An Economic Analysis of the Labor Market for Dental Hygienists and Dental Assistants in California: 1997–2005

Timothy T. Brown, PhD
Associate Director of Research, Petris Center
University of California, Berkeley

Tracy L. Finlayson, PhD
AHRQ Postdoctoral Scholar
University of California, Berkeley

Richard M. Scheffler, PhD
Distinguished Professor of Health Economics & Public Policy
Director, Petris Center
University of California, Berkeley

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Nicholas C. Petris Center on Health Care Markets and Consumer Welfare

School of Public Health
University of California at Berkeley
140 Earl Warren Hall, MC7360
Berkeley, California 94720-7360

Phone: (510) 643-4100
Fax: (510) 643-4281
www.petris.org

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From the Director and Associate Director

The professions of dental hygienist and dental assistant are critical to California's oral health care system. Expert opinions differ about whether there is a workforce crisis in these two professions. To inform this discussion, the Petris Center has undertaken an examination of the California labor market for these two professional groups from 1997 to 2005. We address the following questions: Was there a labor shortage of dental hygienists and dental assistants starting around 1999? Is there currently a labor shortage of dental hygienists and dental assistants?

We find that there was indeed a labor shortage in both groups around the year 1999. We also find that the labor shortage for dental hygienists was alleviated by 2002, and the labor shortage for dental assistants was alleviated by 2001. However, while the average inflation-adjusted wage for dental assistants has returned to its level in 1997, the average inflation-adjusted wage for dental hygienists remains above its level in 1997. The reason for these different outcomes lies in the differing levels of flexibility in the training programs of dental hygienists relative to dental assistants. The very flexible training programs for dental assistants were able to add far more dental assistants to the labor market in response to the increase in average inflation-adjusted wages than the less flexible training programs for dental hygienists.

This report was jointly funded by the California Dental Association Foundation and the Nicholas C. Petris Center on Health Care Markets and Consumer Welfare. The Petris Center conducts economic and policy research to help consumers, consumer-advocates, health care providers, regulators, and policymakers understand today's complex health care market. The Center seeks to provide up-to-date and objective information on changes in the health care system that may impact the health care marketplace and alter its capacity to provide high-quality care at competitive prices. The Center assesses issues related to the welfare of California consumers, including affordability, availability, and access to health care with a particular focus on low and moderate-income consumers. It also concerns itself with the role of consumer choice and the participation of front-line workers in the health care delivery system.

Richard M. Scheffler, PhD
Director, Distinguished Professor of Health Economics & Public Policy

Timothy T. Brown, PhD
Associate Director of Research

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Introduction

In 1999, the American Dental Association's (ADA) Workforce Needs Assessment Survey found that approximately two-thirds of private dental practitioners believed that there were an inadequate number of dental hygienists and dental assistants in their area (Haden et al., 2001). In fact, concern over the perceived shortage of dental hygienists was so great that the ADA Joint Commission on National Dental Examiners voted to allow dental hygiene graduates from non-unaccredited programs to take the National Boards, a decision that was later rescinded (Haden et al., 2001).

Was there a labor shortage of hygienists and/or dental assistants in California during this period? Is there a labor shortage of dental hygienists and/or dental assistants in California at the current time? To examine these questions, we must first define three key terms. The first term is economic demand. It is important to distinguish the concept of economic demand from the concept of "need." Need refers to the amount of goods or services that an individual requires in order to attain some predetermined level of satisfaction (e.g., excellent oral health status) without regard to how the individual may obtain these goods or services. Economic demand refers to the amount of goods or services that an individual is willing and able to pay for at a given price.

The second term is economic supply. This refers to the amount of goods or services that a provider/seller is able and willing to sell at a given price. The final term is "labor shortage." The U.S. Department of Labor defines a labor shortage as follows: "Shortages occur in a market economy when the demand for workers for a particular occupation is greater than the supply of workers who are qualified, available, and willing to do that job" (Bureau of Labor Statistics 2005). A more complete definition would be as follows: Shortages occur in a market economy when the demand for workers for a particular occupation is greater than the supply of workers who are qualified, available, and willing to do that job, at a given market wage.

For example, if the supply of hygienists remains relatively constant, but the demand for hygienists by dental practitioners increases, there would not be enough hygienists available for all the dental practitioners who want to hire a hygienist to succeed in hiring a hygienist at the current market wage. The number of dental practitioners who want to hire hygienists would now be larger than the number of hygienists available. This would result in an increase in the vacancy rate for hygienists as well as an

Introduction (cont.)

increase in the average length of time to hire a hygienist. Because of this, some dental practitioners would begin to increase their wage offers with the hope that higher wages would make their hygienist position more desirable. As the market wage for hygienists rises, fewer and fewer dental practitioners would be willing to pay the increasing market wage required in order to hire a hygienist. The market wage would continue to rise until the number of dental practitioners who want to hire hygienists and the number of qualified and available hygienists are equal. At this point supply and demand would be equal, the market wage would be stable, and thus there would be no more labor shortage. If there had been no significant growth in the number of hygienists during this period, the inflation-adjusted market wage for hygienists would be higher than it was before the labor shortage began.

On the other hand, if significant growth in the number of hygienists did occur following the increase in the market wage, and if this growth was proportional to the initial increase in demand for the services of hygienists, then the inflation-adjusted market wage would then decrease back to its initial level, the level before the change in demand occurred. At this point, supply and demand would also be equal, the market wage would be stable, and thus there would be no more labor shortage. It is also possible for the supply response to be greater than the initial increase in demand with more dental hygienists being produced than are needed to meet the increase in demand. In this case, the market wage would fall to below its initial level until demand and supply are equal. The same is true of vacancy rates and average length of time to hire.

The end of a labor shortage is thus indicated by a stable or declining market wage, a stable or declining average vacancy rate, and a stable or declining average length of time to hire. If each of these are stable, then demand and supply have equalized. If each of these is declining, then it suggests that the market is now in a state of surplus (supply is greater than demand) and will likely stabilize at a point where the market wage, average vacancy rate, and the average length of time to hire are less than the time at which the initial labor shortage began.

Introduction (cont.)

The above discussion suggests the following measures of a labor shortage: rising average inflation-adjusted wages, increasing vacancy rates, and an increasing average length of time to hire. We focus on the change in average inflation-adjusted wages.[1] Rising average inflation-adjusted wages indicate a labor shortage, whereas unchanging average inflation-adjusted wages indicate that the labor market is in equilibrium or a steady state.

In what follows, we examine the labor markets for dental hygienists and dental assistants, and compare the differing outcomes in each labor market. We then explore the fundamental differences in the supply side of each market that are likely responsible for the very different outcomes of each labor market. We conclude with a short summary and discussion.

[1] Pourat et al. (2005) examine the length of time to hire during 2003.

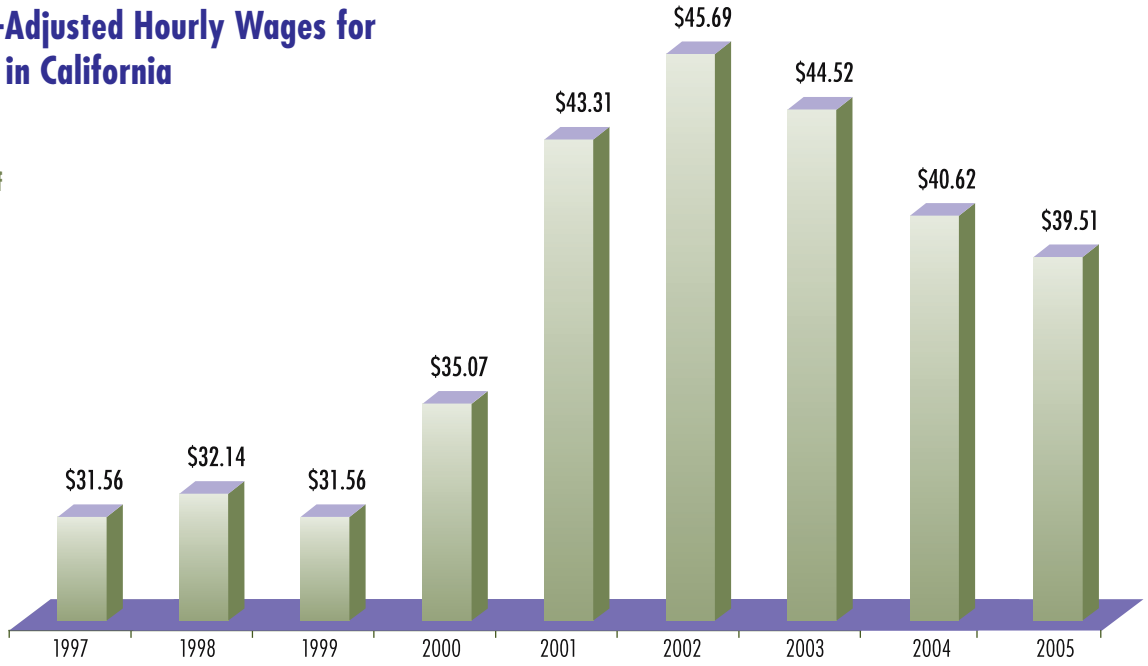
An Economic Analysis:

The Labor Markets for Dental Hygienists and Dental Assistants: 1997–2005

Exhibit 1 shows the trend in average inflation-adjusted wages for dental hygienists in California from 1997 until the first quarter of 2005. There is a clear rise in average inflation-adjusted wages starting in 1999. This is consistent with the perception of private dental practitioners that this was the beginning of a shortage in the labor market for dental hygienists. Wages appear to have peaked in 2002, at a level approximately 48% above their 1999 levels.[2] This indicates that a fairly severe shortage of dental hygienists did occur during this period. Starting in 2003, average inflation-adjusted wages appear to have leveled off.[3] There is no statistical difference between the wages paid in 2002 and the wages paid in successive years. This suggests that the shortage was alleviated through the increase in average inflation-adjusted wages.

Average Inflation-Adjusted Hourly Wages for Dental Hygienists in California

Exhibit 1. Wages for 2005 are from the first quarter of 2005. Wages are adjusted using the Consumer Price Index for September 2005.



Source: Petris Center analysis of data from the Occupational Employment Statistics survey, Bureau of Labor Statistics.

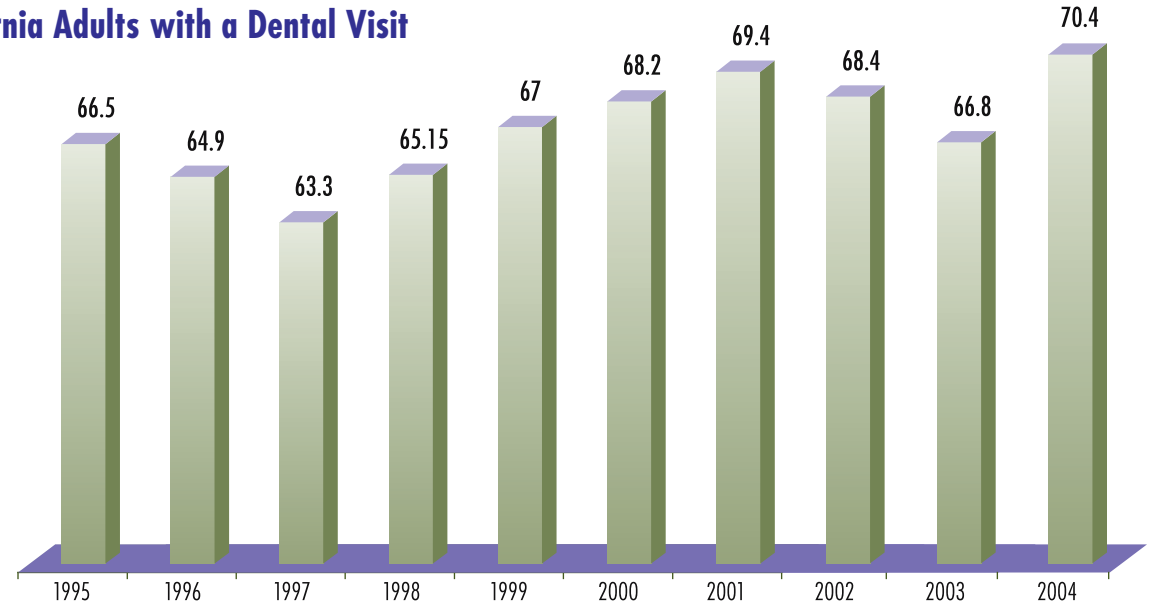
[2] The 2002 inflation-adjusted wage estimate is statistically larger than the 1999 inflation-adjusted wage estimate at the 95% confidence level. See the appendix for more information.

[3] Note that the estimate of the 2003 average wage in current 2003 dollars is $41.21, which is virtually identical to the estimate of the 2003 average wage in current 2003 dollars of $42.00 found in an independent survey conducted by Pourat et al. (2005).

This shortage appears to have been primarily due to an increase in the population-adjusted demand for dental services. The increased demand for dental services would be expected to increase the demand of dental practitioners for dental hygienists, as dental practitioners would need to employ more hygienists to meet the increased demand for dental services. This is exactly what we see comparing Exhibit 2 to Exhibit 1. Exhibit 2 shows that an increase in the demand for dental services in California, as measured by the percentage of adults who visited a dentist or dental clinic in the previous 12 months, started in about 1997 and continued upward through 2004.[4] The increase between the years 1997 and 2004 was approximately 11.2%, a fairly large increase, and this increase only accounts for adults aged 18 and older.[5,6] In other words, approximately 4.1 million more adults in California received dental care in 2004 than received dental care in 1997.[7]

Percent of California Adults with a Dental Visit

Exhibit 2. Percent of California adults, aged 18 and older, who reported at least one dental visit.



Source: Petris Center analysis of data from the Behavior Risk Factor Surveillance Survey (for the years 1995, 1997, 1999, 2002 and 2004) and the California Health Interview Survey (for the years 2001 and 2003). Missing data for the years 1996, 1998, and 2000 are interpolated for completeness.

[4] Our comparison is between the 1997 and 2004 numbers from the California Behavioral Risk Factor Surveillance Survey. Exhibit 2 also includes the 2001 and 2003 exhibits from the California Health Interview Survey. Missing data for the years 1996, 1998, and 2000 are interpolated for completeness. The 2004 prevalence estimate is statistically larger than the 1997 prevalence estimate at the 95% confidence level. Respondents were not asked the reason for their dental visit.

[5] This is equivalent to a change of 7.1 percentage points from the base year of 1997 to the year 2004.

[6] The California Behavioral Risk Factor Surveillance Survey only includes individuals aged 18-65.

[7] Based on population estimates from the California Department of Finance.

This increase in the demand for dental services is consistent with two other data sources. First, statewide health expenditures for dental services in California increased by 18.6% between 1995 and 2000 after adjusting for inflation (2000 is the latest year for which exhibits are available).[8] This is consistent with the increase in dental insurance during the nearest comparable time period for which data are available (1995-2001). In 1995, only 56.3% of the adult population in California had dental insurance. However, by 2001, 68.5% of the adult population was covered, an increase of 21.7% from 1995.[9]

On the supply side, Exhibit 3 seems to show a slight reduction in the estimated number of active dental hygienists per 100,000 population in California starting in 2001.[10] However, the estimated annual numbers of active dental hygienists during the entire period from 1997 to 2004 are not statistically different from each other no matter which years we compare; in other words, the trend is basically flat. This was occurring even though there was a clear increase in the number of candidates per 100,000 population who were passing the hygienist licensing examination in California as shown in Exhibit 4. The growth in the number of new dental hygienists was simply too little to keep up with the much faster growth in the demand for the services of dental hygienists. In other words, the number of hygienists that were being added to the hygienist labor force was simply too small to make much of a difference in the wages paid in the labor market for dental hygienists.[11]

[8] State Health Expenditure Account data are available from the Center for Medicare & Medicaid Services and take into account all payers. Data are only available through 2000. See the appendix for more information.

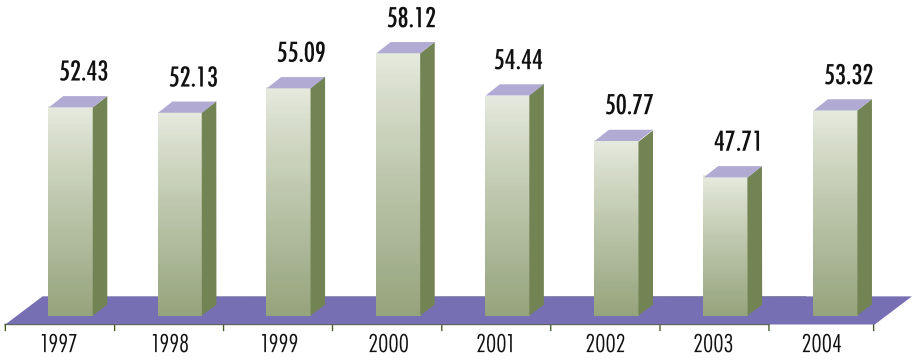
[9] The 2001 prevalence estimate is statistically larger than the 1995 prevalence estimate at the 95% confidence level. The increase in the prevalence of dental insurance from 1995 to 2001 should be taken with some caution as the estimates upon which it is based come from two different data sources. The 1995 estimate is from the California Behavioral Risk Factor Surveillance Survey, and the 2001 estimate is from the California Health Interview Survey (CHIS). We believe that the calculated increase is reasonable given its consistency with the change in state health expenditures and the increase in the demand for dental services. The change from 1995 to 2003 was 18.1% when we use the 2003 estimate from CHIS. This change is also statistically significant at the 95% confidence level.

[10] The estimated number of active dental hygienist comes from the Occupational Employment Statistics survey and, as an estimate, will be different than the number of licensed dental hygienists in any given year. See the appendix for more information.

[11] An additional measure that may be used to examine the change in the supply of dental hygienists over time is the ratio of dental hygienist graduates to dental graduates. This has been analyzed for the years 1987-1999 by Crawford (2003). The ratio from 1997-1999 shows almost no change (0.62 to 0.66) consistent with both groups growing at about the same rate, which is also consistent with our findings of a flat population-adjusted supply curve for dental hygienists during this period.

Estimated Number of Dental Hygienists in California

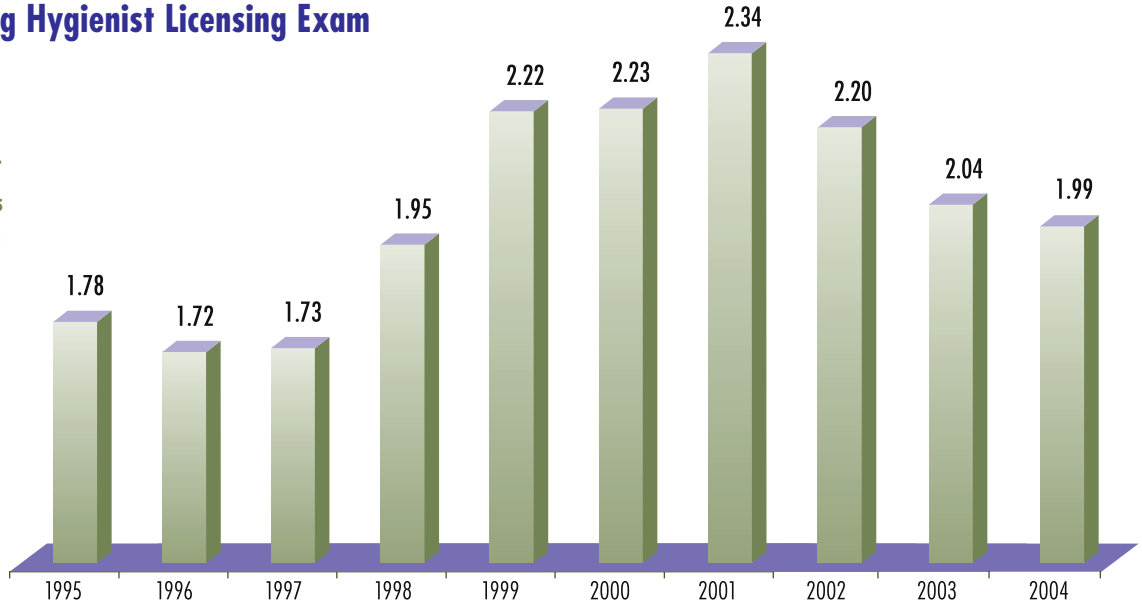
Exhibit 3. Hygienists per 100,000 population. Figures are adjusted using the projected population data from the U.S. Census. Missing data for 1999 was interpolated for completeness.



Source: Petris Center analysis of data from the Occupational Employment Statistics survey, Bureau of Labor Statistics.

Candidates Passing Hygienist Licensing Exam

Exhibit 4. Candidates passing the California hygienist licensing exam per 100,000 population. Figures are adjusted using projected population data from the U.S. Census.



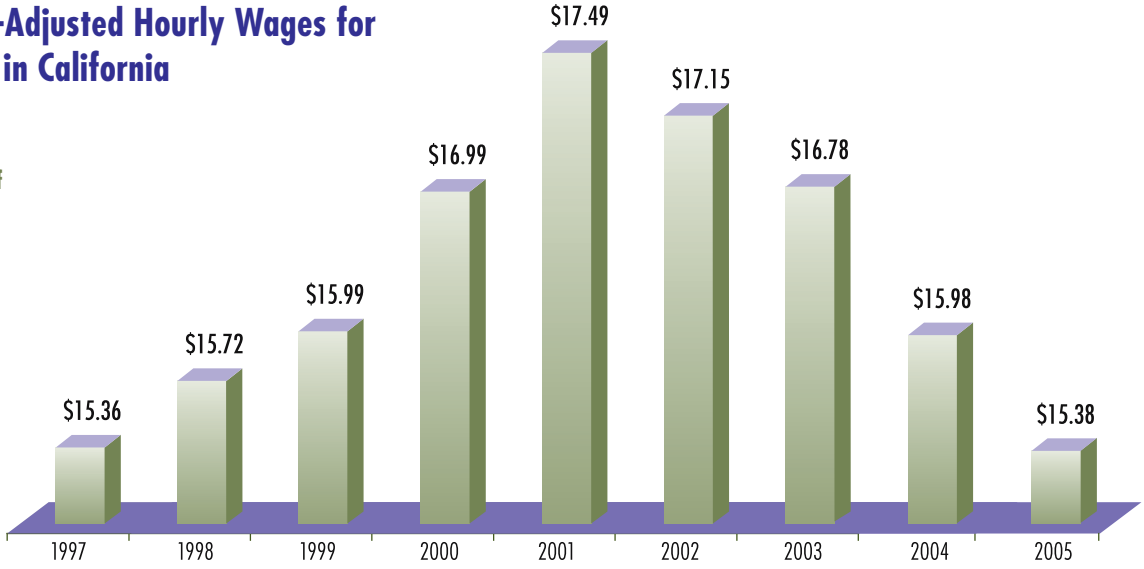
Source: Petris Center analysis of data from the Committee on Dental Auxiliaries (COMDA).

In light of the above data, a labor shortage in the labor market for dental hygienists appears to have begun due to a significant increase in the demand for dental services beginning in 1997. The supply of dental hygienists appears to have responded to this increase in demand, but too slowly and with too few new hygienists being added to the labor market to make a great deal of difference. This resulted in average inflation-adjusted wages rising sharply and then stabilizing.

The data tell a very different story for dental assistants. As shown in Exhibit 5, average inflation-adjusted wages increased by 13.9% between 1997 and their peak in 2001.[12] This indicates a shortage of dental assistants occurred during this period. This is consistent with the increase in the demand for dental services (and thus dental assistants) that was discussed above. The supply response of dental assistants to the increase in average inflation-adjusted wages appears to have been very strong, with the number of population-adjusted dental assistants increasing by 28% from 1997 until their peak in 2003, as shown in Exhibit 6.[13] This strong supply response resulted in average inflation-adjusted wages for dental assistants returning to their 1997 levels within four years.[14]

Average Inflation-Adjusted Hourly Wages for Dental Assistants in California

Exhibit 5. Wages for 2005 are from the first quarter of 2005. Wages are adjusted using the Consumer Price Index for September 2005.



Source: Petris Center analysis of data from the Occupational Employment Statistics survey, Bureau of Labor Statistics.

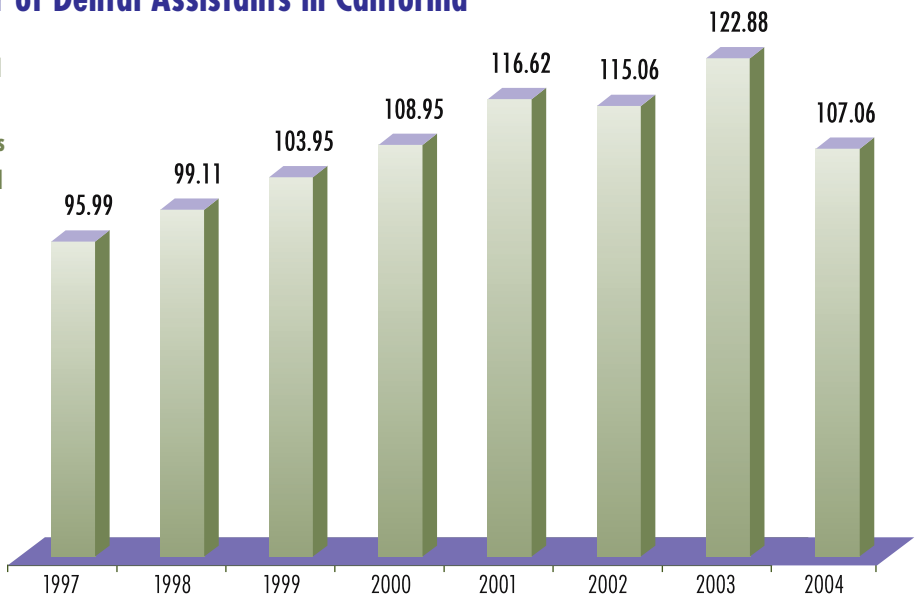
[12] The average inflation-adjusted wages of dental assistants in 1997 and 2001 are statistically different at the 95% confidence level. See the appendix for more information. Note that the estimate of the 2003 average wage in current 2003 dollars is $15.53, which is virtually identical to the estimate of the 2003 average wage in current 2003 dollars of $15.60 found in an independent survey conducted by Pourat et al. (2005).

[13] The number of dental assistants in 1997 and 2003 are statistically different at the 95% confidence level. See the appendix for more information.

[14] The average inflation-adjusted wages of dental assistants in 2001 and 2005 are statistically different at the 95% confidence level. See the appendix for more information.

Estimated Number of Dental Assistants in California

Exhibit 6. Number of Dental Assistants in California per 100,000 population. Figures are adjusted using projected population data from the U.S. Census. Missing data for 1999 was interpolated for completeness.



Source: Petris Center analysis of data from the Occupational Employment Statistics survey, Bureau of Labor Statistics.

In summary, the labor markets for dental hygienists and dental assistants behaved very differently during the period from 1997 to 2005. The higher demand for overall dental care resulted in an increase in the demand by dental practitioners for both dental hygienists and dental assistants, resulting in an increase in the average inflation-adjusted wages of both groups. Labor shortages thus occurred in the labor markets for both professions. However, the supply response in each labor market was very different, resulting in drastically different outcomes. The supply of dental hygienists responded only slightly to the increase in average inflation-adjusted wages, resulting in the labor shortage being corrected by a large increase in average inflation-adjusted wages that now appears to have stabilized. In contrast, the supply of dental assistants responded strongly to the increase in average inflation-adjusted wages. The labor shortage in this market was corrected by the number of population-adjusted dental assistants increasing by such a large extent that the average inflation-adjusted wage was brought back to its 1997 level. It is not clear whether or not average inflation-adjusted wages in the dental assistant market have stabilized or will fall further.

An Economic Analysis:

Fundamental Differences in the Supply Side of Each Labor Market

The reasons for the differing supply responses in these two labor markets are likely due in part to the differing training periods required by each profession, the number of training slots available to train each type of professional, and the responsiveness of these two aspects of training to the conditions of the labor market. Dental hygienists must be licensed by the state of California. In order to be licensed, candidates must graduate from an ADA-accredited dental hygiene program; complete approved courses in soft tissue curettage, administration of nitrous oxide, and administration of local anesthesia; and pass the national written examination. They then must pass a clinical examination and examinations in ethics and California law administered by the Committee on Dental Auxiliaries (California Committee on Dental Auxiliaries, 2004). Thus, the supply of dental hygienists is constrained by the number of seats available in accredited dental hygiene programs and the time it takes to complete the required course of study. Decisions to change either the time to complete the course of study or the number of training slots are not determined by the actions of either dental practitioners or those who wish to become dental hygienists. In other words, these decisions are not made by the direct participants within the labor market for dental hygienists.

In contrast, dental assistants can be trained on the job or in dental-assisting programs offered by community colleges, technical institutes, or the Armed Forces (Bureau of Labor Statistics, 2004-05). There is no requirement that they be licensed. Thus, there is no supply constraint on the number of dental assistants that can be produced either in terms of a set time period required to complete training or the number of training slots that are available. Decisions to change either the time to complete the course of study or the number of training slots are actually determined by the actions of both dental practitioners and those who wish to become dental assistants. In other words, these decisions are made by the direct participants within the labor market for dental assistants.

Summary and Conclusion

Using an economic framework, we examined the question of whether there was a labor shortage at any time during the period 1997-2005 in the labor markets for dental hygienists and dental assistants. We examined data on the demand for dental services, the supply of dental hygienists and dental assistants, and the market-determined wages for each profession. Our definition of a labor shortage is as follows: Shortages occur in a market economy when the demand for workers for a particular occupation is greater than the supply of workers who are qualified, available, and willing to do that job, at a given market wage. This suggests the following measures of a labor shortage: rising average inflation-adjusted wages, increasing vacancy rates, and an increasing average length of time to hire. We focused on the change in average inflation-adjusted wages.

We found that there was an increase in the demand for dental services of at least 11.2% from 1997 to 2004. This increase in the demand for dental services is consistent with the increase in statewide health expenditures for dental services of 18.6% that occurred from 1995 to 2000 (the latest year for which exhibits are available). The main reason for this increase in demand was likely the increase in the percentage of the population in California covered by dental insurance, which increased 18.1% from 1995 to 2003 (the latest year for which exhibits are available).

This increase in the demand for dental services was also accompanied by an increase in the demand by dental practitioners of both dental hygienists and dental assistants. The average inflation-adjusted wages of dental hygienists rose 48% between 1999 and 2002. The average inflation-adjusted wage of dental assistants increased by 13.9% between 1997 and 2001. There was no significant supply response in the population-adjusted number of dental hygienists to this increase in average inflation-adjusted wages for dental hygienists. The average inflation-adjusted wage for dental hygienists has thus stabilized since 2002.

In contrast, there was a large supply response in the population-adjusted number of dental assistants to the increase in average inflation-adjusted wages for dental assistants. The number of population-adjusted dental assistants rose by 28% from 1997 until their peak in 2003. This resulted in the average inflation-adjusted wage for dental assistants returning to its 1997 level by 2005.

Summary and Conclusion (cont.)

It appears that the difference in the labor markets for dental hygienists and dental assistants is primarily due to the responsiveness of the supply side of the labor market to changes in average inflation-adjusted wages. This is likely due in part to differences in the flexibility of the training process for dental assistants relative to dental hygienists.

Future changes in the labor market for both dental hygienists and dental assistants may occur due to changes in the prevalence of dental insurance, changes in the net migration of dental hygienists and dental assistants into California, and changes in technology that improve the productivity of each profession. Economic forecasting of such changes in the labor market may improve labor market outcomes. Changes in the demand for dental services can occur due to government policy changes, changes in the economic environment, and changes in the decisions of private firms to provide dental insurance to their employees. Changes in the supply of dental hygienists and dental assistants can also occur due to government policy changes, changes in the economic environment, and changes in the decisions of private organizations. Understanding the possible outcomes of such changes in the labor market is an important step toward better management of the dental marketplace and improving the oral health of the population of California.

Appendix: Select Data Sources and Methods

Averages, prevalence rates, and other numbers that are calculated from data that include the entire population of interest are directly compared. Averages, prevalence rates, and other numbers that are calculated from data that include only a sample from the population of interest are compared after computing 95% confidence intervals. Because sample data are subject to sampling error, this process allows us to say with 95% confidence that if the computed confidence intervals do not overlap, then the differences we observe are not merely due to sampling error. We refer to this as a statistically significant difference.

For example, wage and employment data come from the Occupational Employment Statistics (OES) survey conducted by the Bureau of Labor Statistics. The precision of the wage data is measured by the relative standard error (RSE), which is provided by the OES. The RSE is the ratio of the standard error of the mean (SE(m)) to the mean (m) itself multiplied by 100 (RSE = SE(m)/m x 100). We use the RSE to compute confidence intervals at the 95% confidence level (5% probability of committing a type 1 error) using t-tests when comparing average wage and employment exhibits across years.

Wage data is also adjusted for inflation using the Consumer Price Index (CPI) from the Bureau of Labor Statistics. The CPI was rebased to the index for September 2005 (the latest index available at the time of this report) in order to compute constant 2005 dollars.

State Health Expenditure Accounts (SHEA) for dental services (Expenditures in Offices and Clinics of Dentists (NAICS 6212)) for California are based on California state distributions of business receipts from taxable establishments reported in the 1977, 1982, 1987, 1992, and 1997 CSI (Census of Service Industries conducted by the U.S. Bureau of the Census). No tax-exempt dental offices and clinic establishments report in the CSI. The accounts use state distributions for intervening years using business receipts from the BMF (Business Master File) maintained by the U.S. Internal Revenue Service. To estimate state distributions of 2000 spending, the SHEA extrapolates the 1997 CSI-based estimates using growth in receipts from the BMF in dental offices. For all years, distributions are scaled to national totals.

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