The Declining Supply of Dental Services in Kansas: Implications for Access and Options for Reform

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EXECUTIVE SUMMARY

This study of the dental workforce in Kansas offers an accounting of oral health needs in the state, identifies gaps in the dental workforce that contribute to these needs, and presents a broad range of options for policymakers to address these needs. Key findings indicate that:

- Many poor and rural Kansans lag significantly behind an accepted standard for dental care and oral health.
- These gaps in services and care are caused in part by a limited supply of dentists—especially in rural areas.
- Without policy intervention, these service gaps and resulting oral health problems will grow as the supply of dentists declines.
- State policies and workforce regulations help determine the supply of dentists and the contributions of other dental professionals to the overall supply of services.
- To improve access to dental services, policymakers could attempt to increase the supply of dentists by establishing a dental school or an in-state extension of an existing dental school, expanding education subsidy programs, or requiring more students who receive subsidies to practice in underserved areas.
- Policymakers also could target services towards underserved populations of the state, and/or support the development of new dental practice models, including expanding the types of services that hygienists or other allied professionals can provide.
- Dental workforce needs are difficult to predict and can take many years to address, suggesting the need for policymakers to monitor the dental workforce and update policies on an ongoing basis.

Dental health has improved significantly in the U.S. over the last several decades for children, adults, and the elderly. These improvements are generally attributed to widespread and sustained fluoridation of public water supplies, to increased utilization of preventive dental care, and to a rising public expectation of healthy teeth. Analysis of survey data undertaken for this report indicates that levels of access in Kansas are slightly higher than the national average, and are right in line with levels of access in other states in the north-central U.S. However, this analysis also revealed significant gaps in access for low-income and rural populations. In

addition, a separate analysis of Medicaid data confirms earlier reports of low participation rates for dentists serving low-income children in the Medicaid and SCHIP programs. Poor access to care can have a profound impact on overall health and well-being. In addition to lost productivity and diminished function, oral conditions can generate negative psychological and social impacts on overall quality of life. The pain of an untreated dental problem can also lead to the loss of sleep, depression, and other psychological conditions.

Analysis of the dental workforce indicates that access problems in the state derive significantly, though not solely, from the limited and unevenly distributed supply of services available. Unmet needs for dental services are concentrated among populations least able to compete financially for the limited number of practice hours offered by dentists, and those who live in rural areas where supply is even tighter. It was not surprising to find that the supply of dentists is significantly greater in more urban areas of the state than in rural areas, but one of the most striking findings in the report is that these differences have not been growing. The dentist-to-population ratio in the most rural counties of the state is below 40 dentists per 100,000 residents, while the ratio in metropolitan counties is above 50. These differences have changed little over the last 13 years, which suggests an entrenched disparity in the financial viability of the traditional dental practice model in rural areas.

As a point of reference for discussions about the Kansas workforce, this report provides detailed baseline projections of the dentist workforce in Kansas. These projections indicate that if state policies and market conditions remain essentially unchanged, the total number of full-time-equivalent dentists practicing in the state will increase somewhat for the next decade and then fall gradually to just below current levels. Under the same conditions, the ratio of dentists to the total population — a more direct measure of the supply of dental services — is projected to fall steadily and significantly through at least the year 2045.

While revealing, these projections may inform policymakers for only a brief time. The most elaborate and refined projections of the dental workforce have been consistently and significantly wrong. Nevertheless, the long lead time that it takes to train a dentist suggests that policymakers should keep a close watch on the number and distribution of dentists to monitor progress in

meeting policy goals: deficits may take many years to correct. These difficulties suggest that policymakers need to remain engaged in ongoing review of policies, striking a balance among the competing objectives of access, quality, and the cost of services.

This report documents the impact that state policies have on the supply of dentists. These policies help determine dental workforce supply by providing educational subsidies and dental training slots; establishing the manner in which dental professionals are licensed and allowed to practice; and determining the scope and autonomy with which each of the dental professions can practice. We present a range of options that policymakers might consider to improve access to dental services for underserved populations:

- Build a dental school or an in-state extension of an existing dental school.
- Expand loan repayment programs or provide direct education subsidies.
- Require more subsidized Kansas students to locate in underserved areas.
- Recruit foreign dentists on provisional or educational licenses.
- Use advanced dental students to meet needs in underserved areas.
- Expand the types of services that allied dental professional can provide.
- Allow hygienists or other allied professionals to bill patients directly for their services.
- Provide a separate oversight structure for allied dental professions.
- Improve data collection, monitoring, and reporting of oral health and workforce issues.
- Increase charity care provided by dentists.
- Increase dentists' participation in Medicaid with better and simpler reimbursement.
- Consider Medicaid expansions, with potential limitations on the scope of benefits.
- Advocate for national policies that support access to dental services.

While each of these options could be designed to increase access to dental services, many come with significant public or private financial costs, most yield uncertain benefits, and some may bring with them unintended consequences. It may thus be difficult to obtain public consensus to support a package of policy reforms. Nevertheless, there appears to be widespread agreement that longstanding disparities in access to care among poor and rural populations merit the attention of policymakers.

INTRODUCTION

Many have expressed concern about the availability of dental services in the state of Kansas as a whole, in rural areas specifically, and about the number and distribution of dentists available to serve the poor and uninsured. Kansas is not alone: similar concerns have been raised in other states and in the country as a whole.

Data indicate that access to dentists in the state may be limited. The Kansas Health Institute's (KHI) evaluation of the HealthWave program indicates that Medicaid/SCHIP children have more unmet dental health care needs than physical, mental, or other health care needs. These concerns may not be limited to the poor and publicly insured, especially if national projections of a declining dental workforce apply to Kansas as well. The state ranks 33rd in the number of dentists per capita, a number that may be exacerbated by the state's low population density and long distances between dentists. Moreover, the country as a whole is in its second decade of educational policies designed to reduce the ratio of dentists to population below levels achieved in the mid-1970s and early 1980s. Given these many concerns, it seems a good time to ask where the state stands and what the future might hold with respect to the supply of dental services and the public's access to those services.

This project relies on publicly available data to describe and evaluate the supply of dental workforce professionals in Kansas, to determine whether there is a shortage, and to explore policy options for managing the supply of dental workforce professionals in the long run. Assessing the adequacy of the dental workforce in the state entails an understanding of both the workforce that is available to serve the population as well as the underlying dental health care needs of that population.

This report begins with an assessment of oral health care needs among Kansans (Section I) and proceeds with an examination of the impact of oral health needs on overall health and well-being (Section II). The remaining sections describe the impact of regulation and education requirements and programs on the supply of dentists (Section III), followed by a baseline projection of the number of dentists and their relationship to the total population (Section IV). The last sections provide an analysis of the supply of dental services and the relationship

between workforce policies and oral health needs (Section V), a summary of policy options that might have an impact on levels of access to dental services in the state (Section VI), and some concluding comments (Section VII).

SECTION I. ORAL HEALTH CARE NEEDS IN KANSAS

LONG RUN TRENDS IN DENTAL HEALTH

Oral health has improved significantly in the U.S. over the last several decades. Dental cavities among children, cavities and extractions among adult populations, and the percentage of elderly without natural teeth have all decreased significantly.[1] These improvements are generally attributed to widespread and sustained fluoridation of public water supplies, increased utilization of preventive dental care, and a rising public expectation of healthy teeth. These trends became evident decades ago and led to expectations within the dental workforce professions that dental disease might be substantially eliminated from the population in the foreseeable future, with concomitant changes in the practice of dentistry.

While expectations that dental disease would be eradicated proved to be overly optimistic, dental disease continues to decline. One counterbalance to the impact of declining disease on overall demand for dental services is the emergence of third party payments in dental services. The percentage of dental costs paid out of pocket has decreased significantly since 1970, while the proportion financed by private insurance has increased. This decrease in costs to the patient at the point of service would, all other things remaining the same, tend to increase utilization of dental services.[2] Recent studies indicate that the percentage of Americans obtaining services did not change significantly between 1977 and 1996, although the number of dental visits per user decreased somewhat.[3]

The nature of services provided are changing as the oral health of the population improves. Utilization of diagnostic and preventive services have increased, while restorative and ameliorative services such as fillings and extractions have decreased.[4] As dental disease and disfigurement have declined, popular standards of oral health and dental presentation appear to be rising. One manifestation of these rising standards is the increased use of *cosmetic* procedures; i.e., dental services designed primarily to improve appearance rather than health or function. During the 1990s, for example, the frequency of four common cosmetic dental services increased nearly 80 percent nationwide, rising from 5 percent to over 7 percent of all dental procedures.[5]

CURRENT LEVELS OF ACCESS IN KANSAS

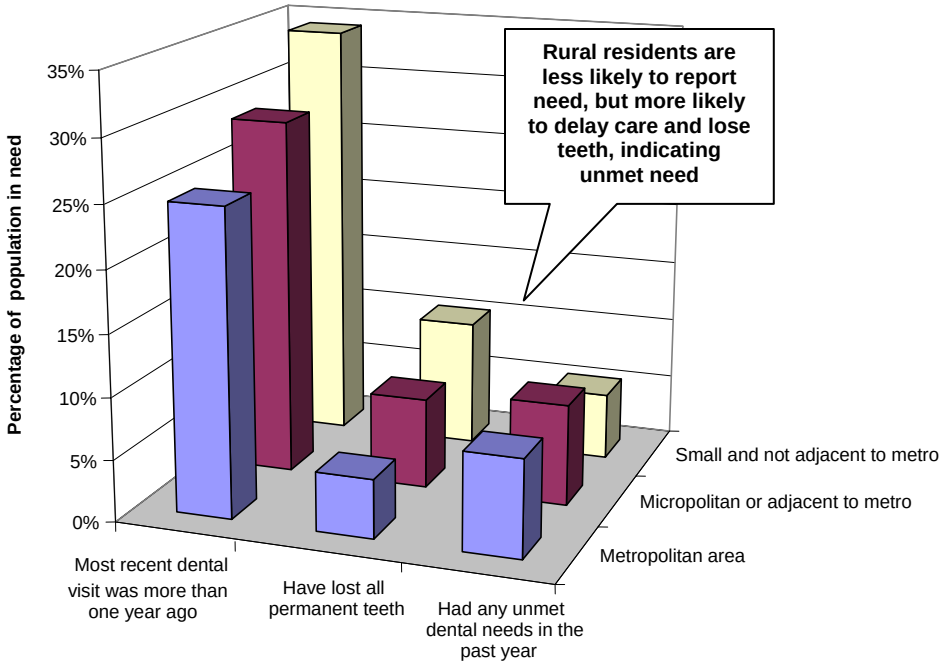
In order to document levels of access to oral health care services in Kansas, KHI analyzed state and national data from the 2002 Behavioral Risk Factor Surveillance System (BRFSS) survey. The 2002 BRFSS data include responses from approximately 238,000 households representing all 50 states, including approximately 4,500 households in Kansas. Individual measures of access from the 2002 BRFSS that are analyzed in this report include the presence of unmet dental needs, the presence or absence of natural teeth, whether an individual made any visit to a dentist in the previous year, and whether an individual made a preventive dental visit in the past year. These indicators incorporate both utilization of dental services and resulting levels of oral health and, as a result, constitute more of a measure of realized access than potential access. In this new analysis of the 2002 BRFSS data, KHI found that adults in Kansas are more likely to have visited a dentist in the past year than were adults in other states: 72.8 percent for Kansas v. 71.3 percent for the rest of the nation.[6] Kansans were also more likely to have had a preventive dental visit in the last year: 69.1 percent for Kansas v. 65.6 percent for the rest of the nation.[7] Overall levels of access in Kansas appear right in line with levels of access in other states in the north-central U.S. KHI's analysis indicates no significant differences between levels of access to dental services in Kansas and the other north-central states of Nebraska, Iowa, Missouri, North and South Dakota, and Minnesota. The overall utilization rates indicated by the BRFSS should be viewed with some caution. These levels are substantially higher than those based on other sources of information, such as the Medical Expenditure Panel survey, which indicates utilization rates of closer to 43 percent nationally, or the National Health and Nutrition Examination Survey (54%). Estimates of overall utilization rates differ in some predictable ways according to whether the survey included verification questions and the length of time for which the respondent was asked to report utilization (i.e., the recall period). However, while the overall rate of utilization may be uncertain, we do not expect that this uncertainty affects *relative* levels of access in Kansas v. the rest of the country.

Have all Kansans shared in these successes? Despite long-run improvements in dental health across the country, increased emphasis on appearance, and favorable levels of access to dental services in Kansas relative to the rest of the country, the possibility remains, and anecdotal evidence would seem to suggest,[8] that there may be those in the Kansas population who are not

sharing equally in this success story. Understanding Kansas' overall level of access, as compared to the rest of the country, also suggests an examination of access differences within its population. Kansas' favorable level of access relative to other states could be due to a) the favorable demographic characteristics of its population, or b) favorable levels of access, relative to the rest of the country, available to individuals with similar demographic characteristics. One way to test this is to measure differences in access after adding statistical controls for demographic factors. Applying this kind of multi-variate statistical model to national 2002 BRFSS data for access to dental services erases the access advantage observed among Kansas residents, except for some possible differences between Kansas' rural population and other states' rural populations.

The multi-variate statistical results indicate that most of the access differences between Kansas and the rest of the country are due to the differences in the make-up of the Kansas population, not to levels of access for specific populations in Kansas v. the rest of the country. For example, levels of access are higher for better-educated and higher-income populations, and Kansas has a very well-educated population with about average income, and this contributes to Kansas' relatively high level of access to dental services as compared to the rest of the country.[9] The multi-variate results also indicate significant variation in levels of access according to key demographic characteristics of the population. We examine several of the demographic characteristics that could have an impact on access to dental health services below, focusing first on rural areas, then on income and other demographic factors.

Figure 1. **Oral Health Needs Differ in Urban and Rural Areas**



THE RURAL ACCESS GAP

One of the state's most distinguishing characteristics is the low-density population spread across the western two-thirds of the state. This region is home to much of the state's most rural and remote populations. Statewide, approximately 31 percent of Kansas' population resides in the 58 (out of 105 total) counties that we define as "rural" according to their low score on the United States Department of Agriculture's Urban Influence coding system, which takes into account not only population density but also proximity to more urban areas. This definition includes as rural any county that does not contain an urban area with at least 10,000 residents, and that is not adjacent to a county with urban areas of at least 250,000 residents. A rural county under this definition lacks any sizable population center and is located at least two counties away from an urban area.

One-third (36) of Kansas' counties are designated as Dental Health Professional Shortage Areas (HPSA) by the U.S. Health Resources and Services Administration, which typically implies that they have fewer than one full-time equivalent dentist for every 4,000 people. Most of these counties are rural. In Section IV below, this study examines in greater detail the supply of dental workforce professionals in rural areas. A question of first importance is whether access

to dental services is lower in rural areas. If not, then the disparate levels of supply observed in rural areas could be considered a moot issue. On the other hand, if differences in access are observed, they pose an implicit question to policymakers about whether—and how—to address disparities in access and the supply of dental workforce professionals.

A recent analysis of national health data demonstrated that urban residents were eleven percent more likely to have had a dental visit in the past year than non-urban residents (64% v. 53%).[10] KHI's analysis of 2002 BRFSS survey data for the state of Kansas indicates an 8 percent advantage in the percentage of non-rural v. rural adults with a dental visit in the previous year. National studies indicate that access to care in rural areas is lower in part because rural residents tend to be poorer and are less likely to be insured for dental services. However, even after taking these and other demographic characteristics into account, rural residents across the country have been shown to face an access gap.[11] This may well be due to the limited and far-flung supply of dental services in rural areas: extended travel times and distances effectively raise the cost of obtaining care and may alter rural populations' preferences for dental services.

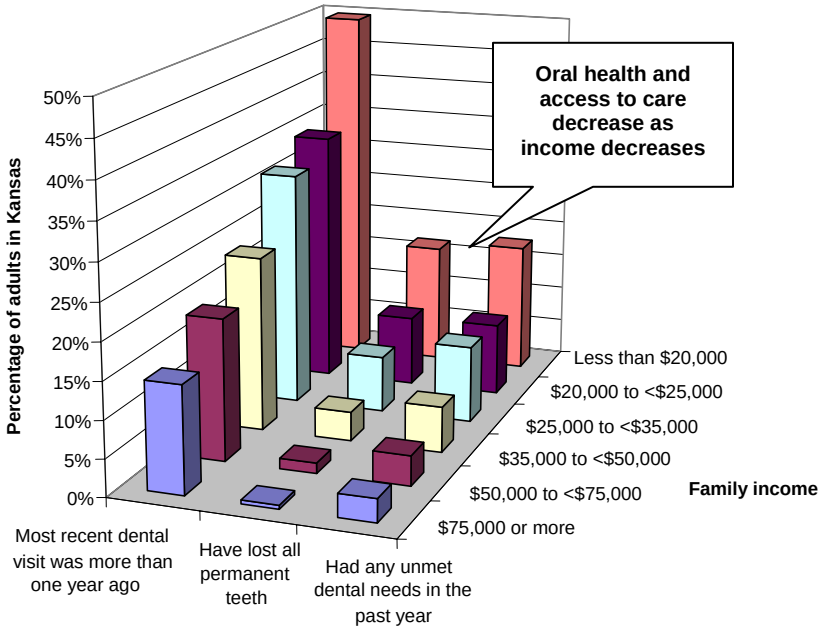
We turn once again to the 2002 BRFSS data to determine whether the rural access gap observed in national studies is also evident in Kansas. The analysis consists of three multi-variate logistic models of dental access and unmet need that include a comprehensive set of independent control variables, including education, income, age, gender, marital status, number of children, overall health, race/ethnicity, and health insurance status. The models examined three indicators of access and need: overall utilization of dental services, utilization of preventive services, and the presence of unmet dental needs. The results indicate that rural deficits in the overall utilization of dental services and in the utilization of preventive services, persist even when controlling for a full set of demographic characteristics.[12] However, the results also indicate that rural residents are *less* likely to report an unmet dental need. These seemingly contradictory results may be partly explained by differences in the way that urban and rural residents perceive and report oral health needs, differences in preferences for dental health care, or differences in attitudes towards preventive care. Existing research has not distinguished between these competing and potentially compounding explanations.

Kansas' rural population is distinguished from rural populations in some other states, especially those in the Eastern half of the country, by its remoteness. Not only are many of these counties low in population, but they may also be many miles, or even several counties, away from the nearest significant population center. This is the chief motivation for using the USDA's Urban Influence coding system to define rural counties in our statistical analyses since it takes into account both population and proximity to population centers in its tiered designations of urban, non-urban, and rural areas. However, it is still possible that these distinctions could fail to reveal some of the distinct characteristics of the Kansas population. To investigate this possibility, we re-ran the multi-variate statistical models described above—this time examining variation in overall utilization, utilization of preventive services, and the absence of all natural teeth[13]—including a statistical interaction term in order to compare Kansas' rural population to other states' rural populations. Findings were mixed: there was no difference in Kansas' rural populations in terms of the prevalence of visits on the whole, nor in the prevalence of having no remaining natural teeth, but the Kansas rural population is less likely than other rural populations to have not had a preventive dental visit in the previous year. It is not clear from this quantitative study whether these differences are cultural; i.e., resulting from different attitudes towards preventive care or oral health generally among the Kansas rural population, or whether these differences result from the added distance that many rural residents in Kansas must travel to reach the urban centers where dentists most likely practice.

SOCIO-ECONOMIC, RACIAL, AND ETHNIC ACCESS GAPS

Access gaps for the poor and disadvantaged are as well-documented in dental services as they are in medical services. Numerous national studies consistently demonstrate a significantly lower level of access for lower income families, less educated families, racial and ethnic minorities, and families with service workers rather than technical, professional, or executive workers.[14] A review of the oral health literature by the General Accounting Office indicated that low income and minority populations are far more likely to experience dental cavities, gum disease, and to have lost more teeth to dental disease.[15] Manski, Moeller and Maas (2001) found that the poor had lower levels of access throughout the 1977-1996 period, and that difference grew over that twenty year period.

Figure 2. **Oral Health Needs Differ by Income**



We conducted an analysis of 2002 BRFSS survey data to confirm that these results also applied specifically to the Kansas population. Appendix 1 summarizes the health needs of the state according to a range of socioeconomic and demographic characteristics. Findings indicate large and statistically significant differences in the level of dental access and need according to age, gender, education, income, urban status, overall health status, and health insurance status. In particular, note the large differences in dental needs across various income categories. For example, the percentage of low-income adults (below $20,000 in annual family income) who have not visited the dentist in the previous year is more than three times the percentage of high-income adults (above $74,000) who have gone without a recent visit.

KHI also constructed multi-variate models of dental needs to identify characteristics with a statistically independent effect on three measures of dental need and access to care: the loss of all teeth, reported visit to the dentist in the previous year, and a reported preventive dental visit (cleaning) in the past year. Findings indicate that adults with less education, income, and overall health all reported significantly lower levels of dental health and access to care. Race and (Hispanic) ethnicity were not found to have a significant independent impact on access to care.

ACCESS TO CARE FOR PUBLICLY INSURED CHILDREN

Kansas' Medicaid and HealthWave programs are designed to provide a source of financing, and ostensibly access, for medical and dental care. The programs' benefit packages include comprehensive dental benefits for children, but only emergency dental services for adults. Nevertheless, access to care requires willing and able beneficiaries and available providers. Dentists in private practice are free to decide whether to participate in the Medicaid and HealthWave programs, and participating dentists are free to decide how many Medicaid and HealthWave participants to see in their practice. Previous reports have demonstrated high levels of remaining need for dental care among the state's publicly-insured population.[16] A comprehensive study of access to dental services in the Medicaid population by the University of Kansas in 1999 concluded that:

- Only one-quarter of children in Medicaid received dental services in fiscal year 1998, and over half of parents with a child on Medicaid thought that the child currently needed dental care.
- The total supply of dentists in the state is not a meaningful measure of the accessibility of dental services to Medicaid beneficiaries due to the small number of dentists that accept Medicaid patients.

For this report, KHI solicited dentist participation and beneficiary utilization data from Doral Dental Services of Kansas, LLC, the vendor providing dental services on a capitated basis to all beneficiaries of Kansas' Title XXI State Children's Health Insurance Program (SCHIP), commonly referred to as HealthWave XXI. Aggregate data was provided at the county level for the period beginning July1, 2003, and ending June 30, 2004. Beneficiary counts and counts of service users from this time period were compared to numbers of practicing and participating dentists provided by Doral. Results indicate that HealthWave XXI beneficiaries in more rural areas are somewhat less likely to utilize dental services: 59 percent of metropolitan beneficiaries received dental services during the year[17] v. 56 percent of children in micropolitan or adjacent counties and 54 percent in the most rural counties. [18] However, the percentage of beneficiaries receiving services in each county was found to be uncorrelated with the dentist-to-population ratios in these counties. Instead, the supply measure found to correlate most strongly with the

percentage of a counties' HealthWave XXI beneficiaries receiving care is the ratio of dentists participating in the HealthWave XXI program to the number of HealthWave XXI beneficiaries in that county.[19] Only about 25 percent of dentists in Kansas are contracted to provide services to children in the HealthWave XXI program, and only 20 percent actually participate by providing services. These percentages are very close to, if not lower than, the percentage of dentists reported by the previous study to be participating in the Kansas Medicaid program in 1998.[20]

To identify a relationship between dentists' participation and HealthWave XXI beneficiary utilization, we estimated a simple regression model that described the statistical relationship between county-level beneficiary utilization rates (the dependent variable) and two independent variables: whether the county is rural according to the USDA Urban Influence coding system, and the ratio of HealthWave XXI participating dentists per HealthWave XXI beneficiary. Results indicate that both characteristics are significant predictors of the percentage of HealthWave XXI beneficiaries receiving care in the course of a year. Beneficiary utilization rates are lower in rural counties and higher in counties with higher dentist-to-beneficiary ratios. This simple analysis may indicate that the impact of rural residence on access to dental services—at least with respect to the HealthWave XXI population—goes beyond the numeric supply of dentists to entail other (and in this case unmeasured) aspects of rural life.

SECTION II. THE IMPACT OF ORAL HEALTH ON OVERALL WELL-BEING

Although recent research has made significant progress in investigating the link between dental health and general well-being, proper dental care is often overlooked as a component of a complete health profile. In 2000, Surgeon General David Satcher published "Oral Health in America," an exhaustive report designed to draw attention to oral health care needs in the United States, especially for the socially and economically disadvantaged.[21] In that report, the Surgeon General concluded that:

> "In spite of the safe and effective means of maintaining oral health that have benefited the majority of Americans over the past half century, many among us still experience needless pain and suffering, complications that devastate overall health and well-being, and financial and social costs that diminish the quality of life and burden American society. What amounts to "a silent epidemic" of oral diseases is affecting our most vulnerable citizens— poor children, the elderly, and many members of racial and ethnic minority groups."[22]

The Surgeon General's report emphasizes the impact of oral health on the daily life of all citizens and the true meaning of oral health.

> "A major theme of this report is that oral health means much more than healthy teeth. It means being free of chronic oral-facial pain conditions, oral and pharyngeal (throat) cancers, oral soft tissue lesions, birth defects such as cleft lip and palate, and scores of other diseases and disorders that affect the oral, dental and craniofacial tissues, collectively known as the craniofacial complex. These are tissues whose functions we often take for granted, yet they represent the very essence of our humanity. They allow us to speak and smile; sigh and kiss; smell, taste, touch, chew, and swallow; cry out in pain; and convey a world of feelings and emotions through facial expressions."

In an analysis of the oral health issues facing older Americans, Slaughter (2004) decomposes oral health issues into two groups based on the nature of the impact of untreated dental problems. The first category of functional impact includes direct/indirect economical loss, eating/nutrition, and sleeping. The second category consists of the more intangible psychosocial issues such as the ability to speak, self-esteem and image, social reaction to oral disfigurement, cultural norms of oral status, and the social function of teeth.

This characterization makes clear the impact that oral health can have on an individual's general well-being and functioning[23]. Oral conditions and diseases impact activities in school, at work, and in the home, which causes millions of hours of productivity to be lost each year. According to the Surgeon General's Report, children between the ages of 5 and 17 lost 3.1 days of school per 100 persons in 1996 due to oral conditions, which translates into a loss of approximately 1,611,000 total days of school in the United States that year. Adults over the age of 18 that are currently employed lost 1.9 days of work per 100 persons due to acute dental conditions, or approximately 2,442,000 total days of work lost. For people of all ages that have a dental condition, 3.7 days per 100 persons were lost to restricted activity induced by the condition and a total of 9,705,000 days were not fully utilized by people experiencing dental restriction of activity. To put these figures in context, note that acute dental conditions represent about 1 percent (.7%) of the work days lost to all kinds of acute conditions.

Table 1. **Disability Days Due to all Acute Conditions and Acute Dental Conditions, U.S. 1996**

	All Acute Conditions		Acute Dental Conditions[24]	
	Total Days (In Thousands)	Days per 100 Persons	Total Days (In Thousands)	Days per 100 Persons
School-loss days	152,305	296.9	1,611	3.1
Work loss days	358,377	284.0	2,442	1.9
Bed days	717,868	271.7	4,602	1.7
Restricted activity	1,648,932	624.0	9,705	3.7

Source: Oral Health In America[1]

The World Health Organization (WHO) has also examined the issue of oral health and advocates the view that oral health is a determinant factor that influences general well-being. The Surgeon General's report summarizes findings from eleven studies that develop and measure how oral health care can affect quality of life. In addition to the economic burden placed on the individual and society through the loss of work or school days, oral conditions and disease place a person at risk for poor nutrition through the compromised ability to bite, chew, and swallow foods. Tooth loss, facial pain, and other conditions affect an individual's ability to select certain foods, which can ultimately produce a diet of poor nutrition.

In addition to lost productivity and diminished function, oral conditions can generate a psychosocial impact that diminishes a person's overall quality of life.[25] For example, poor oral health can create anxiety strong enough to affect personal behaviors. Kay, Ward, and Locker (2003)[26] found that 65 percent of survey respondents had worried about their oral health in the 12 months prior to completing the survey, while 55 percent indicated a concern for the appearance of their mouth and teeth during the previous year. Nearly one-third (31%) of dental patients communicated unhappiness with their oral appearance and 10 percent avoided some leisure activities (including socialization) due to oral health problems.

Table 2. **Oral Health Condition's Impact on Patients**

Impact	Percent
Worried about oral health	65
Concerned about appearance	55
Unhappiness with appearance	31
Avoided leisure activities	10

Source: Kay, Ward, and Locker, 2003

The pain of an untreated dental problem can also lead to the loss of sleep, depression, and other psychological conditions. A Canadian study found that 5.5 percent of the total population experiences a loss of sleep due to oral pain. Among individuals that report oral pain, the amount of sleep lost due to that pain increased as the intensity of the pain increased. From the individuals with mild pain 20 percent experienced a loss of sleep, 32 percent of moderate oral pain suffers experienced a sleep disturbance, and 59 percent of respondents with severe pain lost sleep due to their condition.[27]

Available research also establishes a relationship between poor oral conditions and less tangible losses to an individual. The presentation and maintenance of good oral health appears to be becoming a more important cultural benchmark of overall health. Those who do not possess the ability or desire to engage in preventive maintenance are more likely to be subjected to the economic, physical, and cultural costs of poor oral health. Social interaction and functions may be impaired due to an untreated oral condition including limitations in verbal communication, social relationships, personal relationships, and intimacy. One study from the United Kingdom

found that 27 percent of adult survey respondents were self-conscious or tense because of an oral condition, and 18 percent felt embarrassed and unable to relax[28]. In addition, they found that 10 percent of the respondents admitted to pronunciation difficulties or to a loss of taste, while nine percent said they had interrupted a meal or had a bad diet.

The reduction in or loss of social interactions due to oral abnormalities can generate lower self-esteem, depression, anxiety, and other psychological issues. The U.K. study also found that eight percent of the respondents to their study indicated irritability with others or difficulty performing their usual job because of their oral condition, thus impeding social function.

Table 3. **Percentage of Individuals Reporting Problems Caused by Oral Condition**

Problem	Percent
Self-conscious or tense	27
Embarrassed	18
Pronunciation difficulties/ loss of taste	10
Bad diet/interrupted meals	9
Irritability/Inability to perform	8

Source: Nuttal et al., 2001

All of this establishes that oral health concerns can pose profound challenges to an individual's overall well-being. The distributional analysis of dental needs presented in Section II above demonstrates that oral health care needs are concentrated among the poor, among minorities, and among rural populations in the state. The challenge for policymakers is to determine whether existing public policies are contributing to the oral health burden of the state's most vulnerable populations, and whether new public policies can help ameliorate these demonstrated needs. One candidate set of public policies that could be contributing to the observed pattern of dental needs are the laws, regulations, governing bodies, and educational institutions and subsidies that help determine the size and composition of the state's dental workforce. The next section describes the set of public policies governing the state's dental workforce. An extended analysis of the relationship between public policy, the size and

distribution of the Kansas dental workforce, and levels of dental need in the state follow in Section IV.

SECTION III. THE PUBLIC POLICY OF THE KANSAS DENTAL WORKFORCE

This section provides an overview of the role of public policy in educating and regulating the dental workforce. These details help to establish the role that policymakers can be expected to play in ameliorating any deficiencies in supply.

DENTISTRY: THE PATH TO A PROFESSION

The supply of dentists in Kansas is partly a function of the number of Kansas residents that attend dental school. Kansas does not have a school of dentistry, but maintains a reciprocal in-state tuition agreement with the University of Missouri-Kansas City (UMKC) School of Dentistry to accept approximately 20 students per year from the state of Kansas. In exchange for admitting Kansas students at in-state prices, approximately 491 students from Missouri are eligible to receive in-state tuition in architectural programs at the University of Kansas or Kansas State University. UMKC dental students represent about two-thirds of the number of new dentists entering practice in Kansas each year.

The typical student seeking to pursue dentistry as a profession must first complete an undergraduate degree at an accredited university. However, an undergraduate that has 90 or more college credit hours may apply for admission to many dental school programs, including UMKC. There is no predetermined undergraduate major that ensures acceptance to dental school, but all pre-dental plans of study are immersed in the science fields (such as biology, chemistry, physics, and anatomy).

UMKC requires all candidates to have completed specific coursework before beginning the first year of the dental program, including: (1) four semesters of biology with labs, particularly general biology, anatomy, physiology, and cell biology, (2) eight to ten credit hours of general chemistry with labs, (3) eight to ten credit hours of organic chemistry or a one-semester five-hour terminal organic chemistry lab, (4) eight to ten credit hours of physics with labs or one semester of physics with lab and one semester of college math (college algebra or higher), and (5) six credit hours of English composition.

After graduating from a four-year dental program, prospective dentists are required to pass the National Board Dental Examination (NBDE) parts I and II, as well as the required state/regional clinical examination. Dentists are not allowed to apply for a practicing license within a state without a passing NBDE score. The American Dental Association (ADA) states that "the purpose of the National Board Dental Examination is to assist state boards in determining qualifications of dentists who seek licensure to practice dentistry. The examination assesses the ability to understand important information from basic biomedical and dental sciences and also the ability to apply such information in a problem-solving context."
State dental boards also require a clinical exam for state licensure. These exams can be administered by the state board itself or through a regional testing service. None of the states that administer their own clinical exam accept any other results for initial licensure. Kansas does not have its own state examination but is one of only eight states that will accept the results from any of the four regional testing agencies, as well as results from the 12 states that have their own state examination.

Every dentist is required to obtain and maintain a dental license within the state they intend to practice. After the initial licensure a dentist must renew their license in their current state of practice or obtain a new license if they move their practice to a new state. To ease the burden of transitioning from one state to another, many state dental boards do not require a dentist with adequate experience to retake the state clinical board examinations. Instead, the state dental board can grant a practicing license to transferring dentists that are currently licensed and who have actively practiced for a minimum period of time in another state (typically five years). According to the American Dental Association's Department of State Government Affairs, as of July 2004, 44 states, including Kansas, allow the licensure of dentists by these means.
Once a dentist is licensed in the state in which they intend to practice, all state dental boards have a requirement of continuing education credits that must be met for the dentist to be granted re-licensure. The total credits that are required vary widely from state to state as do the number of years in which a dentist has to complete the required hours. Kansas requires 60 credit hours over two years, which is about 10 more hours per year, on average, than other north-central states and most states nationwide.

THE STATE PRACTICE ACT

The basic functions that each of the dental professions may perform are set out in statute and are, thus, determined by the state legislature.[29] One of the key policy issues that state legislatures have considered in recent years is the degree of autonomy that will be afforded hygienists in the practice and business of dentistry. Hygienists do not receive the same level of training and education as dentists, although dentists rely heavily on hygienists to perform many of the most common dental services. States vary significantly in the range of services that hygienists are allowed to perform independently. A recent study ranked Kansas 24th in the level of autonomy afforded hygienists; i.e., the level of dentist supervision required, the breadth of tasks that they may perform, and the ease with which they can bill patients directly (rather than through a dentist) and set up their own independent practices.[30] Some scope-of-practice issues, such as the use of new technologies, are left to the dental board.

KANSAS DENTAL BOARD

The Kansas Dental Board was created to carry out and enforce the Kansas Dental Practices Act (Chapter 65, Article 14). The board consists of nine members: six licensed and qualified resident dentists (one from each congressional district and two at-large), two licensed and qualified resident dental hygienists, and one representative from the general public. Members of the board are appointed by the Governor for four-year terms and serve until their successors are appointed. The dental board composition differs between the five midwest states described in Table 4 below, but all consist of at least one hygienist and a majority of dentists.

Table 4. **Composition of Dental Boards in Five Midwest States**

Members	Kansas	Iowa*	Missouri	Nebraska	Oklahoma
Dentists	6	5	5	6**	8
Hygienists	2	2	1	2	1
Public	1	2	1	2	2
Term (yrs)	4	--	5	5	3
Total	9	9	7	10	11
Selection	Appointed	Appointed	Appointed	Appointed	Elected

*Iowa has an additional dental hygiene board consisting of two dental hygiene members and one dentist.
** Two must be faculty members of the two dental colleges.

While every board has a unique framework, the overarching purpose remains the protection of the general public through the licensure and control of dental professionals, including dentists, dental hygienists, and dental assistants. These boards have the power to enforce their state's dental laws and acts, as well as the authority to issue licenses, registrations, and permits. The goal is to maintain the high professional standards of the field through the regulation of entrance into the field and the investigation of complaints, which may or may not be followed with disciplinary action from the board.

SUMMARY

This description of the educational and regulatory role that the state plays for the dental professions—which has focused on dentists, although the roles are quite similar for dental hygienists and assistants—helps to establish the importance of public policy in determining the supply of dentists in the state. In the subsidies provided for dental education, in securing dental training slots for native Kansans, in determining the manner in which dental professionals will be licensed and allowed to practice, and in determining the scope and autonomy with which each of the dental professions can practice, public policies in Kansas help to determine the flow of dental professionals into practice and the productivity of the workforce that is in place.

SECTION IV. THE SUPPLY OF DENTAL SERVICES IN KANSAS

The Surgeon General's recent report, "Oral Health in America," concludes that:

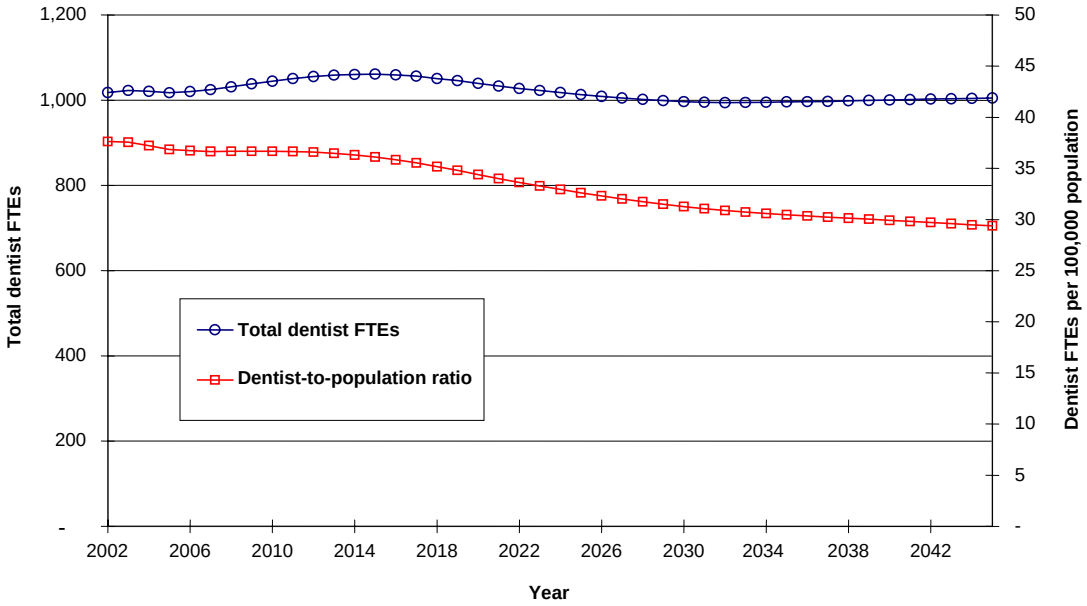
> The dentist-to-population ratio [in the U.S.] is declining, creating concern as to the capability of the dental workforce to meet the emerging demands of society and provide required services efficiently (p. 241).

The American Dental Association predicts a decline in the dentist-to-population ration from a peak of 55 per 100,000 in 1994 to 50 in 2025.[31] Does this prediction apply to the state of Kansas? This section provides a baseline projection of the supply of dentists in the state over the next four decades. This baseline is intended to serve as a point of reference for discussions of dental workforce supply, but does not constitute a comprehensive prediction of the number of dentists over time. A more comprehensive prediction might take into account possible or likely changes in workforce policy that might increase or decrease supply. Projections taking these contingencies into account have not performed well over the years.[32]

This projection is intended to illustrate the supply of dentists over time if no significant policy changes are made, in order to provide a baseline that policymakers can work with to assess the need for change. Similarly, the model used below assumes that the technology and practice of dentistry will not change in some way that might affect supply. This model includes dentists only, and therefore is not a comprehensive model of the dental workforce. This report focuses on the supply of dentists primarily because the current dental practice laws in the state of Kansas restrict to dentists alone the license to provide restorative, pain-reducing services. These restrictions act as a technological constraint on the practice of dentistry and limit the responsiveness of the dental labor force mix between dentists and the two other major components of dental supply, dental assistants and dental hygienists. This projection of the supply of dentists is indicative of the overall supply of dental services to the extent that this labor mix does not change over time. Again, the projections are designed to provide a point of reference for policymakers as they decide whether to make changes in policies that help determine the dental workforce, including both educational subsidies and dental practice laws.

OVERVIEW

Figure 3. **Baseline Projection of the Number of Full-time Dentists and the Dentist-to-Population Ratio in Kansas: 2002–2045**



Source: Kansas Dental Board licensure database (2002); Author's estimates for 2003–2045

The Kansas Health Institute projects that if state policies and market conditions remain essentially unchanged, the total number of full-time-equivalent dentists practicing in the state will increase somewhat for the next decade and then fall gradually to just below current levels. Under the same conditions, the ratio of dentists to the total population is projected to fall steadily and significantly through at least the year 2045 [see Table 5]. The endpoint for this projection—the year 2045—is pegged to the average year of retirement for dentists who entered dental school this fall. This projection of the dentist workforce is based on a cohort- and gender-specific model of licensure, hours worked, and retirement. It draws primarily on data contained in the Kansas Dental Board's licensure database. Cohorts were defined according the date of initial licensure by the Kansas Dental Board. The projections actually begin with the year 2003, since much of the information contained in the database is current only through 2002, which was the last time that dentists were required to renew their licenses. Because of the difference in the amount and pattern of hours worked for male and female dentists, separate models were created for each gender and aggregated to arrive at the total workforce of dentists in any given year. Full-time-

equivalency was defined as a 40-hour work week, although alternatives were considered. Adjusting the length of the full-time work week would shift the FTE projections up or down, but would not alter the long-run projection of a decline in the workforce.

Consideration was also given to the potential effect of the age distribution of dentists in different parts of the state. Rural dentists are slightly older than non-rural dentists in Kansas, which means that the percentage of new dentists locating in urbanized areas of the state has been slightly above average. This could cause the supply of dentists to fall more in rural than in non-rural areas. Nevertheless, population growth is also lower (or even negative) in many rural areas around the state. The net effect on dentist-to-population ratios was not explicitly modeled, but is discussed in some detail below.

Table 5. **Baseline Projections of the Dentist Workforce through 2045**

Year	Total Number of Practicing Dentists*	Total FTE Dentists	Total Population (in millions)	Practicing Dentists per 100,000 Persons	FTE Dentists per 100,000 Persons
2002	1,191	1,018	2.70	44.0	37.6
2005	1,188	1,017	2.76	43.0	36.8
2010	1,226	1,044	2.85	43.0	36.7
2015	1,253	1,061	2.94	42.6	36.1
2020	1,233	1,039	3.02	40.8	34.4
2025	1,198	1,013	3.11	38.6	32.6
2035	1,169	996	3.27	35.8	30.5
2045	1,178	1,005	3.42	34.4	29.4

*Licensed and reporting positive hours worked

Sources: U.S. Census Bureau; Kansas Dental Board licensure database (2002); Author's estimates for 2005–2045

METHODOLOGY

This baseline projection of the supply of dentists describes what might occur if licensure regulations and educational subsidies remain at their current levels until 2045. This projection does not constitute a prediction that policy changes will not occur. Wherever possible, observed

trends or levels for key elements of the model were assumed to remain constant throughout the projection period. This implies no net impact of any possible changes in:

- Dental workforce policies; e.g., the division of labor among dentists, hygienists, assistants, and any other dental practitioners as regulated through the Kansas Dental Board.
- Educational subsidies and infrastructure, including the number of training slots for new dentists provided through the UMKC School of Dentistry and the absence of training facilities for dentists in the state of Kansas.
- Financial incentives for non-resident dentists to locate in the state.
- Productivity and technology, to the extent that changes in capital investments and/or new technologies might make the profession more or less productive, more or less in demand, and more or less attractive to those considering entry into the Kansas dentist workforce.

It is important to note that this is solely a (baseline) projection of the supply of dentists in the state and does not take into account any changes in demand for these services. In addition, there is no attempt to model the interaction between the market for dental services and the policies which help determine supply. For example, this study does not estimate the reaction in the supply of dentists to the likely rise in dental prices and dental incomes that could result from the decrease in supply that occurs as baby boom dentists retire. A reaction in supply of this type would require either a policy change increasing the number of Kansas residents being trained as dentists at UMKC or an increase in financial incentives for non-resident dentists to locate in the state, and both of these dynamics were held constant in this baseline estimate. Estimates of the dentist-to-population ratio are included as a point of reference, as a measure of supply, but are not intended as a measure of the proportion of dental needs being met in the state. [33]

To project the dentist workforce into future years, current and future dentists were divided into gender-specific groups, or "cohorts," according to the year of initial licensure by the Kansas Dental Board. The variation observed in the resulting projections stems largely from the current uneven distribution of dentists by age, which will lead to uneven retirement patterns in the coming decades. Workforce participation and hours of work effort for each cohort were then

projected year-by-year through 2045 subject to the cumulative effect of retirement and hours-by-age patterns in each year. For example, the cohorts of practicing dentists that were first licensed in the 1950s and who were still practicing in 2002 entered at an average age of 26.5 and were already in their 70s in 2003 (the first projected year in the model). The model assumes that another 13–20 percent of the dentists from these cohorts will retire in 2003 and in each year thereafter. Over time, the model generates a pattern of retirements for these cohorts that looks like the right tail of the curve displayed in Figure 6 (retirements from these cohorts in the left tail and middle of Figure 6 are not observable because those retirements occurred before the model begins, and before the information in the licensure data was collected). The model also assumes that male and female dentists in this age group (70+ years of age) work about 26 hours per week, if they practice at all.

The total work effort of Kansas dentists in any given year is obtained by adding the hours worked in that year by male and female dentists in each cohort. FTEs are obtained by dividing average number of hours worked per week by 40. FTEs per 100,000 persons, a common measure of supply, are obtained by dividing the total FTEs practicing in any given year by the population estimate for the state for that year, and multiplying that ratio by 100,000.

Key elements of the model include:

- The number of new dentists entering practice each year.
- The number of hours worked by each age group.
- The gender of entering dentists (past, present, and future).
- Retirement patterns for dentists.
- Estimates of the Kansas population.

The specific assumptions in each area are described in below.

NUMBER OF NEW DENTISTS

To establish the baseline projection of the supply of dentists in the state, we assumed that the number of new licensees during the 2003-2045 period would remain constant and equal to the average numbers observed (for each gender) during the 1993-2002 period. However, the recent

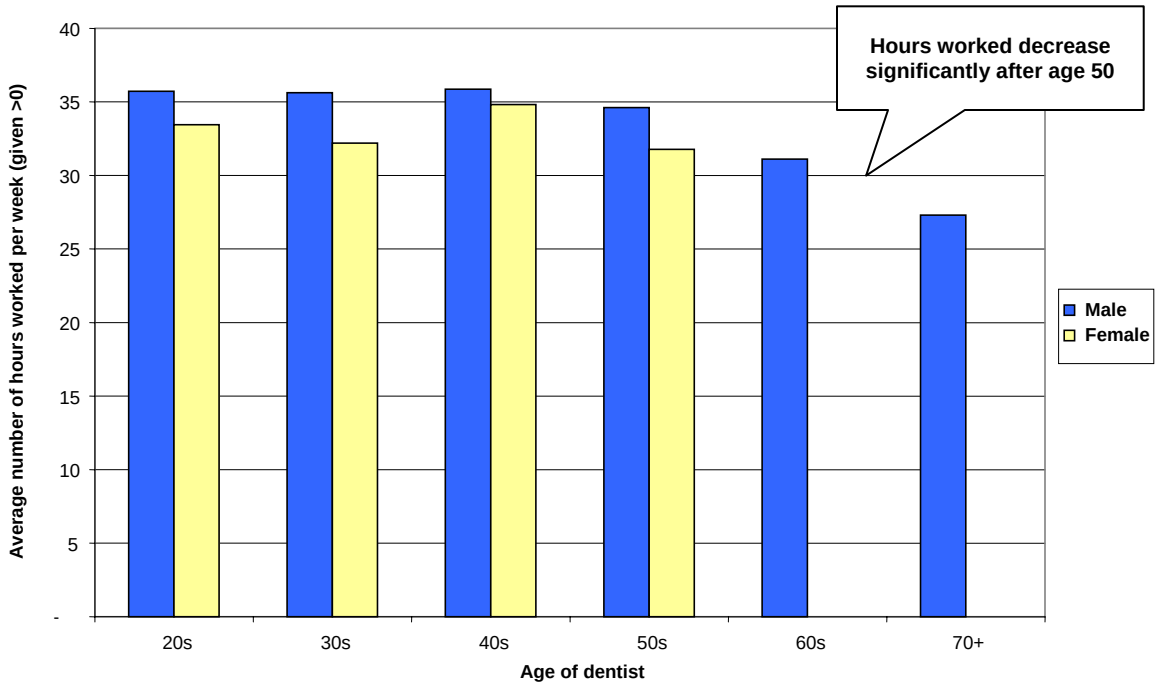
increase in the number of Kansas residents accepted into the UMKC dental school from 16 to 20 per year was incorporated into the model without any reductions for attrition or loss to relocation of Kansas residents into out-of-state practices (the first of these licensees will enter in 2006). UMKC administrators and ADA records indicate that the vast majority of Kansas residents attending UMKC do return to practice in Kansas. Factoring in the 12 additional dentists licensed each year with degrees from other institutions, we assumed that Kansas would license a total of 24 new male dentists and 8 new female dentists each year.

The baseline assumption that the number of new dentists entering practice each year will not change may or may not be a reasonable interpretation of market activity in the absence of changes in Kansas dental supply or health policies. The baseline model projects an overall decrease in the total number of practicing dentists (and FTEs) beginning in about 2015. Since most dentists own their own practice (in whole or in partnership with other dentists), this decline could make it more difficult for some retiring dentists to sell their practices, depending in part on where those retiring dentists are located, the current structure of their practice, and the placement patterns of dentists who enter practice between now then. It is possible that dwindling demand for dental practices from home-grown dentists would lower the sale price of dental practices and make Kansas a more attractive destination for new dentists from other states to set up their practices. However, given that Kansas' age distribution mirrors the nation's, with similar implications for the coming retirement of baby boom dentists, there does not seem to be a compelling reason to predict that the Kansas market will become relatively more attractive to out-of-state dentists.

HOURS WORKED

The number of hours worked by practicing dentists is based on the observed distribution of hours-worked-by-age for men and women up through age 60, as reported by dentists to the Kansas Dental Board. Thereafter, hours-by-age observed for men are also applied to women. Because no women were licensed to practice dentistry until the mid 1970s, only one female dentist in the state has reached age 60. For purposes of computing the number of dentist FTEs in the state, a full-time work week is set at 40 hours. See Figure 4 for the observed distribution of average hours worked by age for men and women in Kansas in 2002.

Figure 4. **Average Number of Hours Worked per Week (By Gender and Age): 2002**

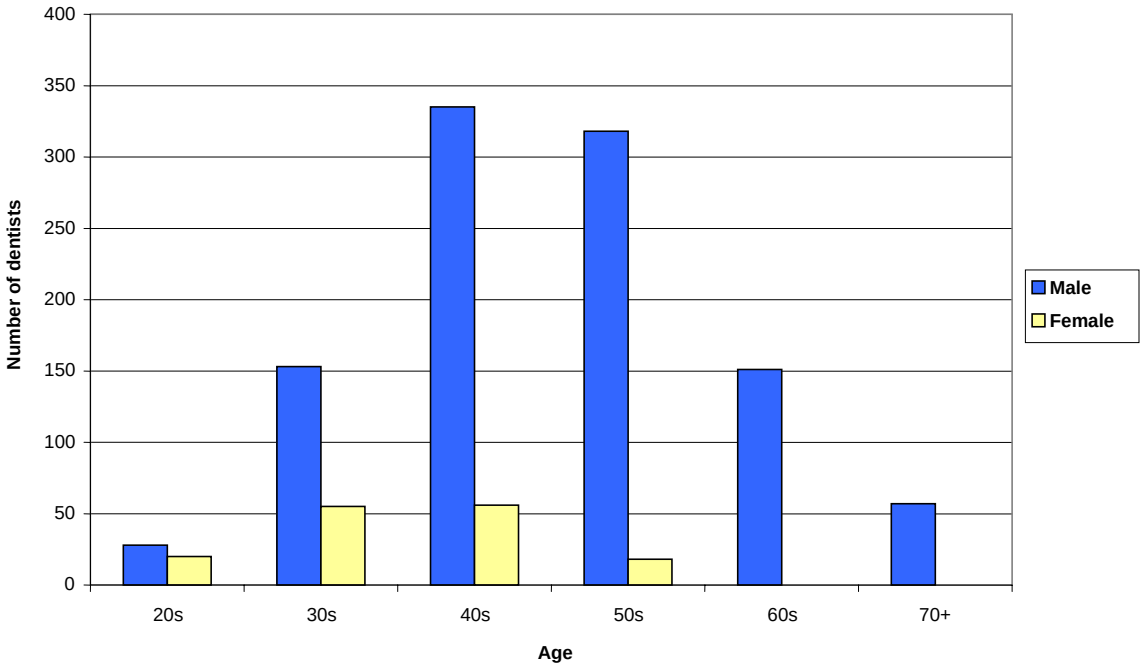


Source: Kansas Dental Board licensure records

GENDER COMPOSITION

The gender composition of practicing dentists is important because male dentists tend to work more hours than female dentists, especially during the child-bearing ages (20s and 30s). The gender composition of entering cohorts of new dentists through 2002 were observed in the licensure data and incorporated directly into the model. The projected gender composition of entering cohorts of new dentists was set equal to the proportion observed since 1990 (and since 1995), about 25 percent female and 75 percent male. Nationally, this trend may be changing towards a more balanced workforce, with a higher percentage of women. To the extent that this projection underestimates the proportion of the workforce comprised of females, the total projected work output will be overestimated (since females work fewer hours), and this represents another way in which the model is conservative in that it does not overstate the anticipated decline in the workforce. Another difference in the licensure data is that females are entering the profession, on average, younger than their male counterparts, a difference that emerged in the 1990s and seems to have increased in the 2000–2002 period. Among practicing dentists in 2002 and licensed in the 2000–2002 period, the average age of licensure for female was 28.7 years, almost four years younger than the male average of 32.5 years.

Figure 5. **Age Distribution of Dentists Practicing in Kansas in December 2002**



Source: Kansas Dental Board licensure records

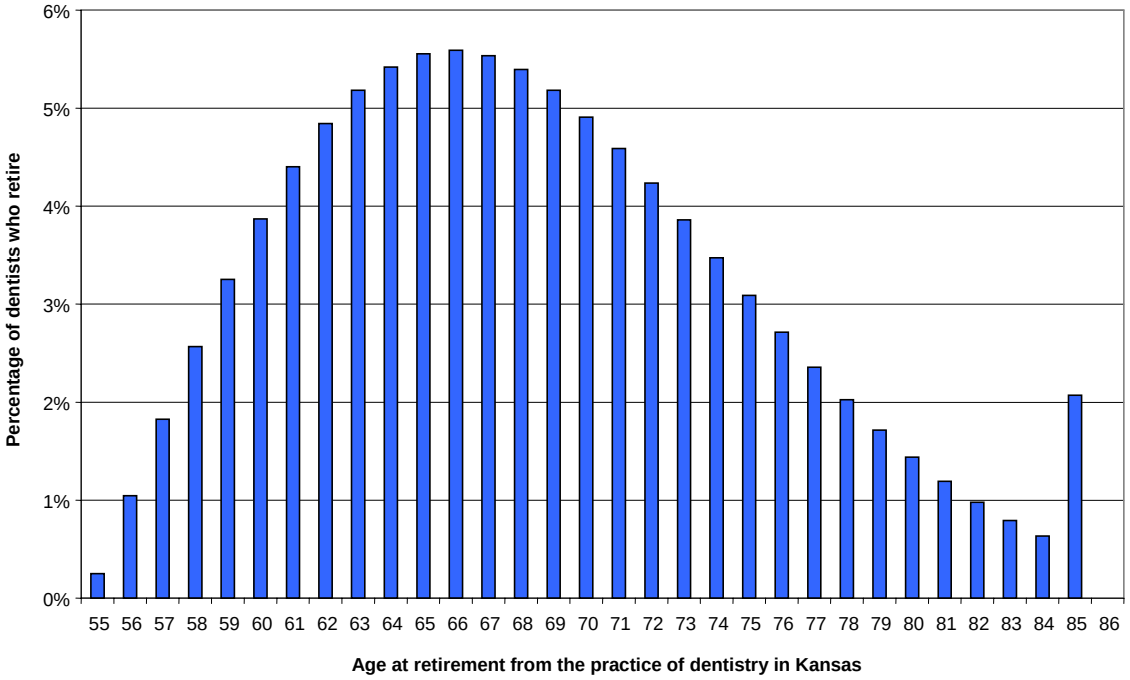
RETIREMENT

Dental workforce projections are very sensitive to assumptions about the retirement behavior of practicing dentists.[34] The cross-sectional age distribution of dentists practicing in 2002 is not representative of a long-run equilibrium age distribution due to large fluctuations in the number of incoming dentists over the last four decades. Many fewer dentists are entering practice today than entered during the 1970s and 1980s, yielding what amounts to a baby boom-era bulge which is now about halfway to two-thirds of the way through a dental career. As a result, the current age distribution should not be used in any direct way to develop fitted estimates of age at retirement.

The licensure database used as the basis for this analysis does not include historical data, but instead includes only the most current information. This implies that we cannot follow dentists over time to observe exit and retirement patterns. Since we can neither observe nor infer retirement patterns from Kansas data, we searched for other sources of information on this topic. One potential source consists of a survey of dentists' retirement expectations administered by the

American Dental Association. However, these expectations were judged to be of limited value in informing actual/eventual behavior, partly because these expectations have not been validated against actual retirement patterns, and because of the possibility that dentists may not be able to predict retirement-related factors that are beyond their direct control, such as the presence of an attractive market for the purchase of a dental practice.

Figure 6. **Projected Retirement Age of Dentists in Kansas: 2003–2045**



Source: Author's assumptions

At least two sources of opinion on the retirement plans of dentists were identified. An article in the *Journal of the American Dental Association* advising dentists on the eventual sale of their practice assumed that "85 percent of dentists retire when they are between 55 and 65 years of age and that the average age of retirement is 62 years."[35] These assumptions cannot be reconciled to the observed age distribution of dentists in Kansas and were not used in this workforce projection. Another source of conjecture about the future retirement pattern of dentists can be found in the assumptions underlying the ADA's annual Dental Workforce Projections, which include tables summarizing the future age distribution of dentists.[36] These age distributions can be compared over time to derive crude estimates of the career patterns of successive cohorts of new dentists. The ADA workforce model assumes that dental careers will lengthen significantly

over time, helping to sustain the overall supply of dentists at something close to the current dentist-to-population ratio. For example, the ADA retirement assumptions imply that the proportion of the dentist workforce at or above the age of 65 will double in just the next 15 years. These assumptions were judged to be too speculative to serve as a point of reference for policymakers and were not used in this analysis.

Instead, the retirement assumptions used in the model are designed to meet the following criteria:

- They are meant to be conservative in that they may lead to an overestimate in the supply of dentists in the state over time. The presumed average retirement age is much higher than 62, and even exceeds the standard Social Security retirement age (which rises to 67 and averages 66.5 over the timeframe of the projections). These relatively optimistic assumptions yield no career attrition through age 54 and smoothly rising retirement rates through age 84, at which point all remaining workers retire, and imply an average age of retirement of 68.3. This compares closely with published estimates of the average age of retirement of male physicians in the U.S.; 67.4 years and falling as of 1995.[37] This assumption is applied to all dentists in the model, including those already practicing at the time of data collection in 2002.

- Retirements are assumed to be spread out over the 55-85 year age span to reflect market realities of matching retiring practice owners with replacement purchasers; i.e., without abrupt spikes at age 60 or 65. Underlying this assumption is the expectation that any potential spike in the supply of dental practices for sale (by retiring dentists) will adjust to the more evenly spaced demand for these practices (from younger dentists). As more and more retiring dentists compete for a limited supply of new dentists, the sale price of practices could trend downward, prompting some dentists to remain in practice longer. More specifically, retiring dentists will attempt to time the sale of their practice to maximize the proceeds that will help finance their retirement, and this may result in sales that are more evenly dispersed than the ages of the retiring dentists might otherwise suggest.

- The model assumes that there will be no difference in the retirement patterns of male and female dentists. This assumption cannot be confirmed: female dentists did not begin to practice in Kansas until the 1970s and have not yet reached deeply into the retirement age distribution, so their retirement patterns cannot be compared to those of male dentists. In the U.S. population as a whole, female workers retire at nearly the same age as men: median of 61.2 years for females v. 61.7 years for males.[38]

See Figure 6 for the assumed distribution of retirement by year of age for each cohort of dentists included in the workforce projection.

PROJECTIONS OF THE KANSAS POPULATION

Population projections used as the denominator in computing the dentist-to-population ratio are from the U.S. Bureau of the Census through 2025, with an extension of those trends in growth rates through 2045 [see Figure 3]. Census estimates are observed to grow at .56 percent per year in the period 2016-2025, and this rate of growth is observed to decline at a linear rate of about 10 percent (not percentage points) per decade. Growth rates by decade are thus:

- Census Bureau estimates:[39]
  - 2002-2005: .69 percent increase per year, rising to 2.76 million in 2005.
  - 2006-2015: .63 percent increase per year, rising to 2.94 million in 2015.
  - 2016-2025: .56 percent increase per year, rising to 3.11 million in 2025.

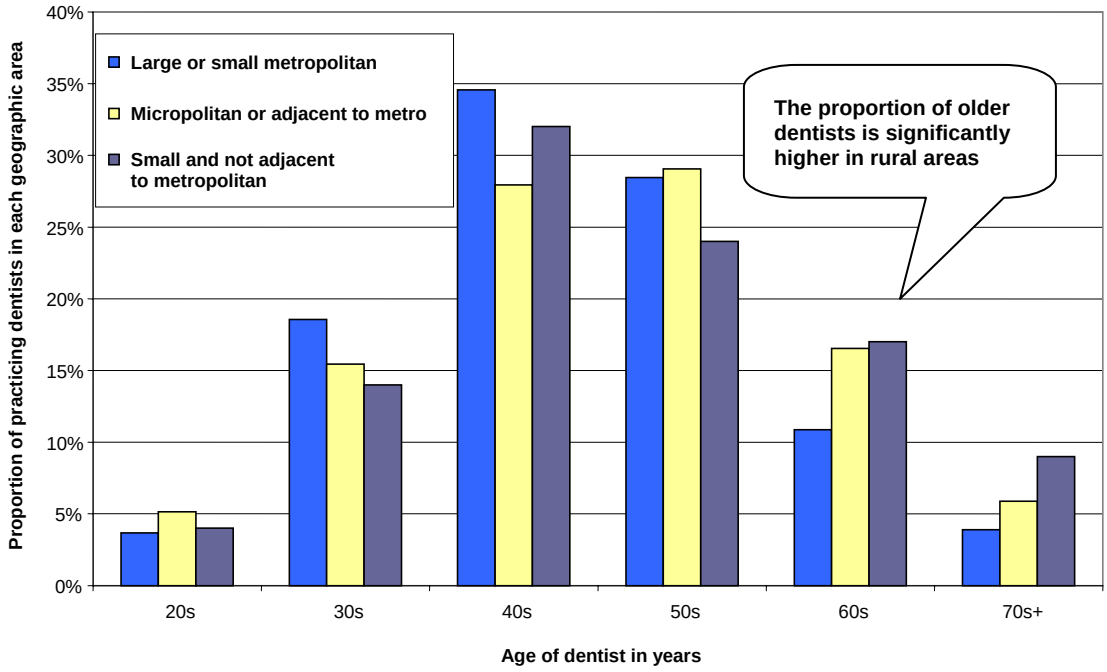
- Extended projections:
  - 2026-2035: .51 percent increase per year, rising to 3.27 million in 2035.
  - 2036-2045: .46 percent increase per year, rising to 3.42 million in 2045.

POTENTIAL LIMITATIONS

This model is based on a series of assumptions that may or may not come to pass. Because the goal of this report is to inform policymakers wishing to address the remaining dental needs in the state, this model of the dental workforce was intentionally based on somewhat optimistic

assumptions in order to minimize the possibility that any policy inferences would lead to unnecessary expansions of the dental workforce, which could have a deleterious impact on the attractiveness of the profession and the quality of applicants to dental schools. Thus, if anything, the model is most likely to overstate the future supply of dentists in the state.

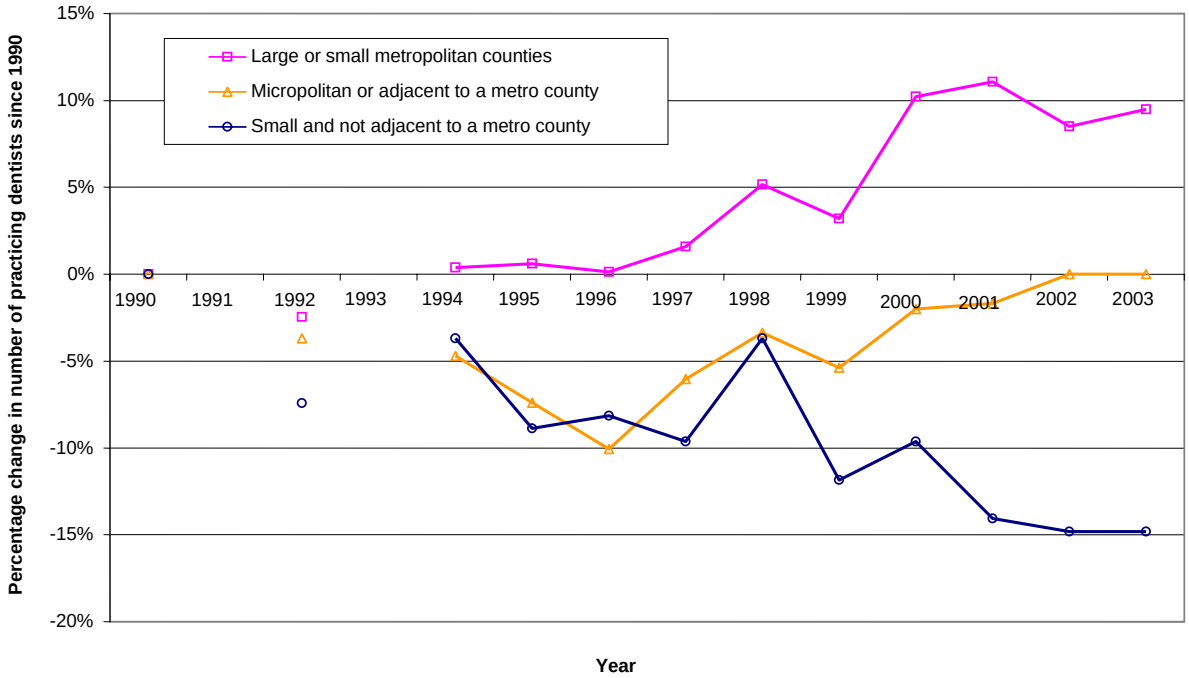
Figure 7. **Age Distribution of Dentists: Urban v. Rural**



This Projection Does Not Separately Model Supply in Urban and Rural Areas

The evidence presented in Section II above demonstrates that rural populations experience access deficiencies even after taking into account socioeconomic differences between rural and urban populations. Could these deficiencies be due in whole or in part to supply factors such as the number of dentists and the ratio of dentists to the size of the population? Is there any reason to conclude that the situation is getting worse, and that access to dental services in rural areas will fall further behind levels of access in urban areas? To begin to address these questions, we analyzed the state's dental licensure database, which includes practice and licensing information on all dentists in the state. We found that the age distribution of dentists in urban and rural areas might raise modest concerns that access problems could worsen in rural areas if rural dentists retire in greater numbers (see Figure 7). Rural dentists are slightly older: dentists in the most

Figure 8. **Change in the Number of Licensed Dentists Across Kansas Since 1990, by 2003 Urban/Rural Designation**



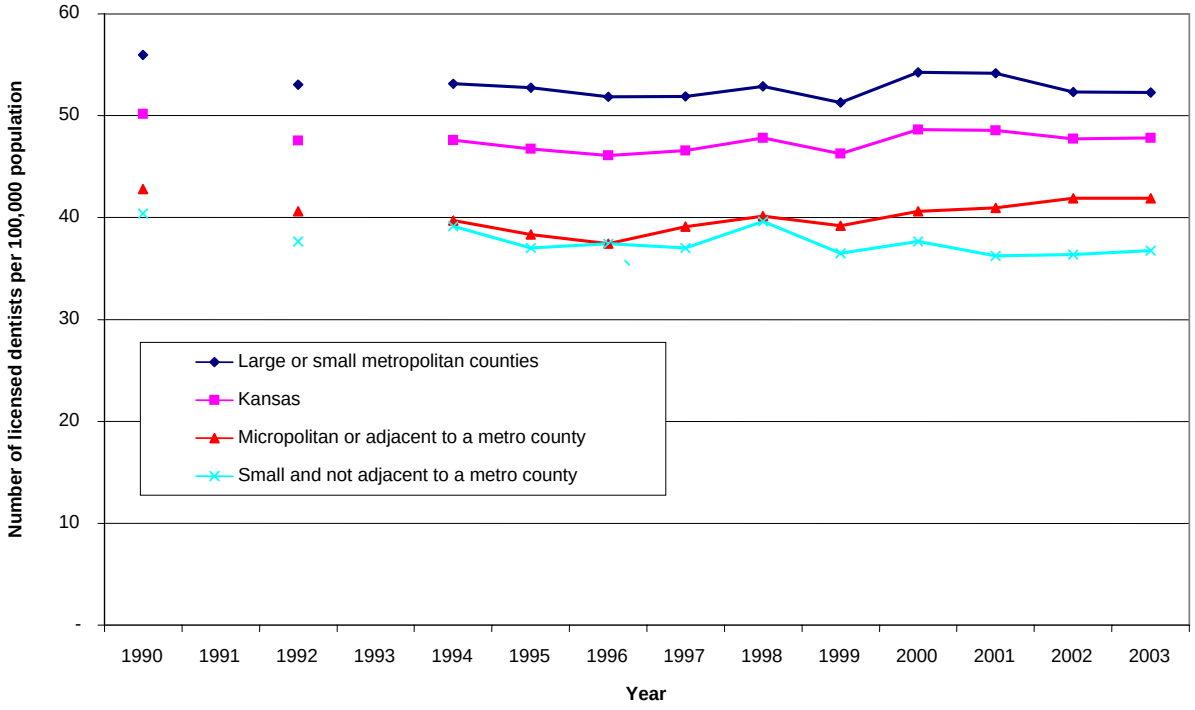
Source: University of Kansas Policy Research Institute tabulations of Kansas Dental Board licensure data, 1990-2003

rural counties are 51.0 years old, on average, compared to 49.9 years for intermediate counties and 48.2 years for the most urban counties. Nevertheless, average age is an indirect measure of workforce trends. More direct measures would include the actual location of dentists, their relationship with the population, and the location decisions of new dentists.

Historical counts of licensed dentists by county obtained from the Policy Research Institute at the University of Kansas indicate that the number of dentists has grown significantly in urban areas within Kansas over the last 13 years, while the number of dentists located in the most rural areas of the state has decreased significantly (see Figure 8).[40] However, the Kansas population is growing in more urban areas and shrinking in the most rural areas. These changes in the distribution of dentists and population have essentially offset themselves over the 1990–2003 period, generating dentist-to-population ratios that were stable in both urban and rural areas over the longer run (See Figure 9). Indeed, the most striking aspect of dentist-to-population ratios across the state is not the rate or manner in which they are changing, but the sustained disparity in these ratios in urban and rural areas. The (licensed) dentist-to-population ratio in the most

rural counties of the state is below 40 (per 100,000 population) while the ratio in metropolitan counties is above 50. These differences have changed little over the last 13 years, which may suggest an entrenched disparity in the financial viability of the traditional dental practice model in rural areas.

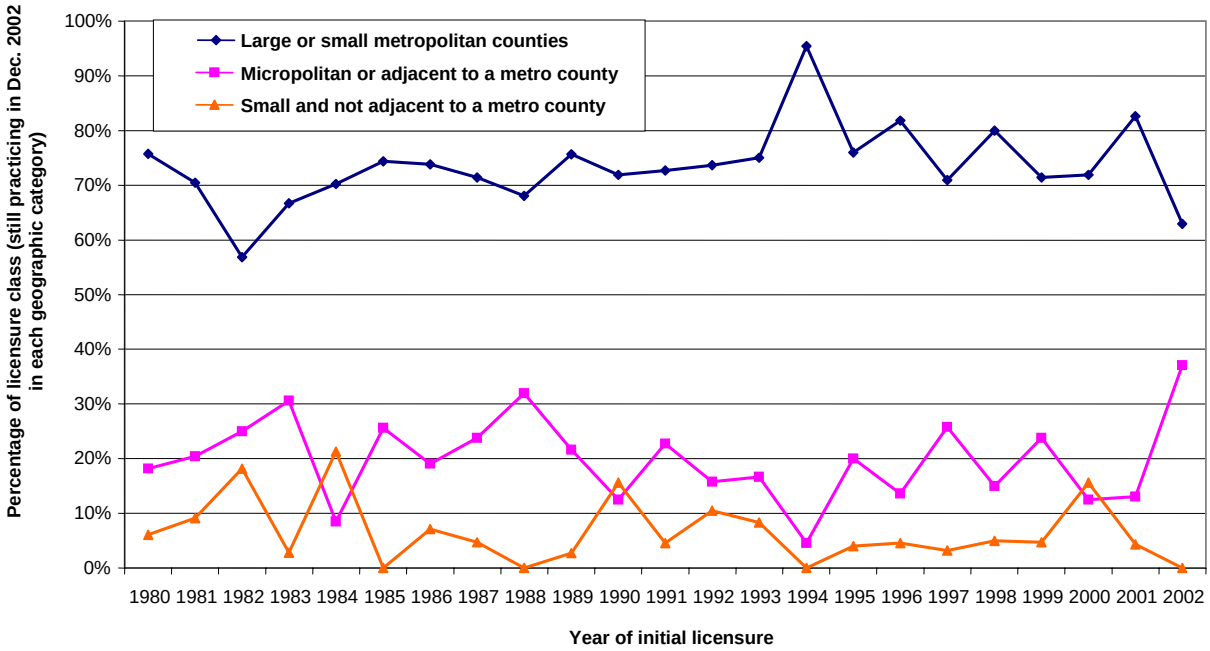
Figure 9. **Dentist-to-Population Ratios Across Kansas: 1990–2003**



Source: Author's tabulation of licensure data obtained from the University of Kansas Policy Research Institute.

As a final indicator of potential trends in the distribution of dentists across the state, we examined the location decision of newly-licensed dentists. If, for example, the newest dentists were practicing in disproportionate numbers in more urban areas, supply ratios could change significantly in the long run. Figure 10 tracks the practice locations of dentists from the 2002 licensure database according to the year of their initial licensure. There appears to be no long run trend in the percentage of each successive cohort of newly-licensed dentists that locate in metropolitan v. rural areas. This analysis examines the practice location in December 2002 and could be subject to confounding trends if relocations within the state are common. Nevertheless, the evidence seems to suggest stability in the practice location decisions of new dentists.

Figure 10. **Distribution of New Dentists Across Kansas Since 1980***



**By date of first licensure; for dentists still licensed and practicing in Kansas in December 2002.*

Taking into account minor differences in age, stable dentist-to-population ratios, and apparently stable initial practice location decisions by new dentists, it appears that the supply of dentists in rural areas of the state is chronically lower than in urban areas, but that this disparity is not growing. This result provides some justification for the statewide approach taken in the workforce modeling exercise above. The persistence of rural disparities in the dental workforce also suggests that it may be quite difficult to overcome whatever entrenched market characteristics have led to dentists' location decisions. Potential policy solutions for the statewide access gap and the rural workforce gap are discussed in greater length in Section VI below.

This Workforce Model Focuses Solely on the Supply of Dentists

We present in this section a model of the supply of dentists, not a model of the supply of dental services. This model assumes that the current business model and technology of dentistry will not change in ways that alter productivity,[41] the balance between human and technologic

contributions to the production of dental services (i.e., the capital-to-labor ratio), nor the balance between various components of the dental workforce (e.g., dentists, dental hygienists, dental assistants, and so-called "mid-level" practitioners, should they be licensed to practice in this state). These assumptions do not constitute any kind of prediction, but instead serve to provide in this model an indication of what may happen to the supply of dental services should the practice and policies of dentistry in this state remain static in the long run.

Whether the business of dentistry will change significantly depends upon the future path of both state dental workforce policy and market-place dynamics. Indeed, policymakers may deliberately choose to address this or another of the model's key assumptions precisely so that the implications of this model's predictions (i.e., diminished access to dental services for vulnerable populations) do not come to pass. Two current examples of how policies and market-place dynamics can work together include the potential modification of state dental practice laws to better facilitate the practice of mobile dentistry, and the expanded use of new technologies such as the DIAGNOdent© portable cavity detector, which provides numeric readings indicating the level of decay.

The state dental board is currently studying the issue of mobile dentistry, having approved the operation of just one such service. Practice laws do not prohibit, but also do not explicitly regulate the practice. Some contend that mobile dentistry is prone to abusive or predatory marketing practices, especially for elderly residents in nursing homes, one of the two main targets for mobile practices. Whether or not that is true, mobile dentistry is intuitively appealing as a means of providing low-cost services for Kansas' two key underserved populations: poor children, who can be reached in large numbers in a school setting, and rural populations (although there are no examples in Kansas of a mobile practice that is targeted to a general, non-residential, rural population). Nevertheless, mobile dentistry is just one potential variant on the one-dentist, one-practice standard that current state dental practice laws encourage and/or protect.

The DIAGNOdent© device illustrates both the promise and limitations of technologic solutions to the access problems in the state. At its best, this relatively low-cost device

essentially mechanizes the diagnostic process for cavities. The Kansas Dental Board recently approved the use of DIAGNOdent© technology by hygienists for this purpose. Hygienists, however, cannot fill cavities, raising questions about where children and others who have been screened by a hygienist and found to have a cavity will be able to get that cavity filled. Nevertheless, the emergence of this new device helps to illustrate the potential for technologic advances to change the practice of dentistry in ways that might affect the relevance of the baseline projections to state dental policies.

SUMMARY OF WORKFORCE PROJECTIONS

This baseline model of the dental workforce predicts that, without significant changes in technology and state workforce policy, and without a significant improvement in the attractiveness of the Kansas market to out-of-state dentists, the number of practicing dentists in the state is predicted to remain relatively stable over the next 30-40 years (the approximate working life of a dentist). Factoring in Census Bureau projections of a steadily increasing population, the dentist-to-population ratio – a more direct measure of supply than the raw count of dentists – is expected to decline steadily and significantly over the long run. These trends are expected to be felt in both urban and rural areas of the state, although rural areas begin with a substantial deficit in terms of the ratio of dentists to the total population.

The projected decline in the aggregate supply of dentists in Kansas and the unequal distribution of dentists across the state raise important questions about the relationship between the supply of dentists and the presence of unmet dental needs in the state. The next section provides an extended analysis of the market for dental services in Kansas in order to better understand the relationship between observed (and projected) dental workforce characteristics and the oral health needs identified in this report.

SECTION V. AN ECONOMIC ANALYSIS OF DENTAL MARKETS IN KANSAS

LONG RUN TRENDS IN DENTAL MARKETS

We have noted already several ways in which the market for dental services in the U.S. has changed over the last three decades. The percentage of individuals receiving care has been relatively stable, while utilization has declined. The nature of dental services has changed as well. The number of cavities has fallen and, along with that, the number of fillings, but use of preventive care has increased. Sources of financing have also changed. About half of financing for dental services is out-of-pocket, which is several times higher than for hospital or physician services, but the percentage of dental services paid for out-of-pocket has declined substantially since 1970, as private insurance payments have increased.[42] All else equal, a decline in out-of-pocket payments due to increased insurance coverage would be expected to increase consumer demand for dental services. Rising cultural standards for oral health have also bolstered consumer demand for preventive and cosmetic services.

Increasing demand for dental services—especially restorative services—has been mitigated by the overall increase in oral health due to widespread fluoridation of treated water supplies. Whether demand has on net increased (due to increased insurance coverage and rising cultural standards for oral health) or decreased (due to fluoridation and improved oral health) is unclear. Yet an assessment of these long-term market trends is likely to have a profound impact on the perceived need for changes in dental workforce policies. In the late 1970s and early 1980s, projections of declining demand helped lead to reduced federal funding for dental education and a significant contraction in the number of available slots in dental schools around the country. The looming decline in the dentist-to-population ratio is a direct result of this educational contraction. This section takes key indications of market trends, such as prices, utilization, dental profits, and changes in the nature of services provided, and applies this information to several potential interpretations of long-run dynamics in the market for dental services, each of which have distinct implications for dental workforce policies.

Key Indications of Market Trends

Perhaps the most basic indicators of a market are the prices charged and the quantities purchased for the goods or services offered. What has happened to prices and utilization in U.S. dental markets? Real dental prices in the U.S. have increased at a rate of 5.6 percent per year since 1982, and have more than tripled in that period, while general inflation has risen at less than half that rate. Examination of detailed pricing information from the ADA indicates that these price increases have been relatively widespread, covering preventive, restorative, and cosmetic services.[43] The profitability of the profession has also increased: dentists' incomes have risen in near lock-step with prices. Over the last 20 years (1982-2002), dental incomes have risen 5.5 percent per year on average, from an average of $59,500 to $173,000 per year. Dentists now rival primary care physicians in annual income.

While prices and profits have increased, per-capita utilization has declined. Taken together, these changes cannot be explained by changes in demand alone. Increases in demand would tend to increase both prices and utilization—as has occurred with medical care over the same time period—while decreases in demand would tend to reduce both prices and utilization. Similarly, the combination of increasing prices, increasing profits, and decreasing utilization is inconsistent with an increase in the supply of dental services, despite indications that aggregate supply has actually increased during this historical time frame: the number of dentists, the dentist-to-population ratio, and dental productivity have all increased.

The most likely explanations for observed market trends in prices entail some sort of supply constraint, potentially in conjunction with an increase in the exertion of market power by dentists. Determining the role of market power in the dental market hinges partly on whether there have been significant shifts in the nature of consumer demand. If consumer needs and preferences have not changed in the last twenty years, and given that we have ruled out the possibility that aggregate supply has contracted, the market analysis is rudimentary: no possible combination of shifts in supply and demand could, in a competitive market, result in the observed combination of price increases and quantity decreases. Hence, if consumer preferences have not changed substantially, then it would be reasonable to conclude that the market is less

than competitive, and that the price increases, in particular, are explained by an increasing use of market power by dentists. We consider this case first.

Market Power

Market power is an indication of weakness in the level of competition between suppliers of a product or service, and is typically the result of an under-supply of providers. When competition is weak, profit-maximizing suppliers will have an incentive to constrain supply and increase prices: there is no need for some specific conscious intent to distort the market. Market power is a pervasive characteristic of many sectors of the health care economy. The suggestion that dentists may be exerting market power due to their relatively small numbers is not a new idea. Indeed, the Federal Trade Commission investigated just this issue in the 1970s. Whether this market power is derived naturally, owing to the small number of applicants and entrants into a profession, or whether it is derived from regulatory control over the profession, limiting entry and proscribing the range of services that may be provided by allied dental professionals, the net result of market power (via limited supply) is a restriction on the number of consumers who can purchase a product and an elevation in that product's price, as consumers bid up the price for limited supply. Concerns about the concentration of power in the market for dental services are that this process could leave an ever larger group of potential consumers at the bottom of the demand curve, unwilling or unable to pay for dental services at a rising market price. Limited levels of competition are also likely to affect rural areas, where concentrations of paying customers are thinner and profit opportunities lower.

One likely source of market power for dentists is the licensure process, which exists mainly to control the quality of the workforce and the services they provide. Researchers studying a variety of professions, including dentistry, have demonstrated the impact that these kinds of controls can have on prices and professional income. For example, economists at the University of Minnesota used data on Air Force personnel from across the country to assess the impact of state licensure laws on both the quality and price of dental services, concluding that variation in dental licensure laws around the country had no measurable impact on the quality of services provided, but that more restrictive laws did significantly increase prices for dental services.[44] This finding does not call into question the need to regulate the dental profession in order to

ensure quality, but does reflect the marginal or even negative value of the incremental differences in state licensure laws that were observed at the time the study was done.

Shifts in Market Demand

Apart from, or in addition to, the exertion of market power it is also possible that the market has shifted towards more costly and thus less common procedures. As in other medical markets, the technological content of dental services has changed in ways that increase value, creating markets for new services and replacing markets for older and less effective services. Along with these changes in technology, societal standards and cultural expectations for oral health have changed, increasing the average consumer's willingness to pay for dental services that yield straighter, whiter teeth. At the same time, the population as a whole has enjoyed sustained improvements in oral health resulting from the introduction of fluoride into drinking water and from high levels of utilization of preventive dental services among children. There is evidence that cavities have declined significantly over time at the national level, and this evidence is matched by large declines in the number of fillings reported by dentists to the ADA.[45]

Increased demand for preventive and cosmetic treatments that occurs alongside a replacement of older restorative treatment with higher-quality alternatives could help explain the overall trends towards higher prices and lower per-capita utilization of dental services. Certainly, dentists have (on average) adapted to the changing nature of consumer demand, devoting larger percentages of their practice to preventive and cosmetic dentistry and smaller percentages to traditional restorative treatments. Looking at these different types of services as separate markets suggests the possibility that dentists may have responded to shifts in consumer demand by contracting the amount of services supplied to restorative markets and expanding the amount of services supplied to preventive and cosmetic markets. This would help to explain price increases and utilization decreases in service areas that have been contracted. Dentists' reallocation of supply to meet rising demand for preventive and cosmetic dentistry would also seem to be consistent with observed increases in prices and utilization in those markets. One concern raised by this explanation is that the supply shift has left some populations behind with less access to needed care. As demand for dental services has shifted and the practice of dentistry has adapted towards more profitable services, population sub-groups that have not benefited from the overall

rise in oral health and who continue to need more traditional restorative services are faced with a tightening level of supply. As the needs analysis above indicates, these populations are least likely to be able to afford care to begin with.

IMPLICATIONS FOR ACCESS TO DENTAL SERVICES

It is not clear whether demand shifts or market power are behind the long rise in dental prices, or whether they might both have had an impact on the market. The implications for policies intended to make dental markets more broadly accessible differ somewhat based on these competing interpretations. To counter market power, for example, the state might adopt a general policy of increasing the aggregate supply of dentists in order to generate more competition, lower prices, and greater access. If the baseline projections of declining supply presented in Section IV prove accurate, dentists' market power will increase, and broad supply strategies may become more appealing, whether or not market power best explains historical market trends.

Countering demand shifts may require policies that support new business models with different cost structures and profit-maximizing service mixes or other supply strategies targeted at underserved populations who have not benefited from improvements in oral health. Whether it is market power, market shifts, or both that are to blame for observed increases in prices and limited levels of supply, the impact on those who live in rural areas and those who are poor is the same. The limited supply of dental services in the state leaves many without access to needed services. Those Kansans with the lowest levels of dental care are also those who have the lowest level of supply (e.g., rural residents) and those who can least afford access. Those who have means and a nearby dentist have measurably higher levels of access to care. The problem lies with those whose willingness to pay for dental services is below the market price, not necessarily because they have no need for services—we know that some do have needs—but rather because they live too far away from a dental provider or they cannot afford the market price for these services.

Overall System Capacity

The discussion above illustrates how the "free hand" of the dental economy may tend to allocate services in an ethically undesirable fashion. An even more basic question is whether *any* method of allocating available resources could meet the demonstrated needs of the population. Does the current workforce—or will the workforce of the future—have the capacity to meet existing needs, whether services are distributed through a free market, a subsidized market (i.e., through public health insurance), or outside the market (i.e., through donations of care)? One of the policy options discussed below is to increase payment rates in Medicaid or otherwise provide a source of financing for the poor and uninsured. If more Kansans were insured for dental services, would the system's capacity rise to meet the needs of all willing customers? Could the system respond in that way apart from wider reforms in the supply or practice of dentistry? Several states have implemented Medicaid payment rate increases in an attempt to induce more providers to participate in the program (participation is voluntary). Could that approach work to satisfy dental needs in Kansas? The economic prediction is straightforward: if dentists operate purely on a profit motive—an overly simplistic and easily contestable assumption—then the quantity of services they supply to Medicaid recipients will only respond to price increases that rise above current market rates, a fiscally unlikely proposition.

Figure 11. Case Study: Raising Medicaid Rates Payment in Michigan

One of the most successful recent programs to increase rates of dental access in the Medicaid program is the Medicaid Healthy Kids Dental Program, which raised reimbursement rates approximately 250% (to between 83 and 111% of private rates) and saw significant improvements in the number of contracting dentists and the percentage of children receiving care. Since the program was inaugurated in 2000, the need for restorative dental services within the target population has decreased, as has the average distance traveled for dental visits. Total costs to the state are between $5 and 6 million

Inducing dentists to provide more services to the poor *without* relying to some extent on dentists' charitable inclinations or an increase in the number of practicing dentists seems a difficult proposition, although some states have had success increasing access for children by

raising rates up to competitive levels. Prospects for a market-based increase in access for the adult population seem much dimmer. If dentists have already demonstrated a preference to limit practice hours at current rates (to something less than 40 hours per week), and if many Kansans have already demonstrated an inability to pay current rates, let alone the higher rates that would be necessary to induce an increase in production, then there seems to be little prospect for a free market solution even if supplemented with heavy consumer subsidies. Looking at this in a different way, consider the minimum increase in the number of low-income adults receiving an annual dental visit that would be required to bring their rate of utilization up to the level observed in middle-income or even upper-income adults. This would entail an additional 78,000 to 225,000 additional Kansans visiting the dentist every year, which represents a 6 to 18 percent increase that varies depending on which standard of access is applied to the low-income population.[46] It would be difficult to argue that there is this much "slack" or unrealized capacity in the current system. Moreover, even if the aggregate supply of dentists were increased substantially, the market price for services would, as it does in nearly all markets, almost certainly exceed the amount that some Kansans would be able to pay for dental services. The likelihood that some will be priced out of the market for dental services even with significant expansion in the workforce implies that expansionary policies alone will not meet the dental needs that remain in the state.

Charity Care

As is the case in medicine, dentists provide a significant amount of uncompensated dental care. Dental charity care takes place in private offices, at clinics, and at organized charity events around the state. National studies suggest that as much as 5.4 percent of the total value of care provided in dentists offices is not compensated.[47] One of the specific ways that dentists have reached beyond their offices to provide free dental care is the periodic large-scale Kansas Mission of Mercy (KMOM) clinics, which are sponsored by the Kansas Dental Charitable Foundation. These one- to three-day clinics have been scheduled every 9-12 months in strategic locations around the state. The three KMOM clinics that have been held to date have provided a wide variety of dental services to over 6,000 individuals (or approximately 2,000 persons per event), and have raised awareness for dental needs around the state.[48] Nevertheless, KMOM clinics, at their current pace, can meet only a small fraction of the dental needs around the state.

According to 2002 BRFSS data, there are at least 145,000 adults in Kansas with an unmet dental need over the course of a year, which is at least 50 times more than could be served through KMOM events at their current pace.

The Role of Public Policy

The findings presented in this report suggest that the current dental workforce in Kansas is both insufficient in number and inappropriately distributed to meet the dental needs of the population, and that these deficiencies are likely to grow worse as population growth strains an already tight supply of dentists. The analysis has also suggested several ways in which public policy has an impact on the workforce. Dentistry is a subsidized and regulated market. Previous studies have adequately demonstrated the potential impact that policy reforms can have on supply. The ebb and flow of national educational policies in the dental profession have left a lasting impression and a sizable baby boom bulge of dentists flowing through the system.

Nevertheless, it is not clear *how much* control state policymakers might exert over the size, composition, and location of the dental workforce, especially at the state level. Although Kansas maintains a reciprocal agreement or compact with an out-of-state school of dentistry, more than a third of (new) dentists in Kansas are trained at some other out-of-state institution. Dentistry is, to some extent, a national market since dentists are free to train and move wherever they choose. That many choose to (train in and) return to practice in their home state provides a window of opportunity for state legislatures to impact the supply of dentists through educational programs, but this impact is clearly limited. While some may view the arguments in favor of new policy intervention to be strong, it may not be clear in advance which policies and programs might have the greatest impact on access to care.

Historical experience demonstrates how difficult it is to predict the need for, and the supply of, dental services. Forecasts of a population without cavities, prevalent just two decades ago, are now discarded. The most elaborate and refined workforce projections have been consistently and significantly wrong.[49] The long lead time that it takes to train dentists suggests that policymakers should keep a close watch on the number and distribution of dentists to monitor progress in meeting policy goals: deficits may take many years to correct. Conversely, policymakers should avoid over-corrections that could have a lasting impact: dental careers can last 30-40 years.

These difficulties suggest that policymakers need to remain engaged in an ongoing or regular review of policies, striking a balance among the competing objectives of access, quality, and cost of services.

The findings presented in this report suggest the value of tailoring policy solutions to the specific workforce needs of the state. Increasing the number of dentists locating in Kansas may help to alleviate some of the dental needs that we have documented in this report, and would certainly alleviate the forecast decline in the dentist-to-population ratio, but training more dentists may not be an effective way to increase access for the two pockets of deepest need: low-income and rural residents. Previous efforts to increase access to health services for underserved populations by increasing the overall supply of medical providers have had little effect.[50] Addressing Kansas' specific needs may require creativity, experimentation, and a potentially multi-dimensional approach. The range of options open to policymakers is generally well-known: researchers, advocates, professional associations, and other states have compiled many such lists, and these lists include options that have been tried as well as some that have not. We present a list of options in the next section that could serve as a starting point for policymakers should they decide to intervene in this market in order to increase access for underserved Kansans.

SECTION VI. POLICY OPTIONS AND POTENTIAL IMPLICATIONS

This report has documented the presence of significant unmet oral health care needs in the state of Kansas. The report has also documented longstanding access disparities between rural and non-rural residents of the state, and between lower- and upper-income populations. Analysis of the dental workforce reveals an entrenched disparity in the supply of dentists in rural and non-rural areas of the state, and strongly suggests that access problems in the state derive significantly, though not solely, from the limited and unevenly distributed supply of services available. These access problems may be exacerbated in the coming years if predictions of a growing population and stagnating supply of dentists hold true. Another key contributor to unmet dental care needs is the lack of resources that many Kansans have available to devote to dental health care: lack of disposable income and dental insurance contributes to disparities for both low-income and rural populations.

There have been a number of policy changes considered and/or implemented in the State of Kansas in recent years with a potential impact on the supply of dental services to underserved populations in the state. These changes have included modest expansions of the scope of preventive services that hygienists can provide, changes which, in theory, could free up dentists to focus on more intensive services and thereby increase the overall productivity of the workforce. In 1998, the legislature allowed dental hygienists to practice under general supervision (i.e., with specific direction) rather than under direct (i.e., in-person) supervision alone, and, in 2003, established a separate licensing (or "permit) process for hygienists to practice off-site in schools and other institutions. Chairside dental assistants were given authority to scale (i.e., scrape plaque) and polish above the gumline. The legislature has also considered legislation that would increase the number of out-of-state dental school slots available to Kansas students, and to fund a loan repayment program for dentists. These approaches are but a few of many options available to the state to increase the supply of services in the state.

Increasing the supply of services to underserved populations is likely to require more than an increase in the overall supply of dentists. In a recent summary of the dental workforce and access to care published in *Health Affairs,* the authors contend that new dentists are trained "within the current practice model," that is geared towards insured patients. "Practitioners operating in the

traditional delivery service model are able to sustain and increase income while working shorter hours, so they have little financial incentive to modify their practice" in order to serve Medicaid and low-income patients.[51] There are also few incentives within existing markets for new dentists to establish or purchase practices in underserved areas of the state. The state's most pressing oral health needs are located in what are financially the least attractive dental markets: low-income areas where reimbursement is least likely and missed appointments most likely; and rural areas, with a widely dispersed population that must devote more travel time to each dental visit, and has less discretionary income to apply to the rising population standard for oral health care.

These are thorny, difficult issues that seem to offer no quick and easy solutions. However, the promise of oral health in this state and in this country seems much brighter. In a recent white paper on access to dental care for the underserved, the American Dental Association gave a strong indication of the potential to meet oral health care needs in this country:

> "The day that we as a nation decide to provide oral health education to families of newborns, public health measures such as community water fluoridation, and regular dental visits to every American will mark the birth of the first generation that could grow up essentially free of dental disease.[52]"

This is essentially a recapitulation of the predictions of the late 1970s and early 1980s that dental disease was on the path towards extinction, but with three important preconditions added: education, fluoridation, and access to care. Our familiarity with the idea that eliminating dental disease is within the realm of possibility should not, however, lessen the impact of this characterization of our capabilities as a society. The opportunities that the state faces in oral health go far beyond those we face in the medical sciences, where the access and education preconditions are only the first in a long list of preconditions, and where the possibilities of success are far less certain.

The third of the preconditions listed by the ADA to eradicate dental disease—access to care—is the subject of this report, and the analysis above suggests that policymakers may first need to address this issue by defining an appropriate standard for access to care. Certainly, their selection of options to improve access will be driven by the (potentially implicit) standard of

access; i.e., the minimum level that they would like for the state's population to achieve. There is some indication that among the general population the standards of oral health are rising, which could result in something of a moving target for policymakers. This report makes no recommendation as to an appropriate standard of access to care, except to suggest that there are those in Kansas who would fall beneath virtually any reasonable standard. Selecting an appropriate standard of care to serve as a basis for public policy should itself be the result of a well-designed public policy process so that the resulting standard—even if it changes over time—motivates policy change. Indeed, the selection of an appropriate (minimum) standard of care for the population, and the identification of potentially costly policy solutions to help meet that standard, are in a very real way one and the same decision.

Another implication from the findings in this report is the diversity of need across the state. As policymakers begin to seek solutions for the identified needs among lists such as those proffered below, it may be useful to consider the likelihood that the solutions may need to be as diverse as the populations which are their targets. Access problems may be a matter of aggregate supply in some areas, a matter of participation in Medicaid in others, a matter of charitable care in others, and a matter of allied dental workforce opportunities in still others. Meeting the needs of some populations may entail a multi-pronged approach. The options presented below are, for the most part, scalable to the needs identified, and may be targeted with some creativity to specific populations.

1. INCREASE THE OVERALL NUMBER OF DENTISTS IN THE STATE

There are a number of ways that policymakers could attempt to increase the overall supply of dentists in the state above baseline levels, including: (1) building a dental school or financing an in-state training program in cooperation with an out-of-state institution, (2) expanding loan repayment incentives, or (3) creating educational subsidy programs in lieu of, or in addition to, those already in place through the reciprocal arrangement with UMKC's School of Dentistry. Nevertheless, previous research suggests that increasing the overall number of dentists in the state is an inefficient way of increasing access to care for the most needy populations. This report has demonstrated, for example, that even during periods when the supply of dentists was increasing in Kansas, disparities in potential access (i.e., number of available providers) and

realized access (i.e., utilization and need) for low-income and rural populations either grew or remained constant. Policymakers may, nonetheless, wish to pursue a broad strategy of increasing the number of dentists in the state in order to increase the level of price competition in the market or to avoid the predicted decline in the supply of dentists relative to the size of the population. The three supply-enhancing policy alternatives mentioned here are discussed in more detail below in the context of more targeted policy objectives.

2. INCREASE THE SUPPLY OF DENTISTS IN RURAL AND LOW-INCOME AREAS

Meeting this objective may prove difficult. Disparities in the dentist-to-population ratio in rural and non-rural areas are longstanding, and have been quite robust to the steady and substantial shifting of both population and wealth from rural to more urban areas of the state. Countering the market incentives that have led to these longstanding disparities will likely require a strategic infusion of subsidies and/or tailored recruitment efforts.

Federal Loan Repayment Programs

The Federal government operates a loan repayment program for young dentists who contract to work in an underserved area for at least two years. The current administration is in the process of increasing the number of available slots in this program by 300-400 percent, up to a total of 150-200 dentists per year. The program is run by the National Health Service Corps (NHSC), which is located in the U.S. Health Resources and Services Administration, and provides young dentists with up to $25,000 in tax-free loan repayments each year for the first two years of service in a Dental Health Profession Shortage Area (DHPSA). Loan repayment contracts can also be extended beyond the initial two-year commitment on a competitively-funded basis. Public or private entities in a DHPSA apply for the program, are scored according to need, and recruit a willing dentist, which could include a current or potential employee. With the rapid infusion of new funds into the program, these loans are not competitive at this point in time: all qualified applicants in last year's pool were awarded contracts. Applications from Kansas would appear to have an excellent chance of funding, at least in the short-term. About three-quarters of NHSC loan repayment dentists remain in a DHPSA for at least 6 months beyond the contractual requirement.

A smaller NHSC program begun in 2002 provides matching funds to States to operate their own loan repayment programs to improve and expand access to health care under the same general structure (absent the tax assistance). However, Kansas relies on local communities to provide the matching funds required to draw down Federal grant dollars. Local observers of this program believe that this local financing requirement is the key factor limiting the appeal of this program: to recruit a young dentist with this program, local communities would need to come up with as much as $17,500 per year, depending on the size of the dentist's outstanding loans. Just one Kansas dentist so far has received loan repayments through this Federal/state program. One small advantage of Federal/state matching program over the Federal loan repayment program is that the state could design its own scoring system for identifying the most needy DHPSAs.

State Loan Repayment Program

The state could take a similar approach in designing its own program without Federal assistance, or could supplement (or eliminate) the local financing requirement by providing state general funds. In either case, the state appears to have the flexibility to design the program to meet the specific needs of the state. They could choose to define shortage areas according to the measured prevalence and concentration of dental needs, rather than strictly on the basis of the dentist-to-population ratio. The state could also link loan repayment programs to placement of dentists in public health and low-income clinic facilities, although such placements may serve to diminish the value of the initial financial inducement provided through the educational subsidy.

Require Subsidized Students to Practice in Underserved Areas

The state could also earmark some number of dental slots at UMKC School of Dentistry to students who contract with the state to establish (or purchase) practices that serve rural or underserved populations (as a condition of taking part in the reciprocal in-state tuition program), or who agree to practice in these areas for a minimum specified period of time. Another option that the state could use to entice more dentists to locate in underserved areas is to offer tuition subsidies to Kansas students willing to go to out-of-state dental schools and then return to serve in an underserved area. This program could be used to either replace or compliment the reciprocal arrangement with UMKC with direct educational subsidies at other institutions. Implicit in this suggestion is the possibility that the state could add conditions of practice

location to the existing slots at UMKC: some other states have, to one extent or another, done something like this. The current reciprocal agreement with UMKC does not require Kansas students to return to practice in Kansas. Arkansas, another state without its own dental school who has a contractual arrangement with UMKC, requires their UMKC students to pay back a portion of the out-of-state tuition subsidy that they receive if they do not return to practice in Arkansas. Kansas could consider not only this kind of requirement, but could, in addition, reserve some number of its UMKC slots for students who contract to practice in underserved areas upon graduation.

Foreign-trained Dentists

Another approach to increase the supply of dentists in underserved areas is to develop programs to use foreign dentists in a temporary or provisional role. An innovative program in Maryland allows foreign-trained dentists who complete a U.S.-based pediatric dentistry residency full scope-of-practice opportunities in underserved settings such as federally qualified health centers. They remain under contract with the state for at least two years, or until they pass their U.S. board exams. Most of the handful of dentists that have graduated from the program have remained in Maryland. There is a small talent pool, and the program is somewhat costly ($40,000-$57,000 per year, per dentist). There have been about 13 participants since the program was initiated in 1999, and there are eight currently. In return for their service, participating dentists receive modest pay, a sponsored Visa, and if they pass their boards, they are able to apply for full state licensure at the end of their service. In Maryland, the target population is low-income Medicaid-eligible children, which explains the pediatric training requirement, but other states could tailor program requirements and target specialties to their specific needs.

Advanced Dental Students

Another approach would be to use native Kansas dental students to provide an appropriately-designated set of services in underserved areas as part of their training. Students from Kansas provide a larger and more easily recruited labor pool than foreign-trained dentists. The state might have to create the physical and administrative infrastructure to support advanced dental training in underserved areas. One proposal that has received some attention recently would be to create a dental training program in Wichita in affiliation with the UMKC School of Dentistry.

The idea would be to provide students from Kansas with either the final two (clinical) years of dental training or post-graduate Advanced Education in General Dentistry (AEGD) at a facility in Wichita, where students could serve an urban population in need and potentially organize satellite operations in more rural and western portions of the state. AEGD students are more advanced and versatile than the pre-doctoral clinical students, and would provide a bigger boost to access in the Wichita area. Other considerations include the impact of this kind of program on placement upon graduation, and the overall efficiency of a training program over alternatives such as educational subsidies.

3. UPDATE STATE PRACTICE LAWS

Enable Independent or Generally Supervised Practice by Dental Hygienists and/or Mid-level Practitioners

One of the key motivations for expanding the scope of services that hygienists can perform is the possibility that they might choose to provide services in low-income and rural areas. What this really implies is the possibility that hygienists could provide services at a profit in areas (or populations) where dentists have not chosen to locate, either independently or as an extension of existing dental practices. Relative to current practice laws, this means that hygienists or some other type of allied dental professional would need both expanded authority to provide the kinds of services that these populations most need, and that there be a viable business model to match trained personnel (hygienists) with those who most need services. To facilitate the emergence of such business models, policymakers may also want to consider providing hygienists with the opportunity to bill Medicaid and other payers independently. It is not clear whether this is a viable business model (e.g., with inclusion of medical liability insurance) given that mid-levels would not be performing some of the higher-profit services. Independent practice of hygienists hasn't really caught on in Colorado, where it has been authorized for more than 20 years, potentially because their scope of practice isn't wide enough to generate sufficient income to support a practice. Indeed, we were unable to find any evidence that creative uses of dental extenders or mid-levels have been able to mitigate access gaps in rural areas. Examples of states that have provided more independent practice opportunities to hygienists include[53]:

- Arizona provided authority in 2004 to hygienists with a written affiliated practice agreement with a dentist to perform and bill for a limited number of services provided to certain low-income children.
- Connecticut provided authority in 1999 to hygienists with two years experience to practice without supervision in certain institutional settings.
- Washington provided authority in 1984 to hygienists with two years experience to practice without supervision in hospitals, nursing homes, and other selected institutions.

Expand the Breadth of Services that Hygienists May Perform, or Create a Mid-level Practitioner

The specific services that such a mid-level practitioner would perform, in addition to those currently authorized for hygienists, might be concentrated on services designed to control pain and prevent further decay and disease; e.g., applying a temporary restoration to relieve discomfort (subject to appropriate guidelines), removing sutures (placed by dentists), and triaging and preliminary diagnostic services (i.e., screening and referral to a primary care dentist). The state might want to organize a consensus-building process to come up with a list of other services that they or some other type of mid-level practitioner might provide. Such a process would first need to arrive at a tractable set of decision criteria for selecting such services; e.g., that the services be reversible, that they enhance productivity, that they meet an existing need in the population, and/or that education levels be commensurate with the expanded role of the hygienist or practitioner. The division of labor in the dental workforce is a contentious issue for each of the professions involved, and has important implications for the quality of care provided to the public. An open and transparent process that facilitates both trust and consensus is imperative.

Create a New Oversight Structure to License and Oversee the Allied Dental Professions and to Advise the Legislature in this Area

Hygienists in some other states perform a variety of important services that they are currently prohibited from providing in Kansas, including providing temporary and permanent fillings, administering local anesthesia, and applying sealants. A team of researchers from Georgetown University studying the impact of state dental practice laws on access to preventive care for low-income children concluded that legal restrictions on the ability of hygienists to

provide preventive services (e.g., sealants) "operate as a barrier to the provision of preventive oral health services to low-income children by limiting the number of individuals who can provide such services." Secondly, they conclude that "it is difficult to make changes in the scope of practice of one class of professionals who are overseen by a different group of professionals." Options for reforming the oversight structure for hygienists include establishing a separate Dental Hygiene Board, creating a sub-Committee consisting of a majority of Hygienists that would make recommendations to the Board (with varying degrees of autonomy), or removing oversight of hygienists to some other appropriate public body or agency, such as the Department of Health and Environment. These types of reforms would create more of a focus on the allied dental professions, which may be a key component of tailored solutions that address the state's specific access deficiencies, e.g., rural and low-income populations. Some observers of the dental profession contend that the concentration of dentists on state dental boards serves to limit opportunities for hygienists and other allied dental professionals. A recent report published by the U.S. Health Resources and Services Administration concluded that:

> "The dental hygiene profession has progressed less quickly than most other health professions. This is largely due to the regulation of the profession by dentistry, a condition that is unusual in health regulation since most other professions are provided with autonomy in governing their constituents.[54]"

Some go so far as to correlate these regulatory limitations directly with the access problems faced by low-income population.[55] Since 1980 (and mostly in the 1990s) several other states have reformed the oversight structure for dental hygienists:

- Washington has created a fully independent Dental Hygiene Advisory Committee to regulate the profession.
- New Mexico and Iowa created dental hygienists advisory panels with the power to make near-binding recommendations to their dental boards.
- Florida, Maryland, Texas, Arizona, Missouri, and California have created hygienists advisory panels that report to the state's dental board.
- The Connecticut Department of Health directly regulates dental hygienists in that state.

4. IMPROVE DATA, MONITORING, AND REPORTING

This option entails creating the information flows and regulatory responsibility to routinely monitor the adequacy of the dental workforce. Existing mechanisms and policies related to the dental market could result in further shortages and/or surpluses given the infrequent and unplanned nature of oversight and policy review in this area. Policy options in this area would be designed to provide data for more frequent reviews of the dental workforce.

Assign Monitoring Responsibility

The state's Dental Practice Act does not charge the dental board with advising the legislature on matters of dental practice, nor are they charged with monitoring or reporting responsibilities. As a matter of practicality, the dental board periodically advises the legislature on specific oral health matters and often proposes legislation required to perform their functions. But they do not report on a regular basis on the general status of the dental profession, nor on access, and their engagement in legislative matters is selective. For example, they did not choose to comment on the most recent legislative initiative related to the dental workforce, 2003 House Bill 2161, which provided an avenue to expanded practice opportunities for hygienists outside of the dental office in schools and other institutions. One option for policymakers wishing to keep closer tabs on workforce and access trends is to place comprehensive dental workforce and access monitoring and reporting responsibilities before some public agency; i.e., the Kansas Dental Board (KDB), the new dental officer at the Kansas Department of Health and Environment, or the Office of the Governor.

Disseminate Information

A precondition for monitoring and reporting on the status of oral health in the state is to collect appropriate information. Policymakers could supplement existing data collection with important elements, such as:

a. The number of Kansans entering dental training, both at UMKC and at other institutions around the country.
b. The geographic origin of these Kansas students.
c. The location patterns of newly practicing dentists across the state (this data is already collected by the dental board through the licensing process).

d. Retirement patterns for dentists in Kansas. This information could be collected separately through the dental board, or could be inferred from a longitudinal licensure database (see suggestion below to enhance historical record-keeping at the board).
e. Levels of access to dental services, especially for underserved populations identified in this and similar reports. Potential sources include the BRFSS data used in this report, but could also include dedicated data collection efforts.
f. The racial and ethnicity composition of workforce. These characteristics are not currently included in the licensure process, and have not been systematically collected for the existing workforce. This constitutes a major deficiency in the licensure process, leaving policymakers without the ability to determine whether the dental workforce in Kansas reflects the racial and ethnic diversity of the population. The race and ethnicity of a dentist is an important predictor of the racial and ethnic composition of their patient base: fewer minority providers translates into fewer minority patients.[56]

Improve Data Collection

In addition to the new data elements described above, the Kansas Dental Board might be encouraged to maintain historical records at each re-licensure (every two years) to create a longitudinal record of workforce participation, relocation, and retirement—three key variables which will help determine the supply of dental services.

5. INCREASE THE AMOUNT OF CHARITY CARE PROVIDED BY PRIVATE DENTISTS

Increasing charity care could potentially be accomplished in the private office setting. One recent article in a dental journal called for dentists to devote at least 5 percent of their practice to charity care and Medicaid.[57] Another way to increase the amount of charity care would be for dentists to donate more time to public health clinics, schools, nursing homes, dental clinics, and other facilities and institutions. Another approach, which could be implemented alongside a general increase in the provision of charity care, would be to establish dental referral networks for more intense and specialty care. In this way, dentists could rely on a wider network of screening providers, including hygienists serving low-income populations under the authority of 2003 HB 2161, and potentially including medical doctors identifying dental needs in their patients. It is reasonable to ask what proportion of existing need might be met with some type of

charity care. We have demonstrated the small fraction of dental needs met by periodic, large-scale events such as the ongoing series of clinics sponsored by the Kansas Mission of Mercy. We have also shown that providing access to care to low-income populations at a level comparable to others would entail a double-digit increase in the percentage of the population with a dental visit (each year).

It may be difficult indeed for the dental workforce to increase charitable efforts to this extent, both because of the increased time commitment required and because of the direct financial loss that this level of effort would entail. Nevertheless, charitable events do serve to help isolate the greatest needs: presumably those in pain or with the greatest needs are most likely to avail themselves of free care. There may be ways to further design charitable care to identify those in greatest need and least able to pay. Ultimately, the state may find it necessary to subsidize this charitable care in order to limit the losses incurred by dentists and to encourage them to carry a larger charitable load. Indeed, the State Medicaid and SCHIP programs play exactly these two roles: identifying those that society has judged to have the greatest needs, and providing a level of subsidy for their care. [58]

6. INCREASE DENTISTS' PARTICIPATION IN STATE PUBLIC HEALTH INSURANCE PROGRAMS

The state has a long-standing program designed to ensure access to needed medical and oral health services on a comprehensive, statewide basis for selected populations. Nevertheless, as this and previous reports have documented, dentists' participation rates are relatively low, averaging about one-quarter of practicing dentists in the state. The legislature has dealt with this issue on a routine basis. Specific options for improving the participation of dentists in the state's public health insurance programs include:

Simplify Reimbursement

Dentists in the state have been disappointed with the efficiency and accuracy of the claims reimbursement process. While the current problems may be temporary in nature, initiated with a change in the payment process following the re-bidding of the claims processing function to a new vendor, previous payment arrangements and processes have raised similar ire. There may be

a natural limitation in the active management and oversight of the Medicaid dental program to the extent that it second-guesses dentists. A certain degree of administrative burden may be difficult to eliminate in such a large program of public reimbursement: an unmanaged program could lead to both fraud and misuse. Nevertheless, there may be ways in which administrative burdens can be reduced for participating dentists.

Increase Reimbursement

States make routine decisions about payment rates as they struggle to maintain a balance between fiscal constraints and their desire to secure access for beneficiaries. Increasing payment rates can generate increased program participation by private dentists. Studies have shown that payment increases are not effective unless they raise rates to at least 70-75 percent of private rates. The most effective reimbursement policies may be those which tie public payment levels to private payment rates directly in a statutory formula. Such a firm commitment, while potentially putting public spending under the control of market forces, is likely to send the strongest signals to providers who might otherwise be reluctant to initiate or expand Medicaid participation because they perceive that the payment increases will either be temporary or will stagnate over time. Sending a consistent signal to providers is especially important if providers believe that they must make procedural or personnel changes or other investments in their operations in order to accommodate a (larger) Medicaid patient load. Some dentists serving substantial numbers of Medicaid patients argue that there are economies of scale to the Medicaid portion of their business, partly because of the high rate of missed and cancelled appointment in this population. Some dentists who make a successful business treating this population have adopted tailored strategies for their Medicaid clientele such as overbooking, active appointment reminder programs, and limiting the number of appointments that clients can miss without being dropped.

Other Approaches

Other innovative approaches that states have either tried or considered include providing state income tax breaks to dentist that provide a requisite amount of services to low-income and/or Medicaid recipients; and providing some nominal level of reimbursement for missed appointments, although this option raises legitimate concerns of potential fraud.

7. EXPAND MEDICAID COVERAGE AND CONSIDER TRADE-OFFS BETWEEN THE SCOPE AND NUMBER OF DENTAL SERVICES PROVIDED

Expansion of Medicaid coverage to include those currently not served (e.g., low-income childless adults and fathers) could enhance access for these populations, especially if combined with strategies designed to increase the number of dentists who participate in the Medicaid program. In the face of tight fiscal constraints, one potential approach includes extending Medicaid or SCHIP dental coverage to these populations but keeping costs down by limiting benefits to some extent; e.g., requiring some cost-sharing or placing restrictions on certain dental procedures. Federal Medicaid rules dictate an all-or-nothing approach to the extension of dental services to a specific population: children receiving Medicaid dental services are entitled to any medically necessary care, an essentially unlimited package of services. In this context, expanding eligibility for such a broad range of dental benefits can seem to be a Phyrric victory, consisting of a smaller-than-desired expansion population receiving less-than-desired levels of access because the state cannot fully fund efforts to recruit providers into the comprehensive program. Limited benefit packages may not qualify for the joint federal/state Medicaid and SCHIP programs and may need to be financed by states alone. Nevertheless, the current federal administration has signaled a willingness to consider requests for waivers of federal benefit regulations for programs that expand eligibility. Though novel and uncertain, this might be one way to consider expansion of (some) dental benefits to the adult Medicaid population. Whether advocates, policymakers, and voters might agree to such trade-offs in light of what appears to be a *rising* overall standard of oral health in the population is unclear, but if these trade-offs yield predicted increases in the overall oral health of covered populations, they should merit at least passing consideration.

8. ADVOCATE FOR NATIONAL POLICIES THAT SUPPORT ACCESS TO DENTAL SERVICES

Local associations, coalitions, the Kansas Dental Board, the Governor's office, and the legislature (e.g., via resolutions) could voice support for association and congressional initiatives addressing Kansas' pressing needs, such as:

a. Lobby existing groups to establish new workforce models. The American Dental Association (ADA) at their national meeting in October 2004 voted to oppose the

establishment of a mid-level practitioner (in the form of an advanced dental hygiene practitioner), but referred three issues related to the development of a mid-level practitioner to a task force set to report back to the ADA next year.[59] State policymakers and advocates could press the ADA and American Dental Hygiene Association to work together to develop workforce solutions that meet the access needs of the state, which are shared by many other states.

b. Make a recommendation to Congress and the Administration to reintroduce educational subsidies to schools of dentistry in order to encourage (or require) an increase in the number of new dentists being trained.
c. Seek creation of a federal funding program for construction or expansion of dental schools, to include the extension of an out-of-state institution in Kansas.
d. Advocate for continued or even expanded funding for loan repayment programs run by the National Health Service Corps.

9. SUMMARY OF POLICY OPTIONS

The strategies identified above can be organized into two broad categories: strategies designed to increase or maintain the number of dentists, and reform strategies designed to better target the workforce at populations in greatest need. The supply strategies listed here all entail the use of public funds to provide incentives to dentists to locate in Kansas generally or in underserved areas of the state. Prospects for success hinge mainly upon public support for the requisite subsidies, and upon the ability of the state and local communities to recruit dentists to underserved areas. Prospects for successful workforce reforms are less straightforward. Certainly there are few, if any, proven and sustainable means of solving the kinds of access problems observed in this state. Workforce reform strategies entail minimal or negligible public spending and are instead focused on changes in training and regulatory requirements which might foster innovations that increase the output of the workforce, taking the supply of dentists as a given. Reforming the educational and regulatory structure of the dental professions in Kansas would be neither quick nor easy. The creation or expansion of allied dental professions, for example, could take years to become accepted and fully utilized within the market. There may also be a strong rationale for adopting market reforms at a measured and incremental pace in order to ensure: (1) that the public is protected from any harm that could result from

inexperience, malfeasance, or inappropriate training in a reformed professional workforce, and (2) that no significant damage is done to the quality of the workforce by reducing the attractiveness of its professions.

Despite the uncertain impact of workforce reforms on access to care, policymakers may judge that the remaining dental needs in the state, entrenched as they are in the fundamental demographics of the population, merit innovation and even experimentation. Some observers of the dental profession are strident in their conclusions about the balance between health risks and access:

> "the dental licensing laws intended to protect the health, safety, and welfare of low-income children fail to do so by restricting the provision of preventive oral health services." *Lea Nolan et al (2003)*

While it is conceivable that changes in the structure of the dental workforce could put some at risk of lower quality, or even harmful care, these risks can be mitigated by carefully selecting the path and pace of reform and by appropriately monitoring the impact on quality. But even these measured risks must be placed against the certain lack of access that some in the population will experience under the existing educational and regulatory regime, and which may become more severe if the supply of dentists declines in coming years.

SECTION VII. SUMMARY

This report has offered an accounting of oral health needs in the state of Kansas, identified gaps in access to the dental workforce that contribute to these needs, offered workforce projections that suggest these gaps may grow in the future, and presented a broad range of options for policymakers to address these needs. While advocates and providers alike have suggested a wide variety of potential solutions, and consensus may be difficult to obtain, there appears to be widespread agreement in at least one of the key findings from this report, which is that there are significant disparities in access to dental services within the population meriting the attention of policymakers:

> "…the degree of oral health disparities and the extent and severity of untreated dental disease—especially among underserved children—is unacceptable."
> *ADA White Paper on Access (October 2004)* [60]

Moving forward with an agenda to improve access to dental services may require difficult choices involving certain costs and/or risky outcomes. In some sense, these choices are unavoidable. The state is inextricably involved in the regulation and subsidization of the dental workforce, and existing policies have already had their impact. The analysis offered in this report of deficiencies in the Kansas dental workforce is to some extent an evaluation of the impact that current policies have had. Of course, state policymakers cannot fully control dental markets, nor human behavior, and thus cannot be held fully accountable for the outcomes we have documented. Policymakers will need to weigh the oral health needs of the population against both the costs of potential reforms and the uncertain impact that they will have. The findings in this report suggest the value that accrues to the state when policymakers acknowledge their limited yet important role in dental markets and engage regularly in an informed review of the policies which determine that role.

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APPENDIX I

Table A–1. **Dental Needs by Demographic Characteristics in Kansas**

	Most Recent Dental Visit Was More Than One Year Ago	Have Lost All Permanent Teeth	Had Any Unmet Dental Needs in the Past Year
Age			
18-24	26.5%*	0.0%*	9.9%*
25-34	29.5%*	0.4%*	9.4%*
35-44	23.4%*	1.5%*	9.3%*
45-54	27.0%*	4.4%*	8.3%*
55-64	24.2%*	10.0%*	5.2%*
65 and older	32.6%*	22.4%*	3.4%*
Gender			
Male	30.9%*	4.8%*	6.8%
Female	23.9%*	7.6%*	8.5%
Race and ethnicity			
White, non-Hispanic	26.6%	6.6%	7.1%
Black, non-Hispanic	27.4%	3.9%	12.9%
Hispanic	33.5%	4.4%	9.9%
Other	31.4%	3.8%	10.2%
Education			
Less than high school	46.6%*	20.3%*	13.8%*
High school graduate or GED	33.6%*	10.0%*	8.3%*
Some college or higher	22.1%*	3.0%*	6.8%*
Family Income			
Less than $20,000	49.6%*	16.6%*	17.8%*
$20,000 to < $25,000	34.6%*	9.6%*	9.8%*
$25,000 to < $35,000	31.9%*	7.6%*	10.5%*
$35,000 to < $50,000	23.7%*	4.0%*	6.2%*
$50,000 to < $75,000	19.1%*	1.4%*	4.0%*
$75,000 or more	14.4%*	0.5%*	3.1%*

Table A–1 (cont). **Dental Needs by Demographic Characteristics in Kansas**

	Most Recent Dental Visit Was More Than One Year Ago	Have Lost All Permanent Teeth	Had Any Unmet Dental Needs in the Past Year
Urban Status			
Metropolitan area	24.7%*	4.8%*	7.9%
Micropolitan or adjacent to metro	28.9%*	7.3%*	8.2%
Small and not adjacent to metro	34.2%*	10.3%*	5.4%
Overall health status			
Excellent/Very Good/Good	25.9%*	4.9%*	7.1%*
Fair/Poor	37.0%*	15.6%*	12.0%*
Health Insurance			
Covered	25.0%*	6.4%	6.0%*
Uninsured	45.9%*	4.8%	21.5%*

*Prevalance rates differ using a p=.01 level of significance.

Source: KHI analysis of BRFSS data.

ENDNOTES

[1] See Eklund, Pittman, and Smith (1997) for an analysis of utilization patterns for a large cohort of privately insured families over a 15-year period. See also "Oral Health in America: A Report of the Surgeon General," for a more comprehensive assessment and retrospective look at oral health conditions in the United States. See also Valachovic (2000).
[2] Author's analysis of National Health Account data, available from the Health Care Financing Administration at http://www.cms.hhs.gov/statistics/nhe/default.asp#download. See also Brown, Wall and Manski (2002) for a study of financing trends in dental services. See Manski, Macek and Moeller (2002) and Manski, Moeller and Edelstein (2001) for evidence of the impact of dental insurance on utilization and spending.
[3] Manski, Moeller and Maas (2001).
[4] Eklund, Pittman and Smith (1997).
[5] Data source: ADA, "The 1999 Survey of Dental Services Rendered." The four procedures are whitenings, bondings (e.g., resin fillings), implants and veneers.
[6] Controlling for age differences across states. Differences are statistically significant at the $p<.001$ level.
[7] Difference is statistically significant at the $p<.001$ level.
[8] Note, for example, the unmet dental needs revealed through widely publicized charitable events such as the Kansas Mission of Mercy free dental clinics that have been held in Garden City, Wyandotte County, and Pittsburgh, Kansas.
[9] 2003 Current Population Survey, U.S. Bureau of the Census, accessed online at http://www.census.gov/population/socdemo/education/cps2003/tab13.xls (education data) and http://www.census.gov/hhes/income/income03/statemhi.html (income data) on Oct. 19, 2004.
[10] Casey, Davidson and Moscovice working paper, University of Minnesota, 2004.
[11] See Casey et al. (2004).
[12] The dependent variables included (1) any dental visit in past 12 months; and (2) any preventive visit in past 12 months.
[13] Unmet needs were added to the BRFSS instrument for the Kansas sample only and are not available for comparison to the national sample.
[14] See overviews in "Oral Health in America: A report from the Surgeon General, 2002." For specific findings, see Manski, Moeller and Maas (1999a, 2001).
[15] General Accounting Office, "Oral Health: Dental Disease is a Chronic Problem Among Low-Income Populations." GAO/HEHS-00-72, April 2000.
[16] Davis et al. (1999).
[17] Calculated on an annualized member-month basis.
[18] The Office of Management and budget defines a *micropolitan* area as a non-metro county with an urban cluster of at least 10,000 persons. *Adjacent* counties are counties next to a metropolitan county. *Metropolitan* counties have an urban cluster of at least 250,000 persons.
[19] Pearson correlation coefficient = .38, significant at the $p=.0001$ level
[20] Davis et al. (1999).
[21] U.S. Department of Health and Human Services. "Oral Health in America: A Report of the Surgeon General." Rockville, MD; U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.
[22] Ibid, page 1.
[23] Dental, Oral, and Craniofacial Data Resource Center. "Oral Health U.S., 2002." Bethesda, Maryland: 2002.
[24] An acute dental condition is defined as a dental symptom or treatment visit.
[25] Petersen, Poul Erik, "The World Oral Health Report 2003: Continuous improvement of oral health in the 21st century—the approach of the WHO Global Oral Health Programme." WHO/NMH/NPH/ORH/03.2 2003.
[26] Kay, E. J., Ward, N., and Locker, D. "A general dental practice research network: impact of oral health in general dental practice patients." British Dental Journal 2003; 194(11): 621–625.
[27]Locker, D., and Grushka. M. "The impact of dental and facial pain," Journal of Dental Research 66:9 (September 1987), pp. 1417–1417.
[28] Nuttall, N. M., Steele, J. G., Pine, C. M., White, D., and Pitts, N. B. "The impact of oral health on people n the U.K. in 1998." British Dental Journal 2001; 190(3): 121–126.
[29] See K.S.A. 65-1456 (hygienists) and K.S.A. 65-1422 (dentists).
[30] Health Resources and Services Administration (2004). This ranking is based on practice laws as tabulated in 2001, and thus does not reflect the provisions included in House Bill 2161, which went into effect on July 1, 2003 and

allows hygienists to apply for permits to practice unsupervised, but under the direction of a dentist, in schools and other institutions with low-income populations.

[31] 2004 American Dental Association Dental Workforce Model: 2002–2025.

[32] See Capilouto, Capilouto and Ohsfeldt (1995).

[33] Dentist-to-population ratios are used in this report solely as a measure of the quantity of supply and are not intended as a measure of the *adequacy* of supply. Simple ratios do not capture the essential components of market activity and individual societal needs. Ratios are a measure of realized supply, but do not impart the flexibility of supply and its potential response to demand, i.e., ratios do not constitute a complete supply function (or curve). Other realizations of a market equilibrium such as prices, profits, and quantity are likely to be more indicative of the interaction between the supply and demand of dental services.

[34] It seems more palatable to couch this discussion in terms of dentists' retirement choices, but this discussion could be more accurately described in terms of labor force participation, which is a function of a wide variety of career choices as well as health constraints such as disability and mortality.

[35] Beazoglou, Tryfon, Bailit, H., and Brown, L. J. "Selling your practice at retirement: are there problems ahead?" *Journal of the American Dental Association* 131 (December 2000), pp. 1693–1698.

[36] See Table 2 in the *2004 Dental Workforce Projections.*

[37] Greene (2000).

[38] Employee Benefits Research Institute (2001).

[39] Source Table: "Projections of the Total Population of State: 1995–2025." Retrieved from the U.S. Census Bureau at http://www.census.gov/population/projections/state/stpjpop.txt on August 20, 2004.

[40] Note that these totals are slightly higher than those cited in other sections of this report which are based on direct analysis of the 2002 licensure data because they also include licensed dentists who report that they are not currently practicing. Data obtained online at: http://www.ukans.edu/cwis/units/IPPBR/ksdata/ksdata.shtml.

[41] ADA practice survey data indicates that productivity (output per dentist) grew at nearly 4 percent per year between 1960 and 1974, fell at a rate of 0.13 percent per year through 1990, and grew at about 1 percent per year through 1998. The 38-year average was 1.41 percent per year. See Beazoglou et al. (2002).

[42] Author's analysis of National Health Account data, obtained online at http://www.cms.hhs.gov/statistics/nhe/default.asp.

[43] See ADA, "The 1993 Survey of Dental Fees" and "2001 Survey of Dental Fees."

[44] See Kleiner and Kudrle (1997).

[45] "Recommendations for Using Flouride to Prevent and Control Dental Cavities in the United States," Mortality and Morbidity Weekly Reports 50 (RR14):1–42 (August 17, 2001).

[46] Author's estimates based upon 2002 BRFSS data.

[47] Manski, Moeller and Maas (1999b).

[48] See Betley (2003a), Betley (2003b) and Reichard (2004) for descriptions of the dental care provided at these events.

[49] See Capilouto et al. (1995).

[50] See Valachovic (2000).

[51] Mertz and O'Neil (2002), p. 73.

[52] American Dental Association (2004), p. 1.

[53] Source: American Dental Hygiene Association website.

[54] U.S. Health Resources and Services Administration (2004).

[55] Nolan et al. (2003).

[56] See Brown and Lazar (1999).

[57] Benn (2003).

[58] Through the income limitations and other categorical eligibility requirements, the state has provided some judgment as to which populations are in greatest needs, i.e., children, poor mothers, the poor elderly and disabled.

[59] "2004 American Dental Association House of Delegates Actions Affecting the Dental Hygiene Profession," obtained online from the ADHA website on November 1, 2004.

[60] American Dental Association (2004), p. 1.