7.6	Rural
Columbia	770	5,011	6.5	Rural
Crawford	1,110	8,228	7.4	Rural
Cumberland	3,166	15,142	4.8	Urban
Dauphin	4,021	30,755	7.6	Urban
Delaware	8,239	52,757	6.4	Urban
Elk	346	2,543	7.3	Rural
Erie	3,373	34,498	10.2	Urban
Fayette	1,959	15,837	8.1	Rural
Forest	39	324	8.3	Rural
Franklin	3,162	13,295	4.2	Rural
Fulton	311	1,378	4.4	Rural
Greene	436	3,851	8.8	Rural
Huntingdon	659	4,064	6.2	Rural
Indiana	914	6,843	7.5	Rural

County	October 2018 CHIP Enrollment	MA Child (0-20 years) Enrollment, 2017	Ratio of MA Enrollment (2017) to CHIP Enrollment (2018)	Center for Rural Pennsylvania Rural Status
Jefferson	728	4,530	6.2	Rural
Juniata	369	1,748	4.7	Rural
Lackawanna	2,495	22,583	9.1	Urban
Lancaster	10,034	43,616	4.3	Urban
Lawrence	1,120	9,023	8.1	Rural
Lebanon	2,521	13,249	5.3	Urban
Lehigh	6,802	39,726	5.8	Urban
Luzerne	4,283	37,451	8.7	Urban
Lycoming	1,442	10,865	7.5	Rural
McKean	380	4,675	12.3	Rural
Mercer	1,193	11,408	9.6	Rural
Mifflin	685	4,289	6.3	Rural
Monroe	2,519	16,435	6.5	Rural
Montgomery	9,840	48,174	4.9	Urban
Montour	171	1,169	6.8	Rural
Northampton	4,330	24,472	5.7	Urban
Northumberland	1,171	8,764	7.5	Rural
Perry	717	3,569	5.0	Rural
Philadelphia	24,109	269,858	11.2	Urban
Pike	834	4,764	5.7	Rural
Potter	165	1,823	11.0	Rural
Schuylkill	1,936	13,811	7.1	Rural
Snyder	666	2,872	4.3	Rural
Somerset	1,106	6,083	5.5	Rural
Sullivan	54	384	7.1	Rural
Susquehanna	630	3,594	5.7	Rural
Tioga	502	3,986	7.9	Rural
Union	572	2,540	4.4	Rural
Venango	716	5,600	7.8	Rural
Warren	397	3,726	9.4	Rural
Washington	2,540	15,491	6.1	Rural
Wayne	652	4,230	6.5	Rural
Westmoreland	4,759	26,318	5.5	Urban
Wyoming	374	2,509	6.7	Rural
York	7,186	40,318	5.6	Urban
Total	178,523	1,214,545	6.8	.

The differences between rural and urban counties with respect to the percentage of the total county population enrolled in CHIP and the MA-to-CHIP enrollment ratio for the county are not statistically significant. Also, the correlation between the percent of the total county population enrolled in CHIP and the median family income of the county is not statistically significant. However, the correlation between the median family income of the county and the MA-to-CHIP enrollment ratio is quite high (-0.52) and statistically significant. The greater the county average family income, the lower the ratio of MA-to-CHIP enrollment is in the county. That finding is consistent with eligibility requirements of the two programs. Counties with fewer families with incomes below poverty or near poverty will have lower rates of MA enrollment.

The overall delivery system for dental coverage and dental care across the range of incomes is quite complex. CHIP's place in this system is between the MA population (low-income) and the privately insured/self-pay population (higher income). Each of the three populations is exposed to a different set of conditions regarding the coverage for and use of dental care. Since a managed care model is used in the delivery of both the MA and CHIP programs, and since several types of private insurance are available in the individual and employer-sponsored markets, the delivery system is, in practice, even more complex. One size does not fit all, even within the two public programs and within the private market. When families with lower incomes seek dental care for their children, they must first identify the program for which they qualify and then navigate the protocols of the program and the MCO in which they enroll.

Community Health Centers

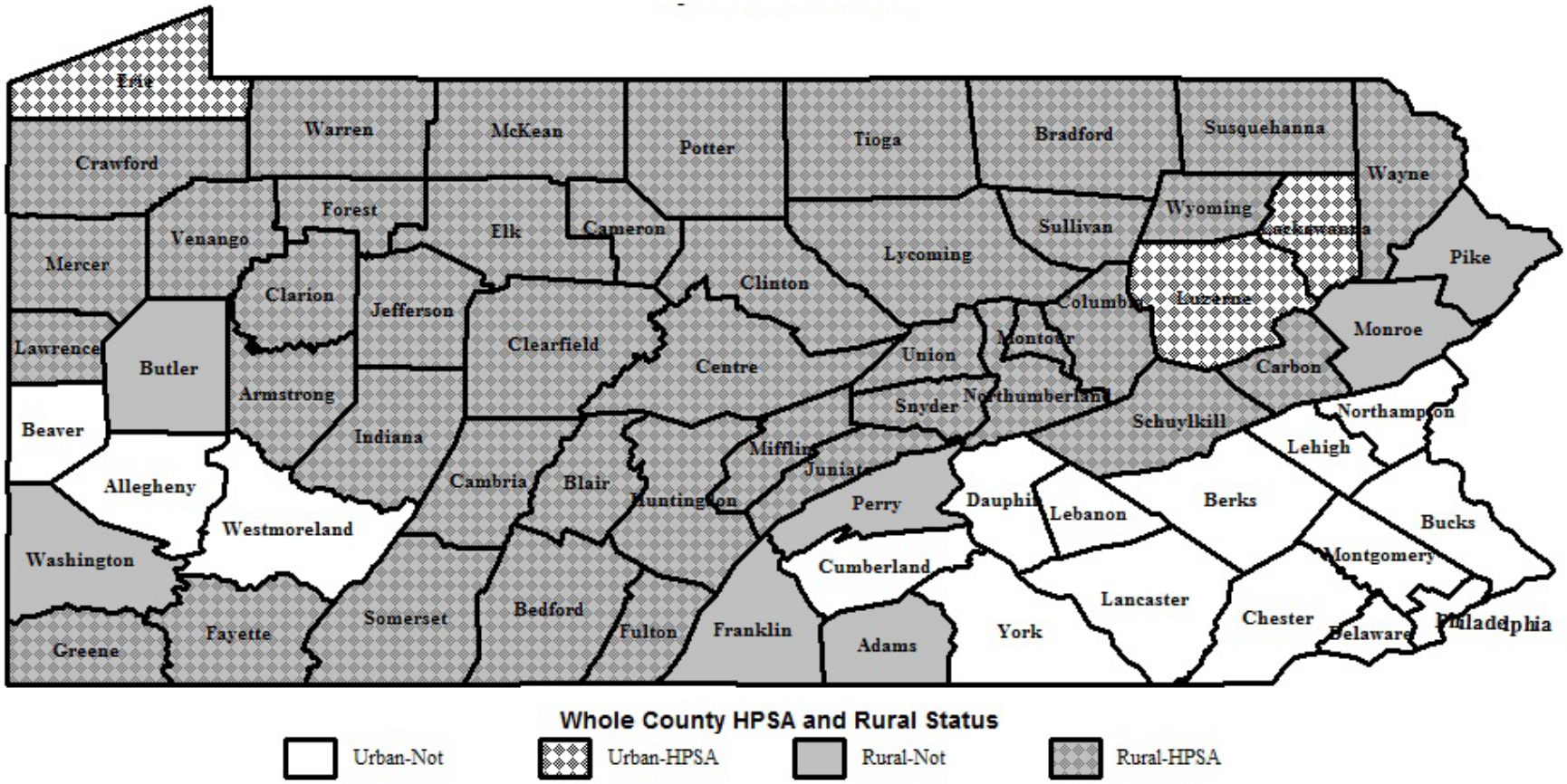
Community Health Centers (CHCs), administratively known as Federally Qualified Health Centers (FQHCs), are comprehensive health clinics that receive a federal grant to partially cover costs and receive favorable federal and state reimbursement for the services that they provide. They are designed to serve the Medicaid, low-income, and uninsured populations. The charges for which uninsured patients are responsible vary with their income. The poorer the patient, the less they will be charged.

Under agreement with the federal government, FQHCs are required to deliver "primary health services." Included in primary health services are "preventive dental services" including education, prophylaxis, and fluoride treatments (Maxey, undated). Currently, 84 percent of Pennsylvania's FQHCs offer on-site dental care and the remainder meet the obligation by contracting with private dental offices (NACHC, 2018).

FQHCs are an important component of the mosaic of dental care for the uninsured and low-income population, as well as those relying on the MA program. There are 264 FQHC clinical sites in Pennsylvania that served nearly 775,000 patients in 2016. Ninety-one (91) percent of these patients had incomes below 200 percent of the poverty level and 67 percent had incomes below 100 percent of the poverty level. Thirteen percent were uninsured and 51 percent were insured by MA. The centers employed 121 FTE dentists and 84 FTE dental hygienists (NACHC, 2018b). With dental and medical services co-located and with a philosophy of integrated care, FQHCs are ideal sites for a dental home. The majority of the clinical sites are in urban areas, but rural areas are also well-populated with FQHCs.

In addition to clinically serving low-income and uninsured populations, FQHCs also function to distribute health care providers to areas that are underserved by providers. The federal government assigns underserved status to areas based on two general designations: the Medically Underserved Area (MUA) and the Health Professional Shortage Area (HPSA). Both are primarily based on the population-to-provider ratios in the area. An FQHC must be located in or serve the population of a MUA. A HPSA practice site is a requirement for providers who participate in both federal and state educational loan repayment programs (dental HPSAs are shown in Figure 5). Many areas are designated as both a HPSA and a MUA. By virtue of these designations, FQHCs serve as a magnet to attract dental providers to areas of low service.

Figure 5: Whole County Low-Income Dental HPSAs by Rural Status, 2018



Source: Pennsylvania Department of Health

Rural Health Clinics

Rural Health Clinics (RHCs) were federally authorized in 1977 to address physician shortages for patients with Medicare in rural areas through the use of non-physician providers. Much like FQHCs, RHCs are paid an all-inclusive rate for preventive and primary care services. To qualify as an RHC, a clinic must be located in a non-urbanized area as defined by the U.S. Census Bureau, and it must fall in a federally-designated shortage area (HPSA, MUA, or Governor-declared shortage area). Unlike FQHCs, RHCs are not required to provide patients with access to dental services (CMS, 2018). However, based upon patient need, at least 13 of Pennsylvania's 67 RHCs (current as of the date of this research) have started to integrate oral health risk assessments, patient education, and fluoride varnish into their primary care practice. In addition to integrating care into their practice, these RHCs also are coordinating dental care for their patients, referring patients to local dentists. Two RHCs have hired Public Health Dental Hygiene Practitioners to provide additional preventive services in the medical clinic, including prophylaxis and sealants. Providing access to preventive oral health services and dental referrals, RHCs can serve as an entry point into the dental care system.

Head Start[17]

Approximately 35,000 low-income children, aged zero to five, are served statewide by Pennsylvania Head Start (Head Start) and Early Head Start Programs. When compared to the number of children served by MA, CHIP, and the school oral health program, the number of children served by Head Start is relatively small. However, the Head Start program is of

[17] Information about the Head Start program was obtained from interviews with program administrators.

significant importance since it serves as a gateway for the children enrolled to access comprehensive and preventive dental care.

The primary goal of Head Start is to promote school readiness and development through a comprehensive program that focuses on early learning, but also on health and family well-being. Head Start programs instill healthy habits, including oral health habits, at a young age. All children brush their teeth at least once daily while at Head Start, usually after a snack or a meal.

Head Start programs are required to follow the State's Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) schedule. EPSDT is an MA benefit that provides children enrolled with comprehensive and preventive health care services, including dental and mental health services. Each state Medicaid program determines the periodicity schedule for dental services. In Pennsylvania, the EPSDT schedule states that a child should see a dentist within six months of the eruption of the first tooth or by their first birthday and then every six months thereafter. Upon entry into a Head Start program, the program has 90 calendar days to determine whether or not a child is up to date on the EPSDT schedule. Programs self-report compliance in their annual Program Information Report, which is a requirement for continued funding. Information reported includes the number of dental preventive services the program provided, the number of children who needed and received dental treatment and the number of children who needed follow-up treatment.

Head Start engages family advocates who are assigned a case load and work one-on-one with families. These advocates strive to empower parents using a respectful, positive approach.

Family advocates can assist families in addressing a wide-variety of needs including housing and work, MA enrollment, and enrollment in supplemental food programs.

Family advocates may provide education to parents and families on the importance of good oral health and offer recommendations to help the family maintain or improve oral health. Motivational interviewing techniques are employed to guide education and goal-setting.

The family advocate also can assist a family in navigating all systems, overcoming any barriers in an effort to obtain care for the child. In 2012, OMAP developed an operations memo that required each MCO contracted with OMAP to identify a dedicated Head Start Liaison. If a family is having difficulty finding access to care for their child, the Head Start family advocate or health coordinator will contact the Head Start Liaison at the MCO in which the child is enrolled. The liaison is responsible for collaborating with Head Start to assist in identifying providers who will treat the child. Upon enrollment in Head Start, parents sign consent forms that allow Head Start staff to make such communications on behalf of the family. The goal of Head Start, with the assistance of the family advocate, is to help families learn the importance of seeking care and how to navigate the health care system. The impact of this assistance in navigating the complex health care system could be exponential as the family is learning a new skill that they can carry with them for a lifetime.

The Head Start family advocate aids the enrollee's family in integrating all the disparate services available to them, regardless of their source or sponsor. As such, the advocate transforms an unintegrated mosaic of services into an integral whole for the enrollee's family. The advocate

makes sense out of a difficult-to-comprehend system. He/she is positioned above any individual program or service and represents the child as a person and not as a program participant. This is a model of navigation that may be valuable elsewhere in the mosaic of oral health care.

Other Sources of Care

Additional sources of oral health care are available in Pennsylvania. These programs are often in place to offer care to those who might otherwise be unable to access care, be it due to a lack of dental insurance or the lack of a dental home. While many of these sources of care do not serve as a dental home, some of these options may serve as an entry point into the oral health care system.

Sealant Saturday events are hosted annually across Pennsylvania. The Pennsylvania Dental Hygienists' Association (PDHA) sponsors these events, which are geared towards children and are often offered each February to coincide with Children's Dental Health Month. Sealant Saturday events provide free dental sealants, which are a preventive service and are often placed on permanent molars. PHDA began collecting Sealant Saturday data from each site in 2003. Often, Sealant Saturday events are hosted by dental hygiene programs and use their clinics. The aggregated data provided to the research team included the number of events each year, the number of volunteers, the number of sealants placed, the number of children served, and the number of children who were found to have active dental disease. The data do not disclose the locations of each individual event or the age of the children served. It is also unknown how many children returned to seek additional services year-after-year. The most recent data available to the research team was from 2016, which indicated that 21 Sealant Saturday events were held, served 592 children, and provided 2,418 sealants. While Sealant Saturday events do not offer a

dental home, they do provide access to a preventive service and often serve as a point of referral to a dental home if a patient has active dental disease.

Mission of Mercy events take place nationwide. The Pennsylvania Dental Association sponsors a Mission of Mercy event in Pennsylvania annually, known as MOM-n-PA. The location of MOM-n-PA changes each year in an effort to provide care to all areas of the Commonwealth. Each patient attending the event receives access to free dental services, which are prioritized based on patient need following an initial examination. All services are provided by volunteer dental providers and are available on a first-come, first-served basis. These events offer a range of dental services but do not serve as a dental home. Volunteers do their best to provide patients with as many services as possible; however, due to limited time and resources, these events may not fulfill all of a patient's dental needs.

Pennsylvania has 62 free clinics, which are safety-net clinics and provide medical care to individuals who are uninsured. Often, free clinics rely on volunteer providers and are non-profit (501(c)3) organizations. Eighteen of Pennsylvania's free clinics offer dental services in addition to medical services. A free clinic can serve as a dental home for an uninsured patient; however, when and if a patient obtains dental insurance, they are often directed to a dental office that participates with their insurance plan.

School Health: The Mandated Dental Program and Dental Hygiene Services Program

Children are using dental care at a higher rate than working-age adults (Nasseh and Vujicic, 2016) and in recent years, children's rate of use has been increasing. This is occurring while use

among working-age adults is decreasing (Nasseh and Vujicic, 2016).[18] These trends are occurring in all insurance groups, although some groups have shown greater change than others (Munson and Vujicic, 2016b; Nasseh, 2013; Ku, 2013; U.S. Health and Human Services, 2017).

The dental care utilization gap between children insured by Medicaid and those privately insured has been decreasing in all states (Vujicic and Nasseh, 2015). That is, there has been an increase in use equity, which is the use difference between the publicly and privately insured. In Pennsylvania, although utilization equity ranks low among states (7th lowest), that gap has been decreasing disproportionately (Vujicic and Nasseh, 2015). Pennsylvania has made significant progress in achieving insurance-based utilization equity, but the need for greater equity still exists.

If children, regardless of insurance type, are increasingly using dental care; what are the mechanisms that have resulted in increased use? One mechanism that has the potential to foster increased use for many is the Mandated Dental Program (MDP). The MDP is a part of several health initiatives and mandates (school health) within the Commonwealth's K-12 school system. A January 2019 report from the Children's Dental Health Project indicates that Pennsylvania is one of only 14 states and the District of Columbia to have a Dental Screening Law.

The MDP has its basis in the Public School Code of 1949 (PL 30, no. 14, Title 28, Chapter 23: Health and Safety, Section 3: Dental Examinations). The law mandates that every student receive

[18] Estimates of use rates vary widely in the literature and are dependent on the data source and the definition of utilization employed. The pattern of higher and increasing rates among children and lower and decreasing rates among working-age adults is constant across sources, however.

a dental examination when entering school (kindergarten or first grade), in Grades 3 and 7.[19] The student's family dentist may perform the examination and document that service using a school dental form. School districts are encouraged to maximize the use of family dentists to fulfill the mandate. For those students not examined by a family dentist, examinations are required to be performed by a school-appointed dentist. If the school dentist determines that treatment is required, notice is sent to the student's parents. When the family dentist completes the examination, parents are responsible for payment. When a school appointed-dentist completes the examination, the Commonwealth provides reimbursement to the school district. This mandate applies to all schools, public and private.

School districts may opt out of the MDP by instituting a Dental Hygiene Services Program (DHSP). Every DHSP is required to have a DHSP Plan. Each school district develops its own plan, which must be approved by the certified school dental hygienist, the school dentist, and the school administration when it is created or amended. It must be reviewed and evaluated at least every 3 years and submitted annually to the Pennsylvania Secretary of Health. The DHSP plan must ensure that all students receive either a screening by a certified school dental hygienist or receive a dental examination by the family dentist in the mandated grades (K/1, 3, 7). In addition to a screening, other preventive services are recommended but not required. The plan may include dental prophylaxis, fluoride treatments, and the application of dental sealants and also must include classroom curriculum on oral health. Only a few school districts have opted to replace the MDP with a DHSP. For the 2015-2016 school year, 37 of the state's 501 school

[19] Additional exams are required for students enrolling in the district for the first time who do not have verification that the required examinations were performed and for non-graded students who have a grade-level equivalence to the mandated grades. Additional examinations also may be performed when school personnel observe student oral health issues.

districts reported a DHSP in the state's School Health Annual Request for Reimbursement System (SHARRS). PA DOH requires that school districts report activities under the program(s) via standardized forms and uses the reported data to determine reimbursement to school districts. Data derived from this reporting system have been used for the analyses presented in this report. Interviews with school nurses and school dental hygienists revealed that, as school dental hygienists are retiring, many districts are choosing not to fill these positions. If this trend continues, it could indicate that many of the districts who currently have a DHSP will discontinue the DHSP in the future.

The law requires that the Dental Health Program be available to all students regardless of school type. Consequently, traditional school districts, private schools, and charter schools must meet the mandate. The analyses in this report are based on traditional school districts only. Since charter schools do not have a defined geographic service area and private schools[20] are absent from the reported data, analyses were limited to traditional school districts.

Scope and Coverage of the MDP (Counties)

For the 2015-2016 school year, it is estimated that 89 percent of students in the mandated grades in public school districts received an examination by the school dentist or by their family dentist. This is an estimate for the Commonwealth as a whole. In contrast, the average for school districts is 92 percent. The latter estimate weights each school district equally regardless of enrollment. The statistics reported for the school health programs are considered to be estimates because the data reflect ratios derived from different sources. In this case, the enrollment was obtained from

[20] Some private schools request that their local school district perform the service for them. These data are intermingled with the school district data. The indication is that this is an infrequent occurrence.

the Pennsylvania Department of Education (October 1 enrollment) and the examination count from PA DOH. Additionally, examination counts may include some private school students[21] and some students who are ungraded but qualify for the program.

Table 18 presents selected statistics for the MDP program for counties. The first column of the table is the estimate of the percentage of students in the mandated grades who received an examination. The estimate exceeds 100 percent for some counties, likely due to the factors mentioned above or to reporting errors. These percentages can be best conceived as a general ratio of examinations to enrollment rather than a pure percentage and should be considered as estimates.

For most counties, the percentage of mandated students receiving exams was near or exceeded 100 percent. Among the few counties that were lower, Philadelphia was the most notable and the lowest of all counties (34 percent). There is only a single public school district in the county and many students are enrolled in charter schools. The low percentage may be a consequence of the district structure and the manner in which enrollment is counted.

Table 19 presents a comparison of rural-urban differences in the scope and coverage of the MDP by county. The first column of the table presents the rural-urban difference in the percentage of students in the mandated grades who received an examination. For urban counties, the estimate is about 94 percent and for rural counties the estimate is about 86 percent. This difference was statistically significant, although the difference was modest and the rural-urban status of the

[21] On occasion, public school districts may enter into an agreement with a private school to conduct the program.

county explained only about 6 percent of the variation in the percentages (eta-squared).[22] Rural counties tended to rely more on the school dentist than on family dentists for exams (columns 2 through 4 in Table 19). However, this tendency was modest and inconsistent. It is not unreasonable to hypothesize, and therefore expect, that students in rural school districts would less frequently have a dental home and, consequently, make greater use of the school dentist.

[22] Eta-squared is a "percentage reduction in error" measure of association. If the mean (average) for all counties was known, the best guess for each county would be that mean. All the statistical variation about that mean would be considered error in the guess. If knowledge of the means for rural and urban counties were added to that knowledge, then using the rural mean and the urban mean would be the best guess. The statistical variation around the two means becomes the error associated with the new guess. The eta-squared of 0.06 for this table indicates that the amount of error incurred with the new guess (using two means) reduces the amount of error from the first guess by 6 percent.

Table 18: Characteristics of the Mandated Dental Program by County
(Based on Aggregated Public School Districts*), 2015-2016

County	Percent of Mandated Enrollment with Dental Exam (school and family dentist combined)	Percent of Mandated Enrollment with School Dentist Exam	Percent of Mandated Enrollment with Family Dentist Exam	Percent of All Exams Done by School Dentist	Percent of Exams with School Dentist That Were Referred	Percent of Referred Dentist Exams Returned Completed	Center for Rural PA Rural Status	Number of School Districts
Adams	96	12	83	13	26	13	Rural	4
Allegheny	87	28	59	32	40	10	Urban	42
Armstrong	96	11	85	12	31	60	Rural	4
Beaver	91	34	57	37	23	16	Urban	14
Bedford	86	32	55	37	38	8	Rural	5
Berks	85	16	69	19	28	13	Urban	17
Blair	105	34	71	32	19	13	Rural	7
Bradford	69	21	48	31	33	17	Rural	7
Bucks	107	20	86	19	20	19	Urban	13
Butler	95	13	82	14	35	16	Rural	7
Cambria	98	34	64	35	16	23	Rural	12
Cameron	56	13	43	23	37	57	Rural	1
Carbon	80	34	46	42	19	7	Rural	5
Centre	98	18	80	18	1	0	Rural	1
Chester	102	8	94	8	48	7	Urban	7
Clarion	96	33	63	34	32	18	Rural	6
Clearfield	89	28	61	31	38	15	Rural	8
Clinton	86	26	60	30	33	12	Rural	1
Columbia	97	19	78	20	35	1	Rural	6
Crawford	46	7	39	15	32	8	Rural	2
Cumberland	99	15	84	15	37	16	Urban	8

County	Percent of Mandated Enrollment with Dental Exam (school and family dentist combined)	Percent of Mandated Enrollment with School Dentist Exam	Percent of Mandated Enrollment with Family Dentist Exam	Percent of All Exams Done by School Dentist	Percent of Exams with School Dentist That Were Referred	Percent of Referred Dentist Exams Returned Completed	Center for Rural PA Rural Status	Number of School Districts
Dauphin	97	29	68	30	32	6	Urban	9
Delaware	104	29	75	28	30	6	Urban	14
Elk	108	12	97	11	57	30	Rural	3
Erie	101	45	56	44	27	21	Urban	13
Fayette	79	53	27	66	21	17	Rural	6
Forest	83	28	55	34	30	56	Rural	1
Franklin	78	14	64	17	26	16	Rural	3
Fulton	82	31	51	38	25	12	Rural	3
Greene	89	47	42	53	16	38	Rural	5
Huntingdon	77	31	46	40	39	18	Rural	4
Indiana	100	31	69	31	31	18	Rural	7
Jefferson	86	27	59	32	23	8	Rural	3
Juniata	89	46	43	52	28	7	Rural	1
Lackawanna	87	27	60	31	26	25	Urban	10
Lancaster	110	17	94	15	20	26	Urban	14
Lawrence	81	23	58	28	41	5	Rural	8
Lebanon	90	32	57	36	41	6	Urban	6
Lehigh	108	13	95	12	32	9	Urban	8
Luzerne	93	37	56	40	22	16	Urban	9
Lycoming	73	21	52	29	23	23	Rural	7
McKean	66	15	51	22	27	19	Rural	5
Mercer	94	37	57	40	27	41	Rural	10
Mifflin	91	9	82	10	35	35	Rural	1
Monroe	98	34	64	34	23	2	Rural	2

County	Percent of Mandated Enrollment with Dental Exam (school and family dentist combined)	Percent of Mandated Enrollment with School Dentist Exam	Percent of Mandated Enrollment with Family Dentist Exam	Percent of All Exams Done by School Dentist	Percent of Exams with School Dentist That Were Referred	Percent of Referred Dentist Exams Returned Completed	Center for Rural PA Rural Status	Number of School Districts
Montgomery	113	14	100	12	53	11	Urban	20
Montour	100	11	89	11	13	0	Rural	1
Northampton	95	35	61	36	34	31	Urban	7
Northumberland	89	39	51	43	24	18	Rural	6
Perry	92	22	70	24	31	10	Rural	4
Philadelphia	34	0	34	0	.	.	Urban	1
Pike	99	34	65	34	34	23	Rural	2
Potter	89	30	58	34	46	37	Rural	5
Schuylkill	84	42	42	50	30	13	Rural	12
Snyder	45	13	33	28	21	3	Rural	2
Somerset	88	11	77	13	36	46	Rural	11
Susquehanna	72	19	53	26	72	3	Rural	4
Tioga	63	21	42	34	23	9	Rural	1
Union	88	13	75	15	18	0	Rural	2
Venango	81	25	57	30	27	23	Rural	5
Warren	87	21	66	24	26	4	Rural	1
Washington	80	32	49	39	32	17	Rural	14
Wayne	108	15	92	14	31	63	Rural	2
Westmoreland	94	26	69	27	36	20	Urban	17
Wyoming	98	44	54	45	45	13	Rural	2
York	88	22	66	25	32	6	Urban	13

* Excludes districts with dental hygiene services program (Sullivan County only has one school district that offers a Dental Hygiene Services Program). Data are aggregated from public school districts and do not include charter schools. Estimates exceed 100 percent for some counties due to reporting errors.

Table 19: Rural-Urban Differences in Characteristics
of the Mandated Dental Program by County
(Based on Aggregated Public School Districts*), 2015-2016

		Percent of Mandated Enrollment with Dental Exam (school and family dentist combined)	Percent of Mandated Enrollment with School Dentist Exam	Percent of Mandated Enrollment with Family Dentist Exam	Percent of All Exams Done by School Dentist	Percent of Exams with School Dentist That Were Referred	Percent of Referred Dentist Exams Returned Completed
Urban	Mean	**93.92**	**23.38**	**70.53**	**24.50**	**32.35**	**14.62**
	N	19	19	19	19	18	18
	Std. Dev.	16.846	11.130	17.450	12.106	9.235	7.807
Rural	Mean	**85.73**	**25.20**	**60.53**	**29.57**	**29.92**	**19.09**
	N	47	47	47	47	47	47
	Std. Dev.	14.119	11.405	16.127	12.684	11.320	16.447
Total	Mean	**88.09**	**24.68**	**63.41**	**28.11**	**30.59**	**17.85**
	N	66	66	66	66	65	65
	Std. Dev.	15.284	11.271	17.007	12.641	10.768	14.652
Sig. Test	*Eta-Squared*	*0.060*	*0.005*	*0.072*	*0.033*	*0.010*	*0.019*
	F	*4.067*	*0.349*	*4.972*	*2.215*	*0.658*	*1.216*
	Significance	*0.048*	*0.557*	*0.029*	*0.142*	*0.420*	*0.274*

* Excludes districts with a dental hygiene program (Sullivan County has a dental hygiene program only). Data are aggregated from public school districts and do not include charter schools. All counties are weighted equally in the averages and percents will not equal rural, urban, or state totals.

Scope and Coverage of the DHSP (Counties)

Table 20 presents selected statistics for the DHSP for public school districts aggregated to the county level. During the 2015-2016 academic year, there were 37 DHSPs operating in 22 counties. The first column of the table is the estimate of the percentage of students in the mandated grades who received a screening by the school hygienist.

There is wide latitude permitted in the scope of services offered in a DHSP plan. The program is not required to limit screenings to students in the mandated grades. The reported counts are ostensibly for screenings in the mandated grades, *but they may include additional services and/or include students in other grades*. This anomaly in the Commonwealth's data reporting is evident in the percentages reported in the first column of Table 20 where many are significantly greater than 100 percent. Moreover, the sum of students using a family dentist (second column) and those receiving screenings (first column) more often and more significantly exceeds 100 percent. In fact, this sum is less than 100 percent in only three of the 22 counties. Similar to the reported statistics for the MDP, these percentages are best viewed as ratios of service to enrollment in the mandated grades. The difference between rural and urban counties with respect to the percentage of students examined or screened was not statistically significant (first column, Table 21). The rural-urban difference with respect to the use of a family dentist in lieu of a dental screening also was not statistically significant.

Table 20: Characteristics of the Dental Hygiene Services Program by County
(Based on Aggregated Public School Districts*), 2015-2016

County	Percent of Mandated Enrollment Screened in Hygiene Program (Ratio of All Screenings to Enrollment in Mandated Grades)	Percent of Mandated Enrollment Using Family Dentist in Hygiene Program	Percent of Hygienist Screenings Referred	Percent of Hygienist Referrals Returned Completed	Percent of Total Enrollment Receiving Dental Education	Center for Rural PA Rural Status	Number of Districts
Adams	45	64	33	31	53	Rural	2
Allegheny	32	84	17	38	40	Urban	1
Berks	96	7	29	14	67	Urban	1
Centre	117	6	2	88	29	Rural	3
Chester	76	41	8	22	90	Urban	5
Clarion	226	49	0	.	30	Rural	1
Crawford	132	0	14	25	0	Rural	1
Dauphin	147	17	24	6	105	Urban	1
Delaware	25	122	0	.	8	Urban	1
Franklin	28	71	43	31	99	Rural	2
Lancaster	83	31	19	4	51	Urban	2
Lehigh	231	18	27	19	35	Urban	1
Luzerne	108	58	14	10	75	Urban	2
Lycoming	69	33	0	.	71	Rural	1
Mercer	131	22	12	81	29	Rural	2
Monroe	98	64	17	6	104	Rural	2
Montgomery	159	12	9	30	89	Urban	1
Northampton	179	31	7	19	108	Urban	1
Sullivan	51	47	0	.	29	Rural	1
Susquehanna	51	40	23	18	32	Rural	2

County	Percent of Mandated Enrollment Screened in Hygiene Program (Ratio of All Screenings to Enrollment in Mandated Grades)	Percent of Mandated Enrollment Using Family Dentist in Hygiene Program	Percent of Hygienist Screenings Referred	Percent of Hygienist Referrals Returned Completed	Percent of Total Enrollment Receiving Dental Education	Center for Rural PA Rural Status	Number of Districts
Tioga	99	53	36	19	24	Rural	1
York	64	32	10	3	88	Urban	3
* Excludes districts with a Mandated Dental Program. Only counties with at least one district with a Dental Hygiene Services Program are included. Data are aggregated from public school districts and do not include charter schools.							

Table 21: Rural-Urban Differences in Characteristics of the Dental Hygiene Services Program by County (Based on Aggregated Public School Districts*), 2015-2016

		Percent of Mandated Enrollment Screened in Hygiene Program	Percent of Mandated Enrollment Using Family Dentist in Hygiene Program	Percent of Hygienist Screenings Referred	Percent of Hygienist Referrals Returned Completed	Percent of Total Enrollment Receiving Dental Education
Urban	Mean	109.14	41.27	14.97	16.42	68.66
	N	11	11	11	10	11
	Std. Dev.	63.833	34.641	9.213	11.349	31.647
Rural	Mean	95.09	40.71	16.45	37.34	45.60
	N	11	11	11	8	11
	Std. Dev.	56.395	23.430	15.697	30.281	32.899
Total	Mean	102.12	40.99	15.71	25.72	57.13
	N	22	22	22	18	22
	Std. Dev.	59.215	28.861	12.582	23.669	33.639
Sig. Test	*Eta-Squared*	*0.015*	*0.000*	*0.004*	*0.204*	*0.123*
	F	*0.299*	*0.002*	*0.073*	*4.108*	*2.807*
	Significance	*0.591*	*0.965*	*0.790*	*0.060*	*0.109*

* Excludes districts with a Mandated Dental Program. Only counties with at least one district with a Dental Hygiene Services Program are included. Data are aggregated from public school districts and do not include charter schools. All counties are weighted equally in the averages and percents will not equal rural, urban, or state totals.

An assessment of the coverage of the MDP and DHSP at the county level revealed that most counties were at or approaching full coverage for mandated students. There was variation between counties, however, where some counties had greater coverage than others. Rural-urban differences at the county level were modest at best. Most counties are comprised of a number of individual school districts and this could mask patterns that may be present when school districts are used as the unit of analysis. A knowledge of patterns for counties provides useful information for the allocation of resources, but program differences exist as a school district phenomenon. Do rural-urban differences exist when looking through the lens of the school district? Is program

coverage associated with attributes of the school district? In the following section, the unit of analysis is changed from the county to the school district.

Scope and Coverage of the MDP (School Districts)

Rural-urban differences in MDP coverage for school districts are presented in the first column of Table 22. The results were very similar to those observed at the county level; the difference was statistically significant, but modest. In urban school districts, 96 percent of mandated grade students received an examination and, in rural school districts, 88 percent received examinations. The eta-squared is 0.04. Rural-urban differences were statistically significant for the percent of enrollment examined by a family dentist and for the percentage of examinations performed by the school dentist (columns 2 and 4 in Table 22). In both cases, the data indicated a greater reliance on the school dentist in rural school districts, although the associations were modest. A statistically significant difference also existed for the proportion of school dentist examinations that were referred for further treatment. The referral percentage is an indicator of the need for additional oral health care. Rural school districts had a higher rate of referrals, but the difference was modest.

Table 22: Rural-Urban Differences in Characteristics of the Mandated Dental Program by School District (Includes only those districts that have not chosen the Dental Hygiene Services Program), 2015-2016*

		Percent of Mandated Enrollment with Dental Exam (school and family dentist combined)	Percent of Mandated Enrollment with Family Dentist Exam	Percent of Mandated Enrollment with School Dentist Exam	Percent of All Exams Done by School Dentist	Percent of Exams with School Dentist That Were Referred	Percent of Referred Dentist Exams Returned Completed
Urban	Mean	96.11	71.31	24.79	26.59	29.49	16.82
	N	246	246	246	246	237	230
	Std. Dev.	23.224	30.190	21.594	22.952	21.764	22.338
Rural	Mean	87.55	60.62	26.93	31.17	33.98	20.12
	N	214	214	214	214	206	201
	Std. Dev.	20.432	23.415	17.926	19.934	22.400	22.862
Total	Mean	92.12	66.34	25.79	28.72	31.58	18.36
	N	460	460	460	460	443	431
	Std. Dev.	22.358	27.739	19.979	21.698	22.151	22.617
Sig. Test	*Eta-Squared*	*0.04*	*0.04*	*0.00*	*0.01*	*0.01*	*0.01*
	F	*17.373*	*17.622*	*1.305*	*5.151*	*4.559*	*2.289*
	Significance	*0.000*	*0.000*	*0.254*	*0.024*	*0.033*	*0.131*
*All school districts are weighted equally and the averages will not equal rural, urban, or state totals.							

Scope and Coverage of the DHSP (School Districts)

Since the number of school districts that administer a DHSP was quite small, rural-urban differences need to be very consistent to exhibit statistical significance. Rural-urban differences in the DHSP program by school district are presented in Table 23. Only the scope of dental education exhibits a statistically significant rural-urban difference (last column, Table 23). Urban school districts offered dental education to proportionally more students than their rural counterparts. The difference was quite large: 73 percent of urban students received some dental education, while only 52 percent of rural students have received this education.[23]

Table 23: Rural-Urban Differences in Characteristics of the Dental Hygiene Services Program by School District (Includes only those districts that have chosen the Dental Hygiene Services Program), 2015-2016*

		Percent of Mandated Enrollment Screened in Hygiene Program	Percent of Mandated Enrollment Using Family Dentist in Hygiene Program	Percent of Hygienist Screenings Referred	Percent of Hygienist Referrals Returned Completed	Percent of Total Enrollment Receiving Dental Education
Urban	Mean	99.58	42.30	11.73	24.62	72.58
	N	18	18	18	14	18
	Std. Dev.	63.366	36.884	10.280	24.429	30.377
Rural	Mean	81.94	45.05	19.63	38.98	51.51
	N	19	19	19	13	19
	Std. Dev.	54.960	22.366	17.914	30.492	35.185
Total	Mean	90.52	43.71	15.79	31.53	61.76
	N	37	37	37	27	37
	Std. Dev.	59.045	29.908	15.046	27.947	34.188
Sig. Test	*Eta-Squared*	*0.02*	*0.00*	*0.07*	*0.07*	*0.10*
	F	*0.821*	*0.076*	*2.666*	*1.838*	*3.784*
	Significance	*0.371*	*0.785*	*0.111*	*0.187*	*0.060*
*All school districts are weighted equally and the averages will not equal rural, urban or state totals.						

Dental Sealants and Fluoride Programs

[23] Correlations between characteristics of the DHSP and school district socio-economic characteristics were not calculated due to the small number of districts using the program.

Two preventive treatments, dental sealants and fluoride programs, are mentioned in the Pennsylvania code that authorizes the DHSP. They are mentioned as options but are not required. They are not mentioned in the code authorizing the MDP.

Only a small minority of districts have chosen to formalize these preventive treatments: 2 percent have a sealant program and 18 percent a fluoride program. All sealant programs are in districts with a DHSP; 43 percent of districts with a DHSP have a fluoride program while only 16 percent of districts with a MDP have instituted a fluoride program. Table 24 presents the frequency of fluoride programs in all districts (regardless of program type) by the rural-urban status of the district. Rural districts were much more likely to have a fluoride program: 30 percent of rural districts administered some form of fluoride treatment, while only 6 percent of urban districts did so. This difference was statistically significant.

It cannot be determined which factors school districts consider in choosing to incorporate a fluoride program into their school health program, but the disproportionate presence of programs in rural areas is consistent with geographic need for fluoride supplementation. Fluoridated public water is disproportionately found in urban and metropolitan areas. Rural areas are less likely to have fluoridated water and disproportionately rely on well water.

Table 24: Rural-Urban Differences in Fluoride Program by School District, 2015-2016

		Rural Status		Total	
		Urban	Rural		
Fluoride Program in District	No	247 93.6%	163 69.7%	410 82.3%	Chi-Squared= 48.72 Sig.= 0.000
	Yes	17 6.4%	71 30.3%	88 17.7%	
Total		264 100.0%	234 100.0%	498 100.0%	

Few school districts chose a sealant application program as part of their school health activities (Table 25); only 2 percent of all school districts engaged in sealant application. The difference between urban and rural areas was not statistically significant.

Table 25: Rural-Urban Differences in Sealant Application by School District, 2015-2016

		Rural Status		Total	
		Urban	Rural		
Sealant Application Program in District	No	260 98.5%	226 96.6%	486 97.6%	Chi-Squared= 1.91 Sig.= 0.167
	Yes	4 1.5%	8 3.4%	12 2.4%	
Total		264 100.0%	234 100.0%	498 100.0%	

Results from School Health Survey

Key informants associated with the school health program were interviewed as part of this study. The intent of the survey was to gain insights about the program's challenges and successes from those closest to the program. Key informants included school nurses, school dental hygienists and a school health coordinator. The survey was not intended to provide statistical estimates of the entire population of school dental programs since the sample size was small and the selection

was not random. Response percentages are presented below to allow the reader to gain a sense of the responses of key informants.

When asked about the school district's selection of a MDP or a DHSP, the participants frequently (74.1 percent) stated that their program was long-standing and the decision took place before their tenure. Three districts with MDPs discussed the transition from a DHSP to an MDP and commented that it was due to the elimination of the Certified School Dental Hygienist (CSDH) position, often when a CSDH retired.

The number of students that each school nurse or dental hygienist served varied from fewer than 100 to 18,000. During the interviews, it was noted that Pennsylvania sets limits on the student-to-school nurse ratio; however, there are no such limits for CSDHs. Due to the structure of the DHSP, these programs seem to offer less variation across districts than the MDP. The CSDH performs oral health screenings on students in mandated grades and in some instances, provides preventive services. The MDP was fulfilled in most instances (five of the districts surveyed) by school dentists, while in other instances (two of the districts surveyed), it was fulfilled using mobile dental units (with either equipment being brought into the schools or in a mobile capacity)[24]. Districts also used a combination of the two delivery methods, where the school dentist completed screenings for mandated grades and the school made the mobile services available for students in all grades (four of the districts surveyed).

[24] Due to the limited number of respondents, tables describing survey responses to this section are available in Appendix 5. The intent of the findings presented here is to highlight the insights offered by the respondents.

The majority of school districts with MDPs paid the school dentist directly (eight districts surveyed) and in some cases, the child's insurance was billed for school-based oral health services (three of the districts surveyed). This is particularly true in districts where mobile services were offered to children. Of the DHSPs surveyed, no difficulties were reported in identifying a school dentist. In two instances, respondents noted that the school dentist serving districts with DSHPs did not have a complicated role and that their primary responsibility was to review and approve the district's DHSP plan. Five of the district dentists had long-standing relationships with the school district. While 88.9 percent of respondents noted that there were no difficulties in finding a school dentist, one respondent representing an MDP stated that they had difficulty recruiting a dentist and another respondent anticipated difficulty finding a new school dentist when their current district dentist retires. The districts were both located in urban areas. In instances where districts reported no difficulty in finding a dentist to support an MDP, a long-standing relationship with the school district was often noted (five respondents). Only 7.4 percent of districts with either program reported the need to rely on multiple dentists to fulfill the mandate.

Respondents were asked their opinion regarding the impact of the oral health program within their district made on the oral health status of their students. In districts with DHSPs, 100 percent of respondents stated that the DHSP positively impacted the oral health of students in their districts. Respondents most frequently mentioned patient advocacy, care navigation, referral coordination, and oral health education as the sources of that impact (14 respondents). In districts with MDPs, 72.8 percent of respondents stated that the MDP positively impacted the oral health of students in their districts. The perceived impact was associated with access to oral health

services at school, leading to improved oral health. Some districts with MDPs and DHSPs chose to offer additional oral health services to students beyond the mandated screening or examination. Two thirds of districts offering additional services stated that they do so due to student and community need. This was true in both rural and urban settings. Some districts chose to offer oral health services to students in grades other than those mandated. Of the districts with DHSPs surveyed, 87.5 percent offered services to additional grades while 45.5 percent of districts with MDPs surveyed offered services to students in non-mandated grades. Specific services offered varied widely among DHSPs. In MDPs, services offered to additional grades were offered by mobile dental programs.

Following an oral health screening or examination, each child's parent or guardian must be informed in instances where follow-up care is necessary. Oral health screenings are often completed by dental hygienists and are not intended to provide diagnosis of dental disease, whereas dental examinations are often completed by dentists and may offer diagnosis of dental disease. Of the districts surveyed, 63 percent stated that they send a letter to the student's parent or guardian and follow-up as needed. Letters are either mailed or sent home with the student. The method varied by school district and by the age of the child screened. After parents were informed of any necessary follow-up care or treatment, some districts chose to follow-up to ensure that the treatment was completed. One hundred (100) percent of the districts with a DHSP who were surveyed indicated that they complete some type of follow-up to ensure treatment completion. Most frequently, the CSDH will re-screen children who were referred for further treatment. In 45.5 percent of districts with MDPs there was no follow-up to ensure referral completion. While follow-up is not mandated, when schools do offer follow-up, they serve as a

safety-net of sorts for students in need, often helping to navigate families to care. Of the districts who follow-up, the task falls largely on the school nurse.

When asked about difficulties in tracking referral completion, school nurses and school dental hygienists in districts with MDPs and DHSPs, respectively, stated that parent compliance in returning a completed referral form was the greatest challenge. This could explain why CSDHs in districts with DHSPs frequently re-screen children to ensure referral completion. Re-screening is often less burdensome than following a paper trail and the CSDH can quickly determine whether or not a child requires additional care. Urban districts with DHSPs also noted that the transient nature of their school district population adds challenges to following up on referral completion. If a child's dentist (family dentist) completes the school form and additional treatment is indicated, the school district typically does not intervene. In 18.8 percent of districts surveyed with DHSPs, the CSDH screened all children, regardless of whether the family dentist completed a form. In 12.5 percent of districts with DHSPs, the respondent reported following up with the child's family if the family dentist indicated the need for additional treatment.

When asked about challenges with the oral health screening process, respondents most frequently noted difficulty in finding follow up care for children (i.e., providers accepting MA and children who are uninsured). This was true in both rural and urban settings, and across both school oral health programs. The most frequent response from districts with DHSPs, particularly in urban school districts, was non-compliant parents or parents not valuing oral health. When asked about notable difficulties encountered in the program, respondents indicated difficulties with limited time to serve a large number of students, challenges finding physical space within

schools for conducting the screenings/examinations, and difficulty taking students out of class for screenings/examinations. In MDPs in both rural and urban areas, respondents noted difficulty coordinating dental exams with the dentist's schedule, meeting the dentist's needs (supplying a dental assistant, etc.), and the limited availability of the school dentist to complete exams. Language barriers were noted as a challenge in urban areas in both MDPs and DHSPs. One respondent in an urban MDP noted that the lack of comprehensive care is a difficulty, stating that a "quick look" doesn't meet the needs of the students.

When asked about components of the existing school oral health program that are working particularly well, respondents from DHSPs overwhelmingly answered oral health education and oral health screenings. The most frequent answer within MDPs was oral health evaluations. Respondents from both programs noted affiliations or connections to brick and mortar dental clinics as a positive component of their current oral health program. Respondents from DHSPs noted care navigation and their school district's investment in the value of oral health. While respondents from districts with DHSPs typically had two to three responses to this question, those from MDPs were less likely to provide more than one response. Other responses from MDPs included preventive services, increasing parental awareness of oral health, a reliable school district dentist, and oral health care navigation. There were no significant differences between rural and urban program location.

Respondents were asked their opinion about the components of an ideal school-based oral health program. Preventive services were most frequently mentioned by respondents from both MDPs and DHSPs and in both urban and rural areas. School-based health clinics offering both medical

and dental services to students were mentioned by six respondents. Access to comprehensive care was reflected in seven other responses, including restorative services, mobile services, and increasing the number of local dental providers willing to accept MA and CHIP. One respondent also noted that effective digital data collection to replace the existing paper forms from PA DOH would be ideal.

Finally, respondents were asked if they had any message that they felt was important to convey to the Pennsylvania General Assembly. Overwhelmingly, respondents felt it was important for legislators to understand that comprehensive oral health care is needed in schools. They also noted that the availability of comprehensive oral health services will need financial support. Good oral health will promote students' ability to learn while decreasing the number of school days lost to dental pain. In addition to recognizing that dental pain can hinder a child's ability to learn, four respondents highlighted the connection between oral health and overall, systemic health. One quarter of respondents from schools with a DHSP advised that the DHSP is an important school program and highlighted the need to continue to facilitate school certification for the registered dental hygienists who staff these programs.

Given the opportunity to provide any final comments, respondents highlighted the need for funding to support school oral health programs and the need to increase the number of dentists who participate in MA and CHIP. Other responses included consideration of a mandated oral health screening at the high school level, the recommendation for oral health education, access to language (interpretative) services, and the need for better oral health data collection and surveillance.

Summary of School Health Initiatives

The school health program is a very important gateway to oral health care. There is no other gateway that is open to almost all children in Pennsylvania, rich and poor, urban and rural, healthy and not healthy. School health programs have the potential to serve all children. If the goal is to ensure access to oral health care for all Pennsylvania children, then school health is arguably the entry point with the greatest potential for success. However, it is only one point of entry and it is only a potential comprehensive solution. Schools cannot provide a continuity of care. Their priority is not in providing health care services, but in providing education. They offer a gateway and only that. What happens after entering the health care system is what will ultimately determine progress toward the goal of equitable access and use.

To understand the role of the school health program in oral health care for children, the first question to address is the number of students receiving dental care at school. Although the data system designed to administer the school health program prohibits an exact estimate of program coverage, it does allow for a general impression of the scope and coverage of the program. The analyses based on those data indicated that most students receive that care.

Pennsylvania code allows for two types of programs to fulfill the mandate of ensuring or providing dental examinations/screenings to students upon entering school and in Grades 3 and 7. The first is the Mandated Dental Program (MDP). It requires that students provide verification of a dental examination by their family dentist, or in the absence of that, verification that the school conducts the examination through a school dentist. In the 2015-2016 academic year, 93 percent of school districts chose the MDP. The second option is the Dental Hygiene Services

Program (DHSP). In that option, all students in the mandated grades are required to either see their family dentist or be screened and evaluated by the school hygienist. Only 7 percent of districts chose this option in the 2015-2016 academic year.

The best estimate is that approximately 89 percent of students in the mandated grades in districts using the MDP had an examination. Because of data reporting anomalies, it is challenging to obtain an exact estimate of the percentage of students being examined/screened in the DHSP. The data suggested that coverage is complete or nearly complete. Urban school districts and school districts that had higher socio-economic scores tended to have slightly greater coverage than rural districts and districts with lesser socio-economic scores.

The best estimate is that most students[25] are entering the dental health care system through the school-based dental services programs. It was previously asserted that what happens after receiving school based oral health services will ultimately determine progress toward the goal of equitable access and use. It was noted earlier that schools cannot provide a continuity of care because they are not health care providers. They do, in some cases, participate in the initial step in establishing a dental home and that participation has been documented in the school health data system.

[25] "Most" in this context implies most in the grades mandated by code. It does not imply all students in all grades.

If a need for treatment is determined in the initial examination/screening, the program is required to notify the student's parents and request that the parents return verification that the treatment was completed. On average, in school districts with an MDP, about 32 percent of all students examined by a school dentist were referred for further treatment and parents verified that treatment was completed for approximately 18 percent of those students (Table 22). That number reflects the percentage of parents who chose to notify the school that the treatment was completed. It is impossible to verify how many additional students were treated for whom the school was not notified. For school districts using a DHSP, on average, 16 percent of students were referred and, in 32 percent of those referrals, the school district was notified that treatment was completed (Table 23).

These numbers are important since it is an indication of a school's participation in assisting in establishing regular care and a continuity of care. For students seeing a family dentist, the school's role in that participation is minimal and its role is that of a reminder, directing patients to their dental home. For students who see a school dentist or are screened by a school hygienist, the school's role is more important. It is a reasonable assumption that all, or at least most, of those students who choose to see a school provider do not have a regular source of dental care. The school program is an introduction to that care for those students, and, for those who are referred, the program is an introduction to a regular source of care. On average, about 26 percent of students in the mandated grades of MDP districts are examined by a school dentist (Table 22). Of those, 32 percent were referred and at least 18 percent of those referred had follow-up care. Considering these numbers, including the reminders, the urgings, and the introductions, the counts are significant, but they do not necessarily imply that the program has a significant impact

on the issue of access. They address the immediate need for evaluative and preventive care, but only in the short term. The processes that institute the continuation of care and the establishment of a dental home are not assured by the program. Those processes are beyond the scope of school health.

School health programs can contribute to the goal of equitable health care access and use. The impact of the school health program can be maximized by linking the delivery of care in the school to external systems of care. This may include linking students with Medicaid, CHIP, and private dentists. Supports, such as guidance and assistance, could be included in the follow-up to referrals for treatment. It also could include linkages to other social services that share the goals of the school oral health program.

This general observation from the analysis of the archival data also was observed in the results from the survey. Regardless of program type or location, those surveyed believed that the school-based oral health program increased access to comprehensive oral health services for the students within their districts. All children have access to school regardless of their socio-economic status. Making comprehensive oral health services available to all children in a school-based setting could serve as an entry point into the oral health system for children and their families. The general consensus was that the current mandates are not enough. Respondents, in some cases, expressed this directly, while others indicated that their district provided services beyond those mandated in an effort to meet student and community needs. In addition to providing screenings and oral health care, respondents agreed that the school-based oral health program can serve as a source of education and care navigation for students; however, time and funding often

hinder efforts to provide these services to all students. Given the influence of good oral health in a child's ability to learn and grow and the impact oral health has on overall, systemic health, respondents agreed that more comprehensive school oral health programs will have a positive effect on all children.

Findings of the survey conducted as part of this research were similar to the findings of surveys conducted by the Children's Dental Health Project, which explored dental screening laws nationwide (Children's Dental Health Project, 2019). The primary intent of dental screening laws, including Pennsylvania's, is to ensure that children are free of dental disease. The secondary, and more challenging, aspect of such programs is the intent to establish dental homes for children. The report from the Children's Dental Health Project notes barriers consistent with those identified in this research regarding the school's role in connecting children to care. These barriers include identifying providers who participate in the MA program, lack of workforce capacity within the school to make and track dental referrals, lack of compliance with screenings and referrals, and insufficient parental value and education concerning oral health.

The Supply and Distribution of Dentists in Pennsylvania

Considering dentist supply as a condition that "frames" access to oral health care for low-income children is a productive approach to understanding the findings of this research. As a frame, it defines the arena in which oral health care is delivered but does not fully determine it. The overall supply of dentists and its geographic distribution need to be assessed. Distribution is a special case of supply and can be considered as the supply for areal partitions of a larger area of interest. Calculating the distribution of dentists consists of calculating the supply for each

geographic partition of the entire area of interest. As a result, the distribution of dentists by county is achieved by calculating the supply of dentists for each county.

The supply of dentists provides a framework for oral health care for low-income and rural children in a number of ways. The most fundamental way is that it places limits on availability. Consider the extreme case of a zero supply of dentists. In that case, there would be no access. The other extreme also can be considered, i.e., the situation in which the supply greatly exceeds need. In that case, it would be expected that a framework of ready availability would be present. For areas of any significant size, both scenarios are highly unlikely and neither extreme is the case for Pennsylvania as a whole. It is when supply is in an intermediate, and a more normal range, that the manner in which supply and access take on a more complex character, especially for low-income and rural populations.

With the exception of two rural counties without a dentist, areas in Pennsylvania are characterized by an intermediate supply range,[26] and the range exhibits a great deal of variation, from a very low supply to an abundant supply. The local supply (distribution) and the overall supply of dentists frame access and use, both independently and interactively.

There are three ways in which the dentist supply of the intermediate range defines access to health care for low-income and rural residents. One way is by setting absolute limits as

[26] There are many smaller areas that do not have a resident dentist. For these areas, there often is a dentist in a neighboring area. Because the definition of reasonable market areas for a dentist is subject to interpretation, classifying these areas as having no access due to supply also is subject to interpretation. Depending on the way access is defined, these areas may be classified as a "no access" area in some contexts and "low access" in other contexts.

illustrated by the two extreme scenarios previously described. The second way is that the general supply of dentists affects its distribution. This is quite important to service in rural areas. When the overall supply is relatively tight with respect to demand, dentists will be more likely to locate in areas with the greatest income potential, primarily suburban and wealthier urban areas. Lower income rural and inner-city areas become less attractive choices when the overall supply is low and market opportunities are ample in higher income areas (Schwartz, 2007). The third way is that under the same tight supply condition, dentists will be less likely to participate in Medicaid programs or to include publicly insured patients in their panel (Schwartz, 2007).

The research team considered the effect of dentist supply as a "frame" because it is not determinative of behavior. It serves as a frame within which personal decisions of dentists take place and personal decisions of (potential) patients take place. It also interacts with other influences (frames) on access. Other influences include the presence of dental hygienists and other oral health practitioners, the attitudes of dentists toward the nature of dentistry, dentists' attitudes about the importance of public health dentistry, the reimbursement schedule offered by public insurers, the existence and distribution of special programs like Community Health Centers, the school health program, Head Start, Medicaid, CHIP, and other programs as well as other social and economic factors.

One important consideration is subcultural patterns of use in low-income and low-service populations (Schwartz, et al., 2003). When a community has historically experienced a pattern of limited access because of low supply or economic factors, the cultural expectation of seeking care decreases. The idea of going without care is seen as less of an aberration than it is in

subcultures that have historically experienced easy access and ample supply. The meanings associated with seeking care are different across subcultures and have evolved partly because of the local supply of dentists and ease of access. In these cases, increasing access by increasing supply or lessening the economic burden of receiving care will not immediately change use patterns. Only after time, in the presence of adequate supply or low cost, will the cultural expectation and meaning evolve and change. This is a side effect of demand that is partially framed by the supply of dentists.

The factors affecting access and use are numerous and interrelated; isolating the effect of any single factor is an endeavor that is difficult to accomplish. In the presence of little variance in overall supply, a recent and persistent trend has emerged. There has been a continual decrease in use of working-age adults since the early 2000s. This is true of rich and poor, insured and uninsured, urban and rural, and in the presence of modest and abundant local supply. At the same time, there has been an increase in use among children. Although both the decrease in use for adults and the increase in use for children has occurred in all groups, some groups have shown greater change (Munson and Vujicic, 2016b; Nasseh, 2013; Ku, 2013; U.S. Health and Human Services, 2017).

It is difficult to identify all causes of these changes but the differential effect among sub-groups can provide a clue to some. In the early 2000's, Medicaid dental service was restricted for adults and increased for children. As might be expected, both adults with Medicaid and children with Medicaid have shown a greater change than their non-Medicaid age equivalents. For adults with Medicaid, there has been a greater decrease in use and for children with Medicaid there has been

a greater increase in use than that experienced in other groups. Overall for both age groups, Medicaid use is still less than their non-Medicaid counterparts. This twofold pattern of differential change and the persistence of different use levels illustrates that both the immediate economic effect of increased coverage and the effect of differential subcultural expectations frame utilization. Other factors that have been identified as affecting the decrease of use among adults are a self-assessed decrease in need and the economic recession of 2007 (Yarborough, 2014).

The Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services has established thresholds for defining an area as a supply shortage area. These thresholds are calculated for specific geographic areas, population groups, and/or facilities. Qualified areas can be federally designated as a Dental Health Professional Shortage Area (Dental HPSA) and may be eligible for federal aid to reduce the shortage. HRSA has established a ratio of between 3,000 and 4,000 people-per-dentist as the threshold to qualify as a Dental HPSA. This almost certainly is a lower supply than the supply at which local supply begins to affect access and use. Even in the absence of identifying an exact supply level at which differential access for low-income and rural populations is set in motion, one can compare supply levels for different areas under the assumption that some effect is potentially present at all levels.

The adequacy of the size of the overall dentist workforce in relation to need or demand can be assessed by considering the population-to-dentist ratio. That type of evaluation assumes that all patients have equal access to all dentists. Demand, as measured by current use, is not the same as

need. Need, as suggested by public health scholars, exceeds current utilization levels. They recommend that everyone receive a preventive visit, including an examination and a prophylaxis, at least once a year. Those visits, in combination with other treatment visits, would result in an estimate of considerably more than 400 million annual visits to address the national need, and could be considerably greater.[27] The current demand, in contrast, is considerably less. Meyerhoefer, et al. (2016) estimate that current demand, as measured by use, is less than 300 million visits annually. Current supply is adequate to fulfill demand when it is measured by current use.

Using a conservative 400 million annual visit estimate of need and 2,500 annual visits per dentist results in a required supply of 160,000 clinical dentists. That need can be accommodated by the current supply of dentists, which is over 196,000.[28] When using the ADA estimates, Pennsylvania's supply is nearly identical to the nation as a whole, and therefore, the supply in Pennsylvania also is adequate to meet need. Using the more conservative estimate of the number of active clinical dentists used elsewhere in this report, the supply is estimated to be much closer to the need, but still exceeds it.

Using a more liberal definition of need, such as one suggested by more than a single preventive visit per year, need can rise to 500 million annual visits or more nationally. Using the 500 million visit need estimate, 200,000 dentists would be required. This is a number that exceeds the

[27] Since some health advocates recommend one prophylaxis annually while others recommend two or more, and since oral health levels may change, the actual number could fall in a broad range. Nevertheless, it is at least 400 million.

[28] These calculations assume that each dentist provides full-time clinical service and does not consider part-time dentists. Each dentist is assumed to schedule 2,500 visits per year. This overestimate resulting from the assumption of full-time clinical work is somewhat attenuated by using the 2,500 visit rate. Estimates of annual visit capacity range from 2,500 to 3,000, depending on the number of clinical auxiliary staff.

current supply. In all of these scenarios, the expectation that all dentists are participating in full-time clinical care is unrealistic. Consequently, the supply levels will overestimate the amount of clinical service available.

Despite trends in declining patient care visits per dentist per week (Health Policy Institute, 2018b), it appears that the total workforce is adequate to meet dental health care needs under the assumption of equal and universal access and using conservative estimates of need. This is true in Pennsylvania as well as the nation as a whole. However, when using the more conservative supply estimates for Pennsylvania, the supply is measured to be much closer to the total need and would certainly be inadequate when using a more liberal estimate of need. Of course, this is a "modeled" adequacy based on the assumption of universal and equal access. Given the adequacy of overall supply in this "modeled" world, the issue of geographic distribution and differential access assumes a greater importance. This is the topic that will be addressed in the next section.

The Supply and Distribution of Dentists in Pennsylvania--Distribution

Distribution is simply a special case of supply. One can consider distribution as the supply for areal partitions of a larger area of interest. In addition to calculating the population-to-dentist ratio for specific geographic partitions of Pennsylvania, the comparison of urban and rural ratios also is a concern. In this study, the research team defined rural using the Center for Rural Pennsylvania's definition of rural as follows: counties and school districts are considered rural if they have a population density less than 284 persons-per-square mile. The benchmark of 284 is the density for Pennsylvania as a whole. In this study, the research team used both counties and school districts in its analyses. All population-to-dentist ratios in this section of the report use only active clinical dentists in the calculation of the ratio (described in the methods section).

Table 26 and Figure 6 present the population-to-dentist ratios for counties in Pennsylvania. Figure 6 shows that the highest population-normed dentist supplies are found in and around metropolitan areas of Pennsylvania.[29] The lowest supply is found in rural counties. Figure 7 presents the population-to-dentist ratio by Pennsylvania school district. Figure 8 shows school districts without an active clinical dentist. It is important to note that the majority of these school districts are rural.

[29] In all of the maps that divide areas into three groups (low, medium, and high) presented in this report, the groups are defined by tertiles, i.e., the three groups have equal number of cases.

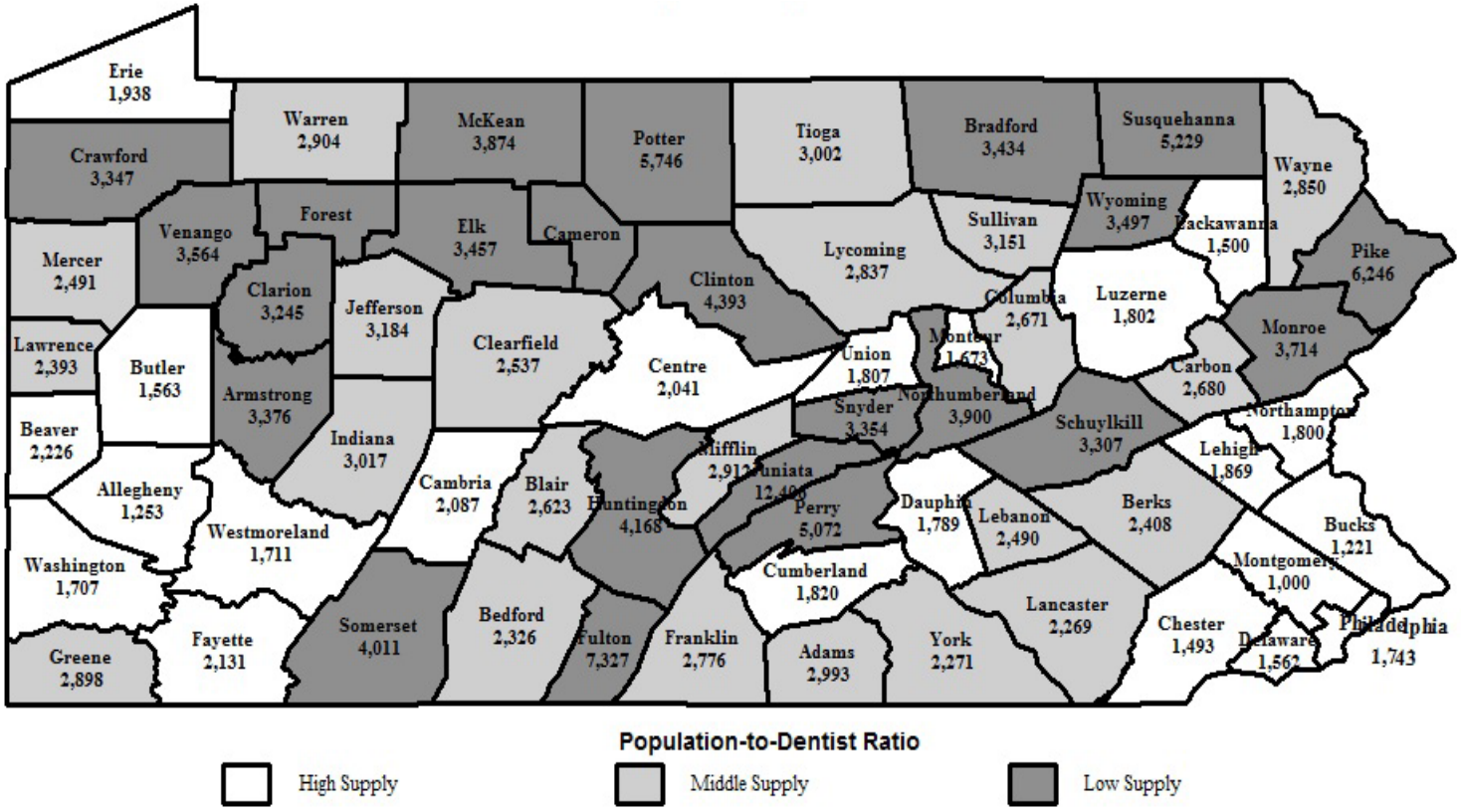
Table 26: Population-to-Dentist Ratio by County and Rural Status, 2017

County	Population to Active Clinical Dentist Ratio	Center for Rural Pennsylvania Rural Status
Adams	2,993	Rural
Allegheny	1,253	Urban
Armstrong	3,376	Rural
Beaver	2,226	Urban
Bedford	2,326	Rural
Berks	2,408	Urban
Blair	2,623	Rural
Bradford	3,434	Rural
Bucks	1,221	Urban
Butler	1,563	Rural
Cambria	2,087	Rural
Cameron	(no dentists)	Rural
Carbon	2,680	Rural
Centre	2,041	Rural
Chester	1,493	Urban
Clarion	3,245	Rural
Clearfield	2,537	Rural
Clinton	4,393	Rural
Columbia	2,671	Rural
Crawford	3,347	Rural
Cumberland	1,820	Urban
Dauphin	1,789	Urban
Delaware	1,562	Urban
Elk	3,457	Rural
Erie	1,938	Urban
Fayette	2,131	Rural
Forest	(no dentists)	Rural
Franklin	2,776	Rural
Fulton	7,327	Rural
Greene	2,898	Rural
Huntingdon	4,168	Rural
Indiana	3,017	Rural
Jefferson	3,184	Rural
Juniata	12,406	Rural

County	Population to Active Clinical Dentist Ratio	Center for Rural Pennsylvania Rural Status
Lackawanna	1,500	Urban
Lancaster	2,269	Urban
Lawrence	2,393	Rural
Lebanon	2,490	Urban
Lehigh	1,869	Urban
Luzerne	1,802	Urban
Lycoming	2,837	Rural
McKean	3,874	Rural
Mercer	2,491	Rural
Mifflin	2,912	Rural
Monroe	3,714	Rural
Montgomery	1,000	Urban
Montour	1,673	Rural
Northampton	1,800	Urban
Northumberland	3,900	Rural
Perry	5,072	Rural
Philadelphia	1,743	Urban
Pike	6,246	Rural
Potter	5,746	Rural
Schuylkill	3,307	Rural
Snyder	3,354	Rural
Somerset	4,011	Rural
Sullivan	3,151	Rural
Susquehanna	5,229	Rural
Tioga	3,002	Rural
Union	1,807	Rural
Venango	3,564	Rural
Warren	2,904	Rural
Washington	1,707	Rural
Wayne	2,850	Rural
Westmoreland	1,711	Urban
Wyoming	3,497	Rural
York	2,271	Urban

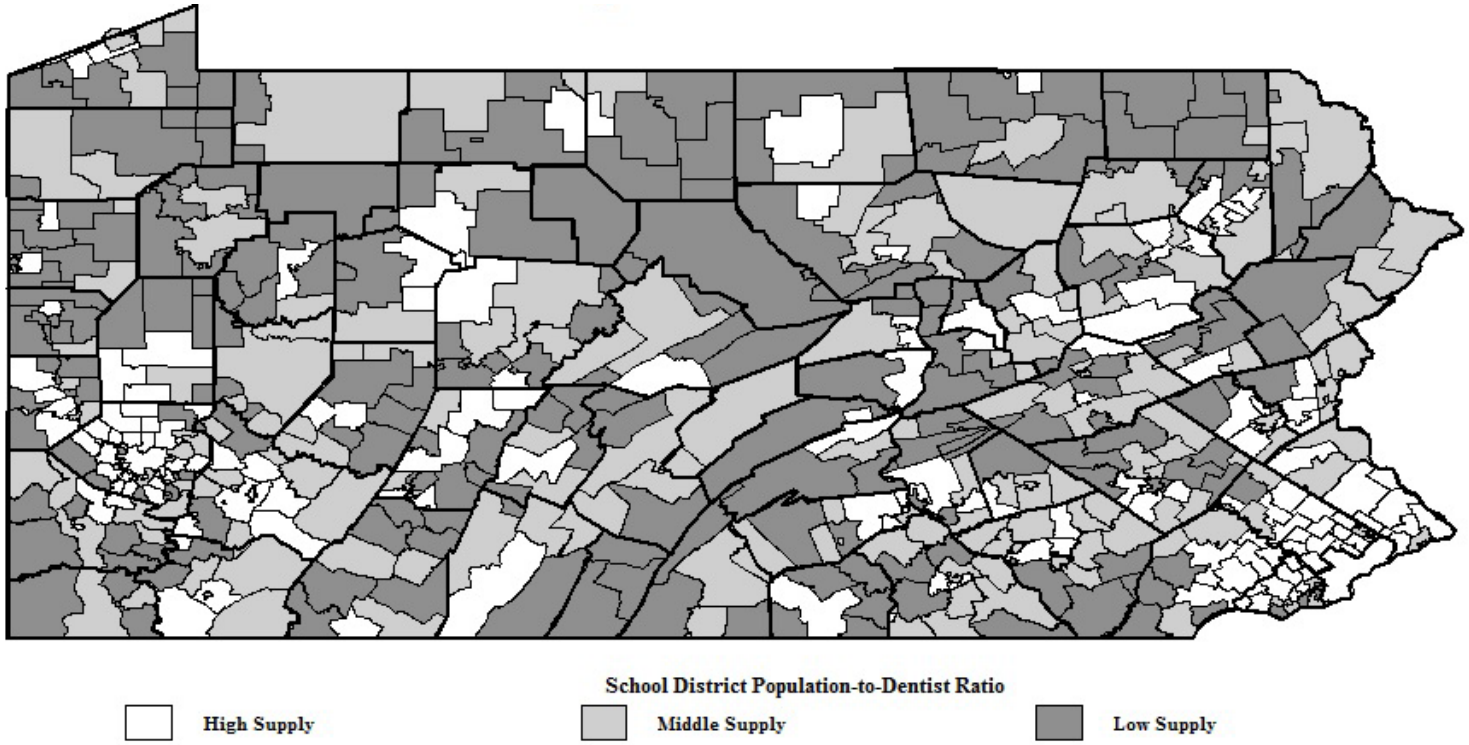
Source: American Dental Association Masterfile

Figure 6: Population-to-Dentist Ratio by County, 2017
(Divided into equal thirds of counties)



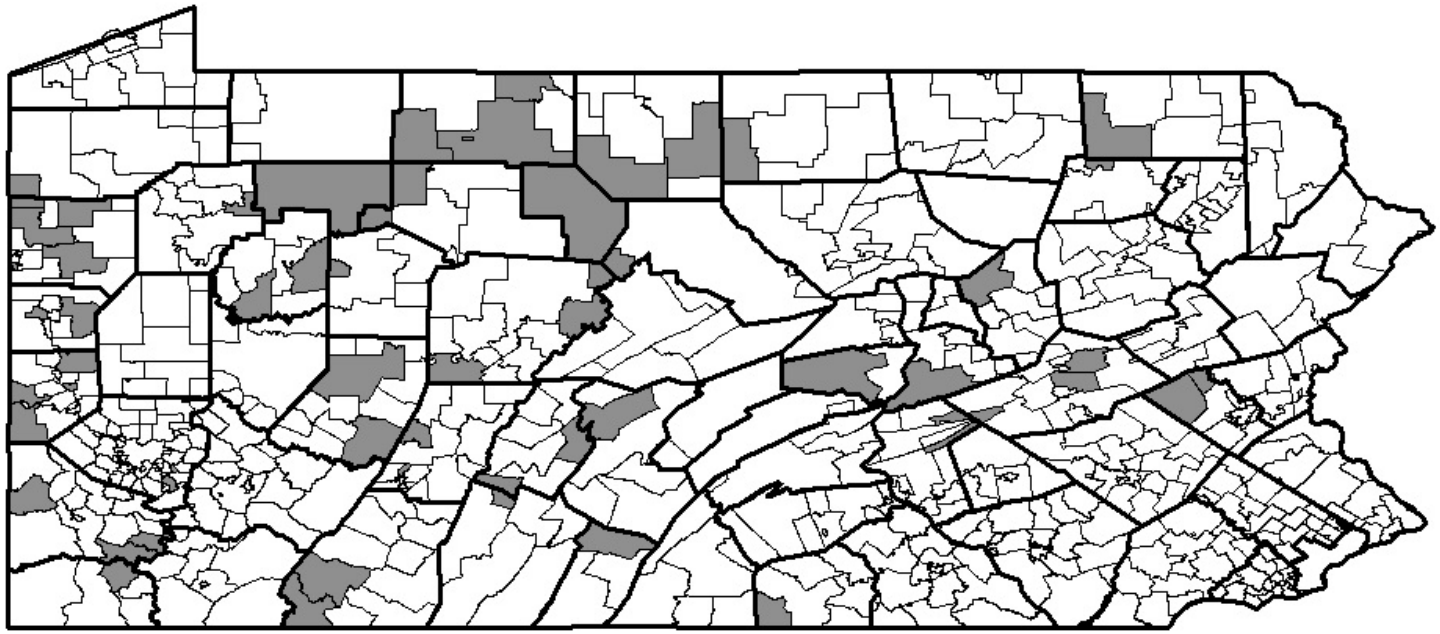
Source: American Dental Association Masterfile

Figure 7: Population-to-Dentist Ratio by School District, 2017
(School districts are divided into three equal groups)



Source: American Dental Association Masterfile

Figure 8: School Districts Without an Active Clinical Dentist, 2017
(Shaded areas are school districts without a clinical dentist)



Source: American Dental Association Masterfile

In Table 27, average ratios for rural and urban counties are compared. It is important to note that the table presents averages for county ratios and is not the same as the Pennsylvania ratio as a whole or for the total population in urban and rural counties. That is, each county is weighted equally. Larger counties have the same weight as smaller counties. The average rural county ratio is nearly twice that of the average urban county ratio, 3,477 and 1,798, respectively. This difference is statistically significant (see "F" ratio).[30] The eta-squared presented in the table (0.21) indicates that 21 percent of all the statistical variation in county ratios can be statistically "explained" by the rural-urban status of a county.

To further illustrate the disparity between urban and rural dentist supply, Figure 5 presents the counties that have been designated as whole county Dental HPSAs by the rural-urban status of the county. To be designated as a Dental HPSA, a local area must apply for the status. The application is reviewed by PA DOH's Bureau of Health Planning and the designation is approved and assigned by HRSA. Although eligibility criteria are complex, the main eligibility criterion is that the proposed area meets a threshold ratio of population-to-dentists. HPSAs can be a simple geographic HPSA, a special-population-based HPSA, or a facility-based HPSA. All whole-county Dental HPSAs are special population (low-income) HPSAs. Smaller areas also can be designated. This is the case for small sections of Pennsylvania's cities. Once designated, an area qualifies to establish federally-supported clinics, as a site for provider loan repayment programs, and for preferential reimbursement from public insurers.

[30] The F-ratio is a statistic that is associated with a probability statistic. By convention, if the probability is 0.05 or less, the difference is considered to be statistically significant. Statistical significance implies that the difference is highly unlikely to have occurred by chance or by random influences. Statistical significance does not indicate substantive or theoretical significance. In this case, the eta-squared statistic of 0.21 indicates an important substantive difference. Eta-squared is a measure of association between two variables and is an analog to the more familiar correlation coefficient. The equivalent correlation coefficient would be equal to the square root of 0.21 or 0.46.

Figure 5 (Page 71) indicates that nearly all (41 out of 48) rural counties are designated as whole county Dental HPSAs, while only a few (three out of 19) urban counties are so designated. There are smaller area Dental HPSAs in urban counties and in some rural counties. These include Adams-Gettysburg and surrounding area, Allegheny-parts of Pittsburgh, Delaware-parts of Chester City, Franklin-two townships, Lancaster-parts of Lancaster City, Lebanon-parts of Lebanon City, Northampton-parts of Bethlehem and Easton, Perry-western portion, Philadelphia-parts of Philadelphia City, and York-parts of York City.

Table 27: County Population-to-Dentist Ratio by Rural Status, 2017

Center for Rural Population Rural Status	Mean	N
Urban	1,798	19
Rural	3,477	46
Total	2,986	65

Source: American Dental Association Masterfile

Tables 28 and 29 present counts of pediatric dentists by county. The total number of pediatric dentists in Pennsylvania is few (208). This is not surprising since only about 3 percent of dentists nationally claim a pediatric specialty (Kaiser Family Foundation, 2018). In Pennsylvania, this percentage is also about 3 percent. Many general dentists will treat young children, while others are reluctant to do so (Pennsylvania Department of Health, 2018). Consequently, the supply of pediatric dentists is not the only indicator of service availability for children. PA DOH (2018) reports that among all dentists, 90 percent will treat patients 5 years old or older, but only 12 percent will treat infants. The American Academy of Pediatric Dentistry, the American Dental Association, and the American Academy of Pediatrics recommend that children visit the dentist by age 1 (American Academy of Pediatrics, 2014).

All urban counties are home to at least one pediatric dentist, while pediatric dentists are located in only 23 percent of rural counties.

Table 28: Active Clinical Pediatric Dentists by County and Rural Status, 2017

County	Number of Active Clinical Pediatric Dentists	Center for Rural Pennsylvania Rural Status
Adams	3	Rural
Allegheny	25	Urban
Armstrong	0	Rural
Beaver	3	Urban
Bedford	0	Rural
Berks	3	Urban
Blair	0	Rural
Bradford	0	Rural
Bucks	20	Urban
Butler	5	Rural
Cambria	0	Rural
Cameron	0	Rural
Carbon	0	Rural
Centre	4	Rural
Chester	9	Urban
Clarion	0	Rural
Clearfield	0	Rural
Clinton	0	Rural
Columbia	1	Rural
Crawford	0	Rural
Cumberland	3	Urban
Dauphin	4	Urban
Delaware	10	Urban
Elk	0	Rural
Erie	4	Urban
Fayette	2	Rural
Forest	0	Rural
Franklin	0	Rural
Fulton	0	Rural
Greene	0	Rural
Huntingdon	0	Rural
Indiana	0	Rural
Jefferson	0	Rural
Juniata	0	Rural
Lackawanna	7	Urban

County	Number of Active Clinical Pediatric Dentists	Center for Rural Pennsylvania Rural Status
Lancaster	10	Urban
Lawrence	0	Rural
Lebanon	1	Urban
Lehigh	10	Urban
Luzerne	2	Urban
Lycoming	1	Rural
McKean	0	Rural
Mercer	0	Rural
Mifflin	0	Rural
Monroe	0	Rural
Montgomery	33	Urban
Montour	1	Rural
Northampton	3	Urban
Northumberland	0	Rural
Perry	0	Rural
Philadelphia	27	Urban
Pike	0	Rural
Potter	0	Rural
Schuylkill	0	Rural
Snyder	0	Rural
Somerset	1	Rural
Sullivan	0	Rural
Susquehanna	0	Rural
Tioga	0	Rural
Union	2	Rural
Venango	0	Rural
Warren	0	Rural
Washington	3	Rural
Wayne	1	Rural
Westmoreland	5	Urban
Wyoming	0	Rural
York	5	Urban

Source: American Dental Association Masterfile

Table 29: Presence of Pediatric Dentist in County by
Center for Rural Pennsylvania Rural Status, 2017

		Center for Rural Pennsylvania Rural Status		
		Urban	Rural	Total
Presence of Pediatric Dentist in County	No	0 (0 %)	37 (77%)	37 (55%)
	Yes	19 (100%)	11 (23%)	30 (45%)
	Total	19 (100%)	48 (100%)	67 (100%)

Source: American Dental Association Masterfile

The results above are quite categorical: urban counties have a more favorable supply of dentists and a greater supply of pediatric dentists. This is consistent with long-standing trends in the geographic distribution of dentists and other health care professionals (Schwartz, 2007, 2008).

The Supply and Distribution of Dentists in Pennsylvania: Summary of Current Supply and Distribution

The data that describe the overall supply and distribution of dentists within Pennsylvania suggest some clear and unequivocal patterns:

- Pennsylvania's overall supply of dentists is nearly the same as that for the United States as a whole.
- The overall supply of dentists in Pennsylvania is sufficient to meet current demand under the assumption of equal access for everyone.
- The overall supply of dentists in Pennsylvania is sufficient to meet a conservative estimate of the need under the assumption of equal access for everyone.

- Geographic access is not equal as urban rates of population-normed dentist supply are nearly twice that of rural rates. This pattern has been demonstrated at both the county and school district levels.
- In the absence of an oversupply of dentists, dentists have financial incentives to avoid rural areas and to avoid treating patients with public insurance (Medicare and Medicaid). As long as there is an adequate market among patients who self-pay and patients with commercial insurance (which tends to provide higher rates of reimbursement), dentists will gravitate to this market.
- Considering these patterns, the issue of most importance for public policy is the geographic distribution of dentists. The issue of overall supply is of a lesser importance but should also be considered.

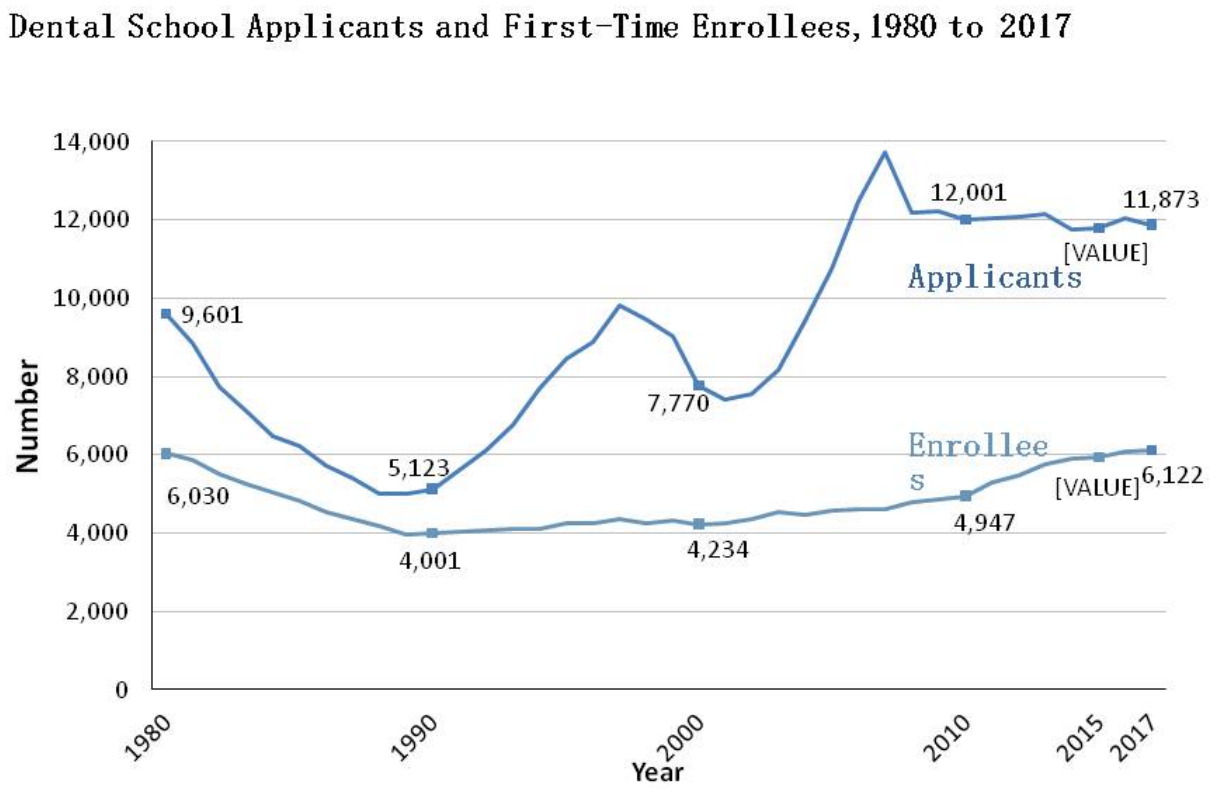
The Supply and Distribution of Dentists in Pennsylvania: Looking to the Future

The future supply of dentists is largely dependent on two factors: (1) the rate of new dentists entering the workforce and (2) the retirement rates of the existing dentist workforce. The former relies on assumptions about the future, the latter largely on the existing age structure of the current workforce. The ADA (Munson and Vujicic, 2016) has projected the national dentist supply through the year 2035. They used several models that differ with respect to their assumptions about dental school graduation rates and dentist retirement rates. The ADA has projected that the population-normed dentist supply will, at the minimum, remain at current levels, and at the maximum, increase significantly. These projections have been significantly influenced by the recent trend of increasing enrollment in dental schools. Age of retirement also has increased from 66.1 years in 2005 to 68.8 years in 2015 (Munson and Vujicic, 2016). The

graduation rates of Pennsylvania dental schools also have exhibited an increase in recent years, but not as pronounced as the nation as a whole (see Figures 9 and 10).

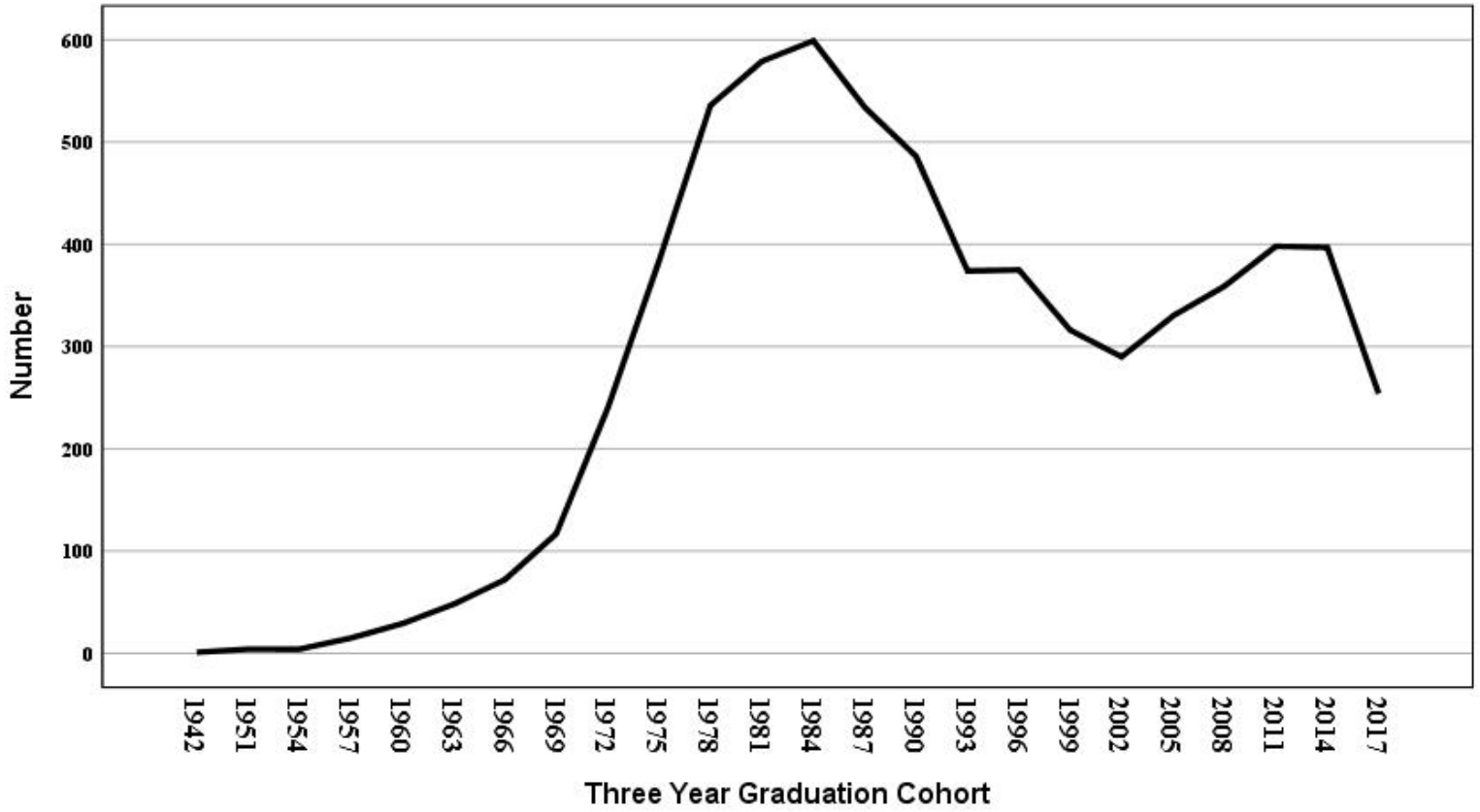
These recent increases in dental school graduates represent a rebound from historical trends. The last 40 years of dental school history have been interesting and that history has implications for the both the current and near future supply.

Figure 9: National Trends in Dental School Applications and Enrollees



Source: American Dental Education Association, U.S. Dental School Applicants and Enrollees

Figure 10: Pennsylvania's Active Clinical Dentists by Graduation Cohort



Source: American Dental Association Masterfile

There were 3,290 dental school graduates in the 1960-61 academic year. The number of graduates increased steadily to 3,775 in the 1970-71 academic year (U.S. Department of Health and Human Services, 2005). Around that time, there was an infusion of federal funds into dental education (much of it related to provisions in Title VII of the Public Health Service Act) that contributed to the establishment of new dental schools (13 nationwide between 1960 and 1980) and increased the capacity of existing schools (U.S. Department of Health and Human Services, 2005). As a result, the number of graduates increased to 5,353 by the 1984-85 academic year.

Soon after that, this infusion of federal funds was curtailed, and concerns regarding an oversupply of dentists began to emerge among professional groups (Mertz and O'Neil, 2002). This resulted in a rather rapid decline in dental education capacity over the following 10 years. During this period of time (1980s-1990s), seven dental schools closed their doors and many of the remaining schools substantially reduced their educational capacity. The combination of school closures and the reduction in capacity was equivalent to the loss of 20 average-sized dental schools (U.S. Department of Health and Human Services, 2005). By 1992-93, the number of graduates had declined to 3,778 and increased only marginally until the turn of the millennium, when the number of graduates increased to 4,171 (Weaver, 2004).

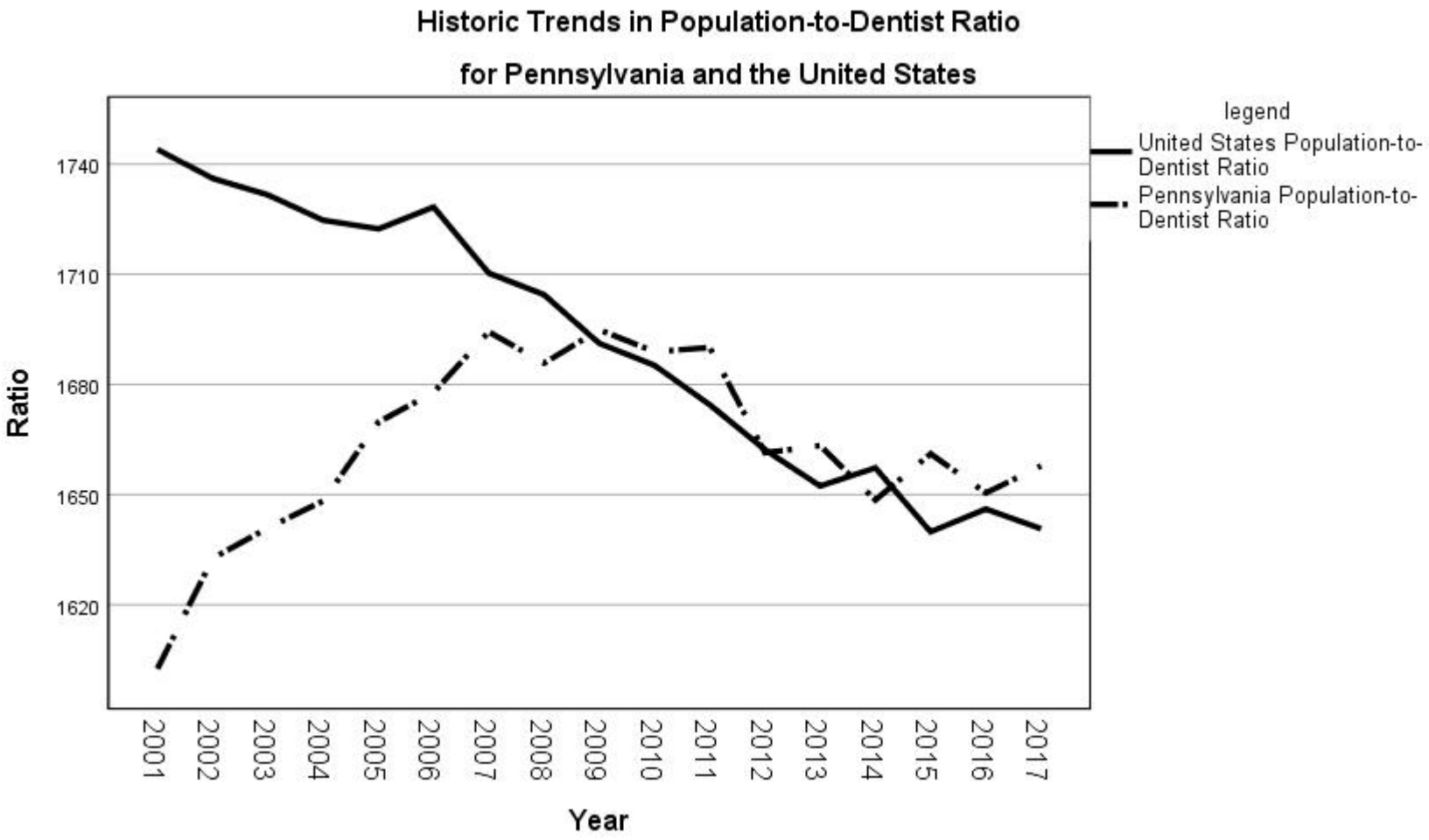
These rather dramatic historical changes in dental education capacity have produced a top-heavy population pyramid for dentists. The current workforce includes a large cohort of older dentists who were educated in the peak capacity years (the late 1970s through the mid-1980s) and significantly fewer younger dentists who are members of the much smaller graduation cohorts entering the labor force from the mid-1980s until recently. As a consequence, the dentists from the peak enrollment years have begun to retire and will continue to do so. It is only quite recently

that current enrollment has reached replacement levels and it is expected that current enrollment will exceed retirements in the near future. The rebound to replacement levels and beyond, as well as projections for increases in enrollment nationally, is what has informed the ADA projections for the future.

Although Pennsylvania has followed the national trends, the rebound has not been as pronounced. This is partly a consequence of new dental schools being added nationally, but not within the Commonwealth. By inspecting Pennsylvania more closely, one can consider future supply in rural areas and for underserved populations.

Figure 11 displays the recent trends in population-normed dentist ratios for the United States as a whole and for Pennsylvania. The scale for this short period of time is limited, so changes in ratios may appear relatively larger than if one were inspecting a time period characterized by a greater range of ratios.

Figure 11: U.S. and Pennsylvania Recent Population-to-Dentist Ratios



Source: American Dental Association Masterfile

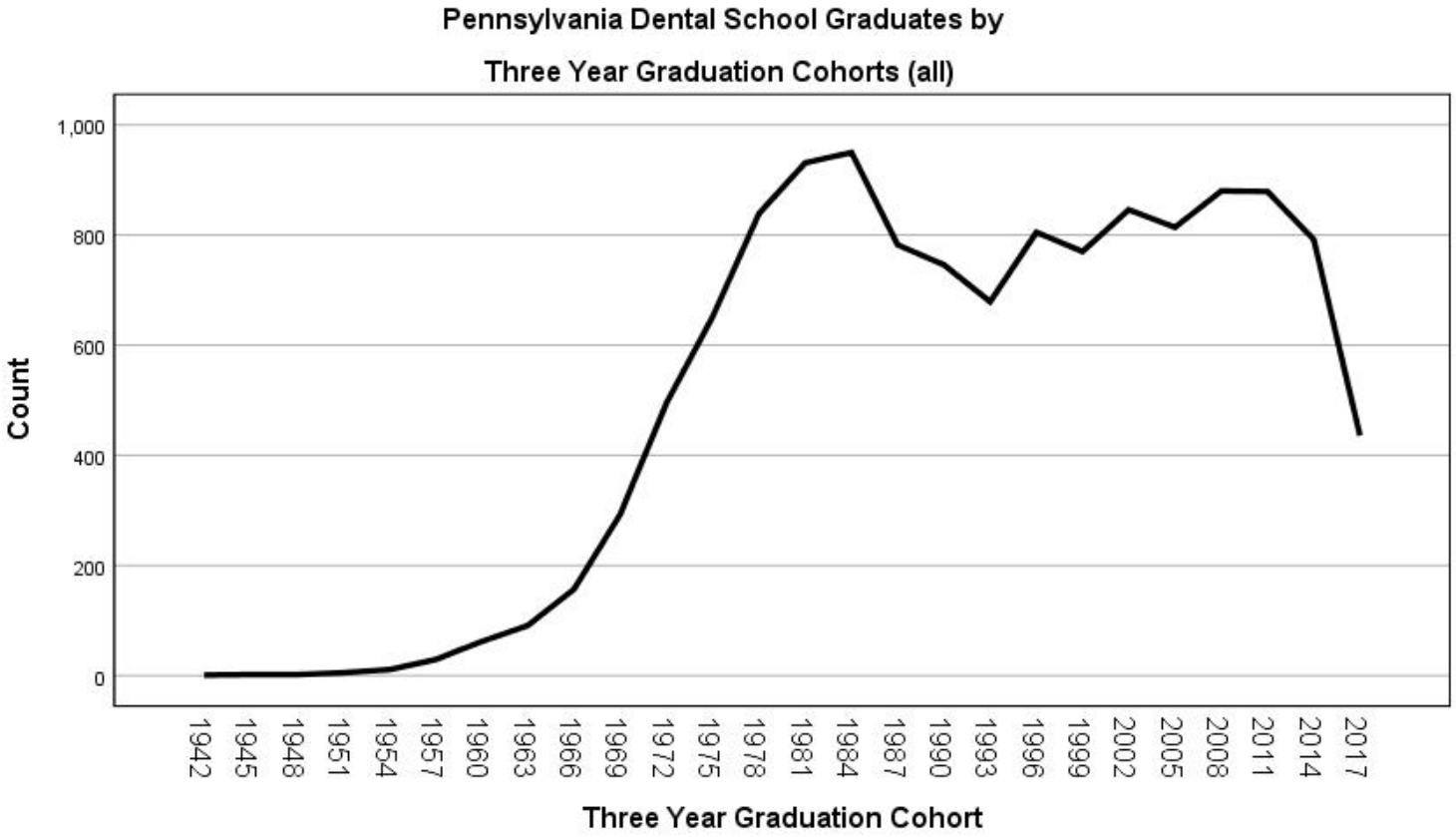
Pennsylvania has three dental schools: the University of Pennsylvania School of Dental Medicine, the Maurice H. Kornberg School of Dentistry at Temple University, and the University of Pittsburgh School of Dental Medicine. The role of these three[31] dental schools are important to consider in these matters. In 2005, 75 percent of active clinical dentists and 70 percent of clinical dentists in rural counties in Pennsylvania had graduated from a Pennsylvania dental school (Schwartz, 2007). Currently, 72 percent of active clinical dentists and 70 percent of clinical dentists in rural counties have graduated from a Pennsylvania dental school. The number of graduates from Pennsylvania dental schools directly impacts the Commonwealth's supply of dentists.

Pennsylvania dental school graduates have followed a historical pattern quite similar to the nation as a whole over the past 10 years (see Figure 11). The rebound, however, has not quite reached the peak years of the 1980's. Figure 12 depicts the number of Pennsylvania dental school graduates. In Figure 13, one can observe that, although total graduation rates from Pennsylvania's three schools had rebounded, fewer of the graduates are finding their way to Pennsylvania service. The historical trend is shown in Table 30. Fifty percent or more of dentists in graduation cohorts between 1975 and the early 1990s are currently located in Pennsylvania and approximately 10 percent are currently in rural Pennsylvania counties. In graduation cohorts since then, the percentage who practice in Pennsylvania and in rural Pennsylvania has declined significantly (25-40 percent in Pennsylvania overall and 3.4-8.5 percent in rural Pennsylvania counties). In the early 2000s, the percentage of students in the three schools that had early life

[31] The Lake Erie College of Osteopathic Medicine opened a dental school at its Bradenton, FL campus in 2012. Starting in the spring of 2015, 50 fourth-year dental students complete a 48-week rotation at the school's dental clinic in Erie, PA. As this dental school is based in Florida, the research team did not include it as a "Pennsylvania Dental School."

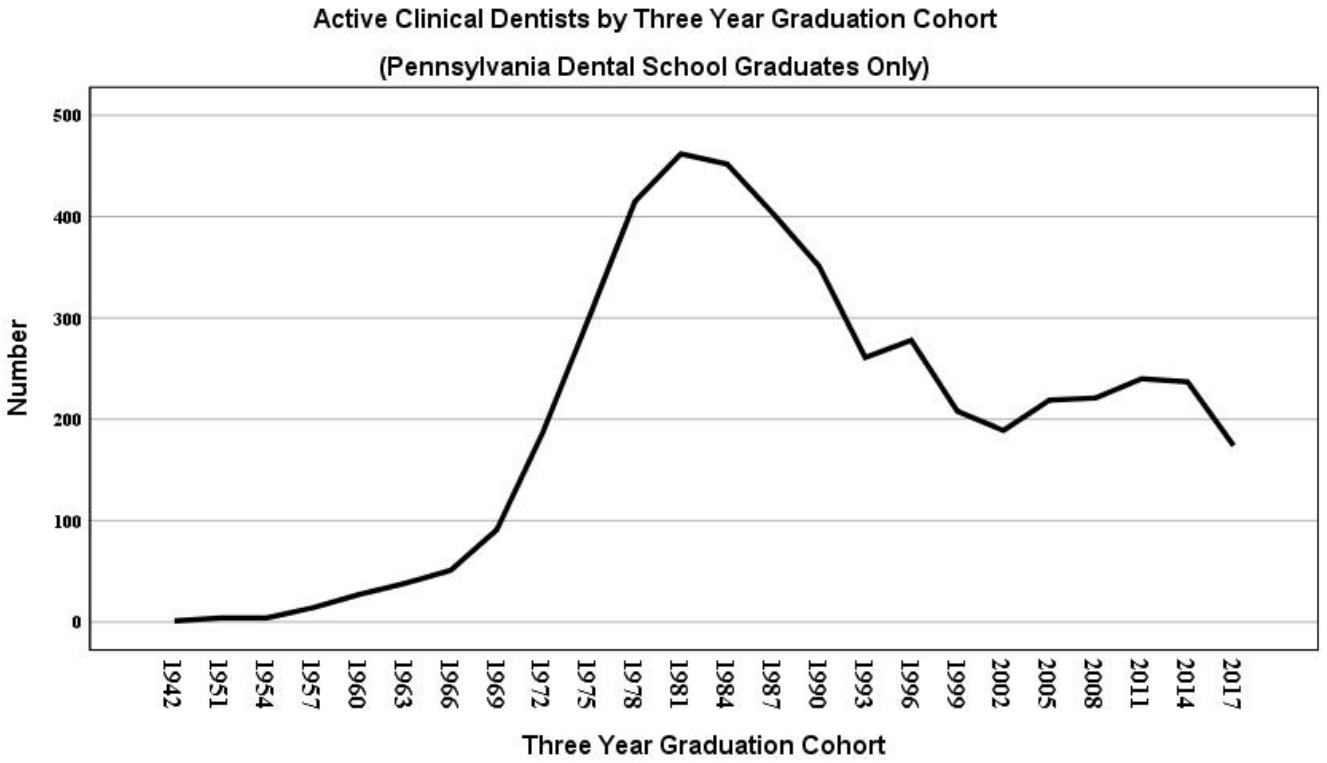
origins in Pennsylvania began to decline significantly (Schwartz, 2007). This is a factor contributing to the decline in Pennsylvania practice destinations. If these trends persist, the composition of the Pennsylvania dental workforce, the rural workforce, and the total supply of dentists will be less dependent on Pennsylvania dental schools. It is likely that such a trend will abate the rebound and damper the goal of equity for rural areas, a trend which is already evidenced.

Figure 12: All Pennsylvania Dental School Graduates by Graduation Cohort



Source: American Dental Association Masterfile

Figure 13: Pennsylvania Active Clinical Dentists from Pennsylvania Dental Schools by Graduation Cohort



Source: American Dental Association Masterfile

Table 30: Current Location of Three-Year Graduation Cohorts
from Pennsylvania Dental Schools

		Rural Pennsylvania County			Total	N
		Urban Pennsylvania	Rural Pennsylvania	All Others		
Three-Year Graduation Cohort (listed year is middle year of three-year cohort)	1972	33.3%	7.9%	58.8%	100.0%	569
	1975	38.1%	10.3%	51.6%	100.0%	763
	1978	42.1%	11.9%	46.0%	100.0%	999
	1981	43.3%	9.8%	46.9%	100.0%	1,127
	1984	42.2%	9.1%	48.7%	100.0%	1,186
	1987	46.1%	9.7%	44.3%	100.0%	1,003
	1990	40.4%	10.1%	49.5%	100.0%	963
	1993	32.7%	8.5%	58.8%	100.0%	903
	1996	28.8%	7.6%	63.6%	100.0%	1,019
	1999	23.5%	4.9%	71.6%	100.0%	1,007
	2002	20.5%	3.4%	76.0%	100.0%	1,103
	2005	25.3%	4.0%	70.6%	100.0%	1,070
	2008	23.1%	4.1%	72.8%	100.0%	1,165
	2011	24.7%	4.7%	70.6%	100.0%	1,167
	2014	28.7%	4.4%	66.9%	100.0%	1,052
	2017	37.6%	3.9%	58.6%	100.0%	670

Source: American Dental Association Masterfile

A closer inspection indicates that the Pennsylvania dentist workforce and the rural Pennsylvania dentist workforce relies disproportionately on the University of Pittsburgh. Temple University and the University of Pennsylvania contribute significantly less to the workforce (see Table 31). University of Pittsburgh graduates are more than twice as likely to provide clinical service in the Commonwealth than graduates from the University of Pennsylvania. This difference is more pronounced for rural Pennsylvania service. University of Pittsburgh graduates are more than eight times as likely than University of Pennsylvania graduates to provide service in a Pennsylvania rural county. This is also true for service to underserved populations (Schwartz,

2007). Temple University's contribution to the Pennsylvania workforce and rural workforce is between that of the other two schools.

Table 31: Dentists' Rural Pennsylvania County Location by Pennsylvania Dental School, 2017 (All Dentists in ADA Masterfile)

Practice Destination	Pennsylvania Dental School			Total
	University of Pittsburgh	University of Pennsylvania	Temple University	
Urban Pennsylvania County	38.1%	21.4%	41.0%	33.0%
Rural Pennsylvania County	16.6%	1.9%	5.5%	7.1%
All Other Destinations	45.3%	76.8%	53.5%	59.9%
Total	100.0%	100.0%	100.0%	100.0%
N	3,444	4,759	4,662	12,865

Source: American Dental Association Masterfile

If current trends hold and if ADA projections are accurate, the urban-rural inequality in the dentist workforce is likely to persist. There is no indication that the conditions that would abate the inequalities are present. First, the size of the total dentist workforce is likely to be stable or increase marginally, both in Pennsylvania and in the U.S. as a whole. This lack of movement toward an abundant supply will contribute to the continuation of the current patterns regarding practice location and populations served. Second, the trends observed in Pennsylvania dental schools increase the likelihood that a greater percentage of dentists will have out-of-state origins. This increases the likelihood of urban practice locations and may contribute to a decrease in the total supply of dentists or attenuate the size of the projected increase. These trends suggest a continuation of inequalities unless interventions from public programs can provide a countervailing influence. These public programs are numerous and varied and include programs such as the expansion of Medicaid, loan repayment programs, Community Health Centers and

other clinics, school health programs, Head Start, CHIP, Area Health Education Center Programs, advances in technologies, and service by non-dentist providers, among others.

Summary of the Role of Dentist Supply in the Oral Health of Low-Income and Rural Children

The maximization of oral health is subject to many influences and the ability to isolate and identify these influences is contingent upon the direction to which the assessment is aimed. Aimed at the individual level, the task is relatively simple. At the community level, it is a bit more complex. At the population level, it is a daunting assignment.

The overall supply of dentists is within a range that renders it unlikely to have a substantial direct and immediate effect on access. However, since there is not an over-abundant supply of dentists, practice opportunities are usually available in favored areas. Consequently, dentists will be unlikely to populate all areas and serve all populations. This will result in a short supply in some areas (distribution) and that may inhibit access. Overall, the effect of dentist supply on oral health is an indirect one, across the distribution of dentists.

The complexity continues. The direct effect of local supply is confounded by other factors that produce a more profound effect on access and use. For the poor, the managed care delivery structure of the state's MA program (HealthChoices) is arguably the most important.[32] Enrollees in Pennsylvania's MA program must visit a dentist who is credentialed by the MCO in which the

[32] Seventy percent of enrollees in the MA program and nearly all children enrolled are receiving care through HealthChoices (Kaiser Family Foundation, 2016b). Those who are not are primarily in a transition status or are Medicare dual eligible (enrolled in both MA and the federal Medicare program or are long-term care patients).

enrollee is a member. Enrollees choose or are assigned an MCO plan contracted in the region in which they reside. There are five HealthChoices regions with several plans contracted in each (see Figure 1 on Page 13). It is highly unlikely that an enrollee would choose a plan based on the local availability of a plan dentist. It is much more likely that this choice would be made based on the local availability of a primary care physician, awareness of the MCO via advertising, offered incentives or referral, or automatic assignment to an MCO by OMAP. Once enrolled, each enrollee may choose to change his/her MCO plan once per month. Enrollees will often change plans based upon incentives, often in the form of a gift card, being offered by other MCOs. The distribution of participating plan dentists within these regions can be quite variable. Dentists are free to participate in any plan but must be credentialed by each plan. MCO dentist panels can change at any time during the contract year. If a dentist chooses to terminate their participation with an MCO, they submit a written request to the MCO with their intent to terminate their agreement. The termination date can be at any point in the future with no minimum timeframe prior to the termination needed. The consequence of this delivery structure is that the effect of overall supply and local supply effects are superseded by the supply and distribution within contracted MCO panels.

The enrollee's resources are important in access to and use of care. Availability of transportation and the consequent loss of wages resulting from a dental visit or from accompanying a child for a visit are important matters affecting use.

The complexity is confounded when considering the establishment of continuity of care and the establishment of a dental home. The presence of changes in MCO dentist panels, the financial

burden of a visit, and the source of entry into care inhibit the establishment of a dental home. A dental home is associated with ease of access and continuing use. The source of entry into care for many children may be through a program like the school health program, Head Start, a free clinic, or a Community Health Center. None of these entry points automatically establishes a relationship with the MCO or establishes a dental home.

The complexity of this scenario leads to the following general impressions about the role of the supply and distribution of dentists in dental care access and the oral health of low-income and rural children:

- The overall supply of dentists has little direct effect on the access and use of dental care of low-income and rural children. It does have an indirect effect through distribution (local supply) of dentists.
- The local supply of dentists may have an inhibiting effect on access and use of oral health care.
- Although the local supply of dentists may have a simple and direct effect, it is framed by and interacts with other factors that determine access and use for rural and low-income children.
- A variety of cultural and economic factors interact with the local supply of dentists, the most important of which is the managed care delivery system of the MA program. Other factors include the multitude of ways that a child can be introduced into the system.
- Overall, the receipt of care is complex for low-income and rural populations and the delivery of care is administratively complex for providers. The complexity of the system of care frames the manner in which the supply and distribution of dentists affects the

access and use of oral health care for poor and rural children and ultimately, their oral health.

In the final analysis, the local and overall supply of dentists are important, although, they are insufficient to fully define access and use.

Taking a broader view, the supply and distribution of dentists in combination with the complexity of the delivery system, and cultural habits of use are factors that affect the access and use of oral health care for poor and rural children. The complexity of the delivery system plays a role not only with respect to the effects of the supply and distribution of providers, but is a factor across many facets of oral health care. The complexity of the delivery system warrants considerable attention in gaining an understanding of the oral health of poor and rural children.

CHAPTER 5: CONCLUSIONS

The primary goal of this research was to document access and use of oral health care by low-income children, especially rural children. The research investigated: (1) the supply and geographic distribution of dentists in Pennsylvania; (2) the supply and geographic distribution of dentists participating in MA programs in Pennsylvania; (3) the use of oral health services by children insured by MA and the geographic variation in that use; (4) other programs targeting low-income children, especially CHIP; and (5) a detailed investigation into the oral health component of the school health program.

The conclusions of the research are presented in two sections. The first presents the most important observations and findings revealed by the analyses. The second integrates these findings by responding to access and use in a more general fashion.

Observations and Findings

Dentist Supply and Distribution

- Pennsylvania's population-normed supply of dentists was nearly the same as that for the United States as a whole. The overall supply of dentists in Pennsylvania was sufficient to meet current demand under the assumption of equal access for everyone. Current trends in dental school enrollment indicate no significant change to the supply in the near future.
- Geographic access was not equal. Urban rates of population-normed dentist supply were nearly twice that of rural rates. Given the current supply and the anticipated future supply, market mechanisms are likely to maintain this inequality.

- In addition to urban-rural inequality, inequalities existed between areas of higher socio-economic status and those of lower socio-economic status. Inequalities existed for all indicators of socio-economic status.
- These conditions and inequalities can be found in most states and have historically been present.
- Considering these inequalities and the overall dentist supply, the issue of most importance for public policy is the geographic distribution of dentists. The issue of overall supply is of lesser importance, but also should be considered.

Dentists Participating in the MA Program

- Enrollment in the MA program increased by more than 20 percent between 2014 and 2017 (10 percent for children). The number of points-of-service for children increased 21.7 percent between 2014 and 2017. The number of unique participating dentists serving children increased 14.6 percent between 2014 and 2017.
- In 2017, there were 2,280 dentists providing service to children enrolled in MA. These dentists offered services in 3,441 unique locations (based on ZIP Codes). Many providers offered service at multiple locations and some in multiple counties.
- Fifty percent of participating dentists contributed less than 7 percent of an FTE to treat children enrolled in MA; 25 percent of participating dentists contributed only about 1 percent of an FTE or less. Only a small minority of participating dentists predominately served enrollees in the MA program.
- Specialist dentists provided MA service in all urban counties and in only about half of rural counties.

- Relatively large contiguous rural areas had no MA service in 2017. These occurred in the Northern Tier and throughout the rural central region.
- In 2017, there was no MA service provided in 48 percent of rural school districts, while no service was provided in only 24 percent of urban districts.
- In 2017, county visit-to-enrollment ratios were positively correlated with urban status, median family income, and total dentist supply. Service was higher in counties of lesser need.

Enrollees in the MA Program

- The MA program was the largest insurer of children in Pennsylvania. About one in three children (0-20 years of age) were enrolled in the MA program.
- Dental care utilization has increased over the past decade for all children. This occurred for the MA insured and the privately insured alike. It has occurred across the U.S. and in Pennsylvania.
- Children insured by MA and CHIP combined had lower annual use rates than the privately insured (55 percent vs. 67 percent, respectively), but this difference has been decreasing. In 2014, 51.1 percent of children enrolled in MA in Pennsylvania had at least one dentist visit. By 2017, this percentage had risen to 53.5 percent.
- In 2017, among the 53.5 percent of enrollees in MA who had a dentist visit, 89 percent had at least one preventive/diagnostic visit.
- During the period of 2014 to 2017, 68 percent of enrollees with a dentist visit visited two or more dentists. The more visits they had, the greater number of different dentists were

visited. This pattern is not consistent with the recommendation of establishing a dental home.

- The number of visits per enrollee exhibited wide variance. Fifteen percent had only one visit, while 12 percent had 10 or more.
- Of the enrollees who had a visit, 6 percent only had a treatment visit. The annual percentage of enrollees with only a treatment visit increased as more new enrollees entered the system. Those gaining MA insurance often enter the system with untreated disease.
- In 2017, the ratio of visits to enrolled children in Pennsylvania was 1.10 to 1. This ratio varied considerably by county. The ratio is an average of enrollees with no visits, those with a single visit, and those with multiple visits.
- In 2017, the urban visits-to-enrollee ratio was 35 percent higher than the rural ratio. This difference has been slightly decreasing since 2014.
- Overall, children enrolled in MA have a yearly dentist visit at rates less than their privately insured counterparts. Among those that had a visit, they tended to use preventive services at rates near the recommendations from public health experts. They tended not to establish a dental home. They used services at varying rates, depending on location.

CHIP and Other Programs

- The MA program provides dental coverage for low-income children, while the CHIP program provides coverage for uninsured children who do not meet the income eligibility

requirements of MA. CHIP is offered at three levels: free, reduced premium, and full-cost premium.

- About 6 percent of all children 18 years of age or younger were enrolled in CHIP.
- The ratio of CHIP-to-MA enrollment varied by county. In general, the greater the socio-economic well-being of the county, the higher the ratio.
- The CHIP program is similar to the MA program in several important respects. First, dental coverage is quite comprehensive in both programs. Second, both programs are administered through managed care contracts. Third, they are both joint federal-state programs.
- Among other programs for low-income children, the Community Health Center program was the most important. Unlike MA and CHIP, which are insurance programs, CHCs are providers of care. There were 264 CHC clinical sites in Pennsylvania; 84 percent of which had on-site dental services and the remainder have a contract with an outside dentist. Thirteen percent of CHC patients were uninsured and 51 percent were insured by MA. CHCs offer comprehensive care, integrating medical care with dental care.
- A variety of other programs offer service to the low-income population including Rural Health Clinics, Head Start, Sealant Saturday, free clinics, and others.
- When the MA program, the CHIP program, the School Health program, and the other points of entry for low-income children into the oral health system are considered, it is clear that the oral health care system for the low-income population is complex. This complexity needs to be navigated to secure a sustainable source of oral health care. The managed care delivery system of the two major insurers, MA and CHIP, adds considerable complexity. The beneficial aspect is that care is being offered from many

points of entry. The disadvantages of the system are finding the proper entry point and identifying a sustainable source of care are very complicated tasks.

School Health

- The oral health component of the school health program mandates examinations or screenings for children entering school and Grades 3 and 7. Other services are encouraged but not mandated. The Mandated Dental Program (MDP) uses both family dentists and school dentists to provide dental examinations. The Dental Hygiene Services Program (DHSP) uses certified school dental hygienists and family dentists and permits hygienist screenings to be substituted for dentist examinations.
- Most districts chose the MDP. In the 2015-2016 academic year, 37 out of 501 districts chose the DHSP option (7.4 percent). Information from key informants indicated that this number will decrease in the near future.
- There is evidence that the vast majority of students in mandated grades are being examined or screened. There is also evidence that in DHSP districts, additional services are more likely to be offered. These additional services include education (broadly offered), fluoride treatments (offered in about one-sixth of districts), and sealants (infrequently offered).
- Both the MDP and DHSP encourage students to receive an examination by their family dentist. In the MDP program, when a student does not notify the school of a family dentist examination, the school dentist performs that examination. In the DHSP program, the certified school dental hygienist performs a screening in the absence of an examination by a family dentist.

- Students in rural districts more frequently used the school oral health provider. Total examination/screening rates were slightly less in rural school districts. Total examination/screening rates were slightly less in poorer districts.
- Fluoride programs were more frequently offered in rural school districts. Because of differences in the fluoridation of water supplies, the need is greater in rural districts.
- *The school health program is an important gateway to oral health care. There is no other gateway that is open to almost all children in Pennsylvania. Despite its potential for offering a near universal entry point into oral health care, the school system is not designed to provide health care—it is an educational institution. The potential of the school health program to contribute to the oral health of low-income students would be well-served by incorporating a component that assists the student's family in navigating the health care system outside of the educational system. Health care navigation is not an expected function of the educational system; nevertheless, it would exploit the potential that the school system possesses to improve the oral health of low-income children.*

Integration of the Findings

Use and Receipt of Care

The infrastructure of the oral health care delivery system for low-income and rural populations has expanded in recent years, especially for children. This includes expansion of the CHC program, Medicaid expansion, the continued development of CHIP, the school health program, and a variety of other public and private programs. However, low-income and rural populations still lag behind with respect to use and oral health status. The structural frames discussed above are, in part, the reason why this expansion has not resulted in full equity.

The public insurance programs are increasing their reach and are operating at levels that allow them to make significant contributions to the oral health of the low-income population. MA enrollment has been increasing as has its utilization. Once in the program, enrollees tend to exhibit patterns that mimic the privately insured, but at less complete levels. That is, enrollees use preventive care and a segment receive significant care, but overall, their use levels are less than the well-insured or higher income populations.

CHIP has shown a modest decline in enrollment since its peak in 2010. Overall, enrollment has been relatively constant. The size and reach of the CHIP and MA programs do not only depend on the decisions of the Pennsylvania General Assembly, but also on the decisions of the U.S. Congress.

Programs like the CHC program and the school health program complement the care facilitated by these two major insurance programs. They do so by introducing potential enrollees to the two programs, offering an entry point to care, and more broadly distributing the points-of-service for care.

Final Conclusion

The infrastructure of oral health care for low-income and rural children is quite broad and multi-dimensional. The infrastructure commences with the overall supply of dentists. The supply of dentists in rural areas is significantly less than that in urban areas and dentists disproportionately treat higher income populations. Oral health care for low-income children is primarily offered

through the two major public insurance programs designed for lower income populations, MA and CHIP. Use rates and patterns within these programs are reasonably high, but still lag behind the privately insured. The reason for this inequality is a result of a number of factors including:

- the rate of provider participation in the two programs,
- the complexity of the managed care delivery system,
- the expectations of the enrollee population, and
- the geographic distribution of services.

The inequality in use is partly being eased by a wide range of other programs, both public and private. These programs contribute to the completeness of the infrastructure for care, but concomitantly, add to the complexity of the delivery system. This complexity makes use more difficult and most likely decreases use rates.

CHAPTER 6: POLICY CONSIDERATIONS

There are two different approaches to integrating research findings with public policy. The first focuses on the big picture and seeks to inform a general approach to policy development. The second focuses on specific research findings and seeks to inform specific policies intended to improve or augment existing programs. Both of these approaches are presented below.

The Big Picture

The concern of this research is oral health care for low-income and rural children. The more general approach to integrating research and policy directs its focus on the nature of the entire system of oral health care for children. One characteristic of the system presented itself consistently during the course of this research. That characteristic is the complexity of the system to the user. This complexity not only presents itself in securing care in the short-term, but more importantly, it affects the establishment of a regular source of care and a dental home. The establishment of a predictable and reliable source of care is the mechanism that contributes the most to achieving and maintaining oral health.

Complexity can be visible only to those providing oral health care or it can be visible to those receiving oral health care. The more important is that which is visible to the recipient of care. Policy always welcomes simple and lean program design for the side of provision of care. However, the important consideration here is not what occurs on the "inside" of the program but what occurs on the "outside." It is the face of the system to the user that directly affects its effectiveness and use. If it is too complex, then utilization will be hindered. This is the case for the oral health care delivery system.

The American health care delivery system is more complex than that of other developed nations. This is a result of a reliance on private markets, the use of a variety of third party payers, a high degree of specialization among providers, the advent of preferred provider panels, and the development of a variety of non-integrated government programs. This is true of the health care system overall as well as the oral health care delivery system for low-income children. Because complexity is so much a part of the fabric of both the private and public sector of the health care system, much of it is beyond the immediate reach of public policy. Any new policy should not result in making the system more complex even when it is associated with an addition of service.

Policy Considerations

In the Conclusions section, the researchers suggested that low-income families are required to navigate a complex route to sustainable dental care equipped with less sophisticated tools. In response, they offer the following policy considerations. The researchers acknowledge that several policy considerations align with key themes and initial findings of the "Ready to Start" Task Force, which focuses on strategy to shape policy related to health, human services, and education for infants and toddlers ages zero to 3 years in Pennsylvania.

Policy Consideration 1: Reform the Medical Assistance (MA) program to permit enrollees to visit any MA participating provider regardless of their MCO affiliation. Removing the barriers to care that the MCO system imposes will promote the development of a "dental home" for enrollees and support consistent care by a provider. As currently structured, the MCO system restricts the number of MA participating providers that an enrollee can visit and introduces an element of unpredictability into the establishment of a dental home. This can be accomplished

while still retaining the managed care structure of the program and maintaining the benefits that the managed care structure offers DHS and OMAP.

Removing MCO geographic barriers will simplify the system for enrollees and allow their use of the full complement of participating providers. This can be accomplished by instituting a set of transfer payments and transfer credits among MCOs. The nature of the transfers would be determined after negotiations between the MCOs and OMAP and could be instituted with little change in total MCO reimbursement. Such transfers would be transparent to the enrollee and to the providers and would result in a simplified system for the enrollee to navigate with a broader panel of available providers.

Policy Consideration 2: Implement a patient navigator program for each MA enrollee. A specific navigator would be matched to each DHS program participant and would go beyond the service representatives already present at the DHS County Assistance Offices. The navigator would serve as an advocate for the participant and would not represent any specific DHS program, provider, or MCO. They would be trained on the roles of a patient navigator, the programs with which enrollees are eligible, a fundamental knowledge of acute and chronic health conditions, and be culturally competent. They would provide assistance in selecting an MCO, selecting providers, and aid in transitions between programs and transitions in and out of the DHS system. In addition, the navigator would assist in navigating social determinants of health, such as housing, employment, and transportation. The Head Start advocacy and navigation model discussed elsewhere in this report can serve as an excellent model.

Additional policy considerations:

- Given the importance of MCO membership in both the MA and CHIP programs, it would be advisable to develop a computer tool for navigating this system structure. The tool would be available to navigators and individuals employed by entry points into the oral health care system. The development of this tool is uncomplicated and should include up-to-date provider participation rosters incorporating GIS techniques to aid participants in making choices that maximize their access.
- There are counties and other large areas without dentist service for the low-income population. Other areas exhibit low visits-to-enrollee ratios. These are all rural areas. Efforts to address these gaps in service should be considered. In many instances, these low or no service areas exist because there are no local dentists. Market mechanisms make it unlikely that a dentist will locate there. The only response to addressing service gaps in these areas is to aid program enrollees in finding an out-of-area provider and securing transportation for visits. In other low-service areas, additional efforts to increase provider participation can be instituted or mechanisms to secure mobile care from nearby providers can be explored.
- The current reimbursement incentives for school-based oral health screenings and examinations are insufficient to encourage full compliance. Consideration should be given to altering the current reimbursement in an effort to encourage more complete compliance. This is especially important in school districts where the population-to-dentist ratio is in low supply. In these districts complete coverage is more important since opportunities for care outside of the school system are more limited.
- The school health program stands alone in its inclusiveness as a contact point between children and the oral health care system. The universal availability of oral health screenings

and examinations in the school setting allows for care navigation and is the first step in securing sustainable care for all students, regardless of socioeconomic status, insurance status, and geographic location. Including preventive oral health services and education in the school setting can allow equal opportunity for all children to access routine services. In school districts where the population-to-dentist ratio is low, consideration should be given to offset the costs of such a program.

- Data collected during school oral health screenings and examinations could be considered for use in a statewide oral health surveillance system since data surveillance is important in guiding oral health policies and programs. Digital infrastructure should be considered prior to implementing such a program. The Pennsylvania Department of Health could consider moving to an all-electronic entry system for SHARRS data. This would facilitate system execution, improve opportunities for quantitative system evaluation, and more easily accommodate any changes in reimbursement policies (as referenced above).

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APPENDIX 1

MEDICAL ASSISTANCE CLAIMS METHODOLOGY

The most significant insurer of dental care for low-income children in Pennsylvania is the Medical Assistance (MA) program, the state's Medicaid program, administered by the Office of Medical Assistance Programs (OMAP) in the Pennsylvania Department of Human Services (DHS). To contribute to the analysis of the MA program, the project team requested archival dental service data from OMAP. The request was limited by the data that OMAP maintains and by mandated protections concerning the identification of individuals and their private medical records.

Data Received From OMAP—Claims and Provider Files

The research team was able to obtain two types of data files: (1) claims and (2) provider. The claims file included one record for each claim for reimbursement made by a dental provider's managed care organization (MCO) on behalf of the provider.[33] The provider (participating dentists) file included one record for each provider.

Four claims files were obtained, one for all claims received in each of the calendar years 2014 through 2017. The claims file included the following data:

1. A code describing the procedure for which reimbursement was sought;
2. Date of service;
3. A unique identification number for the provider of the service;
4. A unique identification number for the enrollee (patient) receiving service; and
5. The age of the enrollee (patient).

[33] Nearly all enrollees receive MA through membership in a DHS contracted Managed Care Organization (MCO). There are some transitional enrollees who receive services via a traditional fee-for-service model. In those cases, the claims were made to DHS directly by the provider.

The files consisted of claims for children only, defined as children aged 0 through 20 years old. For confidentiality reasons, the enrollees' addresses were not included in the file. The number of claims in each file is presented below. The data describing a single claim is called a record or a case and the claims file is a file consisting of claims records.

Calendar Year	Number of Claims
2014	3,766,193
2015	4,200,680
2016	4,437,218
2017	4,576,229
4 Year Total	16,980,320

A single visit to a dentist may, and almost always, generates multiple claims for that visit since dentists receive reimbursement separately for each allowable service that they provide. The reimbursement schedule is very specific. In a simple visit for a single tooth restoration, separate claims may be generated for an x-ray, an examination or evaluation, and the restoration. On average in the four study years, 3.3 claims per visit were submitted, although complex visits generated significantly more claims than the average.[34] The analysis of claims as a claim is largely an administrative matter concerning program reimbursement. This research was interested in analyzing patient visits, their nature, and their geographic distribution, as well as the treatment history of enrollee patients. These are the matters of policy significance. The policy matters require that the data received from OMAP be transformed from data that had been structured by claims into data structured by visits and into data structured by enrollees.

[34] A previous study from 2003 estimated that 2.8 claims per visit were made (Schwartz, et al., 2003).

Visits File

The restructuring of the claims file into a visits file required that each set of claims records associated with a single visit be combined into a composite visit record. Each composite record describes a single visit and all such composite records constitute the visit file. Since the claims record does *not* include an identifier for a visit, criteria for combining claims must be chosen from the data on the claims records. The researchers chose to combine claims based on unique combinations of the date of service and the enrollee identification number. One additional criterion that could have been considered in defining a visit, the provider identification number, is available on the claims record. The researchers chose *not* to add this criterion to the grouping algorithm since it would be rare that an enrollee would receive more than one visit at two different locations on the same day, although it is possible. Additionally, claims from one visit may be made by two different providers from the same location, thereby artificially generating an extra visit. Consequently, one can consider a record in the visit file a "service-day unit" but for substantive reasons, it is best considered as a visit. A maximum of 10 claims were coded onto the visit record from the claims record. Ninety-five percent of all visits consisted of 10 claims or fewer. The combining of records, also known as aggregation, produced the following number of visits for each year:

Year	Claims	Visits
2014	3,766,193	1,181,722
2015	4,200,680	1,272,693
2016	4,437,218	1,316,106
2017	4,576,229	1,368,721
4 Year Total	16,980,320	5,139,292

Geographic Locations

A significant goal of this research was to analyze the geographic distribution of oral health services for children, especially rural and low-income children. Since the claims data and the associated visit data do not include geographic information, the identification of the enrollee's location was obtained from the provider file. The provider file includes the address that the provider supplied to OMAP. Since the home address of the enrollee is protected for confidentiality reasons, this address was used as the proxy for the enrollee's location. As such, the address represents the location of service and not the residential address of the enrollee. In most cases, the service location will be proximate to the enrollee's residence. However, there are cases in which the enrollee must travel to receive service and, as a result, the municipality and the county of the enrollee's residence can differ from the service location. The only guarantee is that the two addresses will be in the same HealthChoices region. How often this occurs and the distance between the two locations cannot be determined.

The first step in assigning a location to a visit (a record in the visit file) is the geocoding of addresses in the provider file. Geocoding is a procedure in which an address is compared to a master list of all addresses, which includes the geographic coordinates of all known address. The master list was supplied by the U.S. Bureau of the Census and is used in conducting the Census. The process of geocoding can result in several levels of address match: an exact match of an address to the master list, a match to the street of the address, or a ZIP Code-only match. For the addresses in the provider file, 85 percent were exact matches or matches to the street of the address. The remainder were ZIP Code-only matches. The coordinates of the geographic centroid of the ZIP Code were assigned to the address in a ZIP Code-only match.

The second step in the geocoding process is identifying the political and administrative units in which the addresses are located. After geographic coordinates were assigned to addresses in the provider file, the points representing the addresses were compared to outline maps of Pennsylvania municipalities, Pennsylvania school districts, Pennsylvania counties, and OMAP regions. Using Geographic Information System (GIS) programming methodology; a municipality, a school district, a county, and a HealthChoices region of the address were assigned to each record in the provider file.

Once the geocoding process was complete, the visit file was merged with the geocoded provider file. This was accomplished by matching records using the provider ID, which was included in both files. In the visit file, the provider ID was defined as the ID included on the first claim on which the visit record was based. The type of merge employed is known as a one-to-many merge. In this type of merge, a record from the provider file is appended to every record on the visit file that matches that provider ID. The merged file resulted in a visit file that included the provider specialty, the municipality of service, the school district of service, the county of service, and the HealthChoices region of service, in addition to the information that constituted a record in the original visit file.

A number of provider IDs on the visit file did not match with any of the provider IDs on the provider file. Some of these were coded incorrectly while others may have been deleted from the provider file. In addition, some providers used out-of-state addresses. In all of these cases, a geographic location in Pennsylvania could not be determined for the visit. Of the 5,139,212 visits, a Pennsylvania address could not be assigned to 207,593 or 4.02 percent of all visits. Since

most of the analysis in the report included a geographic component, the number of cases for most analyses was the total number of visits less the number of visits for which a geographical location could not be determined, for a total of 4,931,699. In those analyses, the number of cases was labeled accordingly. For descriptions of the Commonwealth as a whole, the number of cases was based on the entire set of 5,139,212 visits.

Type of Visit

During the 4-year period on which these analyses were based, claims were submitted for 564 different types of procedures. The 22 most frequently used codes constituted 90 percent of all claims and the 55 most frequent claim types constituted 99 percent of all claims. An average of about three claims were made for each visit, although as many as 10 claims were coded for a visit. The combination of the types of claims made for a visit describes the types of services received during the visit and, hence, is a description of the type of visit. Considering only three-claim visits and considering all the possible combinations of the 564 claim types resulted in 29,742,164 different visit types. To achieve a parsimonious classification, the 564 different types of claims needed to be reduced into just a few types. The researchers grouped the 564 procedures into two groups: diagnostic/preventive (PD), and restorative/treatment (RT). These two groups are consistent with the public health literature and best served the policy goals of this research. Combining the claims from a visit coded into one of these two groups resulted in three types of visits: diagnostic/preventive only, restorative/treatment only, and a combination of the two. This is the scheme that the researchers employed for most analyses.

Enrollee Service History

In addition to describing visits, a goal of this research was to describe the use patterns of enrollees. This task required a second transformation of the data. The first transformation restructured the claims file into the visit file. To describe use patterns, the visit file was required to be transformed into a file in which each record describes all of the visits for an enrollee. This was accomplished by aggregating the visit file on the basis of the unique enrollee ID. All visit records for an enrollee were combined into one record, which included the visit type for each enrollee visit and the date of each visit. From these data, several characteristics of an enrollee's use pattern were assigned: (1) a single visit user or a multiple visit user, (2) a single provider user or a multiple provider user, (3) a preventive/diagnostic user only, a restorative/treatment user only, or a mixed user.

Provider Participation

To assess the scope and geographic coverage of the panel of providers participating in the MA program, the level of participation of each provider needed to be determined. Some providers may have seen patients only in emergency situations or rarely, while others may have regularly included enrollees as part of their patient panel; still others may have had a patient panel primarily consisting of MA enrollees.

The first step in making this assessment was to count the number of visits from the visit file for each unique provider ID and then append that count to the record representing the provider ID in the provider file. The provider ID was the only identifier available in both files.

Unfortunately, the entries in the provider file are not an unambiguous list of providers. The provider file may have included multiple IDs for a single provider, some may have been for the same location, and some for different locations. In the former, they may have been billing under different IDs or possibly the result of duplicate IDs that were not purged from the system and in the latter, they may have been providing service at multiple locations and billing separately from each. Some locations may be geographically proximate, while others may represent service locations separated by considerable distance.

Under these conditions and with the available information, the task became classifying and counting providers in a manner that served the needs of the substantive inquiries of this research. After evaluating the options, the researchers chose two methods of classifying providers by location. In the first method, providers were counted by provider name. All entries for a unique name in the provider file were aggregated and the number of visits associated with all entries with the same name were summed. The county location assigned to a provider was taken from the unique ID associated with the greatest number of visits. These procedures were performed separately for each year and the provider file was restructured in accordance with this algorithm. This method was used to determine the number of providers participating in the program overall and by county.[35] Although considered to be the most accurate method of identifying unique providers, this method is subject to several errors of classification. The first is that two or more different providers with the exact same name may be present in the file and then may be combined into a single provider record. The researchers estimated that this would be a rare occurrence since middle names and idiosyncratic spellings are included in the name field on the

[35] Since each unique name was counted only once, a provider was assigned to the county in which he/she had the most visits only.

data. The second type of misclassification can occur when a unique provider spells his/her name differently on different billing IDs. In that case, a unique provider would be split into multiple records. After considering these errors of classification, the method was still considered to offer the best estimate of the number of providers by location and their level of participation in the MA program. Once the restructured file was developed, the number of providers and their service level was calculated for counties.

Since many providers offered services at more than one location and since the research was concerned with service locations, a second method of restructuring of the provider file was undertaken. The resulting file was used for all analyses, including a "point-of-service" component. In this method, each unique combination of name and ZIP Code was considered to be a "provider." Accordingly, all entries in the original file that shared the same name and same ZIP Code were combined into one record and their associated number of visits were summed. This method focused on point-of-service, a critical component in assessing the availability of services. A provider can only be counted once in each ZIP Code using this method but can be counted in multiple ZIP Codes. The method eliminates double-counting service delivery points for provider records, which have locations in the same building or are very close but fails to count all delivery points in a larger ZIP Code that may be separated by significant distances. All possible methods to count providers incur errors and inconsistencies in the meaning of the indicator across the Commonwealth's geography. The methods chosen were considered to incur the least significant error, while maximizing the goal in developing the indicator.

Once the provider file was restructured using these two methods, visit counts were converted to Full-time Equivalent (FTE) dentist equivalents. Based on a conservative estimate of 2,500 visits a year, visits were converted to FTE providers for each provider and aggregated to geographic unit.

APPENDIX 2

ADDITIONAL TABLES

SUMMARY OF MEDICAL ASSISTANCE PROVIDERS, ENROLLMENT, AND SERVICE BY COUNTY, 2014 TO 2016

ALL DATA FROM OMAP DATA FILES

Summary of Providers, Enrollment, and Service by County, 2016

County	Unique Provider Name and ZIP Code Count	Unduplicated Count of Providers (primary site in county)	FTE Providers	Visits	Visits to Child Enrollment Ratio 2016	Child Enrollment 2016
No Match/Out of State	.	.	15.88	39,696	.	.
Adams	4	4	1.02	2,540	0.33	7,745
Allegheny	413	310	36.88	92,200	0.95	96,857
Armstrong	14	9	1.12	2,788	0.45	6,233
Beaver	49	25	4.51	11,279	0.76	14,797
Bedford	11	11	1.95	4,884	1.08	4,522
Berks	69	69	11.44	28,597	0.66	43,215
Blair	29	22	5.01	12,529	0.95	13,231
Bradford	14	12	0.87	2,169	0.37	5,919
Bucks	140	112	18.05	45,137	1.30	34,827
Butler	79	44	11.22	28,038	2.51	11,178
Cambria	36	35	4.28	10,696	0.82	13,079
Cameron	3	2	0.02	42	0.08	545
Carbon	4	4	0.59	1,480	0.26	5,602
Centre	17	17	5.86	14,662	2.54	5,778
Chester	87	69	29.76	74,393	2.80	26,597
Clarion	1	1	0.00	2	0.00	3,185
Clearfield	16	16	2.80	6,997	0.88	7,964
Clinton	8	7	0.96	2,408	0.68	3,528
Columbia	11	11	1.20	3,009	0.60	4,978
Crawford	24	22	3.33	8,323	1.02	8,136
Cumberland	25	22	6.53	16,337	1.12	14,652

Dauphin	53	43	10.21	25,526	0.84	30,222
Delaware	152	110	19.44	48,607	0.93	52,193
Elk	5	2	0.58	1,459	0.57	2,543
Erie	67	40	11.42	28,551	0.84	34,030
Fayette	42	30	4.62	11,553	0.73	15,875
Forest	.	.	.	0	0.00	340
Franklin	22	19	4.94	12,361	0.93	13,284
Fulton	13	7	0.30	762	0.55	1,375
Greene	19	13	0.92	2,291	0.60	3,821
Huntingdon	4	4	0.66	1,657	0.40	4,118
Indiana	11	5	1.39	3,467	0.51	6,832
Jefferson	11	11	2.05	5,122	1.12	4,563
Juniata	1	1	0.17	428	0.25	1,728
Lackawanna	44	44	12.42	31,046	1.40	22,119
Lancaster	110	72	17.92	44,799	1.04	43,284
Lawrence	17	12	1.56	3,889	0.44	8,842
Lebanon	17	11	1.97	4,930	0.38	13,010
Lehigh	99	60	15.64	39,090	1.02	38,302
Luzerne	79	61	16.54	41,349	1.15	35,970
Lycoming	9	8	2.34	5,841	0.54	10,786
McKean	5	4	0.88	2,190	0.47	4,627
Mercer	27	18	5.50	13,759	1.21	11,342
Mifflin	4	3	0.48	1,193	0.28	4,329
Monroe	15	10	2.87	7,166	0.45	15,909
Montgomery	284	170	28.57	71,428	1.49	48,035
Montour	21	20	2.47	6,177	5.34	1,157
Northampton	54	34	9.17	22,916	0.95	24,074

Northumberland	12	9	2.44	6,107	0.69	8,827
Perry	.	.	.	0	0.00	3,444
Philadelphia	724	369	143.63	359,086	1.33	269,254
Pike	2	2	0.64	1,610	0.33	4,918
Potter	3	2	0.39	975	0.52	1,882
Schuylkill	17	9	1.59	3,982	0.29	13,637
Snyder	1	1	0.02	45	0.01	3,014
Somerset	25	13	4.14	10,351	1.68	6,173
Sullivan	4	2	0.11	264	0.69	384
Susquehanna	3	3	0.36	898	0.25	3,537
Tioga	5	5	0.88	2,194	0.55	4,022
Union	3	3	3.24	8,095	3.20	2,531
Venango	5	4	1.29	3,229	0.60	5,400
Warren	6	4	0.78	1,955	0.54	3,650
Washington	50	17	4.12	10,301	0.66	15,493
Wayne	12	12	3.24	8,103	1.97	4,118
Westmoreland	108	42	9.84	24,592	0.93	26,541
Wyoming	3	3	0.42	1,056	0.42	2,493
York	57	45	10.76	26,912	0.67	40,167
All Counties	3279	2181	510.32	1,275,822	1.06	1,204,763

Summary of Providers, Enrollment, and Service by County, 2015

County	Unique Provider Name and ZIP Code Count	Unduplicated Count of Providers (primary site in county)	FTE Providers	Visits	Visits to Child Enrollment Ratio 2015	Child Enrollment 2015
No Match/Out of State	.	.	24.68	61,700	.	.
Adams	3	3	0.95	2,384	0.31	7,600
Allegheny	376	290	38.66	96,656	1.00	96,980
Armstrong	11	7	1.15	2,873	0.48	6,018
Beaver	46	25	4.20	10,507	0.71	14,707
Bedford	11	11	2.16	5,389	1.20	4,490
Berks	58	58	11.83	29,569	0.69	42,909
Blair	28	24	5.09	12,737	0.98	13,015
Bradford	14	12	0.82	2,058	0.37	5,494
Bucks	120	102	12.81	32,032	0.96	33,489
Butler	80	44	11.83	29,583	2.74	10,788
Cambria	31	31	3.90	9,757	0.77	12,633
Cameron	2	2	0.04	95	0.18	530
Carbon	2	2	0.52	1,299	0.24	5,379
Centre	16	15	5.65	14,133	2.42	5,846
Chester	64	54	29.33	73,327	2.82	26,022
Clarion	1	1	0.00	3	0.00	3,120
Clearfield	15	15	2.52	6,310	0.82	7,717
Clinton	7	6	1.00	2,508	0.73	3,419
Columbia	12	11	1.24	3,108	0.63	4,955
Crawford	25	23	3.31	8,278	1.02	8,092
Cumberland	17	17	6.77	16,926	1.22	13,859
Dauphin	45	36	8.94	22,358	0.75	29,961
Delaware	123	94	18.27	45,663	0.92	49,450
Elk	6	3	0.25	636	0.25	2,535

Erie	68	44	10.15	25,377	0.75	33,888
Fayette	39	29	4.47	11,169	0.71	15,675
Forest	.	.	.	0	0.00	352
Franklin	22	20	3.82	9,557	0.74	12,874
Fulton	11	6	0.33	826	0.63	1,316
Greene	18	11	0.60	1,496	0.43	3,497
Huntingdon	5	4	0.52	1,309	0.32	4,109
Indiana	9	5	1.25	3,123	0.49	6,402
Jefferson	12	11	2.14	5,353	1.23	4,335
Juniata	1	1	0.12	312	0.19	1,684
Lackawanna	42	42	12.36	30,888	1.45	21,274
Lancaster	104	75	19.25	48,132	1.12	43,066
Lawrence	10	6	1.65	4,129	0.48	8,673
Lebanon	13	9	1.13	2,817	0.22	12,759
Lehigh	87	54	16.13	40,330	1.07	37,734
Luzerne	77	60	15.27	38,165	1.11	34,364
Lycoming	8	7	1.55	3,885	0.38	10,146
McKean	5	5	1.05	2,630	0.59	4,492
Mercer	27	19	5.20	13,011	1.16	11,176
Mifflin	7	5	0.57	1,432	0.33	4,344
Monroe	14	9	2.55	6,373	0.41	15,454
Montgomery	248	160	24.81	62,018	1.36	45,620
Montour	18	18	1.80	4,504	3.91	1,153
Northampton	47	31	9.76	24,395	1.05	23,269
Northumberland	14	12	2.97	7,416	0.86	8,581
Perry	1	1	0.00	2	0.00	3,467
Philadelphia	659	340	134.76	336,906	1.27	264,497
Pike	2	2	0.66	1,656	0.35	4,697
Potter	3	1	0.04	104	0.06	1,691
Schuylkill	12	9	1.46	3,662	0.28	13,211
Snyder	1	1	0.03	71	0.02	3,163
Somerset	21	11	3.25	8,124	1.35	6,027

Sullivan	4	2	0.08	188	0.51	370
Susquehanna	3	3	0.31	779	0.24	3,254
Tioga	6	6	0.60	1,508	0.41	3,660
Union	4	3	1.10	2,756	1.10	2,504
Venango	6	5	1.38	3,439	0.64	5,359
Warren	7	5	0.71	1,777	0.51	3,515
Washington	51	19	3.12	7,805	0.52	14,946
Wayne	11	11	3.41	8,520	2.10	4,054
Westmoreland	104	46	10.92	27,294	1.05	25,949
Wyoming	3	3	0.34	852	0.35	2,409
York	52	44	11.23	28,078	0.71	39,496
All Counties	2969	2041	484.14	1,210,357	1.03	1,177,514

Summary of Providers, Enrollment, and Service by County, 2014

County	Unique Provider Name and ZIP Code Count	Unduplicated Count of Providers (primary site in county)	FTE Providers	Visits	Visits to Child Enrollment Ratio 2014	Child Enrollment 2014
No Match/Out of State	.	.	20.39	50,967	.	.
Adams	4	4	0.90	2,261	0.33	6,822
Allegheny	368	285	38.54	96,348	1.04	92,381
Armstrong	11	7	1.06	2,650	0.46	5,736
Beaver	43	24	4.48	11,199	0.81	13,895
Bedford	11	11	2.42	6,049	1.47	4,105
Berks	51	51	11.77	29,421	0.72	40,718
Blair	25	21	5.12	12,804	1.05	12,189
Bradford	12	11	1.09	2,716	0.54	4,985
Bucks	105	92	10.59	26,468	0.87	30,465
Butler	72	42	11.64	29,097	2.85	10,205

County	Unique Provider Name and ZIP Code Count	Unduplicated Count of Providers (primary site in county)	FTE Providers	Visits	Visits to Child Enrollment Ratio 2014	Child Enrollment 2014
Cambria	32	32	3.76	9,396	0.79	11,843
Cameron	1	1	0.02	50	0.10	499
Carbon	2	2	0.48	1,200	0.24	5,105
Centre	14	12	5.09	12,719	2.33	5,469
Chester	66	53	26.46	66,160	2.87	23,034
Clarion	1	1	0.00	1	0.00	2,867
Clearfield	15	15	2.38	5,961	0.81	7,316
Clinton	8	7	0.87	2,184	0.68	3,202
Columbia	12	12	1.27	3,171	0.68	4,650
Crawford	26	23	3.62	9,050	1.16	7,778
Cumberland	19	19	6.83	17,066	1.37	12,491
Dauphin	49	42	7.75	19,380	0.73	26,508
Delaware	114	88	17.37	43,437	0.95	45,869
Elk	5	3	0.36	901	0.37	2,433
Erie	64	42	9.35	23,375	0.73	32,241
Fayette	39	32	4.22	10,562	0.71	14,934
Forest	1	.	0.00	11	0.03	344
Franklin	23	21	3.71	9,280	0.81	11,517
Fulton	13	7	0.42	1,043	0.80	1,298
Greene	16	11	0.70	1,741	0.53	3,275
Huntingdon	4	4	0.56	1,409	0.37	3,852
Indiana	9	4	1.02	2,556	0.43	5,964
Jefferson	12	12	2.16	5,406	1.34	4,024
Juniata	1	1	0.09	221	0.14	1,595
Lackawanna	40	40	11.26	28,153	1.40	20,098
Lancaster	100	72	17.50	43,751	1.10	39,928
Lawrence	11	8	1.68	4,206	0.52	8,132

County	Unique Provider Name and ZIP Code Count	Unduplicated Count of Providers (primary site in county)	FTE Providers	Visits	Visits to Child Enrollment Ratio 2014	Child Enrollment 2014
Lebanon	9	8	0.84	2,104	0.18	11,521
Lehigh	82	62	13.75	34,373	0.99	34,723
Luzerne	67	57	13.73	34,329	1.07	32,189
Lycoming	7	6	1.30	3,254	0.34	9,465
McKean	9	9	0.99	2,478	0.58	4,296
Mercer	23	18	4.56	11,397	1.07	10,632
Mifflin	7	6	1.37	3,434	0.84	4,079
Monroe	12	8	2.95	7,380	0.50	14,816
Montgomery	224	144	20.50	51,250	1.25	40,926
Montour	21	21	1.62	4,041	3.84	1,053
Northampton	47	33	10.94	27,344	1.29	21,139
Northumberland	15	13	2.42	6,038	0.78	7,751
Perry	1	1	0.00	5	0.00	3,172
Philadelphia	639	335	125.44	313,598	1.23	254,051
Pike	1	1	0.37	918	0.21	4,467
Potter	2	1	0.04	94	0.06	1,584
Schuylkill	12	9	1.46	3,658	0.29	12,504
Snyder	2	2	0.07	172	0.06	2,935
Somerset	22	12	2.54	6,355	1.13	5,600
Sullivan	4	2	0.06	150	0.41	365
Susquehanna	3	3	0.35	877	0.29	2,985
Tioga	6	5	0.51	1,277	0.38	3,343
Union	5	4	0.84	2,104	0.85	2,481
Venango	5	4	1.18	2,946	0.57	5,154
Warren	6	5	0.72	1,796	0.55	3,255
Washington	43	15	2.88	7,201	0.51	14,005
Wayne	10	8	2.82	7,040	1.80	3,920

County	Unique Provider Name and ZIP Code Count	Unduplicated Count of Providers (primary site in county)	FTE Providers	Visits	Visits to Child Enrollment Ratio 2014	Child Enrollment 2014
Westmoreland	98	45	10.34	25,844	1.05	24,516
Wyoming	3	3	0.14	354	0.16	2,185
York	43	37	10.78	26,959	0.75	35,877
All Counties	2827	1989	452.06	1,130,173	1.02	1,102,756

APPENDIX 3

SCHOOL HEALTH SURVEY IMPLIED CONSENT

PennState

Pennsylvania Office of Rural Health
The Pennsylvania State University
110 Keller Building
University Park, PA 16802

814 863 8214
Fax: 814-865-4688
porh.psu.edu

Consent for Exempt Research
The Pennsylvania State University

Title of Project: "Oral Health Status of Low-income Children in Pennsylvania: A Rural/Urban Comparison"
Principal Investigator: Lisa Davis, MHA

Telephone Number: 814-863-8214

You are being invited to volunteer to participate in a research study. This summary explains information about this research.

- A portion of our final report, which will be presented to the Pennsylvania General Assembly, includes information on school oral health programs. In an effort to add context to the school program data that we have acquired, we are asking school nurses, school dental hygienists, and school district administrators to participate in a survey about their school's oral health program. The goal of this survey is to learn more about:
  - How the existing oral health program was selected
  - The perceived benefits and challenges of the program
  - Perceptions of opportunities and challenges within the program
  - Program staffing
  - Follow-up and referral activities
- Participants will be asked a series of questions about their school's oral health program. If at any time, the participant feels that they are unable to answer a question, or chooses not to answer a question, they may decline to answer.
- Survey data will be aggregated to assure participant confidentiality. No participant or school district will be identified in the final report. Data will be aggregated to represent rural and urban location.
- This survey should take approximately 15 minutes to complete.

If you have questions or concerns, please contact Lisa Davis at 814-863-8214. If you have questions regarding your rights as a research subject or concerns regarding your privacy, you may contact the Penn State Office for Research Protections at 814-865-1775.

Your participation is voluntary and you may decide to discontinue your participation at any time. You do not have to answer any questions that you do not want to answer.

Your participation implies your voluntary consent to participate in the research.

APPENDIX 4

SCHOOL HEALTH SURVEY

Oral Health Status of Low-income Children in Pennsylvania: A Rural/Urban Comparison
Telephone Survey Questions for School Nurse
or School Dental Hygienist and Administrator

1. ***School District and urban/rural status:*** _____

2. ***Name of Respondent:*** _____

3. ***Respondent type***
    1. ***Nurse***
    2. ***Hygienist***
    3. ***Board Member***
    4. ***Building principal***
    5. ***Superintendent***
    6. ***Other administrator (specify)*** _____

4. ***Type of Program***
    1. ***DHSP***
    2. ***MDP***

*****Note: Questions 1-4 will be pre-filled by researcher.*

Before beginning, be sure to read consent form.

First, I would like to ask you a few general questions about your program and your choice of an MDP or a DHSP.

5. **The Pennsylvania Department of Health classified your program in 2015-2016 as a (***fill in* **MDP or DHSP). Is this still the case?**
    1. **Yes**
    2. **No**

**If answer is "No," skip to question #8 and #9, then come back to questions 6 and 7

6. *School nurse or dental hygienist only:* **How many students are you responsible for?** _____

7. **Thinking back to when you chose the type of program, do you remember the factors that went into making the decision of choosing a DHSP or the MDP?** *(Prompt for the reasons if they remember, write "don't remember," if they don't).*

_____
_____
_____
_____
_____

8. Do you know if the school district changed the type of program, from a DHSP to an MDP or from an MDP to a DHSP?

1. Yes, changed
2. No changes
3. Don't know

9. *(If answered "yes" to Question 8),* **What were the reasons for the change and when did the change occur?**

_____
_____
_____
_____
_____

10. *(If the district has a MDP),* **How is the program fulfilled?**

1. School dentist
2. Mobile unit
3. Van
4. Local dental office
5. Combination (specify): _____
_____

11. *(If the district has an MDP),* **Are services paid by the district or fulfilled through volunteer hours?**

1. Paid by the district
2. Volunteer hours
3. Combination

12. Has the district encountered any difficulties in finding a dentist to serve as the school dentist?

1. Yes (ask to explain)
2. No

_____
_____
_____
_____
_____

13. *(If appropriate, ask)* **What strategies did you use in finding and recruiting dentists?**

_____

14. Has the district ever had to use multiple dentists to fulfill this mandate?

1. Yes
2. No

15. In your opinion, has the program made an impact on the oral health of students in your district *(prompt for explanation)?*

_____

_____

_____

16. I am going to read a list of services that school health programs may choose to offer. Please answer "yes" if your district offers it and "no" if it doesn't. *(Read list and circle each that applies)*

1. Dental Screening / Exam
2. Dental Prophylaxis
3. Dental Sealants
4. Topical Application of Fluoride (varnish, foam trays, mouthrinse)
5. Radiographs
6. Intraoral Photos
7. Restorative Treatment (specify types)
8. Oral Hygiene Education (group or one on one?)
9. Other? (Please specify) _____

17. *(if appropriate, ask)* **If additional services are offered beyond the mandated screening/exam, what prompted this decision? (Ex.: If fluoride or sealants are offered)**

_____

_____

_____

_____

_____

18. We know that dental screenings/exams are mandated upon entry into school (K or Grade 1) and in Grade 3 and in Grade 7. Does the district incorporate dental exams/screenings and/or dental services in any other grade levels?

1. Yes *(ask grades)*_____
2. No

19. *(If appropriate, ask)* **What determined the decision to offer services to these additional grades?**

_____

_____

Now, I am going to ask you a few questions about the referral process (when applicable) and continuity of dental care.

20. If a child requires a dental referral from the school dentist or school dental hygienist to a provider in the community, how are the child's parents and/or the child's dental home notified?

21. Once the child is referred, does the school provide any follow-up in regards to the referral and treatment completion? If so, who within the district is responsible for this follow-up?

22. Are there any difficulties with either the referral or the tracking of treatment completion?

1. None mentioned
2. Yes, explained further below

23. If a school form is completed by the child's family dentist/dental home and indicates the need for continued care or a dental referral, does the school district intervene? If so, what is the typical process/protocol that is followed?

24. In cases where a child's family dentist indicates the need for additional dental treatment, does the school provide any follow-up in regards to treatment completion? If so, who within the district is responsible for this follow-up?

25. Once a child has received a dental exam/screening at school, how are parents notified?

Now I am going to ask you a few questions about the value and effectiveness of the program and possible challenges that you may encounter.

26. In your opinion, what challenges has the district encountered with the dental screening/exam process and any resulting follow-up?

27. What part(s) of your existing MDP/DHSP program seem to be working particularly well for your district and the children it serves?

28. Since you are involved with this program on a day-to-day basis, what do you think are components of an ideal school-based dental program.

29. Our research will be shared with the members of the Pennsylvania General Assembly. Is there anything that you think they should know in crafting legislation about school oral health?

30. Is there anything else you would like to add that we have not discussed?

31. Can you recommend anyone else within your district who might be able to provide additional information that might be valuable to this research?

For school district administrators ONLY:

32. Considering the scope of school policy and resources, where does school health fit in? Where does the oral health program fit within school health?

33. What were the main consideration that factored into the decisions as the district was selecting their dental program?

34. Was there debate or contention in the deliberations? If so, what were the primary concerns? What benefits were discussed?

35. Is a review conducted on the goals and purpose of the oral health program with respect to the general goal of student health?

This concludes our survey. Thank you very much for your participation!

APPENDIX 5

TABLES OF RESULTS FROM THE SCHOOL HEALTH SURVEY

Urban or Rural School District

Type	Frequency	Percent
Urban	22	81.5
Rural	5	18.5
Total	27	100.0

Q3: Respondent Type

Type	Frequency	Percent
Nurse	11	40.7
Hygienist	15	55.6
Other	1	3.7
Total	27	100.0

Q4: Type of Program

Type	Frequency	Percent
DHSP	16	59.3
MDP	11	40.7
Total	27	100.0

Q6: Number of Students Respondent Responsible For

Number	Frequency	Percent
77	1	3.8
420	1	3.8
450	1	3.8
700	1	3.8
800	1	3.8
900	1	3.8
940	1	3.8
1,150	1	3.8
1,300	2	7.7
1,375	1	3.8
1,500	1	3.8
2,500	1	3.8
5,000	2	7.7
5,700	1	3.8
6,500	1	3.8

Number	Frequency	Percent
8,000	1	3.8
8,500	1	3.8
9,100	1	3.8
11,000	1	3.8
13,500	1	3.8
17,000	2	7.7
18,000	2	7.7
Total	26	100.0

Q7: Factors Guiding Selection of Program

Factors	Frequency	Percent
Program predates respondent	20	74.1
Community need	2	7.4
To remain compliant with state requirements	2	7.4
Unsure	2	7.4
Financial decision	1	3.7
Total	27	100.0

Q10: Delivery Method for MDE

Delivery Method	Frequency	Percent
School dentist	5	18.5
Mobile unit	2	7.4
Combination	4	14.8
NA	16	59.3
Total	27	100.0

Q11: MDP Volunteer or Paid

Pay Type	Frequency	Percent
Paid by the district	8	29.6
N/A	16	59.3
Child’s insurance is billed	3	11.1
Total	27	100.0

Q12: Difficulty in Finding a Dentist

Response	Frequency	Percent
Yes	1	3.7
No	24	88.9
Don’t Know	2	7.4
Total	27	100.0

Q14: Used Multiple Dentists

Response	Frequency	Percent
Yes	2	7.4
No	23	85.2
Don’t Know	2	7.4
Total	27	100.0

Q15: Has Program Made Impact on Oral Health

Response	Frequency	Percent
Yes-advocacy/care navigation/referrals	8	29.6
Yes-education/oral health literacy	2	7.4
Yes-advocacy/care navigation/education	4	14.8
Yes-preventive services/care completion/education	2	7.4
Yes-access to care at school/improved oral health	8	29.6
Unsure	1	3.7
No	2	7.4
Total	27	100.0

Q16: Additional and Non-mandated Services Offered

Response	Frequency	Percent
No answer	18	66.7
Restorative offered through collaboration/agreement with outside entity	3	11.1
Orth. services through Smile for a Lifetime Program AND Restorative through collaboration/agreement with outside entity	1	3.7
School based summer migrant sealant program	1	3.7

Works with families to find care/insurance	3	11.1
Sometimes offers mouthguards for sports teams	1	3.7
Total	27	100.0

Q17: Reason for Additional Services

Response	Frequency	Percent
N/A	12	44.4
Student/Community Need	10	37.0
Consistency and Follow-up	2	7.4
Unsure/respondent not involved in decision	3	11.1
Total	27	100.0

Q18: Non-mandated Grade Levels Served

		Frequency	Percent
Valid	Yes	19	70.4
	No	8	29.6
	Total	27	100.0

Q18: Nature of Non-mandated Grades Service

Service	Frequency	Percent
N/A	10	37.0
Grades 1 and 7: prophy, sealants, fluoride and Grade 7: prophy and sealants	1	3.7
Student with needs identified by nurse / re-screening	3	11.1
Add Grade 10 Screening	2	7.4
All students in a special education program	1	3.7
K, 2, 3, 4, 5, 7	1	3.7
Preschool screenings and summer program for students who are refugees	1	3.7
Attempt K-7 and complete at least K, 1, 2, 3, 5, 7	1	3.7
K, 2, 5, 8	1	3.7
Add Grade 5 and 10 screenings	1	3.7
Mobile services available to all with signed consent	4	14.8
Students in special education program and re-screenings	1	3.7
Total	27	100.0

Q19: Reason for Serving Additional Grade

Reason	Frequency	Percent
N/A	12	44.4
Follow-up / Re-screen	4	14.8
Student need / transient populations / limit emergencies	6	22.2
Not involved in decision	2	7.4
Develop relationships / screen before leaving grade/school	3	11.1
Total	27	100.0

Q20: Method to Notify Parents/Dental Home of Referral

Method	Frequency	Percent
N/A	1	3.7
Letter Only	4	14.8
Phone Call Only	3	11.1
Letter and then follow-up with email or text message	2	7.4
Letter and call if needed as follow-up	17	63.0
Total	27	100.0

Q22: Difficulty with Referral/Tracking

Response	Frequency	Percent
None mentioned	10	37.0
Yes	17	63.0
Total	27	100.0

Q22: Elaboration About Tracking Issues

Response	Frequency	Percent
No answer	7	25.9
Parent compliance in returning completed form	11	40.7
Limited time/too many students to track	2	7.4
Language barriers	2	7.4
Difficulty finding a dentist to treat students	1	3.7
Transient nature of school district	2	7.4
Limited time/too many students to track and transient population	1	3.7
No tracking system in place	1	3.7
Total	27	100.0

Q23: School District Intervenes in Family Dentist Referral

Response	Frequency	Percent
No intervention	22	81.5
CSDH screens everyone	3	11.1
CSDH follows-up with family	2	7.4
Total	27	100.0

Q24: Follow-up to Family Dentist Referral

Response	Frequency	Percent
No	17	63.0
No, except if the child presents with pain	1	3.7
Unsure	1	3.7
N/A	6	22.2
Yes, CSDH	2	7.4
Total	27	100.0

Q25: How are Parents Notified of Exam/Screening

Response	Frequency	Percent
Nothing if healthy, letter if routine, call if urgent	1	3.7
Unsure	2	7.4
Letter and follow-up call/email as needed	5	18.5
Letter/card/form	8	29.6
No notification	5	18.5
Notification prior to screening, nothing stating completed unless referral is needed	4	14.8
N/A	1	3.7
Phone call	1	3.7
Total	27	100.0

Q26: Challenges with Screening/Exam

Response	Frequency	Percent
Non-compliant parents/lack of parental value of oral health	6	22.2
Access to care/lack of MA providers for follow-up/lack of insurance	7	25.9
None/unsure	3	11.1
CSDH has limited time-large number of students-difficulty finding space-difficulty pulling students out of class	6	22.2
Follow-up	1	3.7
Coordinating screenings with dentist's schedule/meeting dentist's needs/limited dentist availability	2	7.4
Lack of comprehensive screening/just a "quick look" doesn't fulfill need	1	3.7
Limited time for nurses to follow-up	1	3.7
Total	27	100.0

Q27: Components of Program Which Work Well

Response	Frequency	Percent
Oral Health Education	7	25.9
Preventive Services (including sealants/varnish/prophys)	1	3.7
Screenings/exams/evaluations	10	37.0
Affiliation/connection to brick and mortar clinic or mobile services	4	14.8
Increasing parental awareness of the importance of oral health	1	3.7
School district values oral health program/services	1	3.7
Care Navigation	1	3.7
Dentist is reliable	1	3.7
None	1	3.7
Total	27	100.0

Q27: Additional Responses for Components of Program Which Work Well (second response)

Response	Frequency	Percent
No additional response	16	59.3
Preventive Services (including sealants/varnish/prophys)	2	7.4
Screenings/exams/evaluations	2	7.4
Affiliation/connection to brick and mortar clinic or mobile services	4	14.8
Care Navigation	2	7.4
Dentist is reliable	1	3.7
Total	27	100.0

Q27: Additional Responses for Components of Program Which Work Well (third response)

Response	Frequency	Percent
No additional response	25	92.6
School district values oral health program/services	1	3.7
Care Navigation	1	3.7
Total	27	100.0

Q28: Components of an Ideal Program

Response	Frequency	Percent
Classroom education	6	22.2
Preventive services/dental hygienist/dental hygiene services program	11	40.7
School-based health clinic (medical and dental)	5	18.5
Increased district focus on oral health / increase time that is devoted to services	2	7.4
Restorative services	1	3.7
Mobile services (van or dental unit)	2	7.4
Total	27	100.0

Q28: Components of an Ideal Program (second response)

Response	Frequency	Percent
No additional response	19	70.4
Preventive services/dental hygienist/dental hygiene services program	4	14.8
School-based health clinic (medical and dental)	1	3.7
Increased district focus on oral health / increase time that is devoted to services	2	7.4
Dentist in district	1	3.7
Total	27	100.0

Q28: Components of an Ideal Program (third response)

Response	Frequency	Percent
No additional response	23	85.2
Effective digital data collection	1	3.7
Restorative services	2	7.4
Increase # of dental offices accepting MA/CHIP	1	3.7
Total	27	100.0

Q29: Comments for General Assembly

	Frequency	Percent
Do not disrupt DHSP/DHSP important school program/school RDH must be certified	4	14.8
Oral-systemic link/dental disease can be prevented	3	11.1
Need comprehensive oral care in schools/need funding/oral health important in school w/ability to learn/missed days	8	29.6
No/No answer	3	11.1
mandate dental care like vaccines (for entry into school) / eliminate sugar in school/promote the need to drink water	1	3.7
need for translation services/pay attention to changing demographics and needs	2	7.4
Make oral health care affordable/accessible	2	7.4
mandate dentists to accept Medicaid	1	3.7
Need more school nurses/the state is understaffed	1	3.7
Mandate exams in additional grades (high school)	1	3.7
Don’t limit access to care for those with special needs	1	3.7
Total	27	100.0

Q29: Comments for General Assembly (second response)

Response	Frequency	Percent
No additional response	24	88.9
Oral-systemic link/dental disease can be prevented	1	3.7
Need comprehensive oral care in schools/need funding/oral health important in school w/ability to learn/missed days	1	3.7
Cap the number of children the CSDH is responsible for	1	3.7
Total	27	100.0

Q30: Additional Comments

Response	Frequency	Percent
None	18	66.7
Add high school screening	1	3.7
Sending a bad message by providing children processed food at school	1	3.7
RDH/PHDHP must be school certified	1	3.7
Need funding to increase oral health services	3	11.1
Didactic oral health education is essential	1	3.7
Require all dentists to complete pro bono cases / increase number of dentists accepting Medicaid	2	7.4
Total	27	100.0

Q30: Additional Comments (second response)

Response	Frequency	Percent
No additional response	24	88.9
Need funding to increase oral health services	1	3.7
Language services	1	3.7
Need better data collection / oral health surveillance	1	3.7
Total	27	100.0

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