Chapter 3

The Evaluation Framework for the Dental Pipeline Program with Literature Review

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This chapter begins with an overview of the framework developed by the National Evaluation Team (NET) at the University of California, Los Angeles, School of Public Health to assess the effects of the Pipeline, Profession, and Practice: Community-Based Dental Education program. As members of that team, we outline the major evaluation questions and provide a comprehensive literature review associated with each question. Subsequent analytical chapters will build on this chapter as we report findings from the longitudinal evaluation and discuss implications for policy, dental care delivery systems, universities/dental schools, and population access.

Evaluation Framework

The framework presented in Figure 1 was adapted from our previous conceptual and analytical work on medical care access[1-3] and the structures, processes, and outcomes of educational programs in achieving both short-term educational objectives and longer-term benefits to organizations, delivery systems, and society.[4,5] The three major components of the framework are inputs (contextual environment, stakeholders); Pipeline program components (recruitment, curricular revisions, and extramural clinical rotations); and longer-term outcomes of the program (practice plans, sustainability, and policy reform). Inputs are expected to influence the structures, processes, and outcomes of dental education. Structure refers to Pipeline plans, programs and services, personnel, and resources. Processes are the strategies and approaches used to execute Pipeline plans, programs, and services. Ongoing management and monitoring were provided to improve the performance of Pipeline programs, including coaching and technical assistance by the National Program Office (NPO) and NET feedback reports. In turn, all of these factors influence both the intermediate and longer-term outcomes specified in the evaluation framework. Intermediate outcomes directly reflect the Pipeline program objectives, and longer-term results may take many years to accomplish.

Inputs

The contextual environment influenced Pipeline program design and implementation and, ultimately, the present and future state of dental care access for underserved populations. The contextual environment begins with the area surrounding the dental school and clinical settings where dental students practice and includes the influence of federal and state health policy, the dental care delivery system, university and school policies, and population characteristics. An example of state policy variables is the number of underrepresented minorities (URM) (African American, Hispanic, and American Indian) in a state's legislature, which potentially influences resources for medical and dental education and the availability of services for vulnerable populations. Other state policy variables include Medicaid dental coverage and the number of successful quality reforms in the Medicaid dental program.

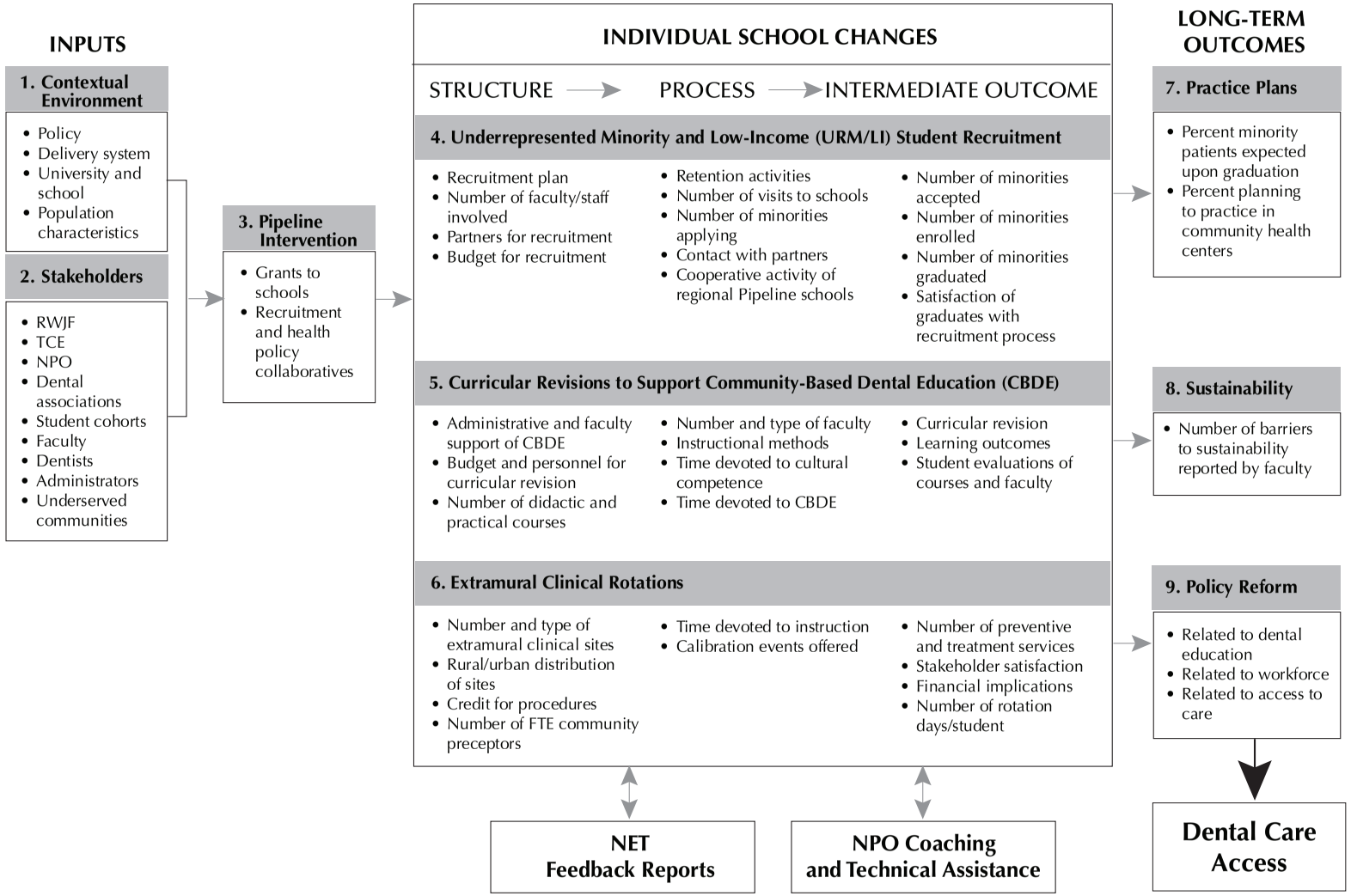

Figure 3.1. Comprehensive evaluation framework

Delivery system variables include the number of federally qualified health centers (FQHCs) or nonprofit organizations that provide primary dental care to the medically underserved in each county and the number of practicing dentists per 10,000 people for each state. Examples of university and dental school contextual variables are the type of support received by the university (public/state-supported or privately supported); the mission statement of the dental school and whether it has a commitment to recruiting URM students and providing oral health care to underserved populations; the number of URM clinical faculty in the dental school; the diversity of the student body; and other characteristics that influence the structure, implementation processes, and outcomes of the Pipeline program components.

Population characteristics include contextual-level variables used to understand the predisposing, enabling, and need characteristics of the patient populations who utilize community-based dental care.[1] For example, when large numbers of low-income, racial, and ethnic minority groups and/or uninsured persons reside in a geographic area, access barriers may be magnified for individuals competing for limited services and resources.[5] However, in terms of influencing the proportion of minority students in dental school, greater numbers of minorities in a community are significantly associated with more URM students in the dental school.[6] Other examples of population variables are number of foreign-born persons, number of persons with less than a high school education, and number of persons without health insurance. All of these contextual characteristics may influence both the intermediate and longer-term outcomes of the Pipeline program, which are designed to improve access to oral health care services.

All of the stakeholders in the Pipeline program (the Robert Wood Johnson Foundation, The California Endowment, the NPO, dental associations, students, faculty, dentists, allied health professionals, and underserved communities) have varying perceptions and specific interests in dental education and the critical role dental schools and dental providers play in responding to the oral health care needs of the nation's underserved and disadvantaged populations.

Pipeline Program Components

Underrepresented Minority and Low-Income (URM/LI) Recruitment. Structure, process, and outcome measures of minority student recruitment are predisposing conditions for dental care access. The evaluation examined the structure of the URM/LI recruitment and enrichment programs (e.g., short- and long-pipeline programs and changes to the admissions process and criteria), as well as the strategies and approaches for increasing URM/LI enrollment (e.g., visits to traditionally black and Hispanic colleges, academic advising, and mentoring). The program outcome measures include the numbers of URM/LI students who complete an application, are admitted to dental school, matriculate, and graduate each year. These intermediate outcomes are linked to longer-term outcomes, such as practice plans upon graduation. The assumption is that increased numbers of minority providers increase the likelihood that underserved populations will receive care. Previous research has found that members of minority groups prefer ethnic- and language-concordant health care providers.[7,8] Further, more minority dental students plan to treat higher percentages of URM/LI patients and patients from rural and inner-city communities compared to their white counterparts.[9-14]

Curricular Changes. Similar to recruitment, the structure and process measures of curriculum revision are considered predisposing to improved oral health access for underserved populations. Curricular revisions are designed to improve, for example, provider-patient communication skills and providers' cultural competence. Curriculum committee leaders, faculty members, and graduating seniors are the sources of information used to assess the perceived strengths and weaknesses in existing curricula and the barriers to and facilitating factors for curricular change. These process and program outcome measures represent potentially beneficial influences on long-term access since dental students completing didactic and experiential courses may develop more sensitivity in providing dental care to minority populations, as well as better communication skills for interacting with diverse groups of patients, thus improving access to care for those populations. There is widespread support for improving the dental curriculum to prepare students to provide culturally competent care. *Oral Health in America: A Report of the Surgeon General*, published in 2000, emphasizes the oral health disparities among racial, ethnic, and socioeconomic sectors of the U.S. population and the implications of those disparities for dental education.[15] The Institute of Medicine (IOM) report *Unequal Treatment*, released in 2002, recommended integrating cross-cultural education into the training of all health care professionals.[16] Those IOM recommendations speak directly to academic medicine "to lead

the way in identifying, developing, and implementing effective curricula in cross-cultural education."[17]

Extramural Clinical Rotations. The goal of increasing student exposure to and experience with providing dental services in the community is twofold. Moving clinical training from the main school clinic to extramural rotation sites improves short-term access to care for disadvantaged patients because dental students provide a greater number of services in underserved communities. Although not a primary goal of the Pipeline program, the exposure of disadvantaged patients to dental students may also assist in the recruitment of more URM individuals to careers in dentistry. The second goal is to encourage dental students to consider long-term service to disadvantaged communities, on either a full-time or part-time basis—thus hopefully swelling the number of volunteers and public health professionals who serve in community clinics and the U.S. Public Health Service (PHS). We will examine the structure (e.g., number and type of extramural rotation sites) and processes (e.g., community partnerships, university-owned clinics, PHS partnerships) for developing these sites, as well as such program outcomes as the number of days spent in extramural clinics and the number and type of services provided by senior dental students.

NET Feedback Reports. Annually, throughout the Pipeline program, the NET provided feedback reports to all Pipeline schools to report preliminary findings from our dental school site visits and to assist schools in continually improving their programs. The feedback reports described the Pipeline schools in the baseline year and documented structure, process, and outcome changes over the duration of the program. In addition to feedback reports, the NET presented overall progress reports at annual grantees meetings to summarize and discuss evaluation findings and their implications.

NPO Coaching and Technical Assistance. The NPO provided ongoing technical assistance to the Pipeline schools. The technical assistance was used by schools to improve program design and execution; these improvements also affect program outcome measures. The NPO convened annual meetings, reported comparative evaluation data, and exposed grantees to best practices and innovative models for Pipeline program components. The NPO also held special workshops, maintained the Pipeline program website, and prepared publications and presentations for symposia. Lastly, the NPO conducted ongoing program monitoring to assess the schools' progress in achieving their objectives, collected annual implementation reports from schools, and developed and executed annual communications plans.

Long-Term Outcomes

The long-term outcomes of the Pipeline initiative that we examined include practice plans of graduating seniors, sustainability, and health policy reform.

First are the practice settings (e.g., community health centers and government programs) selected by dental school seniors upon graduation and the percentages of underserved patients entry-level dentists plan to treat in their dental practice. We investigated the determinants of practice plans before the Pipeline program was implemented, including student, educational program, and contextual characteristics.[9] If the Pipeline program is effective, we expect to see an increasing influence of the educational programs (including cultural competence curriculum and extramural clinical rotations) on the practice plans of graduating seniors.

Second, qualitative and quantitative results were used to assess the likelihood that the Pipeline program will be sustained after foundation funding ends. Evaluators highlight successful practices and processes that schools have implemented to sustain the Pipeline program and its outcomes, such as recruitment and retention of URM/LI students and provision of clinical services in underserved communities. Previous studies have suggested a definition and operational indicators for sustainability.[18,19] Sustainability is multidimensional and multifaceted, and several processes may be required to achieve successful program continuation. For instance, successful maintenance of a program might require alterations in the original program's goals and aims to meet the expectations of the surrounding community.[20] The availability of financial and other resources is always a major determinant of sustainability, as well as the existing culture, climate, and operational realities.[20]

Third, statewide recruitment and health policy initiatives were closely monitored in California and elsewhere to determine implications for sustainability and lessons learned that are worthy of national and state replication. In this report, the NET will describe the process used by the Pipeline schools to work collaboratively and develop partnerships to create national and state policy reform to support and sustain community-based dental education.

Literature Review Associated with Evaluation Questions

The next sections provide a comprehensive literature review associated with the six major Pipeline evaluation questions addressed in this report: 1) recruitment of URM/LI students to dentistry, 2) curricular changes, 3) extramural clinical rotations, 4) practice plans of graduating seniors, 5) sustainability, and 6) health policy reform.

URM/LI Student Recruitment

Racial and ethnic minority groups experience disproportionately higher levels of oral health problems and more limited access to dental care.[15] Increasing minority representation in the dental profession may be one way to address the problem of access.[21-23] Despite prior efforts of dental schools to recruit URM students, however, the proportion of African American, Hispanic, and American Indian dental students remains low and is far less than the proportion of URMs in the U.S. population and the home counties of these dental schools.[21,24] In some states, legislation has been passed that may make it even more difficult to improve the diversity of dental schools by increasing the numbers of minorities and women.[25] California's Proposition 209, for example, prohibits public institutions from considering the applicant's race, gender, or ethnicity in the admissions process. African American enrollment rates at University of California campuses have dropped significantly since this legislation passed in 1996.

The fifteen dental schools that received funding for the Pipeline initiative were required to implement programs to increase the recruitment and retention of URM/LI students. Collaborative recruitment programs based in schools in California and the Northeast were also developed as part of the Pipeline initiative.[26]

The major evaluation questions addressed by the NET regarding URM/LI student recruitment were the following: 1) did participation in the Pipeline program increase the proportion of URM/LI students in the dental schools? and 2) what factors are especially important for URM students in choosing dentistry as a profession? The following sections summarize the published literature that helped us address these questions.

Choice of Dental School. Most of the literature we found on URM student recruitment was descriptive and focused on efforts at individual schools.[27-29] These articles reported that the following recruitment strategies were responsible for successful increases in URM enrollment: adding new scholarships and sources of financial support; forming partnerships with historically black and Hispanic-serving colleges and universities, local school districts, and community organizations; creating summer enrichment programs, with academic advising and mentoring; strengthening the administration's commitment to a diverse student body; and changing existing admission policies.[27,28] A descriptive study by Gravely et al. identified program characteristics that predicted URM enrollment after surveying various recruitment and enrichment programs at dental schools.[29] The variable most associated with increased enrollment was length of time a program had been in existence. This study also found that effective recruitment and enrichment programs included preparatory classes for the Dental Admission Test (DAT), basic science/biomedical science refresher courses, mentoring on learning strategies and organizational skills, and the admissions process.

Two descriptive studies examined recruitment issues from the perspective of dental students.[30,31] Whitehead et al. surveyed two cohorts of applicants accepted and interviewed at the University of Pittsburgh School of Dental Medicine.[30] In this study, for the 1994–95 academic year, the dental school's reputation, facilities, and location were consecutively ranked highest as factors influencing students' choice of school; least important were class size and financial aid. For the 2000–01 cohort, location was ranked as the most influential factor, followed by curriculum, tuition, and reputation, and the least important factors were perceived patient pool and research opportunities. Lopez et al. conducted surveys on African American, Hispanic, and American Indian dental students in twenty-two states that had similar results.[31] While scholarships and financial aid were factors that attracted URM students to their dental schools, reputation was cited as the most influential factor in this study. Further, they found that 49 percent of students chose a dental school even if the financial aid package was less than what was offered at other schools and that the presence of other minority students was particularly important in attracting African American students, but not as much for Hispanics and American Indians.[31]

Choice of Dentistry as a Profession. In the past few years, a number of studies have investigated the motivations underlying the career choices of dental students.[11,31-35] Some studies found the influence of a family dentist was a major factor for URM students to choose the dental profession.[31,32] Qualitative studies also found that early and frequent exposure to dentistry, prior work experience in a dental office, and dentistry's positive image as a family-friendly profession that pays well, has regular hours, and allows dentists to be their own boss were frequently cited factors.[26,27] The focus groups in these studies also revealed the challenges facing minority students when they apply to dental school. Many students said that, when they were undergraduates, their schools emphasized only the medical profession and not dental careers for those interested in the health professions; they added that there was little or no outreach by dental schools and most students were unaware of funding opportunities to defray dental school costs.

Other studies explored racial-ethnic and gender differences regarding professional motivations and career plans.[11,35,36] Butters and Winter surveyed African American and white dental students enrolled in two dental schools and discovered that African American students were more motivated to become a dentist to serve the public and less motivated to obtain a high income than were white students.[11] In contrast, white students were more motivated by factors related to family commitments. Male dental students rated self-employment and business-related motivations as more important for pursuing a dental career, while female dental students rated people-oriented motivations more highly.[35] Further, dental students were significantly more likely than medical students to cite high professional status, high income, regular working hours, and self-employment as important factors in their choice of profession.[34] Dental students also said they were motivated less by the patient care and working with people dimensions of their career choice than were medical students.

In sum, although URM recruitment has been studied previously, much of the literature focuses on individual and school characteristics. Characteristics of the communities where schools are set have been largely ignored. Community factors may not only influence a student to attend a particular institution, but may also attract URM students to choose dentistry as a profession.

Curricular Changes

Both the Robert Wood Johnson Foundation (RWJF) and The California Endowment (TCE) have identified the importance of a strong didactic curriculum to prepare students to provide culturally competent care to patients. Cultural competence enables a health care provider to function effectively and comfortably when encountering the varied beliefs, behaviors, and needs presented by patients. Health care professionals need to interact effectively with patients in order to optimize treatment outcomes across diverse patient populations and to address cultural barriers to accessing health care. The medical literature has suggested that provision of culturally competent care enhances outcomes for patients.[37,38] A systematic review by Beach et al. of the published medical literature on this subject yielded strong evidence that cultural competence training impacts patient satisfaction.[39] Beach et al. also identified several studies demonstrating that cultural competence has a beneficial effect on the knowledge, attitudes, and skills of health care professionals.

The major evaluation questions addressed by the NET regarding curricular change are the following: 1) did participation in the Pipeline program prepare students to treat patients in underserved and disadvantaged communities? and 2) what curricular changes supported their preparations? The following paragraphs summarize the published literature that helped us address these questions.

The literature on this subject has recognized the difficulty in defining and measuring cultural competence. One of the major challenges is untangling social or environmental factors (such as socioeconomic status) from cultural factors.[40] Cultural competence training can also occur at many levels (community, organization or system, and individual). Of the many definitions of cultural competence that are available, we adopted for our evaluation the definition used by TCE for its cultural competence educational program:

> Cultural and linguistic competence is a set of congruent behaviors, knowledge, attitudes, and policies that come together in a system, organization, or among professionals that enables effective work in cross-cultural situations. "Culture" refers to integrated patterns of human behavior that include the language, thoughts, actions, customs, beliefs, and institutions of racial ethnic, social, or religious groups. "Competence" implies

> having the capacity to function effectively as an individual or an organization within the context of cultural beliefs, practices, and needs presented by patients and their communities.[41]

Few studies in either the dental or medical literature evaluate outcomes of cultural competence training. Among those that have, Crandall et al. and Crosson et al. reported on the successes of cultural competence training programs for medical students as measured by student self-report with the Multicultural Assessment Questionnaire and the Health Beliefs Attitudes Survey, respectively.[42,43] Teaching cultural competence skills early in the medical program was found to positively influence student attitudes regarding the importance of assessing patient opinions.[43] In dentistry, Novak et al. surveyed 627 fourth-year dental students from seven dental schools and found the presentation of diversity-specific content had significant and moderately positive correlations with self-perceived cultural competence.[44] Furthermore, the students' perception of the importance of presentations on issues concerning racial and ethnic diversity was also correlated with their perception of their competence or ability to serve and work with diverse populations. Rubin used reflective journals to develop and measure cultural competence and social responsibility in sixty-one first-year dental students at the University of Pittsburgh School of Dental Medicine.[45] Students wrote in journals while completing forty hours of nondental community service. This study found that the combination of service-learning in settings outside of dentistry and reflective journaling enhanced cultural understanding and community spirit in a majority of the students. Finally, Thind et al. analyzed data from the American Dental Education Association (ADEA) 2003 senior survey and found a greater number of weeks students spent in extramural clinical rotations was significantly correlated with their self-rated ability to provide care to diverse groups.[46]

Recently, additional studies have been published about the current status of cultural competence training in U.S. dental schools. Saleh et al. assessed cross-cultural education in forty-five dental schools and found that forty-one schools had some type of formal or informal cultural competence instruction.[47] The primary facilitating factor for inclusion of cross-cultural issues in the curriculum was a diverse patient population, followed by leadership commitment and faculty expertise. Competing curricular time, lack of faculty expertise, and limited financial resources were the three most frequently cited impeding factors. Similarly, Rowland et al. conducted an assessment of dental schools' efforts to implement cultural competence education.[48] Of the fifty-six U.S. dental schools, thirty-four responded to the survey and reported that some type of cultural competence training was included in their dental curricula. A majority of the schools also indicated that their students had a positive perception of educational activities related to cultural competence.

Extramural Clinical Rotations

Community-based clinical rotations have the potential to expand students' education, provide opportunities to treat more diverse patients, and assist schools with maintaining and financing their clinical education programs.[49,50] One of the major aims of the Pipeline program was to establish community-based dental education programs that would have the additional benefit of providing increased access to dental care for underserved populations.[51,52] Encouraging dental students to treat underserved patients in their future practice is also an outcome of extramural experiences.[9,46] Further, dental schools with higher URM recruitment were found to place greater emphasis on community-based dental education and time spent in extramural rotations.[6]

The major evaluation questions addressed by the NET regarding extramural clinical rotations are the following: 1) are students providing increasing amounts of service to community-based underserved patients? (subsequent chapters will provide a description of the services provided by fourth-year students during their extramural rotations, including type of facility, race and ethnicity of patients, number of patient visits per day, and type of service, i.e., diagnostic category), 2) what are the factors associated with a greater number of extramural rotation days? and 3) what factors are associated with extramural clinical rotations being perceived to improve students' ability to provide care for racially, ethnically, and culturally diverse groups? The following paragraphs summarize the published literature that helped us address these questions.

Most dental schools in the United States and Canada now include extramural clinical rotations in their curricula. A 1999 survey found that, on average, seniors were spending 5.3 weeks at extramural sites and the most frequently offered extramural site was hospital-based, with public health clinics being

second.[53] This study also found that the students desired more time in extramural rotations, especially in private practice, to help them become, as they said, "better dentists."[54] There is also a growing acceptance among dental educators of the value of community-based dental education in preparing students to meet the future dental needs of the population. DeCastro et al. compared students who participated in community-based programs with those in traditional programs and found that seniors who spent time in the community were significantly more likely to be confident and clinically prepared to enter the dental profession.[55,56] Similarly, Smith et al. found students' confidence in tackling clinical situations was higher after rotating in primary care clinics, as compared to dental school-based clinics.[57] Further, additional clinical experiences have been associated with higher board scores.[56]

However, extramural programs vary considerably in the type of sites available to the students, the range of services provided to patients, and the length of the rotations.[53] More research is needed to determine which type of externship program is most effective. In the 2003–04 academic year, the Boston University Goldman School of Dental Medicine expanded its six-week externship program to a ten-week program as part of the Pipeline project.[58] The longer program heightened the clinical rotation experience for students because it allowed for more procedures per week and more complex procedures. As the opportunities for extramural rotations increase, schools are looking for best practices to guide them in the design of their community-based clinical education programs.

Practice Plans of Graduating Seniors

The Pipeline program was developed in the belief that workforce diversity may help to alleviate disparities in oral health care for low-income and underserved populations. A strong, capable, and diverse health care workforce is necessary to improve the health and health care of all Americans.[59] Growing evidence shows that underrepresented minorities who enter dentistry have a stronger predisposition to provide care to underserved populations upon graduation and are more likely to continue to do so early in their careers. Further evidence generated from our previous study suggests other student characteristics (such as female gender, values and beliefs, and older age) that increase the likelihood a dental student will provide care to the underserved upon graduation.[9] Thus, recruiting into dentistry more URM/LI students and other individuals with socially responsible values and beliefs may lead to practice plans in favor of underserved patient populations and a decline in the dental care access crisis over time.

The major evaluation questions regarding students' practice plans addressed by the NET are the following: 1) upon graduation, which factors influence students' plans to practice in clinical settings where services are delivered to underserved patients or to dedicate some proportion of their practice to caring for disadvantaged patients? and 2) what was the impact of the Pipeline program on the practice plans of graduating seniors? The following paragraphs summarize the published literature that helped us address these questions. The literature review focuses on the determinants of graduating seniors' plans to provide care to underserved racial/ethnic minority and other special needs subgroups; these determinants are student characteristics and the effects of cultural competence education and contextual variables. We identified several studies investigating the personal characteristics of students, such as race/ethnicity and gender.[10-14,60-65] Only a few studies explored external factors, such as educational programs or economic conditions of the community.[44,46,66-69]

Student Characteristics. Regarding the relationship between race/ethnicity and plans to provide care to the underserved, our search yielded several studies.[10-14] Using self-report instruments, researchers have found that African American students were more motivated than white students to serve the public and work in an urban area[11] and that they were more likely to continue service to underserved populations after participation in the National Health Service Corps.[12] A study on medical students found African American students were more interested in inner-city practice but were extremely unlikely to consider rural practice compared to Hispanics and American Indians.[13] Hayes-Bautista et al. reported that although Latino dentists are far more likely to speak Spanish and practice in heavily Latino areas, the number of Latino dental graduates in California has declined by 59 percent since 1983.[14] This study also reported that Latinos comprise about a third of California's population but only 4.6 percent of the practicing dentists in 2000. We found no literature focusing on the practice plans of American Indians.

Other student characteristics such as gender, educational indebtedness, and prior experiences have also shown a significant relationship to practice plans.[10,13,60-62,65] Kuthy et al. examined students

attending a Midwestern dental school enrolled between 1992 and 2004 and found male students and those with some prior experience with non-English speaking patients were more likely to express comfort with this population of patients.[62] In this study, more recent graduates (i.e., younger student cohorts) and those with some prior experience were also more willing to treat low-income, medically complex, mentally compromised, and other ethnic groups than were older graduates and those without experience. Research focusing on medical students revealed similar associations. Expectations of treating a high percentage of African American or Hispanic patients were associated with medical students' race/ethnicity concordance and their perceived levels of experience interacting with those racial groups.[60] Likewise, a study of alumni from a California medical residency program found that graduation from a high school in a rural census tract was associated with rural practice and that graduation from high school in a census tract with a higher proportion of minorities was associated with practice in a proportionally high minority community.[61] Regarding gender differences, the attitudes of female students toward caring for indigent patients have been found to be more favorable upon their entry to medical school and remained so throughout their education.[65]

Students' personal values, attitudes, and beliefs have also been found to be related to their practice plans.[63,64] In studying the attitudes of family physicians, Eliason et al. found an association between holding personal values regarding protecting all people and the number of indigent patients served.[63] Additionally, Li et al. observed in qualitative interviews that health care providers, including dentists, who had a "strong sense of service to humanity and pride in making a difference" were more satisfied with providing care to medically underserved patients.[64] It has also been hypothesized that inequities are compounded in dentistry more than medicine due to tensions within the dental profession between the moral values traditionally identified with the health professions and the entrepreneurial values associated with being a successful dentist, since the latter emphasize profit and self-interest even to the exclusion of societal responsibility.[70] In summary, a growing body of literature suggests certain individual characteristics—namely, race/ethnicity, gender, age, and values and beliefs regarding medical care access—are good predictors of practice plans. Longitudinal studies are needed to strengthen the validity of these findings since most studies have been cross-sectional and examine behavioral intentions versus actual practice.

Effects of Cultural Competence Education and the Contextual Environment. Aside from students' individual characteristics, it is important to ask whether cultural competence education and elements of the contextual environment affect students' practice plans. One study, for example, found that frequent exposure to racial and ethnic diversity in the student body, faculty, staff, and patient population in the dental school environment and the presentation of diversity-specific content in the curriculum had moderately positive and significant correlations with students' perceptions of their competence or ability to work with diverse populations.[44] These findings were a result of a descriptive study of 376 fourth-year dental students enrolled in seven dental schools across the United States. In another descriptive study, Smith et al. found a positive relationship between curricular emphasis on treating patients from diverse backgrounds and student intentions to care for these patients in their practice.[66] Hewlett et al. found somewhat different results: in their study, students who were most likely to perceive time spent in the cultural competency curriculum as inadequate were also most likely to feel less prepared to care for diverse patients.[71] Thind et al. found a positive association between "time spent in extramural clinical rotations" and "perceived ability of graduating seniors to provide care to diverse groups."[46] Lastly, when controlling for other predictor variables, Kuthy et al. found that community-based student assignments were associated with students' comfort in treating frail elderly, medically complex, and non-English speaking patients.[67] Thus, the literature does suggest a correlation between preparation in the academic program and the preparedness and extent to which care is provided to underserved patients in practice.

Contextual variables represent the social, economic, structural, and public policy environment that influences access to care.[1,5,9] As noted above, much of the literature on practice plans focuses on the characteristics of the decision maker (student or practitioner) and the educational program. Our search yielded only two studies testing the effects of contextual variables on plans to provide care to underserved patients. Beazoglou et al. found the size of the population, its per capita disposable income, and the cost of operating a dental practice were significantly associated with the number of practicing dentists in 140 Connecticut townships.[68] This study examined contextual variables for the distribution of

dentists in the state, but did not analyze the influence of individual characteristics or the academic program on the decision-making process. In another study, Davidson et al. examined three sets of determinants: contextual environment, community-based dental education (CBDE), and student characteristics.[9] The multivariable results of that study found that three contextual variables predicted practice plans: greater numbers of federally qualified health centers, higher percentages of underrepresented minorities, and attending a California Pipeline dental school. To our knowledge, this study was the first to include individual and contextual-level variables to investigate plans to provide care to underserved minority patients upon graduation; no other studies were found in the literature combining these levels of data. From a methodological perspective, that study was thus valuable in advancing the use of contextual variables in dental education and dental health services research and provided detailed information on constructing contextual variables.

Sustainability

Policymakers and funders of health-related programs have become increasingly concerned with the sustainability of programs after the initial funding expires.[18,19] Both implementers and evaluators need to routinely consider sustainability in the program's design, implementation, and assessment of outcomes. For the Pipeline evaluation, we used a broad definition of sustainability, which encompasses not only the continuation of the program components after RWJF and TCE funding has ended, but also the capacity of the program to continue delivering its intended benefits over an extended period of time.[72] Additionally, our framework for evaluating sustainability draws upon the work of Shediac-Rizkallah and Bone[18] on community-health programs.

The major evaluation question addressed by the NET in evaluating sustainability is the following: what were the successful practices and processes that Pipeline schools implemented to sustain recruitment and retention of URM/LI and to provide clinical services in underserved communities? The following paragraphs summarize the published literature that helped us address this question.

During the past two decades, a handful of studies have examined factors that contribute to greater likelihood of sustainability. Mary Ann Scheirer, a senior program officer with the RWJF at the time this evaluation was initiated, conducted a comprehensive review of nineteen empirical studies on the sustainability of U.S. and Canadian health-related programs.[73] A substantial number of studies she reviewed showed some success in sustaining the programs. Scheirer also found convergence on five factors related to successful program maintenance: 1) the program is modifiable over time to meet the needs and conditions of its target population; 2) a program champion is present; 3) the program fits the organization's mission statement; 4) the benefits of the program are visible to both the program staff and the target population; and 5) there is support from stakeholders in the surrounding community.

We identified a few studies that empirically address sustainability subsequent to Scheirer's comprehensive review in 2005. Sadof et al. compared the characteristics of community sites able to sustain an asthma program after the original funding ended with those that were not.[74] That study surveyed program managers at each of the program sites about such characteristics of the program as design, implementation, funding, etc. Sustainability was measured as the continuation of funding from multiple sources. Sites that received subsequent funding were more likely to collect data on asthmatic symptoms and health services encounters and present the results to potential funders; to provide asthma counselors with extended training; to have a program advocate; and to develop community linkages. Another study sought to determine whether community agencies could sustain the positive effects of an aggression prevention program with less direct involvement by program developers using a randomized experiment.[20] The results showed sustainability was adversely affected by high staff turnover, budgetary cutbacks, poor collaboration between the agency and community stakeholders (e.g., local public school systems), and change in fiscal oversight. Finally, Nelson et al. interviewed various stakeholders from intervention and comparison sites to evaluate the sustainability of a behavioral program for children.[75] This program continued to function well, despite initial challenges with transition and restructuring. Comments from the focus group and key informants pointed to the importance of maintaining credibility in the community and involving residents in the initiative. Maintaining the original project managers was also key to this program's success.

Health Policy Reform

The California Endowment included an additional program objective requiring the California

Pipeline schools to work collaboratively to develop a regional recruitment program and a state and federal health policy agenda.[51] The purpose of the policy initiative was to sustain the Pipeline program's efforts and, more broadly, to reduce disparities in access to dental care in California. To achieve this objective, a Health Policy Committee was formed in October 2003.[76]

The major evaluation questions addressed by the NET regarding health policy reform are the following: 1) what impact did the Pipeline program have on the policy perspectives of schools at the state and national levels? and 2) did the California Pipeline schools work cooperatively and were they successful in developing and implementing health policy initiatives to sustain the program? The following paragraphs summarize the published literature that helped us address these questions.

Financing Dental Education: Public Policy Interests, Issues, and Strategic Considerations, produced for the U.S. Department of Health and Human Services, Health Resources and Services Administration (HRSA), highlights these key policy issues concerning dental education: 1) sustained federal and state support and monitoring for dental education; 2) inclusion of dental services in public programs such as Medicaid, SCHIP, and Medicare; and 3) ensuring the availability of dental services to meet the oral health care needs of underserved populations.[77]

The shortage of dentists and the geographic maldistribution of dentists are of particular concern.[78] Currently, safety net facilities, including federally qualified health centers (FQHCs) and other nonprofit and community-based organizations, are inadequate to meet the needs of underserved populations. Furthermore, the number of federally designated dental health professions shortage areas (DHPSAs) is continually increasing.[71]

At the state level, the National Conference of State Legislatures recently gathered interview data to gauge attitudes about policy initiatives concerning the supply of dentists. As a result of that study, Gehshan reported that most educators agreed that alternative approaches to delivering dental care to underserved patients are needed. These approaches could include increased funding for community health centers (CHCs) and FQHCs, providing financial incentives and loan forgiveness programs, making a postgraduate year (PGY-1) a requirement for graduates to work in community-based settings, and supporting recruitment of qualified minority and nontraditional students.[78]

For the most part, dental educators and other leaders in the dental field have reached a consensus regarding the salient policy issues that will move dental education forward into the future.[77] These issues—most prominently, those listed above—aim to improve the quality of education for dental students and residents through community-based dental education programs. What remains to be done is to develop partnerships among various stakeholders to address emerging issues in dental education and to develop public policies at the federal and state levels.[77]

Conclusion

This chapter summarized the evaluation framework developed by the NET, which, in turn, was utilized to develop a comprehensive five-year plan for evaluating the dental Pipeline program. The major components of the framework include the community context in which the Pipeline schools operate and the structure and processes of the Pipeline program that may have influenced outcomes for the participating schools. A literature review was also presented here, related to the short-term outcomes—increasing the number of URM/LI students enrolled in Pipeline schools, providing students with didactic courses and clinical experiences so they are better prepared to treat a diverse group of patients, and having senior students spend an average of sixty days in patient-centered community clinics—as well as the long-term outcomes, including practice plans of graduating students, health policy involvement of the Pipeline schools, and sustaining the Pipeline program achievements. Subsequent analytical chapters will describe major findings and best practices related to all the outcomes of the Pipeline program.

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