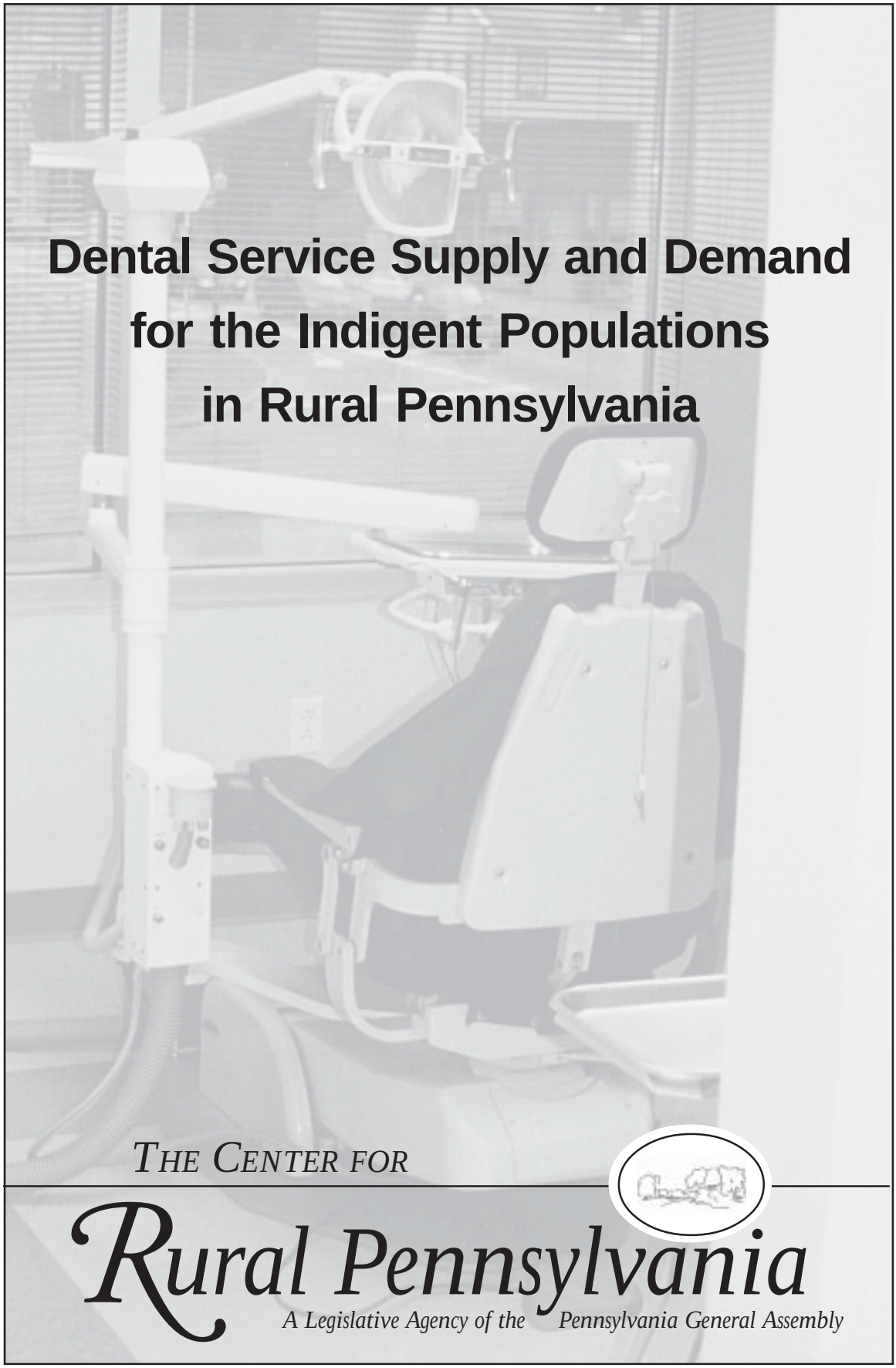
Dental Service Supply and Demand for the Indigent Populations in Rural Pennsylvania



THE CENTER FOR
Rural Pennsylvania
A Legislative Agency of the Pennsylvania General Assembly

Dental Service Supply and Demand for the Indigent Populations in Rural Pennsylvania

A report by
Myron Schwartz, M.A., Social Science Research Institute, and Lisa Davis, M.H.A.
Pennsylvania Office of Rural Health, Pennsylvania State University
and
Alberto Cardelle, M.P.H., Ph.D., and Kristina Whitmire, M.P.H., Health Department,
East Stroudsburg University

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INTRODUCTION

In recent years, oral health has received increased attention, both nationally and in Pennsylvania. The Surgeon General's report on oral health in the United States (U.S. Dept. of Health and Human Services, 2000) has stimulated considerable interest nationally. In Pennsylvania, an oral health strategic planning initiative was launched as a first step in a comprehensive strategic plan to address oral health issues. Arguably, the aspect of oral health that has garnered the most interest is that of access to services, especially with respect to indigent adults and children. Adequate access to dental services among low-income populations has been an intractable problem not only in Pennsylvania but also across the United States (Dubay and Kenney, 2001; Lee and Horan, 2001; Cashion, et al.; 1999; Ronis and Lang, 1998; Rizk and Christen, 1994). In Pennsylvania, the ratio of active dentists to the population has declined by 10 percent in the last decade. The number of dental school graduates declined 31 percent from 1985 to 1995. These trends are also being experienced at the national level. The existing access and use problems among indigent populations, in combination with declining supplies of dentists, will only exacerbate the problem for the poor and pose problems for the general population in the future. Such a situation will surely demand the consideration of Pennsylvania lawmakers.

The consistent finding in the literature is that, while advances have been made in the area of oral health, many of the national oral health objectives within Healthy People 2000[1] were not met, primarily due to the higher rate of disease among low-income groups and their lower use of preventive services. The literature suggests that both the supply of dental providers and the use or demand patterns of the poor contribute to inadequate access to dental services among the indigent.

This report, which is based on research conducted in 2002, describes the supply and geographic distribution of dentists and dental hygienists in the Commonwealth; describes the supply, specifically the number and the distribution, of dental providers available to the Medical Assistance (MA) population in areas of the state that were not covered by the HealthChoices[2] program in 2002; inspects the use of dental services within the MA program for the calendar year 2000 in counties not mandated to participate in HealthChoices in that year; describes the level of dental morbidity observed in Pennsylvania's rural school-aged children and the level of use of dental care among these children; and makes policy recommendations that may assist state and local government in ameliorating the gap in dental care access.

DENTISTS ARE THE ONLY GROUP OF HEALTH CARE PROVIDERS THAT HAS EXPERIENCED AN ABSOLUTE DECLINE IN WORKFORCE LEVELS IN PENNSYLVANIA SINCE 1995.

THE SUPPLY OF DENTAL HEALTH PROVIDERS

Dentists are the only group of health care providers that has experienced an absolute decline in workforce levels in Pennsylvania since 1995. To compound the matter, dental schools are training fewer dentists. The expectation is for this trend to continue since dental school enrollments remain at relatively low levels. Countering this trend, efficiency levels of dentists are increasing, and their cooperative practice of dental care with dental hygienists and expanded function dental assistants has a significant positive effect on this efficiency. However, there is a limit to increases in efficiency. Dentists have an

[1] Healthy People 2000, established by the U.S. Department of Health and Human Service, is a set of health objectives that served as the basis for the development of state and community health plans.

[2] HealthChoices is Pennsylvania's Medical Assistance waiver program that replaces fee-for-service with mandatory managed care. Most rural areas of the state are not yet mandated for managed care, although some areas are. All analyses using these data were performed only for areas of the Commonwealth not yet mandated to participate in HealthChoices. Claims data from contracted managed care companies in HealthChoices areas were not complete enough at the time of the study to permit reliable analyses.

abundant supply of patients, and the declining number of practitioners will most likely have an effect on the availability of dentists in the near future, as current practitioners retire and fewer dentists are being trained to take their place.

The general supply of dentists has an additional impact on the availability of practitioners for enrollees in MA. The overall supply of dentists may affect dentists' willingness to participate in the MA program since, if the supply of dentists is low enough to ensure an adequate private pay patient base, then dentists will be less likely to participate in the MA program. In general, program participation of dentists has been at levels inadequate to provide services equivalent to those received by the population at large, even though this equivalency is a mandate for state participation in this state-federal cooperative program. The impending decline in the supply of dentists will only exacerbate this access problem.

Dentists report that among the factors that discourage their participation in the MA program are low reimbursement levels, excessive paperwork, and low patient appointment compliance. Although the current supply of dentists is not labeled as a shortage, the supply levels also cannot be considered to be excessive. With the prediction of fewer dentists in the workforce in the near future, shortages will most likely occur and will have the most significant impact on poor population groups.

Even with an adequate supply of dentists, geographic inequalities have traditionally existed and currently exist. Most notably, abundant supplies exist in urban areas and limited supplies exist in rural areas. In Pennsylvania, the per capita urban dentist supply is more than 75 percent greater than the rural supply. Also, there is tremendous variation by county, with some counties having a very favorable dentist supply and some an extremely limited one.

CHILDREN FROM LOW-INCOME HOUSEHOLDS HAVE HIGHER CARIES RATES AND MORE UNMET DENTAL TREATMENT NEEDS THAN CHILDREN FROM HIGHER INCOME HOUSEHOLDS.

THE DEMAND FOR DENTAL CARE AMONG SCHOOL- AND PRE-SCHOOL-AGED CHILDREN

While the impact of inadequate dental services is felt by all segments of the underserved population, the inequitable access and unmet need is particularly troublesome for children. Over 40 percent of children visit a dentist during the course of a year, but only about 25 percent of children insured by Medicaid do so (Milgrom and Reidy, 1998). Seventy-eight percent of American children experience dental caries[3] by age 17, making it the most chronic childhood disease (Gillcrist, 2001). In Pennsylvania, a study by Weyant (2000) showed that children in Pennsylvania had a high rate of dental visits, with 87 percent of school-aged children having visited a dentist in the last 12 months. However, this is likely a misleading rate that is optimistically high. Pennsylvania mandates that school-aged children have dental screenings in first, third, and seventh grade, so more children are in contact with a provider, which is a real benefit to school children. However, it does not reflect the sufficiency of care that they are receiving. Generally, the percentage of the population having made any dental visit in the past year is a measure of use. The challenge with using this measure is that it assumes all dental visits are the same, masking differences in visits (Watson, 2001). Despite such high visits to dentists, many children failed to receive the necessary services. For example, in Pennsylvania, 27 percent of children between the ages of 6 and 8 and 14 percent of adolescents aged 15 have untreated caries[4] (Weyant, 2000). In addition, less than 25 percent of children between the ages of 8 and 14 in Pennsylvania had received sealants, a plastic coating applied to the chewing surfaces on the back teeth. Dental sealants are a safe and effective way to stop tooth decay in school-aged children and can prevent future cavities from developing. Healthy People 2010 posits a goal

[3] Tooth decay is the disease known as caries or cavities. These terms are used interchangeably in dental records and in this report.
[4] Healthy People 2000 established the goal that no more than 20 percent of children between the ages of 6 and 8 and 15 percent of adolescents aged 15 should have untreated caries (tooth decay or cavities).

of half of all schoolchildren to have dental sealants. As Weyant's research demonstrates, there is a distinct geography to the distribution of caries in Pennsylvania that this study presumes is influenced by the supply of services as well as other predisposing conditions.

The literature is rich with studies that report that personal characteristics such as income, education, and culture are a strong predictor of access to dental services (Atchinson et. al., 1997). Children from low-income households have higher caries rates and more unmet dental treatment needs than children from higher income households. Dental visits are more scarce among children with lower family incomes. Access to a dental examination for Medicaid-eligible children has been improved by federal and state programs but remains worse for those who are poor but do not qualify for Medicaid (Watson, 2001; Dubay and Kenney, 2001; Edelestein, 2000). In his study of Pennsylvania, Weyant (2000) found that 39 percent of children who did not visit the dentist had some type of dental disease while 18 percent of children who visited a dentist in the last 12 months had a dental disease. Weyant also found a significant economic gradient, with children from the poorest families having three times more dental caries and two times more untreated dental caries than children from wealthier families.

Income is just one predisposing factor. When financial barriers are removed, only a small proportion of low-income children, who theoretically have access to services, ever receive services. Mofidi and colleagues (2002) found that among low-income patients who had insurance access, many other predisposing factors kept them from accessing care. Patients reported difficulty in finding a provider, limited appointment schedules, inconvenient and unreliable transportation, excessive wait times, demeaning interactions with front office staff, and negative interactions with dentists, all of which kept them from seeking consistent dental care.

The critical impact of poor dental care on children is evident in the fact that children missed an estimated 51 million hours of school annually because of dental pain and visits to dentists for treatment (Reis, 1986). Peterson and colleagues (1999), in a study of Texas school children, argue that dental pain may affect a child's mental and social well-being at school and decrease school attendance. The long-term impacts are clear. Very young children with severe dental problems may not grow normally and may show serious behavior and attention problems.

Reisine (1995) noted that when acute dental problems are treated and children are free from pain, they become more actively involved in their education, making improvements in learning and attendance. Although physical growth is slow in the presence of dental problems, when these problems are addressed, children return to normal growth patterns. At the same time, behavior and learning improve dramatically, simply because these children sleep better, eat better, and are in better overall shape to learn and play. Strikingly, the authors argue that dental morbidity (disease rates) is not considered to be a serious public health problem by policymakers because it is generally chronic, not life-threatening, and typically has acute stages of short duration.

The consistent finding in the literature is that, while advances have been made in the area of oral health, many of the national oral health objectives within Healthy People 2000 were not met, primarily due to the higher rate of disease among low-income groups and their lower use of preventive services. The literature suggests that both the supply of dental providers and the use patterns of the poor contribute to inadequate access to dental services among the indigent. The problems caused by this lack of access are profound in children and continue into adulthood.

SCHOOL-BASED PROGRAMS

Pennsylvania's schools are mandated to ensure that children have dental exams performed in kindergarten or first grade and in third and seventh grades. Students are required to show proof of having been to a private dentist during that time period. In the event that the parents are unable to provide a dental visit, the examination must be provided by the school district. Many students have the exam performed by the school. The dental screening is a general inspection of the mouth to observe oral health problems and to establish priorities or categories for subsequent comprehensive dental exams and treatments as needed. Throughout the state, the average percentage of school children who have the school-based exam in urban school districts is 38 percent, while in

rural school districts, the average is 51 percent.

Schools in Pennsylvania carry out this mandate by employing district dental hygienists, contracting out the services with dentists, or providing vouchers to students to visit local dentists. Twenty-nine percent of the rural[5] counties have school districts with hygienist programs, as compared to 65 percent of urban counties. The vast majority of school districts without hygienist programs contract out the services with dentists. Dentists come to the school on prescribed days and screen all students who have not been to a private dentist. Only one of the analyzed districts in this study gave students vouchers to visit local dentists.

The state requires that all school districts report to the Pennsylvania Department of Health the total number of students, the number of students examined by district services, the number of students referred to a dentist, and the number of students who returned confirmation of having the referral completed.

In addition to school districts, low-income preschool aged children are screened for dental needs within county Head Start programs. Head Start is a comprehensive child development program that serves children from birth to age 5, pregnant women, and their families. They are child-focused programs and have the overall goal of increasing the school readiness of young children in low-income families.

PROJECT METHODOLOGY

To learn more about the supply of dentists and dental hygienists in Pennsylvania, the researchers obtained license data for dentists and dental hygienists from the Pennsylvania Department of State, Bureau of Professional and Occupational Affairs. The data were geographically analyzed to identify the county and municipality of each licensee. The data were then aggregated to obtain counts of licensees for each Pennsylvania county and municipality.

There are two limitations to this data. First, the license data do not include an indicator of the current activity status of the licensee. Consequently, the resulting counts are of the potential workforce and not of the currently active clinical service workforce. Additionally, the addresses included in the data are provided by the licensee and are not necessarily the practice addresses of the dentists or dental hygienists. This has implications for the accuracy of the geographic placement of the provider. It is suspected that dentists are more likely to provide their office address than dental hygienists. Both county level and municipality-based analyses were conducted for this report. When the address provided by the practitioner is not a practice site address, the service delivery site may be in error in the data. This has the most consequence for smaller geographic areas of analysis since the practice site and the provided address (most likely a residence) may not be in the same municipality.

The aggregated license data, which produced counts for each municipality and for each county in the Commonwealth, were merged with 2000 U.S. Census data to determine per capita supply levels.

The analysis of MA dentist supply and MA enrollee use was primarily based on two data files provided by the Pennsylvania Department of Public Welfare (DPW): a listing of all dentists enrolled in the MA program (provider file), and a file representing all claims made in the fee-for-service program[6] in the 52 counties not mandated to participate in the HealthChoices managed care program (claims file). The researchers were able to calculate the amount of activity of each dentist enrolled in the program and the types of patients they treated. Additionally, analysis of the claims file alone permitted the calculation of the number of enrollees receiving service by their county of residence, the amount of service they

[5] For the research, a county was considered rural if at least 50 percent of the population was defined as rural based on the 1990 Census.

[6] Data were not available for the managed care waiver program, HealthChoices. The traditional delivery system is known as the fee-for-service program. In that program, dentists bill directly to the Department of Public Welfare for the actual services they rendered.

received (number of visits a year), and the composition of the service population by age, sex, and race for each county and for the Commonwealth as a whole.

Merging the DPW data with U.S. Census data allowed the researchers to calculate use and provider participation rates and to explore social and economic correlates of these rates.

To conduct the demand analysis, the researchers obtained data files from the Department of Health and the Head Start program, which included summary descriptions of dental screenings within schools (by grade) and Head Start programs. With these data, the researchers determined an initial approximation of the level of dental morbidity and use patterns among these children.

Local school dental screening records were reviewed and used to verify the state databases and to obtain more complete information on dental screenings in sampled sites. The researchers reviewed dental screening records for kindergarten, first, third and seventh grade students in 10 purposefully selected rural elementary and middle schools and for participants in 10 county Head Start programs (the sample units). The 42 rural counties in the state were stratified by size, income, and rurality. Ten rural counties with representation of the six health districts and within two standard deviations of the average from the average population, median income, and average population density were selected. Then, one school district within the county at the average size and level of poverty was selected. From these schools, student dental screening records were reviewed and dental morbidity information, referral information, and referral outcomes were collected. This strategy validated the quality of the statewide data and further documented the amount and types of dental morbidity that school screenings have identified in their students. This review of records allowed the development of a dental morbidity profile and an assessment of the unmet clinical needs in the area.

To gauge the morbidity and dental needs of school children in these data, the researchers developed two indices: one to gauge dental health morbidity as the average caries experienced in the primary and permanent teeth, and a second to gauge the percentage of children with dental treatment needs that failed to complete the referral process.

The data from the Pennsylvania Department of Health and the data extracted from the school chart reviews were enhanced with data collected from a mailed parents' survey, a mailed school-nurse survey, and an administered key informant survey.

The nurse survey was mailed to approximately 115 district head nurses in the 42 rural non-HealthChoices counties. A total of 55 surveys were returned for a response rate of 49 percent. Of the 55 surveys, 47 were used for the final analysis. The surveys were designed to extract the nurse's perspective on the impact of unmet dental needs and the factors contributing to their occurrence.

The parent survey was mailed to 425 parents of children who had been referred for further dental care within the 10 schools that were sampled for chart reviews. A total of 42 surveys were returned for a response rate of 10 percent. This survey asked parents to provide socio-demographic information, their experience with using dental care, and their beliefs about dental care.

The key informant survey was administered to the 10 head nurses from the 10 sampled school districts. The survey asked about systems, models, and current practices that have been successful in improving access to dental services for children in need of care.

The results of the interviews were also used to document the impact of unmet dental needs and the factors contributing to their occurrence.

The statewide databases and the data from the surveys and interviews were merged with other data that included socio-demographic data and provider distribution data. This allowed for correlation analyses of dental morbidity and use patterns with income, poverty, and local provider availability.

The demand analysis identified factors affecting the demand of dental services using a conceptual framework for measuring performance of public health systems, developed by Handler, Issel and Turnock (2001).

THE SUPPLY AND GEOGRAPHIC DISTRIBUTION OF DENTISTS AND DENTAL HYGIENISTS

The overall supply of dentists is the most elementary characteristic of the dental workforce. When there are too few practitioners, access to dental services will be limited; when there are too many, the economic well being of dentists may be jeopardized. However, this simple market process is not the only manner in which the supply of practitioners affects oral health access, both for the general population and for MA recipients.

Nearly all types of health care professionals practice in greater numbers in and around metropolitan areas, resulting in geographic inequities in access. Even with adequate overall supplies, some areas may have quite limited access as a consequence of these spatial inequities. The same type of inequality has also been documented for dentists albeit with somewhat less notoriety. The geographic maldistribution of dentists is the rationale for the development of the Dental Health Professional Shortage Area Program by the U.S. Department of Health and Human Services. Dentists who voluntarily participate in MA programs deliver dental services to the MA population. In general, dentist participation has been inadequate to provide services equivalent to those received by the population-at-large (Byck, Walton, and Cooksey, 2002; HRSA, 2001; Mayer, Stearns, Norton, and Rozier, 2000), even though this equivalency is a mandate for state participation in this state-federal cooperative program (HRSA, 2001). The overall supply of dentists may affect program participation rates (Byck, Walton, and Cooksey, 2002; HRSA, 2001; Mayer, Stearns, Norton, and Rozier, 2000). If the supply of dentists is low enough to ensure an adequate private patient base, then dentists will be less likely to participate in the MA program. In addition, if reimbursement levels to dentists from MA are less than the customary charges in the private market and there is an adequate supply of patients in the private market, MA participation will be low and, consequently, access to dental care for MA enrollees will be compromised. So as the number of dentists declines, not only are fewer dentists available, but fewer will participate in MA programs.

Dental hygienists and dental assistants also provide dental services. While the supply of dentists is the primary determinant of the availability of oral health care, the availability of these auxiliaries alters the productivity of the dentist workforce. Additionally, some procedures, such as the application of dental sealants, can be undertaken with minimal dentist supervision. This is particularly important for indigent children who benefit greatly from public dental sealant programs. Sealants have a prophylactic effect in the development of dental caries. In Pennsylvania, the legally authorized scope of work of dental assistants is currently being expanded with the formalization of the Expanded Function Dental Assistant (EFDA) license.[7] Licensed EFDAs can significantly increase the productivity of dentists. Consequently, although the supply of dentists is the primary determinant of potential access, the supply of dental assistants and dental hygienists is also an important component.

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[7] Prior to the early 1990s, the Pennsylvania Dental Board had sole authority over dental assistants and permitted them to place fillings. The interpretation at the time was that it was not clearly forbidden by statute, so the board didn't forbid or explicitly permit it, and, by default, it was allowed. In the early 1990s, the Dental Board chairman reinterpreted the law and concluded that dental assistants were not allowed to place fillings. This concerned many dentists who had relied upon assistants for this function. That group of dentists encouraged the Pennsylvania Dental Association to lobby the General Assembly to pass a law amending the dental practice act in a manner that clearly allowed *expanded function* dental assistants (EFDA) to place fillings. Pennsylvania Governor Robert P. Casey signed the law in 1994, and it was then the responsibility of the Dental Board to develop specific regulations related to the testing and certification process of expanded function dental assistants. The new law clearly stated what the EFDAs could and could not do and only allowed for minor clarifications by the Dental Board. The law clearly allowed EFDAs to place fillings and Board regulations could not change that. The Board, however, would be required to define the certification and testing process. The Dental Board is still in the process of revising these regulations. Consequently, there is still no actual test available to certify EFDAs. All EFDAs in the state have been practicing since 1994 on temporary permits, which are issued based on education alone and not on a standard certification process based on testing.

THE SUPPLY OF DENTISTS, DENTAL ASSISTANTS, AND DENTAL HYGIENISTS IN PENNSYLVANIA

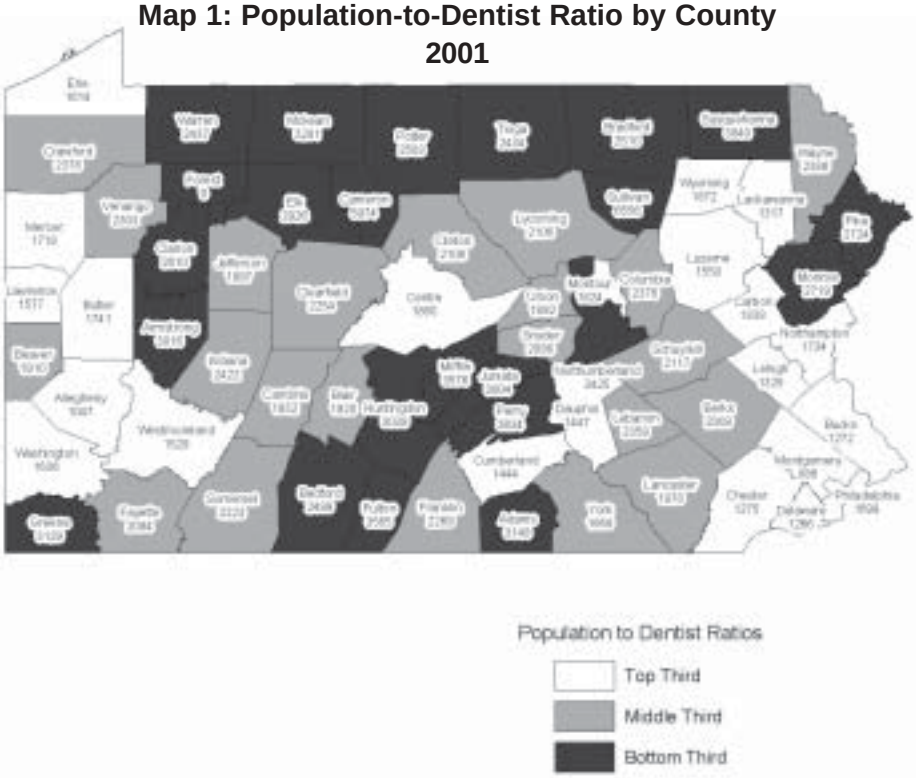
Dentists are the only health care providers that have experienced an absolute decline in workforce levels since 1995. In the past few decades, dental schools have trained fewer dentists, and, as the older cohorts retire, fewer new dentists are available to replace them. Dental school graduates declined 11 percent in Pennsylvania and 30 percent nationally between 1985 and 1996. In 1995, there were 8,641 dental licensees with Pennsylvania addresses; by 2001, this number had declined to 8,021. In 2003, there was one licensed dentist for every 1,531 Pennsylvanians, a decrease in supply from the 1995 level of one dentist for every 1,397 residents. This trend is expected to continue since dental school enrollments remain at relatively low levels and the current practicing dentist workforce is dominated by those approaching retirement. This trend is being evidenced not only in the Commonwealth, but in the nation as a whole (Bureau of Health Professions, 2000). Unless productivity rates dramatically increase, the declining dentist workforce will be a factor in access to dental care for indigent populations.

County population-to-dentist ratios range from a low of 886 in Montgomery County[8] to Forest County, which reports no dentists. The average county ratio is 2,318,[9] and the state ratio is 1,531. American Dental Association survey data indicate, on average, each dentist administers 2,640 patient visits a year without a hygienist and 3,740 with a hygienist. Assuming that the average patient will make 1.5 visits per year,[10] the number of different patients that a single dentist could treat is approximately 1,760 for dentists without hygienists and 2,493 for dentists with hygienists. These data indicate that many counties have supplies well below the full service level, while the Commonwealth, as a whole, has adequate supplies.

Consistent with national trends, dentists are disproportionately located in and around metropolitan cities in the Commonwealth (Byck, Walton, and Cooksey, 2002; Eberhardt, Ingram, Makuc, and et al., 2001). Map 1 indicates just such a pattern with the most favorable population-to-dentist ratios located in counties near Erie, Harrisburg, Philadelphia, Pittsburgh, Sharon, State College, and the Wilkes-Barre-Scranton metropolitan areas. The least favorable ratios can be found in the most rural areas of the Commonwealth, such as the northern tier and rural southcentral counties. However, the few counties that have experienced a significant increase in dentists per capita since 1995 are primarily more rural counties, such as Centre, Chester, Elk, Fayette, Fulton, Franklin, Greene, Juniata, Lehigh, Tioga, and Union.

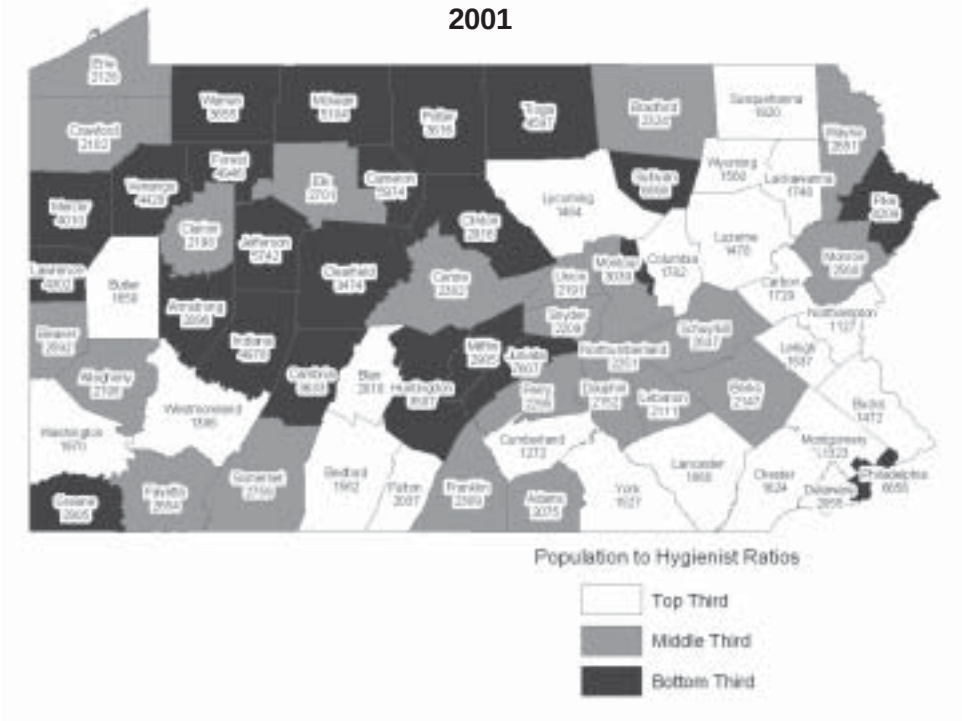
In 2001, there was one dental hygienist for every 2,063

Map 1: Population-to-Dentist Ratio by County 2001



[8]The Montgomery County ratio is quite assuredly subject to the commuter bias.
[9]This differs from the overall rate in the Commonwealth, since each county contributes equally to the average here.
[10]This number is somewhat arbitrary, but is probably a conservative one. It assumes one preventive visit per year per patient and 1/2 a visit for treatment. Included in the treatment average are many common multiple visit procedures, such as dental prostheses and complex restorative procedures.

Map 2: Population-to-Dental Hygienest Ratio by County 2001



Pennsylvanians. The total number of licensed hygienists with Pennsylvania addresses was 5,952. Unlike dentists, the number of dental hygienist graduates has been increasing. Between 1985 and 1996, graduates have increased by 48 percent in Pennsylvania and 20 percent nationally (Bureau of Health Professions, 2000).

Population-to-dental hygienist ratios in the Commonwealth range from 1,127 in Northampton County to 7,607 in Juniata County. The average for all counties is 2,827, while the ratio for the Commonwealth as a whole is 2,063.

Similar to the geographic distribution of dentists, the supply of dental hygienists tends to be greater around metropolitan areas, although for dental hygienists, this pattern exhibits somewhat more variance. Some rural counties, such as Bedford, Fulton, and Susquehanna, have some of the most favorable ratios in the Commonwealth, while some very urban counties, such as Allegheny, have only intermediate ratios. The general pattern of higher ratios in rural areas is seen in Map 2.

Since dentist productivity is greatly increased with a hygienist in the practice, these ratios are critically important to the overall service capacity in Pennsylvania. Productivity can be increased by over 40 percent, on average, with the addition of a hygienist to the practice (Byck, Russinof, and Cooksey, 2000). The compromised capacity of counties with a low dentist supply is sometimes mitigated by a higher than average hygienist supply.

There is a moderately strong tendency for counties with high dentist ratios to have high hygienist ratios and, likewise, for those with low dentist ratios to have low hygienist ratios. The correlation is strong to moderate, but not overwhelming. For example, consider the 15 counties with the least favorable population to dentist ratios shown in Figure 1.

Figure 1: Counties with the Least Favorable Population to Dentist Ratios

County	Dental Ratio Rank	Dental Hygienist Ratio Rank
Forest	67	60
Sullivan	66	65
Cameron	65	64
Susquehanna	64	18
Juniata	63	67
Perry	62	34
Mifflin	61	47
Fulton	60	21
McKean	59	62
Adams	58	23
Greene	57	46
Huntingdon	56	51
Armstrong	55	45
Elk	54	43
Pike	53	56

Figure 2: Dentist and Dental Hygienists Needed to Achieve Median Per Capita Supply for Pennsylvania Counties, 2001

	Dentists Needed to Achieve Median	Hygienists Needed to Achieve Median
Adams County	24.7	.
Allegheny County	.	19.4
Armstrong County	18.6	9.0
Beaver County	11.8	15.3
Bedford County	9.4	.
Berks County	33.9	1.6
Blair County	9.0	.
Bradford County	11.9	2.5
Bucks County	.	.
Butler County	2.4	.
Cambria County	10.8	29.7
Cameron County	2.5	1.8
Carbon County	2.6	.
Centre County	6.9	6.8
Chester County	.	.
Clarion County	8.6	.6
Clearfield County	12.1	15.2
Clinton County	4.3	4.8
Columbia County	10.7	.
Crawford County	15.2	.
Cumberland County	.	.
Dauphin County	.	1.3
Delaware County	.	.
Elk County	8.7	3.5
Erie County	.	34.3
Fayette County	16.5	13.9
Forest County	2.9	1.3
Franklin County	19.1	4.8
Fulton County	4.4	.
Greene County	10.9	5.1
Huntingdon County	11.8	8.4
Indiana County	15.7	24.1
Jefferson County	4.0	13.6

	Dentists Needed to Achieve Median	Hygienists Needed to Achieve Median
Juniata County	7.4	7.7
Lackawanna County	.	.
Lancaster County	39.0	.
Lawrence County	.	22.5
Lebanon County	19.8	.
Lehigh County	.	.
Luzerne County	.	.
Lycoming County	13.6	.
McKean County	13.0	12.6
Mercer County	.8	26.5
Mifflin County	14.4	5.8
Monroe County	30.6	11.2
Montgomery County	.	.
Montour County	.7	2.6
Northampton County	3.2	.
Northumberland County	16.6	2.4
Perry County	13.7	1.5
Philadelphia County	.	485.3
Pike County	10.2	10.8
Potter County	3.6	3.5
Schuylkill County	17.5	13.7
Snyder County	4.1	.6
Somerset County	11.1	8.6
Sullivan County	2.9	2.1
Susquehanna County	13.9	.
Tioga County	7.3	10.4
Union County	2.5	.6
Venango County	8.9	14.1
Warren County	7.8	8.6
Washington County	.	.
Wayne County	8.1	4.4
Westmoreland County	.	.
Wyoming County	1.5	.
York County	29.6	.

In Susquehanna, Fulton and Adams counties, the unfavorable population-to-dentist ratios have the potential to be somewhat mitigated by an abundant dental hygienist supply. However, in most of the other counties, the unfavorable dentist supply is compounded by an unfavorable dental hygienist supply. Six of the 15 counties with the highest population-to-dentist ratios (unfavorable) are also among the counties with the 15 highest dental population-to-hygienist ratios and 12 have ratios greater than the average (median) county.

THE SUPPLY OF DENTAL HYGIENISTS IS ALSO IMPORTANT TO INDIGENT POPULATIONS SINCE THESE POPULATIONS RECEIVE MUCH LESS PREVENTIVE CARE THAN MORE ADVANTAGED POPULATIONS.

The supply of dental hygienists is also important to indigent populations since these populations receive much less preventive care than more advantaged populations (Watson, Manski, and Macek, 2001).

GEOGRAPHIC DISTRIBUTION OF DENTISTS AND DENTAL HYGIENISTS BY COUNTY

The geographic distribution of oral health providers is, essentially, an equality issue. This research set out to identify any geographic inequalities in the distribution of oral health care providers and if there is a pattern to that distribution. Two standards were used as analytical tools in the investigation; the standards of perfect equality and median person.[11] (See Figure 2 on page 13.) These standards are analytical tools only and should not be interpreted as desired or adequate. The determination of adequate levels of oral health provider supply is beyond the scope of this research.

MEDICAL ASSISTANCE DENTIST SUPPLY

Across the nation, one of the primary challenges in providing oral health services to Medicaid recipients is recruiting dentists to participate in the program. Low levels of dentist participation can affect the delivery of oral health care in two ways. First, and most directly, program enrollees may find it difficult to locate a participating dentist or may come up against prohibitive travel costs to visit an available dentist (Mofidi, Rozier, and King, 2002). Second, to stimulate a culture of seeking care among program enrollees that is consistent with their oral health care needs, enrollees must have a reasonable expectation that care is available and routine. This expectation can only be developed if care is, in fact, available. A necessary condition for this to occur is to have a publicly known and adequate supply of dentists serving in the program. Currently, the obvious demand among program enrollees for dental services is low (Byck, Walton, and Cooksey, 2002; GAO, 2000; HRSA, 2001b).

Among the primary reasons identified for low dentist participation in MA programs are: 1) inadequate reimbursement; 2) complex regulations and paperwork; and 3) high rates of patient appointment non-compliance. Traditionally throughout the nation, Medicaid reimbursement levels have been considerably lower than market rates, and dentists, operating with high fixed costs, often take a loss for treating Medicaid patients. Reimbursement reform as a program recruitment strategy has resulted in mixed results, at best (Mayer, Stearns, Norton, and Rozier, 2000).

PENNSYLVANIA MEDICAL ASSISTANCE DENTIST SUPPLY

As part of the study, the researchers investigated the supply of dentists available and/or active in Pennsylvania's MA program, their geographic distribution, their level of participation, and the characteristics of the areas in which they provide service. The results are based on 2000 data from DPW. Data are from the fee-for-service program only, since in 2000, the HealthChoices program was mandated for only 15 counties in the two most urban regions of the Commonwealth; the Southeast and the Southwest. In the remaining 52 counties, the MA program was operating on a fee-for-service basis. However, voluntary participation in HealthChoices was also available in these counties. In 28 of the

[11] The standard of the median person refers to the average Commonwealth resident; this is the person for whom half of the Commonwealth experiences a better dental supply and half of the Commonwealth experiences a less favorable dental supply.

counties, no one received services through HealthChoices; in 14 counties, less than 25 percent of the eligibles received MA services through HealthChoices; and in the remaining 13 counties, 26 percent to 48 percent of eligibles were enrolled in HealthChoices[12] on a voluntary basis.

In Pennsylvania, as elsewhere in the nation, there were significantly more dentists enrolled in the MA program than dentists who actively participated in the program (Byck, Russinof, and Cooksey, 2000). There were also many who only provided services occasionally, treating only a few patients in any given year, presumably on an emergency basis.

In the 52 non-HealthChoices counties in 2000, there were 762 active dentists in the fee-for-service program (dentists counted only once) (Figure 3). A dentist was considered to be active if he/she made at least one billing claim in that calendar year. Since most records are organized by claim, data are most often presented in that fashion. It is important not to equate a claim with a patient visit. Analysis of data conducted in this research indicate that, on average, 2.78 claims are made by a dentist for each patient he/she treats on any one day, since reimbursement for multiple procedures may appear on more than one claim. Assuming in any single day, a patient will make only one visit, on average, each patient visit results in 2.78 claims. If one were to consider less than 50 claims in a year marginal participation, then 544 dentists are participating in the program at non-trivial levels in these counties.

Figure 3: Activity Level of Dentists in Non-HealthChoices Counties, 2000

Claims	Percent
1-9	7.9
10-49	20.7
50-99	10.9
100-499	27.4
500 or more	33.1
Total	100.0

For further insight into the dental provider infrastructure within the fee-for-service program in non-HealthChoices counties, the researchers converted the provider counts to full-time-equivalent (FTE) providers and compared them to the size of the service population. In these 52 counties, there were about 591,950 MA eligibles of which 473,524 were eligible for the fee-for-service program, such as those not voluntarily enrolled in HealthChoices. American Dental Association survey data indicate that, on average, a dentist administers 2,640 patient visits a year without a hygienist present and 3,740 visits with a hygienist present. Using an average of 2.78 claims per visit and incorporating the more conservative 2,640 visits a year, the total number of claims made by these dentists can be converted to FTE-MA only dentists and presented as a ratio with the service base. In 2000, these 762 dentists provided services equivalent to 79.9 full-time dentists treating only MA patients. This reduces to one full-time MA dentist for every 5,928 fee-for-service eligible person in the 52 counties. In comparison, in 2001, there was one dentist for every 1,531 Pennsylvanians.[13] To qualify as a federally designated dental underservice area (Geographic Dental Health Professional Shortage Area), the ratio of FTEs to the general population must be greater than 4,000 in some instances and 5,000 in others.

The ratio of 5,928 fee-for-service eligibles for each FTE MA dentist reflects not only the existing provider infrastructure, but also reflects the demand on those services made by the service population. An increase in that demand, if accommodated by the active dentists in the program, would lower that ratio, all other factors remaining unchanged. There is no current assessment of how much more service the active dentists are willing to provide under the program. Nonetheless, the ratio of 5,928 eligibles per dentist should be considered too high to accommodate full-service to the eligible population.

[12] In 2003, HealthChoices was being phased-in on a regional basis. As of August 2003, the majority of the Commonwealth's Medical Assistance program was being administered through the HealthChoices program and only the most rural regions of the state were yet to be converted to this waiver program.

[13] This number overestimates the supply of dentists, since it does not consider activity level or activity status of the counted dentists. As such, it is not directly comparable to the 5,928 ratio presented above. However, the use of the more conservative patient visits a year in the latter ratio would tend to offset that overestimate and make the two ratios more comparable.

Another method to assess what level of program service capacity the 762 active dentists represent is to calculate hypothetical service ratios resulting from different average participation levels of these dentists. For example, if these dentists were, on average, to participate at a level in which five percent of their patients were MA enrollees, then the resulting service ratio would be one FTE dentist per 15,537 eligibles.[14] A reasonably adequate service level would only be reached if these dentists were to have MA beneficiaries comprise 25 percent or more of their caseload, and equity with the general population would require that over half their patients be MA enrollees. Of course, if more dentists were recruited into the program, the participation level of each dentist would not have to be as great to achieve the overall service level as reflected in the hypothetical eligible-to-FTE dentist ratio.

GEOGRAPHIC DISTRIBUTION OF THE PENNSYLVANIA MEDICAL ASSISTANCE DENTIST SUPPLY

In general, active fee-for-service MA dentists were dispersed throughout the 52 county region in 2000. Active program providers covered most areas, save for a few rural areas. These areas are largely the same areas that have a general overall shortage of health care providers (Schwartz, 2001). The most noticeable areas without a program dentist include areas in rural Clinton and Lycoming counties, Susquehanna County, Sullivan County, and smaller areas located throughout the state. If one considers dentists who make less than 100 claims as marginal participants, then it is clear that truly active dentists are less dispersed throughout Pennsylvania and more areas exist in the Commonwealth without the presence of truly active program dentists. Many areas without a dentist with significant activity (100 claims) are very rural and the population density is quite low. It is very likely that in some of these areas, dentists making less than 100 claims are meeting the entire MA demand for that area. By the researchers' estimates, 100 claims represent about 36 MA patient visits in the year.

In general, there is significant variation in indicators of active dentist supply by county. The ratio of fee-for-service, eligibles-to-FTE program dentists varies from 2,080 (adequate supply) to 867,570 (extremely inadequate). Additionally one county, Sullivan, had no active program dentist. The average ratio for all counties is 40,932.[15] Similarly, the number of active program dentists ranges from 0 to 58, and the number of FTE program dentists ranges from 0.0 to 10.4.

Four of the 52 counties had eligible-to-FTE dentist ratios of under 3,000, a reasonably adequate supply by most standards. An additional 10 counties had ratios between 3,000 and 5,000. This can be considered low service, but not severely underserved. The remaining 38 counties had ratios of over 5,000, 20 of which were over 10,000. The current capacity in these 38 counties should be considered inadequate to meet the dental needs of their program enrollees. Again, these figures may reflect low demand and utilization and not solely reflect program infrastructure.

Blair, Cambria, Clarion, Dauphin, Erie, Lancaster, Mercer, Somerset, and York counties all had voluntary HealthChoices participation rates of between 25 and 50 percent. The estimation of program service ratios, for both the actual ratio and the hypothetical ratios at different participation rates, may be subject to more error in these counties than in other counties.

ZIP CODE PATTERNS OF THE PENNSYLVANIA MEDICAL ASSISTANCE DENTIST SUPPLY

ZIP Codes in the 52 county region were classified into two groups: one consisting of ZIP Codes with at least one active dentist with more than 10 claims, and one consisting of the remainder of the ZIP Codes.

Although many important contrasts exist, the most striking difference is in the rural character of ZIP Codes. ZIP Codes with no dentists conducting significant program activity are, on average, 75 percent rural while those with a dentist conducting significant program activity are only 41 percent rural. Correlated with this trend is the significant contrast for

[14]In this case, total eligibles were used in the ratio, not only fee-for-service eligibles. It is assumed that those active in the voluntary HealthChoices program were likely to make at least one claim and, consequently, be included in the 762 making fee-for-service claims. It is possible that the stock of active dentists serving both types of program administration might be slightly higher than 762. The potential service population for the future is better reflected by all eligibles.

[15]This differs from the overall ratio for the whole region because each county is weighted equally here and, in the previous case, each county was, in effect, weighted by the number of eligibles.

Figure 4: The Supply of Active Medical Assistance Program Dentists by County, 2000

County	Active MA Dentists	Current FTE MA Dentists	Eligible Less Health Choices	Current Eligible-to-FTE Ratio	Ratio at 5% Level	Ratio at 10% Level	Ratio at 25% Level	Ratio at 50% Level
Adams	10	.66	6,208	9,425	12,416	6,208	2,483	1,242
Bedford	12	.89	4,452	4,992	9,997	4,998	1,999	1,000
Berks	37	3.90	28,442	7,299	19,187	9,593	3,837	1,919
Blair	25	2.79	11,848	4,247	15,704	7,852	3,141	1,570
Bradford	9	1.02	7,614	7,486	18,270	9,135	3,654	1,827
Cambria	32	2.90	12,164	4,194	12,780	6,390	2,556	1,278
Cameron	1	.02	866	40,753	17,325	8,662	3,465	1,732
Carbon	3	.01	6,057	592,675	40,377	20,189	8,075	4,038
Centre	14	2.19	7,467	3,409	10,667	5,333	2,133	1,067
Clarion	5	.34	3,828	11,208	24,558	12,279	4,912	2,456
Clearfield	15	2.46	13,841	5,626	18,455	9,228	3,691	1,846
Clinton	5	.83	5,080	6,136	20,322	10,161	4,064	2,032
Columbia	10	.57	6,158	10,787	12,317	6,158	2,463	1,232
Crawford	24	2.93	13,013	4,437	10,844	5,422	2,169	1,084
Cumberland	23	.72	8,049	11,177	8,175	4,088	1,635	818
Dauphin	32	2.63	14,977	5,697	16,682	8,341	3,336	1,668
Elk	1	.00	3,546	867,570	70,926	35,463	14,185	7,093
Erie	41	4.68	22,113	4,725	20,686	10,343	4,137	2,069
Forest	.	.03	816	32,201	.	.	.	.
Franklin	19	2.71	9,957	3,668	10,481	5,241	2,096	1,048
Fulton	12	.22	1,426	6,481	2,377	1,188	475	238
Huntingdon	7	.60	5,972	9,918	17,062	8,531	3,412	1,706
Jefferson	15	2.51	5,224	2,080	9,186	4,593	1,837	919
Juniata	1	.12	1,826	14,612	36,514	18,257	7,303	3,651
Lackawanna	35	7.83	20,880	2,666	14,504	7,252	2,901	1,450
Lancaster	50	1.64	22,153	13,532	12,990	6,495	2,598	1,299
Lebanon	16	1.20	10,589	8,841	13,236	6,618	2,647	1,324
Lehigh	22	2.94	23,940	8,132	28,372	14,186	5,674	2,837
Luzerne	58	10.35	30,157	2,913	12,550	6,275	2,510	1,255
Lycoming	9	.86	13,925	16,099	30,945	15,472	6,189	3,094
McKean	3	.82	7,350	8,966	48,998	24,499	9,800	4,900
Mercer	24	.84	8,768	10,380	13,834	6,917	2,767	1,383
Mifflin	5	.22	6,043	28,089	24,173	12,086	4,835	2,417
Monroe	12	.26	9,417	36,531	20,341	10,170	4,068	2,034
Montour	5	.43	1,919	4,452	8,243	4,121	1,649	824
Northampton	25	3.21	19,763	6,162	15,810	7,905	3,162	1,581
Northumberland	9	1.11	9,042	8,148	23,324	11,662	4,665	2,332
Perry	4	.02	3,445	144,459	17,223	8,611	3,445	1,722
Pike	3	.30	3,750	12,500	25,003	12,502	5,001	2,500
Potter	5	.74	2,802	3,805	11,210	5,605	2,242	1,121
Schuylkill	15	1.33	13,742	10,326	21,448	10,724	4,290	2,145
Snyder	2	.12	3,417	28,989	34,167	17,083	6,833	3,417
Somerset	19	1.15	6,536	5,689	11,203	5,602	2,241	1,120
Sullivan	.	.	935	.	.	.	.	.
Susquehanna	2	.46	5,533	12,068	55,332	27,666	11,066	5,533
Tioga	10	.77	5,089	6,567	10,178	5,089	2,036	1,018
Union	3	.78	3,080	3,956	20,535	10,267	4,107	2,053
Venango	11	1.30	9,556	7,376	17,374	8,687	3,475	1,737
Warren	7	.40	4,777	11,880	14,663	7,331	2,933	1,466
Wayne	6	1.04	5,774	5,532	19,248	9,624	3,850	1,925
Wyoming	6	1.11	3,038	2,739	10,202	5,101	2,040	1,020
York	43	2.90	17,160	5,908	11,896	5,948	2,379	1,190

the percentage of those working in agricultural industries and the percentage of those living on farms.

ZIP Codes with higher poverty rates are more likely to have an active program dentist within their borders. However, looking across the income spectrum, those ZIP Codes with higher average incomes are more likely to include an active program dentist.

MEDICAL ASSISTANCE USE

Medicaid populations traditionally have exhibited low use of dental services. Historically, only slightly more than 20 percent of enrollees use dental services in any given year, and the uninsured poor use services at an even lesser rate (Edelstein, 2000).

Factors leading to limited use of dental services by Medicaid enrollees are varied, complex, and interrelated. First, there is limited access to dentists within the program due to limited program participation by dentists. Second, there is limited demand exhibited by the enrollee population; this is not fully explained, but undoubtedly would include low expectations of available, easily accessed care, and a culture that doesn't include routine dental care in its everyday language.

In rural areas, there are more unmet dental needs and fewer program enrollees (Byck, Walton, and Cooksey, 2002). The needs of low-income populations are much greater than those of higher income groups and use is much lower in low-income groups (GAO, 2000). Unfortunately, only about one-half of those living in poverty were eligible for Medicaid, and although use is low among the Medicaid population, it is even lower among the uninsured poor.

Similar to findings nationally, 22 percent of eligibles in the fee-for-service program in the 52 Pennsylvania study counties had at least one visit to the dentist in 2000.[16] On average, the enrollees who used program dental services had 2.1 visits during the year. However, the most common number of visits was only one: 46 percent of those making visits had only one visit in the year, 28 percent made two visits, and 13 percent had three visits. More than half of those who used dental services were female (56 percent). Their average age was 22 years; 9 percent were under age 5; 23 percent aged 5 to 9; 19 percent were aged 10 to 14; 11 percent were aged 15 to 18; and 38 percent were adults (5 percent were 65 or older). Of those enrollees using dental services, 84 percent were white, 6.5 percent black, and 8 percent Hispanic. In general, Pennsylvania's fee-for-service use patterns within the MA program are quite similar to trends found nationally.

At the county level[17], use rates varied quite a bit, ranging from 12.4 percent in Juniata County to 31 percent in Wayne County. The average of all counties was 22 percent, nearly identical to the 52 county region as a whole. No county came close to the dental utilization rates for general population groups, which is almost always over 50 percent.

Correlations between dental use rates for counties and a variety of social and economic variables measured at the county level showed that age, employment, rurality, industry, farm population, and education did *not* correlate significantly. However, percent of persons with incomes under 100 percent, 150 percent, and 200 percent of poverty did exhibit significant correlations with use rates, as did the percent of people with family incomes less than $10,000.

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[16]A visit was calculated as a claim or claims made by a single dentist on behalf of that enrollee in any given day. More than one claim on a given day may be submitted by the dentist but is treated as a single visit.

[17]Patterns of utilization at a geography smaller than the county would be highly informative. However, because of the rates of voluntary enrollment in HealthChoices, estimates of fee-for-service eligibles at a local level would not be reliable and are not calculated here. HealthChoices enrollment at the county level is available and was introduced into the calculations; enrollment at a geographic level smaller than the county is not available.

Figure 5: Dental Use Patterns for the Fee-For-Service Medical Assistance Program by County, 2000

County	Percent Use	Number Using Services	Percent Under 18	Percent 65 or Over	Percent White	Percent Black	Percent Female	Average Number of Visits
Adams	22.1	1,369	69.5	5.1	86.7	6.7	55.3	2.0
Bedford	26.8	1,194	63.7	3.6	98.5	.7	57.2	2.2
Berks	20.2	5,756	59.6	5.0	40.6	9.8	56.6	1.9
Blair	22.9	2,715	57.7	3.8	96.1	2.6	53.9	2.0
Bradford	23.7	1,806	62.3	3.8	97.6	1.7	58.7	2.0
Cambria	27.6	3,357	58.1	4.2	92.9	5.5	55.3	2.2
Cameron	16.5	143	68.5	4.2	93.7	5.6	62.2	1.8
Carbon	21.8	1,319	60.3	8.8	95.6	1.4	58.8	2.1
Centre	27.0	2,014	69.8	3.4	93.6	2.9	56.2	2.0
Clarion	22.4	858	65.3	6.9	97.3	1.2	57.8	2.1
Clearfield	27.5	3,807	70.7	2.2	98.9	.5	56.9	2.1
Clinton	22.4	1,137	68.4	5.7	98.8	.7	58.2	1.8
Columbia	23.2	1,429	61.2	5.0	96.4	1.7	59.5	2.1
Crawford	29.9	3,886	64.5	2.3	93.5	5.3	55.7	2.2
Cumberland	18.5	1,487	56.0	12.4	85.9	6.3	56.3	1.9
Dauphin	18.2	2,725	57.1	10.5	45.8	39.7	52.6	1.8
Elk	21.7	771	61.7	1.9	98.1	.4	58.5	2.1
Erie	24.1	5,339	55.4	6.3	79.3	14.8	54.3	2.1
Forest	27.6	225	60.9	12.4	98.7	.9	50.7	1.9
Franklin	27.8	2,770	65.3	4.7	85.1	9.2	57.1	2.1
Fulton	29.2	416	68.8	4.1	95.2	3.6	52.6	2.1
Huntingdon	20.5	1,226	68.8	2.9	95.2	3.3	54.6	2.1
Jefferson	29.5	1,540	63.6	7.9	98.8	.3	56.9	2.1
Juniata	12.4	227	66.1	3.5	96.9	.4	46.7	1.7
Lackawanna	24.4	5,093	59.0	4.8	91.0	4.3	57.0	2.0
Lancaster	12.9	2,863	58.9	10.7	65.2	9.6	54.2	2.0
Lebanon	17.2	1,816	60.2	6.9	70.9	3.3	57.3	1.9
Lehigh	16.7	3,987	55.8	7.9	50.6	8.8	55.6	2.2
Luzerne	26.5	7,989	61.7	5.6	93.5	3.5	55.5	2.3
Lycoming	14.9	2,072	61.7	2.6	76.1	21.1	57.6	1.7
McKean	18.7	1,378	63.0	3.1	98.5	.6	57.0	2.1
Mercer	20.4	1,789	53.7	5.6	86.5	12.0	56.7	1.9
Mifflin	17.8	1,073	59.5	3.3	96.7	2.0	57.0	1.9
Monroe	17.8	1,678	72.6	2.4	82.2	7.7	53.4	2.2
Montour	19.8	380	60.0	10.5	95.3	1.3	59.2	2.0
Northampton	18.4	3,633	63.3	4.4	58.3	7.1	56.6	2.0
Northumberland	20.0	1,804	64.7	4.4	94.6	2.9	53.3	2.1
Perry	14.7	505	71.3	4.0	95.6	.6	56.0	2.1
Pike	27.8	1,044	74.3	1.3	89.2	2.9	54.2	2.2
Potter	18.9	531	67.4	6.6	99.2	.2	56.1	2.1
Schuylkill	21.4	2,942	61.7	6.7	96.7	1.9	56.5	2.2
Snyder	13.6	466	70.4	4.1	93.1	4.5	54.5	1.8
Somerset	26.0	1,698	61.7	6.2	99.3	.4	55.8	2.1
Sullivan	16.8	157	57.3	5.1	92.4	5.7	60.5	1.9
Susquehanna	22.9	1,267	68.1	4.6	98.7	.6	55.1	2.2
Tioga	17.5	890	67.1	4.0	97.5	1.5	54.0	1.8
Union	26.0	800	67.8	2.6	91.4	5.0	54.6	1.8
Venango	22.1	2,111	62.9	1.5	97.2	1.9	56.9	1.9
Warren	21.1	1,006	63.2	2.3	98.9	.4	55.7	2.1
Wayne	30.8	1,777	69.7	2.6	95.8	2.0	55.3	2.3
Wyoming	28.5	866	67.9	3.3	97.6	.8	56.8	2.4
York	19.7	3,389	62.9	5.0	73.0	14.2	51.1	2.1

THE DEMAND FOR DENTAL SERVICES IN RURAL PENNSYLVANIA

DATA FROM SELECTED SOURCES

SAMPLED RURAL SCHOOL DISTRICTS

According to the school data on the 663 rural school children in the 10 sampled school districts, the most common dental morbidity and the most common reason for referral is tooth decay and caries. Out of 663 charts reviewed, 277 students or 41 percent, were referred for decay and caries in their primary teeth; another 281 or 42 percent were referred for decay in their permanent teeth. The remaining students, about 17 percent, were referred for orthodontic or other unspecified reasons.

While the charts reviewed were solely for students referred for further examinations, an extrapolation of the data show that approximately 25 percent of all students in the schools suffer untreated primary tooth decay and 22 percent suffer untreated permanent tooth decay. These levels are consistent with previous analyses (Weyant, 2000).

The percent of students referred increases as they get older (Figure 6). However, the reason for referral also changes as the students get older (Figure 7). In kindergarten, 80 percent of the referrals are for tooth decay in primary teeth. By the time students reach seventh grade, orthodontic care and decay in permanent teeth are the most common reasons for referral. The average number of caries among all students referred also increases as students get older, with the mean number of caries doubling from kindergarten (0.43) to seventh grade (0.86) (Figure 8).

Data also show that students requiring referrals tend to show evidence of multiple caries and of chronic decay.

The average number of caries among children needing referral is much higher than the average of the overall population. The average number of caries among all students is more constant and is lowest in the third grade (Figure 9). The same pattern by grade is exhibited in all but two of the districts (third slightly lower than kindergarten and seventh much higher).

The data also show that 30 percent of children in kindergarten with visible dental problems have more than two caries, while 25 percent of seventh graders have more than two caries. In addition, these children show a significant number of fillings at young ages. Ten percent of kindergarteners who were referred already had fillings in their permanent teeth, while 15 percent of third graders and almost a quarter of seventh graders have fillings in the permanent teeth. However, these represent a small percentage of the overall student population. Extrapolating the data from the charts to the overall student population shows that 7 percent of children in the schools had more than

Figure 6: Percent of Students Examined in School Who are Referred to a Dentist by Grade

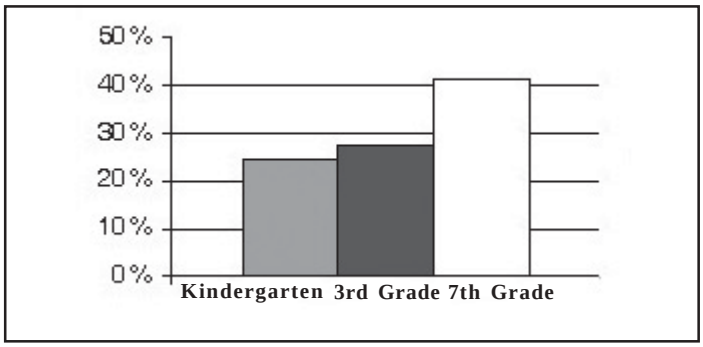


Figure 7: Reasons for School District Referrals to Dentists by Grade

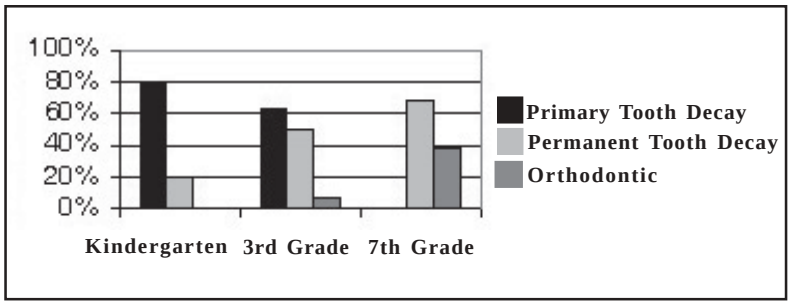


Figure 8: Average Number of Caries in Referred Students by Grade

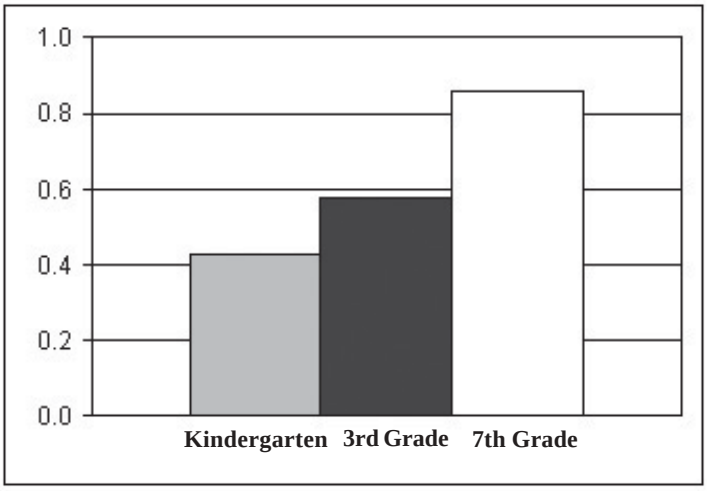
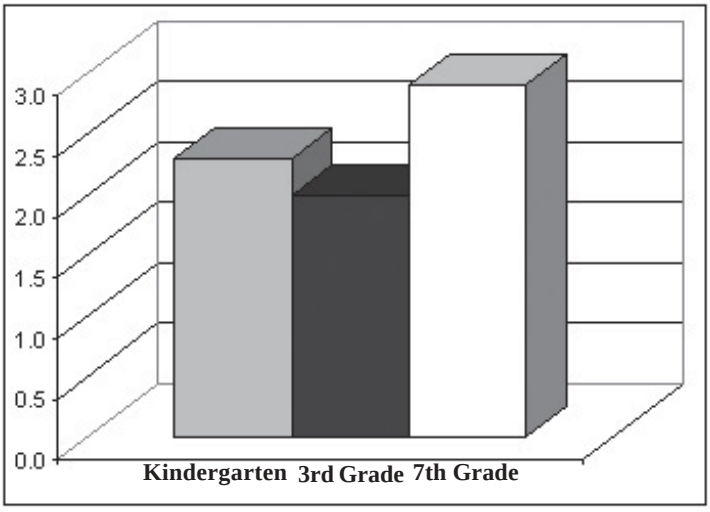


Figure 9: Average Number of Caries in All Students by Grade



two caries in permanent teeth and 4 percent had permanent teeth filled.

Tracking students through three examinations (using only the data of students having received all three examinations), shows that of the students referred in the third examination (grade 7), almost 40 percent had caries in two of the previous examinations while almost 20 percent had caries in at least one of the two previous examinations.

Tracking the average number of caries in this group shows a similar pattern of chronic decay. Unlike the overall group in which the mean number of caries increased as children got older, among the students with multiple referrals, (approximately 40 percent of students referred), the average number of caries remained constant and was much larger throughout their three examination periods – 1.8 during seventh grade, 2.0 during third grade, and 1.6 during kindergarten.

DEPARTMENT OF HEALTH DENTAL SCREENINGS

Significant differences between rural and urban settings do not exist with regard to the number of children requiring further dental examination and referral for care. In urban settings, 35 percent of students are referred and 25 percent complete referrals. In rural settings, 34 percent of students are referred for more dental care and 27 percent complete those referrals.

However, within rural counties, significant differences exist in the demand for dental services and in the level of dental morbidity. Analyzed at the health district level, excluding the Southeast district that only has one rural county, the Northwest and Northcentral districts have the highest use of school dentists, 52 percent and 50 percent, respectively. The Northwest district also has the highest level of referrals with 36 percent of students referred for further services, while the Northcentral district has the lowest level of completed referrals

Figure 10: Screening Outcomes by PA Department of Health District

Department of Health District	Percent Using School Resources (Dentist or Hygienist)	Percent Referred for Further Care	Percent with Complete Referral
Northwest	52	36	33
Northcentral	50	34	18
Southwest	47	33	35
Southcentral	43	29	28
Northeast	42	35	29
Southeast	71	30	35

with less than 20 percent of students completing referrals. (See Figure 10 on page 21.)

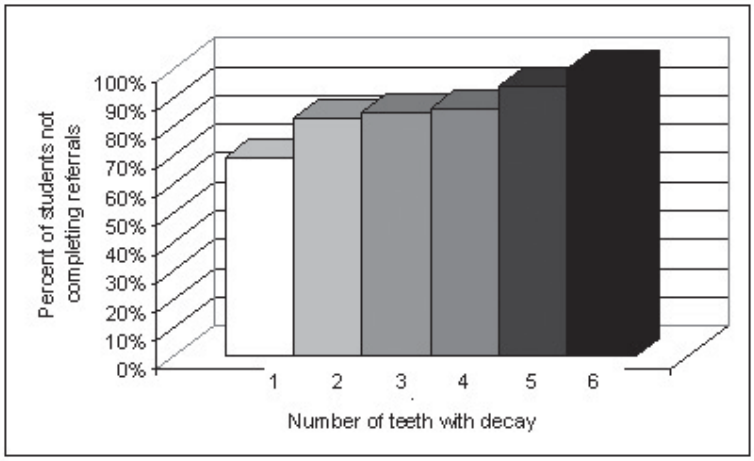
At the county level, more variance is evidenced. And certain counties scored poorly on each of the three variables. For example, Cameron, Clarion, Greene, Schuylkill, and Tioga counties had the highest use of school dentists for dental examination; Armstrong, Elk, Forest, Warren, and Wayne counties had the highest levels of referred students; and Franklin, Forest, Lebanon, Snyder, and Tioga counties had the lowest percentage of students completing referrals. As noted, nine of the 15 counties with the highest percentage of students using school dentists, being referred, and not completing the referrals are located in the Northwest and Northcentral districts. Four are in the Southwest and Southcentral districts and three are located in the Northeast and Southeast districts.

The local school district data show even lower levels of referral completion than the Pennsylvania Department of Health data. Based on school nurse records of students who had submitted documentation of having visited a dentist, the average percentage of students with incomplete referrals was 83 percent (17 percent completion). However, the charts did not necessarily indicate that the students had received appropriate care even in cases where parents had submitted a letter indicating that the student had been to a dentist. Therefore, these referral completion rates are most likely overestimates.

In the rural Head Start programs that were part of this sample, about 79 percent of children in the programs were examined and 23 percent of the children examined required referrals.

In all the school districts, the level of referral completion declines significantly as the number of caries the student has increases. (Figure 11)

Figure 11: Student Referral Completion Rate by Dental Caries Rate



HEAD START

The Head Start data, which measure the dental needs of children between the ages of 2 and 5, show equal levels of overall morbidity, although an unspecified morbidity. On average, across the state, approximately 69 percent of children in the Head Start program got the Head Start dental examination (20,450 children). Of these children, 4,450 or 22 percent were referred for further dental care. Of the children needing further dental care, 2,963 or 66 percent completed the referral.

Comparing rural and urban Head Start statistics demonstrates a similar pattern to the school data collected by the state Department of Health. Rural children are more likely than urban children to be referred because of their dental morbidity, 31 percent compared to 20 percent, respectively. However, rural children have higher rates of completed referrals than urban children, 79 percent as compared to 63 percent.

In the rural Head Start programs that were part of this sample, about 79 percent of children in the programs were examined and 23 percent of the children examined required referrals. Both of these rates are higher than that of the statewide Head Start program, although the sample had a higher referral completion rate of 74 percent.

FACTORS THAT INFLUENCE THE DEMAND FOR SERVICES

SCHOOL NURSE PERCEPTIONS

Asked to rate the health of the children in their school districts, 77 percent of nurses surveyed reported that the health of the children in their districts was good or very good, with 21 percent reporting fair and only 2 percent reporting poor. Ninety-eight percent of school nurses agreed or strongly agreed that a major barrier to access to dental services was the inability of children's caregivers to pay, while 70 percent agreed that the lack of dental insurance coverage was a critical factor. In fact, 89 percent reported that many children had no health insurance and 94 percent reported that many children in their districts were unable to see a dentist. The nurses indicated that only 35 percent of children in their districts had private dental insurance, 39 percent had government insurance, and 18 percent were self-paying. The nurses perceived that the supply of dentists was adequate with 52 percent agreeing that there are enough providers and 46 percent perceiving that they are overburdened with patients. However, the great majority indicated that the dentists do not serve MA patients. Sixty-two percent of the nurses indicated that there were no dental providers within their communities that accept MA clients. Forty-three percent of the nurses reported that the nearest MA dental site was over 20 miles from their communities. Half of the nurses perceived that parents fail to place enough importance on regular dental care and almost 80 percent perceived that parents contacted the dentists only in the case of pain. Seventy percent of the nurses perceived that this contributed to a high number of missed appointments by parents and 80 percent of the nurses agreed that parents lack an understanding about the importance of taking care of primary teeth. The majority of the nurses (83 percent) agreed that a partial reason for this gap is that parents have other competing priorities and may have more important priorities than dental care for their children. Fifty-seven percent of the nurses also agreed that parents have a difficult time getting to the dentist's office because of a lack of transportation.

The same major themes emerged in the key informant interviews. One hundred percent of the nurses interviewed indicated that either the providers in their communities do not accept MA or that those who accept MA are in other counties. In addition to insurance and providers, a third emergent theme was income and the reliance on service industry jobs with limited benefits. Eighty percent of the nurses indicated that income and service jobs with limited benefits contributed to a growing number of families who become uninsured.

> *HEAD NURSES REPORTED THAT, GIVEN THE LOW DENSITY OF PROVIDERS IN RURAL AREAS, TRANSPORTATION BECOMES A MAJOR BARRIER TO ACCESS.*

Head nurses reported that, given the low density of providers in rural areas, transportation becomes a major barrier to access. They also perceived that low levels of income and limited public transportation systems compound the impact these barriers have on families. The nurses noted parents' lack of emphasis on dental care as a critical barrier, although many nurses perceived that the negative attitude is a product of the lack of insurance and transportation, the low number of providers, and income.

The survey and interview results indicate that there is a relationship between the existing and structural barriers to dental care and the perception and beliefs of parents about dental care. As indicated in some of the key informant interviews, parents face greater difficulty in paying for care. For example, the less of a priority dental care becomes and the greater the distance people have to travel for dental care, the less likely they are to place importance on the care of baby teeth. The limited availability of the services increases the costs of accessing the services and negatively impacts the outlook of caregivers about the importance of dental care.

PARENT PERCEPTIONS

The parent survey represents the responses of 10 percent of the total number of parents with children who were given referrals within the 10 sampled school districts. This represents a small number of

parents; therefore, the observations made by this study represent the experiences observed by this small group of parents. The researchers noted, however, that the trends observed in the parents' survey demonstrate similar patterns as in the existing literature, the nurse survey, and the key informant survey.

FAMILIES EARNING BETWEEN $12,001 AND $24,000 ANNUALLY HAD THE HIGHEST LEVELS OF CHILDREN WITHOUT A REGULAR SOURCE OF CARE.

Parent respondents were 97 percent white. Forty percent had annual incomes of under $24,000. Two percent were households with only one adult contributing to the household income; 45 percent had two adults contributing to the household income and 52 percent had three adults contributing to the household income. The families had an average of 2.53 children. Twenty-four percent had incomes less than 125 percent of the poverty level. Twenty-one percent of the families were on MA.

During the previous 12 months, 21 percent of the families surveyed did not have health insurance, 60 percent did not have dental insurance, and 52 percent had not been able to see a dentist because they could not afford the fees.

Fifty percent of those surveyed had been advised that their children should see a dentist. Thirty-four percent were told that they needed to have their children's teeth cleaned and 75 percent indicated that their children had had a cavity in the previous 12 months.

This group, as would be expected given that their children had been referred to a dentist, had a higher than expected level of removed teeth. Over 34 percent of the children had at least one tooth removed, and 21 percent had two or more teeth (primary and/or permanent) removed.

The families also faced significant barriers to dental care. Twenty-four percent of the families said they did not have a regular place to receive dental care. Thirty-seven percent had not taken their child to a dentist in over one year, 13 percent in over two years, and five percent never took their child to see a dentist.

Thirteen percent of the families reported that their children complained about pain in the teeth during the last 12 months, and the same percent had to use the emergency room for dental care during the same time period.

When asked about the importance of dental care, 100 percent of parents said that having other priorities was not part of the problem with dental care, 92 percent indicated dental care is very important, and 97 percent agreed that dental care prevents tooth decay.

There is a gap, however, between the dental needs of these children and their realized access. While school records indicate that the parents received notices of their children's need to see a dentist, only 50 percent recalled the notice and 37 percent had not taken their children to the dentist during the previous 12 months. This is in contrast to the 78 percent who reported trying to make an appointment within the last 12 months.

Parents indicated that the most important reason for this gap was their inability to pay for dental care and the difficulty in finding a dentist. Forty-seven percent of parents agreed that a major barrier to accessing dental care was their inability to pay for the care and 56 percent agreed that part of the problem was that there were not enough dentists in their community.

AS THE FAMILY'S INCOME DECREASES, THE MORE LIKELY PARENTS ARE TO IDENTIFY TRANSPORTATION AS A BARRIER IN ATTAINING CARE.

In analyzing the relationship between the different variables measured in the survey, which included demographic characteristics, socio-economic characteristics, attitudinal characteristics, and experiential characteristics, a distinctive pattern emerges. The strongest relationships emerged between independent variables measuring the parents' ability to pay for dental care (insurance, income, and other resources) and the dependent variables of having a regular dentist, time of last visit, and ability to access transportation.

As students get older, they are less likely to have a regular dentist. A regular source of dental care, especially for rural patients, is the most important predictor of realized access across a variety of types of ambulatory care settings.

The survey data also showed that as children got older they were less likely to have a regular source of dental care and, most likely, a lower level of realized access, as confirmed by the Department of Health data. The ability to have a regular source of dental care is also influenced by the type of insurance coverage the family uses to pay for health services. Families covered by MA and those who self-pay for health services were far less likely to have a regular source of dental care compared to families with private insurance and families with insurance coverage through the state-supported Children's Health Insurance Program (CHIP). More than 60 percent of families who self-pay and those covered by MA did not have a regular source of care. Similarly, families who self-pay and those covered by MA were less likely to visit a dentist in the past year.

Family income also influences the likelihood of a family having a regular source of dental care. As family income decreased, the percentage of families without a regular source of dental care increased. Families earning between $12,001 and $24,000 annually had the highest levels of children without a regular source of care. This relationship is expected as this group is the most likely not to qualify for MA and not have health benefits through an employer and, therefore, are most likely to have to self-pay for health care.

INCOME HAS THE DOUBLE EFFECT OF NOT ONLY LIMITING A FAMILY'S ABILITY TO MAINTAIN A REGULAR SOURCE OF CARE BUT ALSO IMPACTING ITS ABILITY TO ACCESS CARE BECAUSE OF TRANSPORTATION ISSUES.

As the family's income decreases, the more likely parents are to identify transportation as a barrier in attaining care. Families earning between $12,001 and $24,000 annually were most likely to perceive transportation as a barrier. Most likely, these families may have one or two parents employed and not eligible for transportation services. Income has the double effect of not only limiting a family's ability to maintain a regular source of care but also impacting its ability to access care because of transportation issues. Also, as the number of children within a family increased, so did the percentage of children who had not been to a dentist in over a year.

A critical and significant relationship existed with the number of dentists and the number of low-income students in the school. The relationship showed that as the percentage of low-income students in a school district increased, the number of dentists who accept MA decreased. The fact that there are fewer providers where there is a greater need creates clear barriers to dental care and explains the role that transportation has in accessing dental care. In addition, this trend explains the inverse relationship between the number of low-income students and the number of students with private dentist visits. In school districts with more low-income students, the schools' dentists examine more students than a private dentist.

The analysis also showed that as the percent of low-income students increased, the number of students who were referred for further dental care also increased. And as the percent of low-income students in a school increased, the percentage of students with complete dental referrals decreased.

SUMMARY AND CONCLUSIONS

> BECAUSE LOW USE AMONG LOW-INCOME POPULATIONS IS A CONSEQUENCE OF THE RELATIONSHIP OF SUPPLY AND DEMAND FACTORS, IMPROVEMENT EFFORTS MUST INCORPORATE BOTH TO AFFECT A REMEDY.

Pennsylvania is experiencing a declining supply of dentists that is projected to continue into the future. Low dentist supply affects access and use among indigent populations in two ways. First, an absolute low supply affects access for all, but even a more marginal shortage will inhibit the participation of dentists in the MA program, since these dentists have an abundant supply of high paying patients. Second, when the MA program dentist supply is low (or non-existent in some areas), program enrollees maintain the expectation that care is unavailable or difficult to obtain, which contributes to a perception that oral health care is not important. Oral health care use among low-income populations is further exacerbated by structural factors that limit their access and behavior to seek care. These include transportation problems, lack of insurance, great distances to the nearest dentist, and the inability to self-pay. Low-income populations receive oral health care at rates much lower than the general population.

Because low use among low-income populations is a consequence of the relationship of supply and demand factors, improvement efforts must incorporate both to affect a remedy. Two goals on the supply side to improve this situation are: not allowing the general supply of dentists to decline further and increasing the participation rates of dentists in the MA program. Efforts to have a geographically equitable distribution of MA and general dentists is especially important to address the undersupply in the most rural areas.

On the demand side, eliminating the structural barriers that contribute to low care-seeking behavior and increasing the cultural importance of dental care in this population are necessary for achieving equality in use. These two demand side goals are not only interdependent, but are partly dependent on the achievement of the goals on the supply side. That is, increasing the value of care can only be accomplished by eliminating the structural barriers that support this value, one of which is the availability of local or program dentists. The most effective solution must incorporate policies that address both supply and demand issues.

The major findings of the research are:

1. The school and Head Start dental screening programs may be the only contact that many public school students have with oral health care providers. This is especially true of rural counties where dentist supply is low. The screening programs are essential.

2. While screening programs are essential, the referral compliance for these programs in rural counties is low and care is not sought outside the program. Consequently, the unmet needs of poor students remain high.

3. In the rural school district studies, low-income populations had low expectations of receiving dental care and placed a relatively low value on dental care.

4. Structural factors contribute to and maintain low expectations of dental care and low values on receiving care. Among these factors are dentist availability, ability to pay, and transportation problems.

5. There are available models that work to improve continuity of care. (See Appendix for Best Practice models.)

6. The general supply of dentists in Pennsylvania is currently favorable in comparison to other states, but is on the decline. Currently, there is one licensed dentist for every 1,531

Pennsylvanians. Despite the current supply, dentists are not in a state of surplus with respect to need. In general, dentists can generate sufficient caseloads from high-paying and insured patients and do not require MA enrollees to obtain a full patient load.

7. The supply of dental hygienists is increasing in the Commonwealth. Currently, there is one licensed hygienist for every 2,063 residents.

8. There is tremendous variance in the supply of dentists by county and even greater variance across local areas. Dentists are in shorter supply in rural counties, counties with a manufacturing base, counties with high non-professional employment, counties that have lower than average incomes, and counties with high poverty.

9. There is a variance in dental hygienist supply. Hygienists are in shorter supply in counties with high non-white populations, low average incomes, and high poverty rates.

10. Dentist participation rates in the fee-for-service MA program are low, resulting in service rates that are much lower than those enjoyed by the general population. At current levels of participation, there is one full-time equivalent dentist for every 5,928 enrollees in the fee-for-service program. The participating dentists would need to have an average participation rate of 25 percent, meaning 25 percent of their patients are MA enrollees, to achieve a service ratio near 3,000.

11. There is a great deal of variance in fee-for-service MA dentist participation rates by county and by local area (ZIP Code). Some areas are without a program dentist nearby and one entire county is without a program dentist. Excluding the county without a dentist, the eligible-to-FTE program dentist ratio ranges from 2,080 to 867,570. Areas without a MA dentist nearby tend to be the most rural areas of the Commonwealth.

12. The MA dental program service ratios in counties were not correlated with social and economic factors. Although general dentist supply was not correlated with service ratio at the county level, previous research has shown an association at more local levels.

13. At the ZIP Code level, rural areas are less likely to have an MA program dentist and areas with high poverty are more likely to have a program dentist.

14. Twenty-two percent of Pennsylvania's fee-for-service MA eligibles visited a dentist in 2000. This is similar to the rates in other states.

15. Program use rates varied significantly across counties.

POLICY CONSIDERATIONS

The problems of high dental morbidity rates and low dental care rates among indigent populations are inexorably inter-connected and will optimally involve a cooperative effort of all agencies involved, including the Pennsylvania Departments of Public Welfare and Health, the Pennsylvania General Assembly, local school districts, and community coalitions and organizations.

Low use rates and low availability of oral health care providers for indigent populations are issues across the nation. Pennsylvania is by no means unique in facing this situation and seeking its remedy.

LOW USE RATES AND LOW AVAILABILITY OF ORAL HEALTH CARE PROVIDERS FOR INDIGENT POPULATIONS ARE ISSUES ACROSS THE NATION. PENNSYLVANIA IS BY NO MEANS UNIQUE IN FACING THIS SITUATION AND SEEKING ITS REMEDY.

It is also important to note the historically intractable nature of both low oral health care utilization and low availability of providers for poor populations, particularly within the Medicaid program. Consequently, solutions will not be easily developed, particularly in the presence of the current demands on strained state budgets and the emerging national agenda to limit Medicaid expenditures. Additionally, the institution of the HealthChoices waiver program and the advent of a managed care delivery system for Medical Assistance impose another layer or intermediary between the public institution, DPW, and the provider and enrollee. This also has to be addressed in ameliorative efforts. These potential barriers notwithstanding, there is quite a bit that can be accomplished by the Commonwealth's administrative and legislative entities and by local organizations to improve the situation.

1. The public school and Head Start screening programs are tremendously important. The Pennsylvania Departments of Health and Education and local school districts should make every effort to keep these two screening programs at current levels and to potentially increase their scope.

2. Despite the importance of the public school and Head Start screening programs, the lack of continuity of care and low compliance with referrals limit the effectiveness of the programs. The implementation of programs like Vermont's *Tooth Tutor* program (see Appendix) should be explored. More importantly, a more formalized integration of the school-based program and the MA program may be used to develop policies that help find students an oral health home and facilitate continuity of care throughout their formative years.

3. Factors that inhibit the use of oral health care need to be addressed. There is a disproportionately low expectation on seeking and receiving care among indigent populations. The Pennsylvania Department of Health should maintain and consider expanding its efforts in oral health education. DPW can also contribute a great deal to ameliorating the low expectation of seeking and receiving care. As part of its contracts with managed care organizations in the HealthChoices program, DPW can highly recommend or require protocols by physicians and other medical providers to: a) make referrals to a program dentist for prophylactic care; b) explain the benefits that are due to the enrollee under the program; c) provide education materials on the need for oral health care and its relationship to medical problems; and, most importantly, d) make referrals when dental disease is diagnosed or suspected.

4. This research has suggested that low income, lack of insurance, transportation problems, low supply of dentists, and either a low supply or complete lack of MA dentists nearby, are structural conditions that lead to the low expectation of care among poor populations. Efforts at education and value change would involve many organizations and a great deal of cooperation. The local public assistance office, local transportation authorities (travel vouchers), and the education of employers (permitting care-givers to leave work for dental appointments of their charges), are suggested efforts in this regard. An integrated solution such as this would need to originate within the General Assembly or the Governor's Office.

5. Children with chronic dental disease need more attention. This research suggested that, within the public school program, those who are diagnosed with dental disease at an early age are much more likely to be diagnosed at later ages. This suggests that continuity of care is lacking, family awareness of need was not enhanced, structural barriers inhibiting access continue to exist, or a combination of these factors is present for these children. The local school districts should direct additional resources to children who were diagnosed with dental disease at the first mandatory screening and make efforts to find continuity of care, ensure referral completion, and enhance education to their families. This can be done in conjunction with the Pennsylvania Department of Health.

6. Efforts to ameliorate the projected decreasing supply of dentists for the general population must be addressed. The following are specific efforts to help attenuate the declining supply, especially for those who are poor and in the MA program.

a) The Commonwealth should consider offering support to increase dental school enrollments in Pennsylvania's three dental schools. Evidence has shown that those who are trained in Pennsylvania tend to stay in Pennsylvania. This may require new initiatives by the General Assembly and may involve programs like the Pennsylvania Area Health Education Center program.

b) Commonwealth representatives should consider working more closely with the Pennsylvania Dental Association and dental schools to foster their participation in acknowledging the need for more dentists in the future.

c) The Commonwealth should consider continuing or expanding the Pennsylvania Loan Repayment program to encourage more dentists to practice in Pennsylvania and to serve the poor in areas of low dentist supply. Efforts could be developed by the Pennsylvania Department of Health to offer incentives to dentists to continue practicing in these areas after they have fulfilled their loan repayment obligation.

d) Community Health Centers (CHCs) are an ideal location at which to offer oral health care and dentistry services to poor and MA populations. This is especially true for dentists who are on-site rather than contracted by the CHC. Having a dentist at the same site where medical services are offered will encourage low-income/MA populations to seek and develop a continuity of care and will facilitate within-program referral. DPW, the Pennsylvania General Assembly, and the Pennsylvania Forum for Primary Healthcare can be important contributors to this effort.

e) The Commonwealth should consider fostering minority recruitment into dentistry. Evidence has shown that minority dentists are more likely to practice in poor urban areas.

f) The supply of all health care providers has always been a problem in rural areas, especially the most rural. Incentives need to be developed to attract more dentists to rural areas.

g) The formalization of the Expanded Function Dental Assistant as a licensed provider in the Commonwealth will increase the efficiency and productivity of dentists and increase the supply of service available. This program needs to be maintained and other efficiency measures involving auxiliaries should be explored.

7. The analysis in this report focused solely on the DPW's fee-for-service program. In the future, the program in almost all areas of the state, except for some of the most rural, will be administered through a managed care waiver program, HealthChoices. Nevertheless, the lessons learned from this research have significant implications for that program.

a) Currently, there is no uniformity in the levels and manner in which reimbursement to dentists is made in the HealthChoices program. DPW should consider initiating a policy that institutes minimum reimbursement standards for dentists within the managed care organizations.

b) Although rural areas tend to have the lowest availability of MA program dentists, some areas that have high need are served proportional to their needs: areas of the highest poverty more often have a program dentist as do areas with a high proportion of children with single parents. Current DPW contracts require that the managed care organization only have a minimal panel of dentists to serve the enrollees. The department should consider that new and renewal contracts attempt to assure that rural areas and all enrollees have a dentist available within a reasonable travel time from their homes.

c) DPW's Office of Medical Assistance Programs should consider instituting referral protocols to oral health providers from medical providers. This is described in recommendation (3) above. Such a procedure can be included as a service in the contracts to managed care organizations and should be highly effective in encouraging appropriate use of oral health care services of enrollees.

d) The issue of mandatory participation in the Medical Assistance program by all dentists who practice within the Commonwealth should be maintained as a policy option. Such a policy raises many issues, perhaps most importantly, the issue of free choice among dentists. But requiring all dentists to accept program enrollees, up to a certain percentage of their caseload, would most certainly increase program availability and contribute to eliminating the expectation among enrollees that care is not available.

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APPENDIX: BEST PRACTICES

The data and analysis clearly show that in order to improve the preventive dental care and early treatment programs that children need in the Commonwealth, there is a need for a greater number of dental providers who will treat young children and children from low income families. This is the long-term structural solution required. However, some communities have improved access using creative programs that increase the ability of families to use preventive dental services. Many of these interventions were reported not only in the literature but highlighted by school nurses during the key informant interviews.

The literature and the data from the analysis clearly indicate that provider availability could be accomplished by guaranteeing adequate payment through the Medicaid and State Children's Health Insurance Programs, training more pediatric dentists, particularly those from racial/ethnic minority groups, and providing incentives for dental care providers to practice in underserved areas (Vargas and Ronzio, 2002).

SCHOOL-BASED INTERVENTIONS: VERMONT'S TOOTH TUTOR

School-based dental programs led by hygienists have been successful in improving access to private dental care for children with Medicaid/SCHIP. The prototypical model is the Vermont Department of Health's "Tooth Tutor" program. In that program, school-based dental hygienists carry out outreach to local dentists; create and manage a paper screening process to identify children with no dental care in a year; develop a visual dental screening of children in this target group to assist in referring a mix of children with preventive, restorative and emergency needs to area dentists; contact local private practice dentists to arrange for care of individual children; case manage children to help families with barriers to keeping appointments, such as transportation and language differences; and implement a developmentally appropriate dental health curriculum with take home messages for all children in grades K-6.

The Vermont Tooth Tutor program resulted in an increase from 75 percent of children in 54 participating schools with a dental home at the beginning of school year 2000-2001 to 89 percent at year's end (Keating et al., 2002).

INTEGRATED COMMUNITY-BASED MODEL: ACCESS TO BABY AND CHILD DENTISTRY PROGRAM (THE ABCD PROGRAM)

This program is a community mobilization and networking program that seeks to form oral health coalitions. Dentists receive continuing education in early pediatric dental techniques. This qualifies them to receive enhanced reimbursement for selected Medicaid preventive service codes for enrolled children. Dental front office staff receive training in communication and culturally appropriate follow up with the client families. Enrolled families are coached in the need for early and preventive dental care and in appropriate behavior at the dental office, including the need to keep appointments. The resulting no-show rate is significantly lower than in normal practices. Participating private practices accept enrolled clients (including existing clients) at a caseload level determined by each practice. Clients have freedom of choice in selecting a dental provider. This education and support encourages dentists in private practice to increase their commitment to expanding dental access in the community. The emphasis on non-traumatic techniques and oral health education encourages families to seek and accept regular dental care.

COMMUNITY PARTNERSHIPS

Less complex community partnerships have been used to expand access to dental care for children. Community partnerships are created between schools, hospitals, and local dental societies and/or state dental association that encourage dentists to participate in volunteer clinic hours. In Pennsylvania and in other parts of the country, communities have used volunteer providers and "Smile Mobiles," which are on-site portable school dental units, to reduce disparity and improve oral health of underserved child populations. These mobile clinics coordinate with local public school districts to visit critical areas throughout the year. It should be noted that in northeastern Pennsylvania, Wayne County has a mobile clinic and Monroe County has a volunteer community clinic for low-income patients. However, both services have more than a nine-month waiting period for appointments.

MEDICAID-BASED DENTAL SEALANT PROGRAMS

Dental sealant programs have been shown to reduce the number of decayed tooth surfaces among Medicaid-insured children and had the most impact on children with more cavities before sealant placement. In addition, the use of sealants saved Medicaid money for children prone to cavities, according to a study supported by the Agency for Healthcare Research and Quality (HS06993). In a study of 15,438 children enrolled in the North Carolina Medicaid program from 1985 to 1992, the results showed that sealant programs funded by Medicaid were successful in reducing the caries-related dental services children required, but were most effective for children who had multiple dental services for cavities previous to the sealant placement. The study estimated that there was savings in Medicaid expenditures related to sealant use within two years of application for children with two or more prior caries-related dental visits (Weintraub, Rozier, and Huang, 2001).

PSYCHOMETRIC SURVEYS

The data from this study also showed that parent attitudes and knowledge might be a critical predictor of dental care use. Therefore, the use of psychometric surveys in exploring parental attitudes in children's dental care has been shown to be a good assessment tool in determining educational programs aimed at caregivers. Four aspects of parental dental attitudes may be investigated: dental knowledge; child oral health behavior; perceived importance of dental related aims; and parental responsibility. This four-part psychometric questionnaire is a suitable instrument in investigations of priority and responsibility as new aspects of parental dental attitudes, along with dental knowledge and child oral health behaviors (Arnrup, Berggren, Broberg, 2001).

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The Center for Rural Pennsylvania
200 North Third St., Suite 600
Harrisburg, PA 17101
phone (717) 787-9555
fax (717) 772-3587
www.ruralpa.org

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