

DENTAL EDUCATION AND THE UNIVERSITY OF CALIFORNIA

Final Report of the Health Sciences Committee – September 2004

INTRODUCTION

The growth of biomedical research since World War II has produced extraordinary advances in the oral, dental, and craniofacial health of Americans. Armed with high-powered tools, sophisticated imaging techniques and a growing knowledge of genetics and molecular and cell biology, scientists and dental practitioners have set their sights on resolving the full array of craniofacial diseases and disorders, from birth defects such as cleft lip and palate to debilitating chronic oral-facial pain conditions and oral cancers that occur later in life.

Although the nation's oral health is the best it has ever been, Americans are not benefiting equally from improvements in oral health care. In May 2000, the Surgeon General of the United States (U.S.) reported that 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.¹ The report alerted Americans to the importance of oral health, documented the integral relationship between oral and general health, demonstrated that the burden of oral disease is unevenly spread throughout the population (Figure 1), and confirmed that more must be done to eliminate oral health disparities.

- Dental caries are the single most common chronic childhood disease.
- Uninsured children are 2.5 times less likely than insured children to receive dental care.
- For each child without medical insurance, there are at least 2.6 children without dental insurance.
- For every adult 19 years and older without medical insurance, there are 3 without dental insurance.
- More than 51 million school hours are lost each year to dental-related illness.
- Employed adults lose more than 164 million hours of work each year due to dental disease.
- Many elderly individuals lose their dental coverage when they retire.

Figure 1: The Burden of Oral Disease²

In May 2003, the Surgeon General released *A National Call to Action to Promote Oral Health* urging individuals and partnerships at local, state, and national levels to engage in programs to promote oral health and disease prevention. To be effective, the public, health professionals, and policymakers must understand that oral health is essential to health and well being at every stage of life³, and that improved efforts must be made to increase the affordability and accessibility of oral health care to the underserved.

DENTISTRY AND ORAL HEALTH INFRASTRUCTURE

The oral health system includes teams of professionals – primarily dentists, dental hygienists, and dental assistants – who deliver services in independent practices and clinics. Their efforts focus on the diagnosis, prevention, and treatment of oral diseases. According to the American Dental Association (ADA),⁴ dentistry is defined as:

...the evaluation, diagnosis, prevention and/or treatment (non-surgical, surgical, or related procedures) of diseases, disorders and/or conditions of the oral cavity, maxillofacial areas and/or adjacent and associated structures and their impact on the human body; provided by a dentist, within the scope of his/her education, training and experience, in accordance with the ethics of the profession and applicable law.

In comparison to other health professions, dentistry is not well integrated within the broader health care system. Private practice settings and isolation from other health services have helped create to the impression that oral health is not part of one’s overall health,⁵ but rather is a luxury available only to those with access through employee coverage or the ability to pay for services. For too long, the perception that oral health is separate and less important than general health has been ingrained in the American consciousness.⁶ Oral and general health, however, are inseparable. The phrase “the mouth is a mirror” has been used to illustrate what can be accomplished from examining oral tissues – including detection of microbial infections, immune disorders, and some cancers.⁷

Practice Settings

Approximately 93% of professionally active dentists work in private practices (Figure 2). Most private practices consist of one or two dentists, with many group practices employing three or more dentists. In 1998, an estimated 92% of dentists owned their practices. Of these, 76.5% were sole proprietors responsible for overhead expenses (e.g., facility, personnel, and administrative costs) representing 60%-75% of total gross collections.⁸ This practice model differs considerably from the medical field, where many physicians rely on hospitals or other organizations to cover overhead costs.

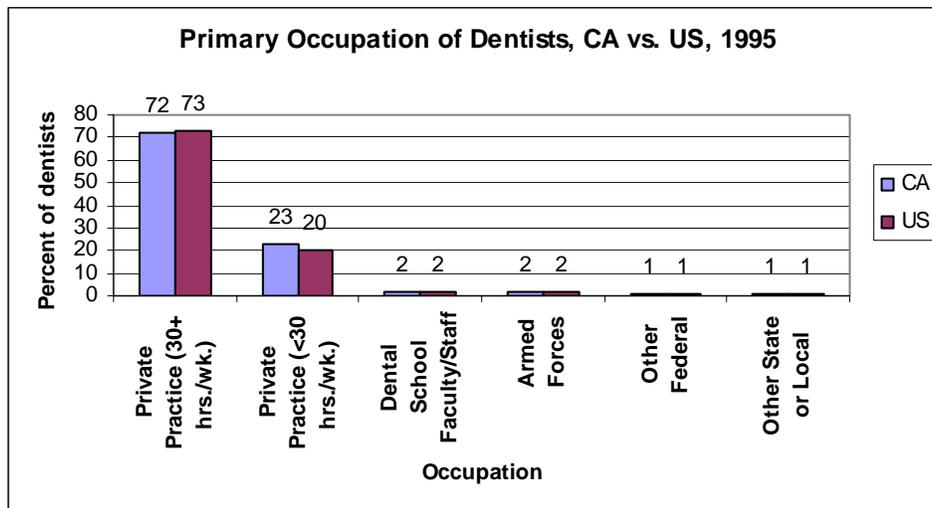


Figure 2: Primary Occupation of Dentists in CA compared to the US^{9*}

* Although these data are from 1995, recent studies show occupational trends among dentists to be approximately the same.

The Dental Safety Net

In addition to private practice settings, much needed dental care is provided through public health clinics, dental and dental hygiene schools, hospitals, nursing homes, and mobile van and school-based programs, as well as by some private practitioners who deliver care to large numbers of Medicaid patients. These settings are part of the “dental safety net,” and are primary sources of care for those who would otherwise have no access to care.¹⁰ The dental safety net nationally, and in California particularly, is limited in scope, financing, and staffing. Nationally, 40% of the federally supported community and migrant health centers have dental facilities. In California, only 25% of community health clinics provide dental health services.¹¹

Oral Health Financing

The dental profession remains a “cottage industry” that has resisted the economies of scale expansion that is popular among medical groups.¹² The current dental practice model is structured to serve insured patients or those who are able to pay for care they receive. Since 1960, these two sources have financed more than 93% of all dental expenditures.¹³ Regardless of insurance or payment mechanism, services are customarily provided and charged on a fee-for-service basis. As recently as 1998, for example, only 4% of dental care costs were financed publicly [largely through Medicaid].

Availability of insurance is a major determinant of access to dental care. An estimated 70.4% of individuals with insurance reported seeing a dentist in the past year, compared to 50.8% of those without coverage.¹⁴ The percentage of the California population without medical and dental insurance tends to be higher than the national average. It is estimated that only 60% of Californians have some form of dental coverage.¹⁵

THE DENTAL WORKFORCE

Supply of Dentists

The overall supply, distribution, and education of the workforce affect the ability of the profession to provide adequate oral health services to all Americans. There are approximately 165,000 professionally active dentists in the United States.¹⁶ The current dentist-to-population ratio is 1 dentist for every 1,700 people.¹⁷ Although the Surgeon General’s report states there is no agreement on as to an optimal dentist-to-population ratio, a ratio of 1:5,000 or fewer primary care dentists-to-population is used to designate a federally defined Dental Health Professional Shortage Area (DHPSA).

While the number of dentists has been increasing for the past 20 years, it has not kept pace with overall population growth, resulting in a decreasing dentist-to-population ratio.¹⁸ This diminishing supply relative to the population is due primarily to a decline in the number of dental graduates and to an aging and retiring dentist population. A 1995 Institute of Medicine (IOM) report concluded there was no compelling case for predicting either an oversupply or undersupply of dental practitioners in the next quarter century,¹⁹ but it noted concerns about the distribution and composition of the workforce.

In 1999, approximately 23,000 dentists were licensed to practice in California.²⁰ This total was equivalent to 68.3 dentists per 100,000 population, which exceeded the 1999 national average of 60.4 per 100,000.²¹ Of these 23,000 licensed dental practitioners, nearly 60% received their dental degree at one of the five dental schools in California and 40% received a degree from a dental school outside of California.

Although California’s five dental schools train more dentists than most other states and the supply seems adequate, the challenges linked to maldistribution of dentists remain unsolved. Many rural areas have shortages of oral health professionals, and most minority and low-income urban areas are disproportionately underserved. Of California’s 487 Medical Service Study Areas (MSSA), 97 are at or below the federal DHPSA primary care dentist-to-population ratio of 1:5,000²² (Appendix A: Map). By federal standards, 20% of California communities in which 12% of the state’s population reside have a shortage of dentists.²³ More troubling still are the 32 MSSAs with no dentist at all. Of these MSSAs, 31 are in rural areas.

Demographic Profile of Dentists

The dental workforce is predominantly male and between 40 and 55 years of age. Although women represent only 11% of California dentists over age 40, they account for 34% of dentists under age 40, reflecting the growing number of female graduates in recent years.²⁴ The average age of a practicing dentist in California is 48 years (50 for men; 40 for women).

The dental workforce is among the least diverse of the health professions. An estimated 13% of dentists nationwide are nonwhite compared with 29% of the population.²⁵ Among dental practitioners, 6.8% are underrepresented minorities (African Americans, Latinos, and Native Americans) compared with 24.8% of the U.S. population.²⁶ Although race/ethnicity data for California dentists are incomplete, data are more complete in the younger cohort.²⁷ Of those reporting, 75% are white, 18% are Asian, 4% are Latino, 2% are African American, and 0.2% are Native American (Figure 3).²⁸ Although the proportion of Asians is growing among younger dentists, Latino and African Americans remain especially underrepresented among California dentists.

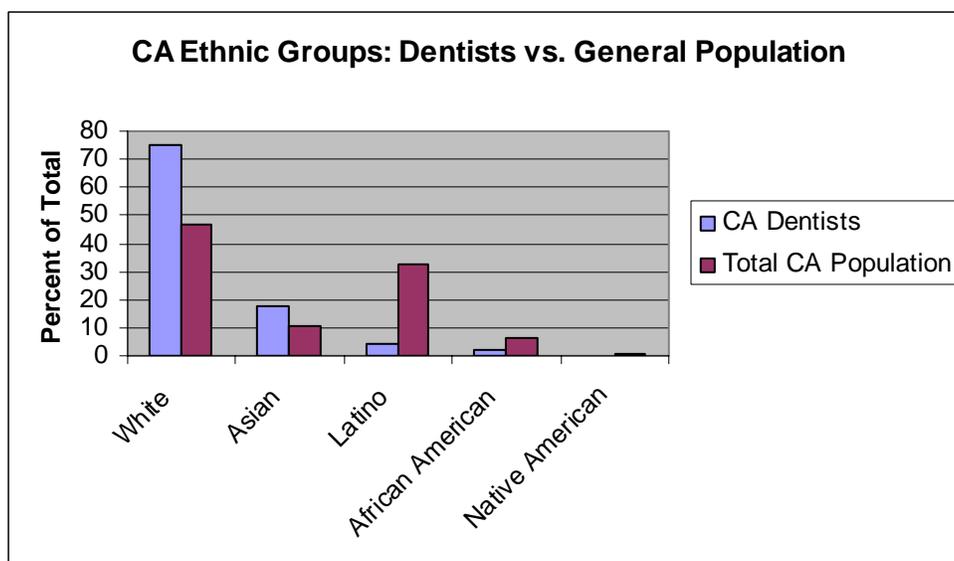


Figure 3: Ethnic Profile of Dentists in CA (2001)

Practice Characteristics of Dentists

More than 80% of dentists in the U.S. are in general practice. The balance comprise specialists, including orthodontists (5.8%), oral and maxillofacial surgeons (4.1%), periodontists (3.1%), pediatric dentists (2.4%), endodontists (2.2%), public health dentists (0.8%), and oral and maxillofacial pathologists (0.2%)²⁹ (Appendix B: Dental Specialties). In 1998, 80.6% of the approximately 23,000 active California dentists were in general practice.³⁰

Allied Dental Professionals

Allied dental professionals include dental hygienists, dental assistants (or auxiliaries), and dental laboratory technicians. In private practices, clinics, hospitals, and convalescent facilities in which they are employed (Figure 4), these health professionals contribute substantially to the provision of dental services (Appendix C: Allied Professional Job Descriptions).

There are approximately 100,000 active hygienists in the U.S., with over 10,000 licensed to provide care in California.³¹ The Bureau of Labor Statistics estimates that there were 175,160 dental assistants and 43,000 laboratory technicians employed in 2000. Although the lack of licensing requirements for these professionals makes their precise enumeration difficult, 1998 estimates from the California Employment Development Department show that the state workforce included 33,000 dental assistants and 6,500 dental laboratory technicians.

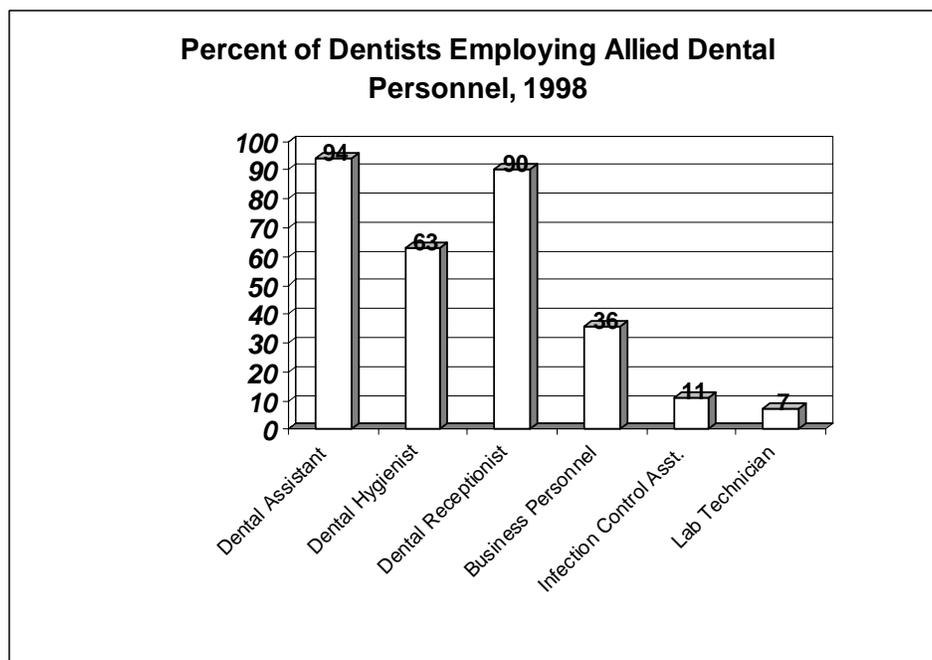


Figure 4: Use of Allied Professionals

DENTAL WORKFORCE PROJECTIONS

Nationally, population growth in the years 1990-1996 matched the growth in most dental personnel. The rate of growth in new jobs in health occupations is projected to be 28.8% between 2000 and 2010. Among the occupations with the slowest rate of growth are dentists (5.7%) and dental laboratory technicians (6.3%). By contrast, the number of hygienists is expected to grow by 37.1%. The dentist-to-population ratio is expected to drop to 53.7 per 100,000³² over the next 15 years, due largely to the increasing rates of retirement of older dentists and the absence of an increase in graduates entering the workforce to replace them.³³

Factors Affecting Demand

Growth of the aging population. California has the largest elderly population in the nation and this group is expected to grow at more than twice the rate of the total population between now and 2020. The number of people over 65 without teeth and the need for restorative and periodontal procedures increase as Californians age and live longer. To meet this demand, there are currently 412 prosthodontists and 657 periodontists in California.³⁴ Although the American College of Prosthodontists expects the number of training programs and enrollees to remain constant over the next decade, the demand for prosthodontic services will likely increase.

Growth of the pediatric population. There are currently 492 pediatric dentists practicing in California. With an expected 22.3%³⁵ growth in population in California counties by 2015, the number of children requiring dental services will increase substantially. The U.S. Census Bureau projects an increase of 18.1 million children under age 15 years (a 14% increase) between 1993 and 2020, with the greatest increases occurring in Florida, Texas, and California.³⁶ It is estimated that California will need 511 new pediatric dentists by the year 2020 – or one in every five pediatric dentists trained in the U. S. during the next quarter century.³⁷ Extended use of hygienists' services (e.g., disease prevention and patient education) is one way to increase the efficiency and availability of oral health care for this population.

Geographic distribution of oral health providers. Oral health care providers are unevenly distributed across the state. In rural and impoverished urban areas, the demand for services exceeds the capacity of the few or sometimes nonexistent personnel to meet the needs of people in those regions (see Appendix A: Map).

Community fluoridation. Fluoridation remains the most effective and least expensive method available for prevention of dental caries,³⁸ yet few California communities have fluoridated water supplies. In 2000, only 69 of the 487 MSSAs in the state were served by water systems that fluoridate. Of these, 80% are urban and 20% are rural; only 6 are considered shortage MSSAs.³⁹

New technologies. The rise in popularity of cosmetic dental procedures – including bleaching and improved restorative procedures – as well as new technologies that reduce patient discomfort are likely to increase demand for dental services.

Factors Affecting Supply and Distribution

Financial determinants. High costs of training and increasing debt loads, together with the significant costs of maintaining a dental practice and lack of insurance coverage for many patients, are among major factors influencing decisions by new graduates about practice types and location.

Aging of the dental workforce. Given increasing rates of retirement, the number of dentists retiring exceeds the number of new graduates entering the profession, which may ultimately create longer-term supply problems (Figure 5).

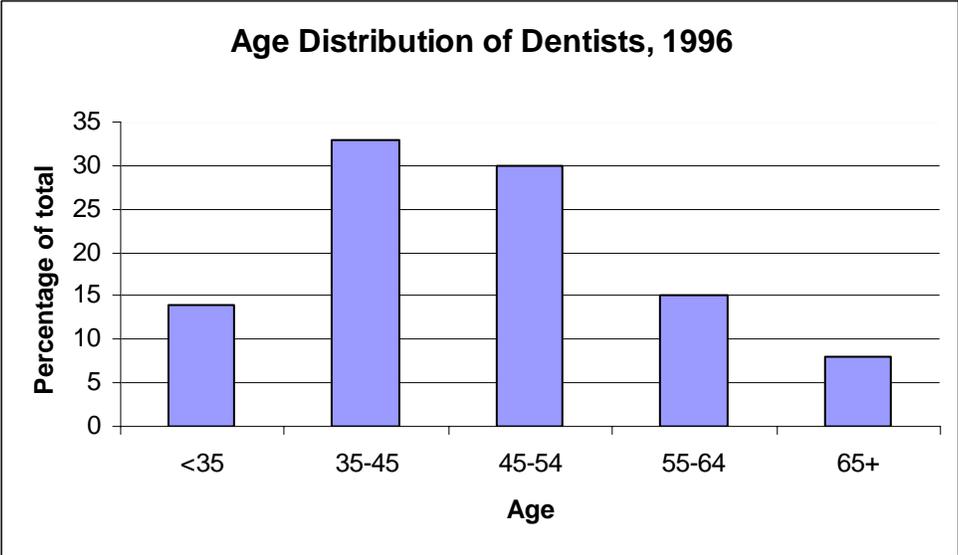


Figure 5: Age distribution of dentists in the United States⁴⁰

Faculty shortages. The contributions of dental school faculty extend beyond their role in training dental practitioners and are critical for the future success of the field. Only 0.5% of dental school graduates, however, currently enter careers in education.⁴¹ This choice is due in large part to the differential between faculty salaries and private practice income, increasing pressures on faculty to generate clinical income, the scholarly demands of an academic career, and increasing levels of student indebtedness.

Allied professionals. The current oral health workforce has reserve productive capacity through the utilization of allied dental professionals.⁴² As the ratio of dentist-to-population declines, there will be a need to draw upon this reserve and to expand productivity through extended use of allied professionals.

DENTAL EDUCATION

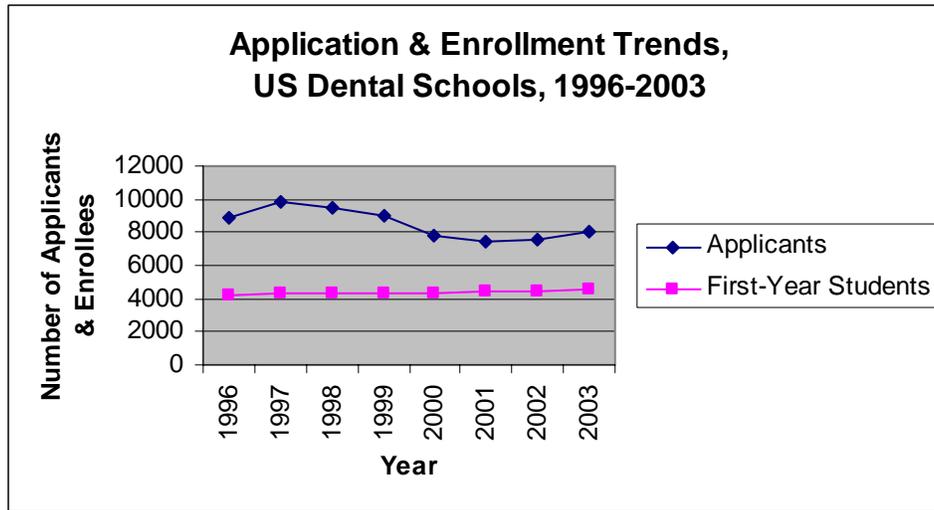
“Academic dental institutions have a unique role in society of educating oral health professionals, generating new knowledge, conducting and promoting basic and applied research, and providing patient care to advance education, research, and serve their communities.” – American Dental Education Association (ADEA)

Currently, 56 accredited dental schools in the U.S. enroll approximately 17,800 pre-doctoral students across a four-year educational period. Approximately 4,440 of these student graduate each year. Dental students are required to complete four years of professional education, at which time they acquire either a Doctor of Dental Surgery (DDS) degree or a Doctor of Dental Medicine (DMD) degree, depending on the school they attend. Both degrees use the same curricular requirements set by the ADA’s Commission on Dental Accreditation. State licensing boards accept both as equivalent and both allow licensed individuals to work under the same scope of practice for general dentistry.⁴³

Upon completion of dental school, graduates may begin to practice as general dentists following a regional or state-administered licensure examination. Except in the state of Delaware, post-doctoral training is

optional, but not required. If a dentist wishes to pursue additional education in general dentistry or become a specialist, post-doctoral programs of one to six years duration are available. Nationally, there are 727 residency programs (355 school-based and 372 hospital-based). Sixty-one of these programs (34 school-based and 27 hospital-based) are offered in California. Graduate academic programs in dentistry that lead to masters (M.S.) and/or doctoral (Ph.D) degrees are also available to prepare individuals primarily for careers in teaching and research.

Dental School Application and Enrollment Trends



Licensure Requirements

Dentists must hold a degree from an accredited dental school in the U.S. or Canada to be eligible to take state or regional licensing examinations. Graduates of non-accredited dental schools are required in most states to obtain additional education in an accredited program to be eligible for licensure. Eligibility for state or regional licensing examinations also requires that graduates pass Parts I and II of the National Board Dental Examination. In addition to the above requirements, dentists who receive their initial license in another state may be licensed to practice dentistry in California if they meet the licensure by credential requirements (Appendix D: Licensure by Credential Requirements).

DENTAL EDUCATION IN CALIFORNIA

There are five dental schools in California, located at the University of California Los Angeles (UCLA), University of California San Francisco (UCSF), University of the Pacific (UOP), University of Southern California (USC), and Loma Linda University (LLU). Approximately 2,200 students are enrolled annually in these programs. For information about the number of dental school applicants, first-year and total enrollment, graduates, faculty FTEs, and federal research funding awarded to California dental programs, please refer to Appendix E: Dental Education Fast Facts.

California Dental School Degree Offerings

| Schools | DEGREES OFFERED | | | Joint Degrees |
|------------|-----------------|----|-----|---------------|
| | DDS | MS | PhD | |
| Loma Linda | X | X | X | |
| UCLA | X | X | X | MBA |
| UCSF | X | X | X | |
| UOP | X | | | |
| USC | X | X | | MBA |

Dental Hygiene Education in California Dental Schools

Two dental schools in California (USC and UCSF) offer degree programs for prospective dental hygiene students. Both schools provide a two-year program that grants a Bachelor of Science (B.S.) degree with enrollment at 50 and 18 students per year, respectively. A minimum of two years of prior work at the college level is a prerequisite for admission.

In recent years, California's community colleges expanded their capacity to grant associate degrees in dental hygiene, which fully qualify the holder for state licensure. Consequently, UCSF has experienced an annual decrease in the number of qualified applicants as people desiring careers as dental hygienists opt for two-year associate programs; in the 2003-2004 academic year, only eight students were admitted to UCSF and no new students were admitted in 2004-2005. The current suspension of new enrollments in the program will permit the faculty to restructure the program to offer a bachelor's degree completion program for graduates of community college programs, a master's program, and a certification program that will qualify the recipient for the newly created Registered Dental Hygienist in Alternative Practice (RDHAP) license.

Strengths of UC Dental Schools

Excellence in Training. The University of California is the only public higher educational institution in the state offering training opportunities for future dental practitioners, faculty, and researchers. The UCSF and UCLA Schools of Dentistry are recognized for the depth, breadth, and caliber of their programs, the range of interdisciplinary degree offerings, their faculty, and the quality of clinical services provided.

Leadership in Dental and Craniofacial Research. The University of California is highly regarded internationally for the breadth of its federal, state, and privately funded dental and health science research activities. The dental and craniofacial research conducted at both UC dental schools was funded with a

combined \$22.2 million in grants from the National Institutes of Health in fiscal year 2003. UCSF consistently ranks in first place among dental schools with respect to the amount of research funding awarded to the institution and its investigators.

Innovation in Dental Education

Pipeline Programs - In 2002, with the goal of improving the number of underrepresented minorities (URM) enrolled in dental schools, the Robert Wood Johnson Foundation (RWJ) implemented a new program entitled "Pipeline, Profession, and Practice: Community Based Dental Education." Through a competitive process, 11 U.S. dental schools, including UCSF, were awarded approximately \$1.5 million each over a five-year period. Under the proposal, UCSF has partnered with organizations that are "well-located and impressively dedicated to serving underserved populations," including community clinics located throughout California. The dental school plans to expand its community training and care programs, which serve populations such as homeless, HIV/AIDS, elderly, and immigrant patients, and to continue its active recruitment of disadvantaged students.

The California Endowment (TCE) is also funding California dental schools to conduct "pipeline" programs similar to those funded by RWJ. UCLA is a recipient of a TCE grant, entitled, "*Community Oral Health Initiative: Partners, Programs, Pipeline,*" that has the goals of reorienting UCLA's community-based clinical programs, revising curricula, and creating a career pipeline that focuses on disadvantaged community college and university students. UCLA is working with community-based organizations, clinics, hospitals, and colleges to improve care and increase student experience in working with underserved communities in the region. If the TCE grants increase their enrollment to the same extent as those funded by RWJ, the ADEA estimates that total URM dental student enrollment could increase by 25% nationwide.⁴⁴ Although this change would raise the total number of URM's by 527 nationally, the increase will not significantly raise the percentage of URM graduates available to practice in California in light of the projected increase in the State's minority population.

Dental School Curricular Reform - The traditional focus of dental education has been to prepare students to enter private practice. According to a recent report of the ADEA President's Commission, the curriculum should be examined in light of different points of entry to dental practice as academic institutions consider workforce needs and requirements.⁴⁵ The process should prepare students for a variety of practice settings, encourage them to establish practices in underserved areas, and participate in outreach and community service programs. UCSF School of Dentistry recently completed a major revision of its curriculum to facilitate an evidence-based, patient-centered learning environment, inclusive of diverse patient groups. UCLA School of Dentistry is changing its curriculum to combine didactic and experiential activities to deliver care in underserved communities. The school is also developing a career pipeline to stimulate interest in dentistry, improve academic readiness, and strengthen recruitment and retention efforts.

Post-Baccalaureate Programs - The UCSF School of Dentistry developed the nation's first post-baccalaureate, pre-dental program in 1998. Admitting 15 students per year, the program targets disadvantaged students who have failed to gain admission to a U.S. dental school. The one-year curriculum provides residential and academic experiences to increase academic competitiveness. In the six years of the program's existence, 100% of the students who completed the program have been admitted to at least one U.S. dental school. To date, 37% have graduated and most are currently practicing in underserved communities. Pursuant to the RWJ pipeline grant, the program was expected to increase its size by approximately 25%. Meeting this objective has been a challenge, however, because of the elimination of the school's outreach funding as a result of the state's current budget deficit. Although the program was in

jeopardy of closing, generous support from the California Dental Association (to fund five positions) and the RWJ Foundation (to fund an additional five positions) has enabled the program to maintain support for 10 students.

In the initial funding year of their TCE grant, the UCLA School of Dentistry took on the challenge to develop and implement a dental post-baccalaureate program. In the first year of the program, every participant who applied to dental school was accepted. An unprecedented collaboration of USC, LLU, and UCLA led to the creation of the new Southern Regional Dental Post-Baccalaureate Program.

Challenges for UC Dental Schools

Student and Faculty Diversity. The dental workforce is not adequately prepared to meet the oral health needs of California's communities. Studies show that oral health professionals from groups underrepresented in dentistry are more likely than others to serve minority and economically disadvantaged patients and to practice in health professional shortage areas.⁴⁶ Despite these needs, the dental workforce includes few dentists from groups traditionally underrepresented in the health sciences. Even more challenging is the recruitment of underrepresented educators and researchers. As both schools of dentistry engage in curricular reform, UC will need faculty who are able to teach and underscore the importance of cultural competence, act as mentors and role models, and encourage URM students to consider academic and research careers.

Recruiting, Training, and Inspiring Future Practitioners. The state's budget crisis threatens the University's efforts to recruit and train a diverse and talented group of dental professionals who will care for underserved groups and communities. The combination of rising fees and increasing debt burdens are expected to influence career choices and may ultimately steer UC graduates away from public service and academic careers.

Shortages of Dental School Faculty. There are approximately 11,330 full and part-time dental school faculty in U.S. dental schools, and roughly 280 vacant faculty positions. The growing need for dental educators is well documented. Compounding the problems associated with the very small number of dentists entering academic careers is the aging of the current faculty and the potential leadership vacuum in the near future caused by the retirement of a generation of mentors. Retirement of faculty age 60 years and older alone is estimated to result in nearly 900 faculty vacancies by the next decade.⁴⁷

Factors associated with the faculty shortage range from diminished interest in teaching to the inability of schools to compete with higher salaries in the private sector. Other factors include pressure to generate income, time and demand required to prepare for an academic career, and level of indebtedness. For UC schools, high costs of housing in Los Angeles and San Francisco add to these challenges. Of the 4,041 dentists graduating nationally in 1998, only 22 (0.5%) expressed interest in a career in academia.⁴⁸ Given this relatively small number, compared to the need for 200-260 new faculty positions to maintain the status quo, the shortage of faculty and its potential effect on the field are clearly evident.

SUMMARY OF FINDINGS

- 1. There is an inadequate supply of dentists in many areas throughout the state.** Prior research on the dental workforce has focused primarily on overall supply rather than its distribution. Recent studies, however, show that the geographic maldistribution of dentists in California is a major barrier to oral health care access.
- 2. Dental education and practice patterns contribute to oral health disparities.** Dental education programs traditionally focus on preparing students for private practice even though a large segment of the population does not have access to care in this setting. As a result, nearly 93% of professionally active dentists currently work in private practice. To date, training opportunities that provide students with the skills needed to provide culturally competent care have been relatively minimal. The exposure of students to a variety of community-based settings could be effective in encouraging them to consider practice in alternative settings.⁴⁹
- 3. California's dental workforce does not reflect the diversity of the state.** The California Department of Finance estimates that, by 2020, the state's population will grow to nearly 49 million. Of these citizens, more than half will be non-white. ADEA data show that between 1980 and 1999, URM applicants to U.S. dental schools increased slightly from 8% to 10.5% of total applicants and 10.2% of first-year enrollees. Between 1990 and 1998, however, the number of first-year URM enrollees declined by 23%. The relevance of these findings for Californians is substantial given that the URM dental school applicant pool is small and declining relative to the population.
- 4. There is a current and growing shortage of new dental school faculty.** The ability of dental education to prepare future professionals to meet the oral health needs of the public is built on the foundation of a well-qualified faculty. The number of faculty is currently insufficient and shortages are expected to increase. With less than 1% of graduating dental students showing an interest in pursuing academic careers, and projected retirement rates for faculty greatly exceeding the number of new graduates available to replace them, new efforts are needed to recruit and retain faculty educators and researchers.
- 5. Integration of dentistry into the broader health care system is needed.** Oral health is an integral part of one's overall health. New and emerging technology is changing the way patients receive oral health services. Increasingly, dental professionals are collaborating with medical and other health science professionals to screen for, diagnose, treat, and rehabilitate patients with a variety of medical conditions. Associations between chronic oral infections and other health problems, including diabetes, heart disease, and adverse pregnancy outcomes, have also been reported.⁵⁰

RECOMMENDATIONS

- 1. Build a dental workforce that meets the needs of all Californians.** As the diversity of the state increases, new challenges will emerge in treating oral disease, reducing barriers to access, and achieving a minimum level of oral health for all. Given that minority dentists are more likely than others to practice in communities with higher numbers of minority and disadvantaged patients,⁵¹ efforts to admit and enroll diverse classes of students should be expanded. Strategies for meeting these challenges should include:
 - Stable funding for outreach programs
 - Increased support for post-baccalaureate programs
 - Development of new initiatives and programs to improve the quality and consistency of pre-dental advising
- 2. Increase efforts to reduce disparities in oral health through education and professional preparation.** Dental educational programs should ensure that students are educated about disparities in oral health and knowledgeable about effective steps to reduce them. Professional oral health training must therefore include best practices for providing comprehensive, culturally competent care in a variety of clinical settings; on-site training in community-based practices and clinics; and practice management education for service delivery models in underserved communities.
- 3. Expand programs designed to recruit and retain a diverse dental workforce in California's underserved communities.** Meeting the oral health needs of California's underserved populations requires the commitment of trained dental professionals to enter those communities to practice. Recruiting students with experience in and with such populations increases the likelihood of achieving this goal. To encourage recruitment, funding for scholarships for these service-oriented students should be increased. Once students complete their training and become invested in delivering care to an underserved community, offering loan forgiveness programs and career placement services encourages these dental practitioners to maintain their investment in these communities long term.
- 4. Develop and support interdisciplinary strategies.** Meeting the oral health needs of all Californians will require comprehensive collaboration across disciplines. Dentists must become more involved in assessing the overall health of their patients through screening, diagnosis, and referral.⁵² UC programs should develop new models of oral health care delivery to provide care within an integrated system by preparing students to assume new roles in the management of oral and general health and conditions in collaboration with other health professionals.
- 5. Develop and support new faculty recruitment and retention strategies.** The education of future dentists is essential for meeting state needs. Recruitment strategies to inspire young dentists to become educators are critical to the survival of the field. A unique approach through mentoring exists at UCLA. In this program, senior students are selected to participate in an elective called "Hands-On Experience for Future Dental Educators."⁵³ The program provides experience in preparing and delivering lectures to first-year dental students and encourages them to pursue academic careers. In addition to mentoring programs, debt forgiveness programs and other incentives for faculty should be considered.

- 6. Consider collaborating with dental hygiene schools to improve access to services.** Dentists and dental hygienists provide complementary but not necessarily overlapping services. In view of the declining dentist-to-population ratio, new roles should be considered for traditional and non-traditional providers.⁵⁴ Increased utilization of allied health personnel as a way to increase the availability and efficiency of oral health services has been well documented.

Appendix B: Summary of Accredited Residency Programs 2004

| ACCREDITED RESIDENCY PROGRAMS | NUMBER OF PROGRAMS | | TOTAL # OF RESIDENTS | |
|---|--------------------|------------|----------------------|--------------|
| | School | Hospital | School | Hospital |
| 1. Dental Public Health | 10 | 6 | 33 | 10 |
| 2. Endodontics | 42 | 9 | 362 | 44 |
| 3. General Dentistry AEGD | 45 | 50 | 311 | 354 |
| 4. General Practice Residency | 27 | 177 | 148 | 894 |
| 5. Oral Maxillofacial (OM) Surgery | 43 | 58 | 452 | 431 |
| 6. OM Pathology | 7 | 5 | 17 | 14 |
| 7. OM Radiology | 4 | 0 | 13 | 0 |
| 8. Orthodontics/Dentofacial Orthopedics | 49 | 9 | 627 | 109 |
| 9. Pediatric Dentistry | 38 | 26 | 368 | 141 |
| 10. Periodontics | 43 | 9 | 453 | 54 |
| 11. Prosthodontics (all types) | 46 | 17 | 354 | 61 |
| 12. Clinical Fellowship | 0 | 6 | 0 | 7 |
| TOTALS | 355 | 372 | 3,138 | 2,119 |

| Schools | RESIDENCY PROGRAMS OFFERED AT CALIFORNIA DENTAL SCHOOLS | | | | | | | | |
|------------|---|------|------|-----|-------|-----|-------|------|-----|
| | GPR | AEGD | ENDO | OMS | ORTHO | PED | PERIO | PROS | DPH |
| Loma Linda | | | X | X | X | X | X | X | |
| UCLA | X | X | X | X | X | X | X | X | |
| UCSF | | X | X | X | X | X | X | X | X |
| UOP | | X | | | X | | | | |
| USC | | | X | X | X | X | X | X | |

Description of Residency Programs:

1. **Dental Public Health:** Dental public health is the science and art of preventing and controlling dental diseases and promoting dental health through organized community efforts. It is that form of dental practice which serves the community as a patient rather than the individual. It is concerned with the dental health education of the public, with applied dental research, and with the administration of group dental care programs as well as the prevention and control of dental diseases on a community basis.
2. **Endodontics:** Endodontics is the branch of dentistry that is concerned with the morphology, physiology and pathology of the human dental pulp and periradicular tissues. Its study and practice encompass the basic and clinical sciences including biology of the normal pulp, the etiology, diagnosis, prevention and treatment of diseases and injuries of the pulp and associated periradicular conditions.
3. **Oral Maxillofacial (OM) Surgery:** Oral and maxillofacial surgery is the specialty of dentistry which includes the diagnosis, surgical and adjunctive treatment of diseases, injuries and defects involving both the functional and esthetic aspects of the hard and soft tissues of the oral and maxillofacial region.
4. **OM Pathology (OMP):** Oral pathology is the specialty of dentistry and discipline of pathology that deals with the nature, identification, and management of diseases affecting the oral and maxillofacial regions. It is a science that investigates the causes, processes, and effects of these diseases. The practice of oral pathology includes research and diagnosis of diseases using clinical, radiographic, microscopic, biochemical, or other examinations.

5. **OM Radiology (OMR):** Oral and maxillofacial radiology is the specialty of dentistry and discipline of radiology concerned with the production and interpretation of images and data produced by all modalities of radiant energy that are used for the diagnosis and management of diseases, disorders and conditions of the oral and maxillofacial region.
6. **Orthodontics/Dentofacial Orthopedics:** Orthodontics and dentofacial orthopedics is the dental specialty that includes the diagnosis, prevention, interception, and correction of malocclusion, as well as neuromuscular and skeletal abnormalities of the developing or mature orofacial structures.
7. **Pediatric Dentistry:** Pediatric Dentistry is an age-defined specialty that provides both primary and comprehensive preventive and therapeutic oral health care for infants and children through adolescence, including those with special health care needs.
8. **Periodontics:** Periodontics is that specialty of dentistry which encompasses the prevention, diagnosis and treatment of diseases of the supporting and surrounding tissues of the teeth or their substitutes and the maintenance of the health, function and esthetics of these structures and tissues.
9. **Prosthodontics (all types):** Prosthodontics is the dental specialty pertaining to the diagnosis, treatment planning, rehabilitation and maintenance of the oral function, comfort, appearance and health of patients with clinical conditions associated with missing or deficient teeth and/or oral and maxillofacial tissues using biocompatible substitutes.
10. **General Dentistry (AEGD):** The Advanced Education in General Dentistry (AEGD) program is designed to extend the scope and depth of students' capabilities as general dentists and to improve their practice efficiency. Most of this type of training takes place in outpatient facilities, and students devote their time to direct patient care.
11. **General Dentistry (GPR):** The General Practice Residency (GPR) program is hospital based and focuses on the relationship of medical disorders to oral disease and dental care. Residents are taught to work effectively with other health professionals in the hospital setting and receive training in emergency care and anesthesiology. These experiences prepare them for general dental practice associated with community hospitals and for other dental specialty programs. The goal of these programs is to influence greater numbers of dentists to pursue careers in providing a broader range of services, services to special needs populations, and to establish practices in underserved areas.

Appendix C: Allied Dental Health Professions Overview

DENTAL LABORATORY TECHNICIANS design, construct, and repair dental appliances such as crowns, bridges, and dentures as prescribed by affiliated dentists using models and impressions of patients' teeth. Specialists include technicians who design and construct crowns and bridges, dentures, ceramic and metal inlays, and orthodontic appliances. Dental laboratories range in some from one-person firms to large, multisite operations.

DENTAL HYGIENISTS work in private practices, clinics, hospitals, and convalescent homes, in complement with dentists to provide prophylactic care, patient education regarding good oral hygiene practices, and periodontal therapy. Dental Hygienists employed in community public health settings help dentists assess dental care needs, plan dental health programs, and provide clinical services.

DENTAL ASSISTANTS perform a variety of patient care, office, and laboratory duties, including working chair-side with the dentist during dental procedures, preparing and fitting molds, casts, and orthodontic devices, scheduling appointments and updating patient records, and providing routine and postoperative patient instruction. Registered Dental Assistants (RDA) and Registered Dental Assistants in Extended Functions (RDAEF) perform more complex patient care tasks under the direct supervision of a licensed dentist.

Appendix D: Licensure by Credential Requirements

- The dentist must hold a valid, verifiable, active license in good standing in another licensing jurisdiction that maintains standards equal to or greater than the jurisdiction in which the applicant seeks licensure.
- The dentist must show lawful practice for a specified minimum amount of time immediately preceding application.
- Meet other state-specific requirements such as a completion of a jurisprudence exam and proof of satisfactory completion of a specified amount of continuing education.

Appendix E: Dental Education “Fast Facts”- California Dental Schools

Source: American Dental Education Association (2003-2004 Academic Year)

| School of Dentistry | UCLA | UCSF | UOP | USC | LLU |
|---------------------------------|---------|----------|------|---------|-----------|
| Applications* | 1191 | 1231 | 1764 | 1622 | 1110 |
| URM Applications | 107 | 103 | 122 | 116 | 77 |
| First-Year Enrollees | 88 | 80 | 156 | 144 | 104 |
| URM First-Year Enrollees | 4 | 12 | 10 | 4 | 7 |
| Total Enrollment | 366 | 351 | 444 | 625 | 395 |
| Total URM Enrollment | 20 | 39 | 25 | 24 | 36 |
| Graduates | 86 | 100 | 150 | 174 | 103 |
| URM Graduates | 1 | 15 | 6 | 2 | 5 |
| Total Faculty FTEs** | 185 | 207 | 210 | N/A | 390 |
| Total URM Faculty FTEs | 12 | 18 | 22 | N/A | 29 |
| NIH/NIDCR Funding*** | \$4.6 M | \$17.6 M | \$0 | \$4.9 M | \$331,476 |

National Dental School “Fast Facts”

Total Applicants- 7987

Total URM Enrollment- 2107

Total URM Applicants- 962

Graduates- 4443

First-Year Enrollees- 4618

URM Graduates- 490

URM First Year Enrollees- 536

Total Faculty FTEs**- 9749

Total Enrollment- 17800

Total URM Faculty FTEs- 893

* Total number of unduplicated applicants to California schools was 1047 in 2002.

** FTE figures include basic science and clinical faculty positions. Faculty data for USC were not available.

*** NIH awards to U.S. Schools of Dentistry in federal fiscal year 2002.

-
- ¹ U.S. General Accounting Office. Oral Health in Low-Income Populations. GAO/HEHS-00-72. 2000 Apr.
- ² U.S. Department of Health and Human Services (DHHS). *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.
- ³ U.S. Department of Health and Human Services. *A National Call to Action to Promote Oral Health*. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention and the National Institutes of Health, National Institute of Dental and Craniofacial Research. NIH Publication No. 03-5303, May 2003.
- ⁴ American Dental Association (ADA). Dentistry Definitions. Available from: <http://www.ada.org/prof/ed/specialties/definitions.asp>. [cited 2004, May 23].
- ⁵ N.K. Haden et al. *Improving the Oral Health Status of All Americans: Roles and Responsibilities of Academic Dental Institutions*. The Report of the ADEA President's Commission, March 2003.
- ⁶ DHHS, *National Call to Action to Promote Oral Health*.
- ⁷ DHHS, *Oral Health in America*.
- ⁸ E.A. Mertz et al., *Improving Oral Health Systems in California: A Report of the California Dental Access Project*. San Francisco: UCSF Center for the Health Professions, 2000.
- ⁹ ADA, Survey Center, *Survey of Dental Practice, 1996*. Chicago: American Dental Association; 1997.
- ¹⁰ E.A. Mertz et al., *Improving Oral Health Systems in California*.
- ¹¹ C. Manuel-Barkin and E. Mertz, et al., *Distribution of Medicaid Dental Services in California*. San Francisco: Center for California Health Workforce Studies, Center for the Health Professions, Oct. 2000.
- ¹² Delta Dental. Dental is Different From Medical. Available from: http://www.deltadentalca.org/tre/tre_dandm.html. [cited 2000, Mar 10].
- ¹³ Bureau of Labor Statistics. 1999 Occupational Employment and Wage Estimates, Feb. 2002. Available from: http://www.bls.gov/oes/1999/Oes_29He.htm. [cited 2002 May 9].
- ¹⁴ B. Bloom et al., "Dental Services and Oral Health: United States, 1989," *Vital Health Stat* 10, no. 183 (1992): 1-95.
- ¹⁵ Mertz et al., *Improving Oral Health Systems in California: A Report of the California Dental Access Project*.
- ¹⁶ American Dental Association, Survey Center. Distribution of Dentists in the United States by region and State, 1998 and 1999. U.S. Bureau of the Census. Statistical Abstract of the United States, 2001.
- ¹⁷ Health Resources and Services Administration (HRSA). Bureau of Health Professions, Office of Research and Planning. Dental Supply Model, 1999. Available from: <http://www.hrsa.dhhs.gov/bhpr/healthworkforce/factbook.htm>. [cited 2004 April 15].
- ¹⁸ E. Mertz and E. O'Neil, "The Growing Challenge of Providing Oral Health Care Services to All Americans," *Health Affairs* 21, no. 5 (2002): 65-77.
- ¹⁹ Institute of Medicine. *Dental Education at the Crossroads: Challenges and Change*. M.J. Field, ed. Washington, DC: National Academy Press, 1995.
- ²⁰ Mertz et al., *Improving Oral Health Systems in California: A Report of the California Dental Access Project*.
- ²¹ ADA, Survey Center. Distribution of Dentists in the United States by Region and State, 1998 and 1999.
- ²² E. Mertz et al., *Geographic Distribution of Dentists in California*. San Francisco: Center for California Health Workforce Studies, Jan. 2000.
- ²³ Ibid.
- ²⁴ Ibid.
- ²⁵ ADA, Survey Center, Distribution of Dentists; AMA, Physician Characteristics and Distribution in the US; and US Bureau of the Census, "Resident Population Estimates of the United States by Sex, Race, and Hispanic Origin: April 1, 1990 to July 1999, with Short-Term Projection to November 1, 2000." Available from: eire.census.gov/popest/archives/national/nation3/intfile3-1.txt. [cited 2002 May 8].
- ²⁶ Ibid.
- ²⁷ Mertz et al., *Improving Oral Health Systems in California: A Report of the California Dental Access Project*.

-
- ²⁸ E.A. Mertz and K. Grumbach, "Identifying Communities with Low Dentist Supply in California," *Journal of Public Health Dentistry* 61, no. 3 (2001): 172-177.
- ²⁹ Mertz et al., *The Growing Challenge of Providing Oral Health Care Services to All Americans*.
- ³⁰ Mertz et al., *Geographic Distribution of Dentists in California*
- ³¹ M. Hurlbutt, Charting a Course for the Future. California Dental Hygienists Association. Available from: <http://www.cdha.org/docs/hurl.htm>. (cited 2000 Aug. 3)
- ³² DHHS, *Oral Health in America*.
- ³³ Ibid.
- ³⁴ ADA, Survey Center. Distribution of Dentists in the United States by region and State, 1998 and 1999.
- ³⁶ E. Salsberg et al., California Physician Workforce Supply and Demand through 2015 (draft). Albany: The Center for Health Workforce Studies. 2004.
- ³⁷ B.A. Waldman, "The Manpower Issue in Pediatric Dental Education: Our Job is not Finished!" *Pediatric Dentistry* 19 (1997): 185-188
- ³⁸ Ibid.
- ³⁹ H. Gift et al., "The State of the Nation's Oral Health: Mid-Decade Assessment of Healthy People 2000," *Journal of Public Health Dentistry* 56 no. 2, (1996): 84-91.
- ⁴⁰ Mertz et al., *Geographic Distribution of Dentists in California*.
- ⁴¹ ADA, Survey Center. Distribution of Dentists in the United States by region and State, 1998 and 1999.
- ⁴² N.K. Haden et al., "Dental School Faculty Shortages Increase: an update on future dental school faculty." *Journal of Dental Education* 64 no. 9 (2000): 657-673.
- ⁴³ Haden et al. *Improving the Oral Health Status of All Americans: Roles and Responsibilities of Academic Dental Institutions*.
- ⁴⁴ ADA, Dentistry Definitions.
- ⁴⁵ Institute of Medicine. *In the Nation's Compelling Interest: Ensuring Diversity in the Health Care Workforce*. Washington, DC: National Academy Press, 2004.
- ⁴⁶ Haden et al. *Improving the Oral Health Status of All Americans: Roles and Responsibilities of Academic Dental Institutions*.
- ⁴⁷ E.A. Mertz et al., *Identifying Communities with Low Dentist Supply in California*
- ⁴⁸ H. Livingston et al., "The Aging and Diminishing Dental Faculty." *Journal of Dental Education* (2004): 345-354.
- ⁴⁹ Ibid.
- ⁵⁰ DHHS. *Oral Health in America*.
- ⁵¹ Ibid.
- ⁵² A. Noonan and C. Evans, "The Need for Diversity in the Health Professions." *Journal of Dental Education* 67 no. 9 (2003): 1030-1033.
- ⁵³ N.K. Haden et al., "Meeting the Demand for Future Dental School Faculty: Trends, Challenges, and Responses." *Journal of Dental Education* 66 no. 9 (2002): 1102-13.
- ⁵⁴ H. Livingston et al., *The Aging and Diminishing Dental Faculty*
- ⁵⁵ D. Krause et al., "Maximizing the Dental Workforce: Implications for a Rural State." *The Journal of Dental Hygiene* 77 no. IV (2003): 253-261.

