

STRATEGIES FOR IMPROVING THE DIVERSITY OF THE HEALTH PROFESSIONS



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Dear Colleague:

As California continues its rapid movement towards a truly multicultural state, there are still well-documented racial and ethnic disparities in the delivery of health care to its people. As such, The California Endowment is pleased to present you with ***Strategies for Improving the Diversity of the Health Professions***, a report that examines the underrepresentation of minority groups within the health work force.

Health disparities in the status of African Americans, American Indians and Latinos are grave. It is these same populations that are also underrepresented in all of the health professions in California. Increased diversity in the physician, oral health and nursing work forces is, therefore, critical to reducing our state's alarming racial and ethnic health disparities. ***Strategies for Improving the Diversity of the Health Professions*** is a timely report that comprehensively evaluates current programs and strategies designed to increase the number of underrepresented minorities in the health professions.

We hope the findings and recommendations in this publication help provide the direction – and inspiration – needed for making effective investments in strengthening California's health work force and for closing our state's health disparities gap.

Sincerely,



Robert K. Ross, M.D.
President and Chief Executive Officer
The California Endowment

Executive Summary		3
Chapter 1:	Introduction	5
Chapter 2:	Trends and Issues for Underrepresented Minorities in the Educational Pipeline: Preschool through College	11
Chapter 3:	Recent Trends in Underrepresented Minorities in Health Professions Schools	21
Chapter 4:	An Overview of Programs to Increase Underrepresented Minority Educational Opportunities in the Health Professions	37
Chapter 5:	Evidence of Intervention Effectiveness	61
Chapter 6:	Findings and Recommendations	87
Appendices		
	Appendix I: Advisory Panel	101
	Appendix II: Program Descriptions	103
	Appendix III: Evaluation Summaries	123
Bibliography		137

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Each year, public and private funders invest tens of millions of dollars on programs that attempt to increase the number of underrepresented minorities (URMs) entering health professions schools and joining the health care workforce. Although enrollment of URMs in health professions schools steadily increased in the early 1990s, enrollment has declined in many of the health professions in recent years. The problem of underrepresentation of many racial and ethnic groups in the health care workforce is particularly acute in California, the nation's most racially and ethnically diverse state.

Why are these trends occurring? Is the problem one of insufficient investment in programs to increase URM participation in the health professions, or are existing programs ineffective? How could resources be most effectively deployed to increase the proportion of URMs in the health professions? How can funders know what works and what doesn't?

This report, *Strategies for Improving the Diversity of the Health Professions*, attempts to answer these questions. Through review of the research literature and assessment of the variety of programs targeting URM participation in the health professions, we attempted to evaluate comprehensively current programs and strategies designed to increase the number of URMs entering the health professions. The report reaches several overarching conclusions:

- Current investments in diversity-oriented programs appear to be playing a role in enhancing URM participation in the health professions.
- Lack of rigorous evaluation research makes it difficult to more conclusively determine program effectiveness and to identify the specific intervention strategies that may most effectively (and cost-effectively) promote URM participation in the health professions.
- The problem of underrepresentation of many minority groups in the health professions is the end-result of profound disparities in educational opportunities and support, beginning at the earliest schooling stages. To address racial and ethnic disparities in the health professions means to confront fundamental social inequities in educational and life opportunities in the US.

The specific findings of the report are:

1. African Americans, Latinos and Native Americans remain extremely underrepresented in the health professions and health professions schools.
2. The underrepresentation of minorities in the health professions is a public health crisis.
3. The dynamics underlying the trends in URM enrollment vary across the different types of health professions schools.
4. Lack of basic educational opportunities and achievement for many minority groups are the fundamental problems leading to the underrepresentation of these groups in the health professions.
5. There is considerable opportunity for better coordination among agencies that fund and implement programs designed to improve the educational success of URM students and to increase their participation in the health professions.
6. The majority of health science-related interventions for URMs at the high school and college level focus on career goals of biomedical research and medicine.

Some professions, such as nursing, are not receiving a commensurate investment in diversity-promoting interventions.

7. There is a paucity of high quality research evaluating the effectiveness of these interventions in improving educational achievement and advancement for URMs and disadvantaged students.
8. The few rigorously conducted research studies that have been performed consistently indicate that interventions can have a positive impact.
9. Despite the considerable resources invested in diversity programs, academic achievement and entry into the health professions by URMs have not increased significantly.
10. URM students are more likely than non-URM students to come from low-income families and are, therefore, disproportionately affected by the rising costs of higher education and adverse trends in the availability of financial aid.
11. Special consideration of race and ethnicity in admissions decisions has been an important tool for maintaining URM enrollment in health professions schools.
12. Funders interested in promoting greater racial and ethnic diversity in the health professions face a dilemma in deciding how to prioritize resources between “upstream” early education pipeline interventions and “downstream” pipeline interventions that target students near the health professional stages of their education.

The recommendations of the report are:

1. To place in the national limelight the widening gap between the racial and ethnic composition of the US population and the composition of the health workforce.
2. To convene a national working group on health workforce diversity that meets regularly to coordinate activities among the many program sponsors and to develop a national strategic plan for promoting URM academic achievement and entry into the health professions.
3. To develop a strategic plan, with assistance from professional associations, at every health professions school to improve the racial and ethnic diversity of the school’s student body.
4. For funders that have the specific objective of increasing the number of URM and other disadvantaged students matriculating in health professions schools, to develop a strategy of working from downstream-to-upstream in terms of prioritizing funding along the educational pipeline.
5. For Health professions funders to continue to consider funding programs that target more upstream, early educational stages (e.g., academic health center/K-12 school partnerships) as demonstration projects with rigorous evaluations.
6. To form coalitions between organizations and institutions committed to racial and ethnic diversity in the health professions and advocates for educational opportunity along all stages of the educational pipeline.
7. To target more resources specifically at interventions to increase the number of URM students in nursing programs.
8. To maintain growth in financial aid per recipient to the rate of inflation of the costs of higher education, and place more emphasis on grants and paid, on-campus internship opportunities for minority and disadvantaged students as opposed to student loans.
9. To establish a national clearinghouse to offer technical assistance to health professions schools about formulating flexible admissions policies that are in compliance with judicial rulings and state and federal laws.
10. To prioritize funding of rigorously conducted evaluation research, in addition to funding interventions themselves.

Background and Objectives

The composition of the health professions in the US fails to reflect the increasing demographic diversity of the nation. Many racial and ethnic minority groups continue to be extremely underrepresented in the health professions.

Table 1.1a

Race/Ethnicity of US Population Compared to US Health Care Professions, 1999-2000

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Asian/Pacific Islander	American Indian/Eskimo Aleutian
	%	%	%	%	%
US Population (over age 18)	72.0	11.2	11.0	3.8	.7
Dentists	88.8	1.5	2.4	7.1	.2
Licensed Practical Nurses	72.9	18.9	4.6	2.8	.8
Managers, Medicine and Health	82.6	8.4	5.3	3.2	.4
Pharmacists	75.9	6.2	3.4	14.2	.3
Physicians	73.1	5.5	3.8	17.5	.1
Physician Assistants	88.2	2	5.3	4.1	.4
RN's	81.7	9.2	3	5.7	.4

Data source: HRSA, US Census 2000

Table source: National Association of Public Hospitals and Health Systems, Issue Brief

Table 1.1b

Race and Ethnicity of California Population Compared to California Health Professionals

	Non-Hispanic White	Black	Hispanic	Asian/Pacific Islander
	%	%	%	%
California Population (2000)	47	7	32	11
Certified Nurse Midwives (1998)	86	5	4	3
Dentists (1997)	76	2	4	18
Nurse Practitioners (1998)	81	4	6	7
Physicians (2000)	70	3	4	20
Physician Assistants (1998)	67	8	13	7
RN's (1996)	79	4	4	13

Data source: CCHWS analysis of OSHPD NP/PA/CNM survey, AMA Physician Master File, ADA Dentist File, BHPt RN survey

The underrepresentation of minorities in the health professions is a public health crisis. Although underrepresentation of African Americans, Latinos and American Indians is ubiquitous among all professions, not merely the health professions, the problem of underrepresented minorities in the health professions is an especially compelling concern for public policy. Minority communities experience inferior access to health care and poorer health compared with communities populated primarily by non-Latino whites. Minority communities are less likely to have adequate supplies of health professionals practicing in these communities. Considerable research has documented that minority health professionals are more likely to practice in underserved, minority communities and serve disadvantaged patients, such as the uninsured and those insured by Medicaid (Moy and Bartman, 1995; Cantor et al, 1996; Komaromy et al, 1996; Mertz and Grumbach, 2001). There is also some evidence that many minorities prefer to receive care from physicians of the same race-ethnicity and are more satisfied with care provided by physicians of concordant race-ethnicity (Saha et al, 1999; Saha et al, 2000). Thus, the underrepresentation of minorities is not only a matter of fairness of opportunity. It has profound implications for racial and ethnic disparities in access to care and in health status.

The US population is more racially and ethnically diverse than at any time in our nation's history. Nationwide, the number of Latinos grew by 58% during the 1990s. Latinos comprise nearly as large a percentage of the US population as African Americans. The three racial/ethnic groups traditionally underrepresented in the health professions – African Americans, Latinos and Native Americans – now account for 25% of US residents and 40% of California residents (US Census Bureau, 2001). The number of Asian Americans has also increased dramatically.¹ The US population is likely to become more racially/ethnically diverse in the future because Latino and Asian American populations are growing more rapidly than non-Latino whites. These trends are especially evident in states along the US-Mexico border and in large urban areas. For example, over 40% of children enrolled in California's public elementary and secondary schools in the 2000-01 academic year are Latino (California Department of Education, 2001). These young persons are the future workforce in health care and other economic sectors. Enhancing the ability of health professions schools to recruit and retain racially/ethnically diverse students is critical to meeting the health care needs of the nation's future voters and taxpayers.

To better understand how to enhance the racial and ethnic diversity of the nation's health care workforce, The California Endowment contracted with investigators at the UCSF Center for California Health Workforce Studies and the UC Davis Division of Education to perform a study of strategies for improving the diversity of the health professions. The objectives of this study were:

1. To document recent trends in enrollment of underrepresented minorities (URMs) in health professions schools,
2. To enhance understanding of the barriers URMs face when pursuing careers in the health professions,
3. To identify strategies and interventions that are targeting and attempting to help URMs to enter health care professions,
4. To evaluate the effectiveness of these strategies and interventions, and
5. To make recommendations about strategies to increase racial and ethnic diversity in the health professions and to improve the effectiveness of interventions in this area, especially for programs in California.

¹ Although Asian Americans as a whole are not underrepresented in most health professions, this overall status belies tremendous heterogeneity among Asian subpopulations. Some specific Asian groups (e.g., southeast Asians) are not well represented in the health professions.

Although allied health workers represent the largest single sector of the health care workforce, our report was commissioned to focus predominantly on health professions other than allied health. The educational pathways leading to careers in allied health differ in many ways from those of the other health professions. Allied health careers also represent a heterogeneous mix of professions with tremendous variation in URM participation across different allied health fields.

Report Outline

Chapter One introduces the study, its objectives, and our conceptual model. Chapter Two summarizes trends and issues in URM educational achievement in the educational pipeline stages prior to health professional school training. In Chapter Three, we analyze data from the past decade on trends in URM applicants, matriculants, and enrollees in health professions schools. Chapters Two and Three are adapted from material prepared for the Herbert Nickens Symposium on Diversity in the Health Professions in March, 2001. Chapter Four provides an overview of existing interventions and programs designed to increase URM educational achievement and entry into the health professions. The goal of Chapter Four is to present the “lay of the land” in terms of the major national and California programs that exist to enhance academic performance among URM and other disadvantaged students. This chapter catalogues major programs according to funding source in an effort to understand the many types of programs that currently exist, the level of funding of these programs, and the different emphases and strategies of these programs. After cataloguing major programs in Chapter Four, we proceed in Chapter Five to critically review the research literature on evaluations of interventions to enhance URM educational success and entry into the health professions. We present a rigorous analysis of the quality of the evidence and the findings of key studies. Chapter Six concludes the report by presenting our overall findings and recommendations.

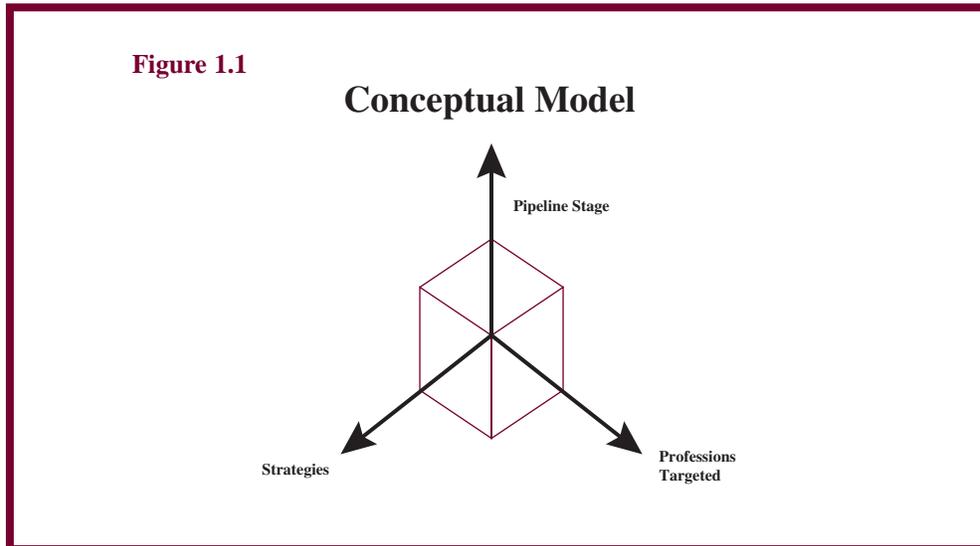
Conceptual Model

It is important to clarify at the outset our conceptual models for 1) use of key terms, and 2) a scheme for classifying programs and interventions. Terms such as “programs,” “strategies,” and “interventions” often mean different things to different people. We define these terms as follows:

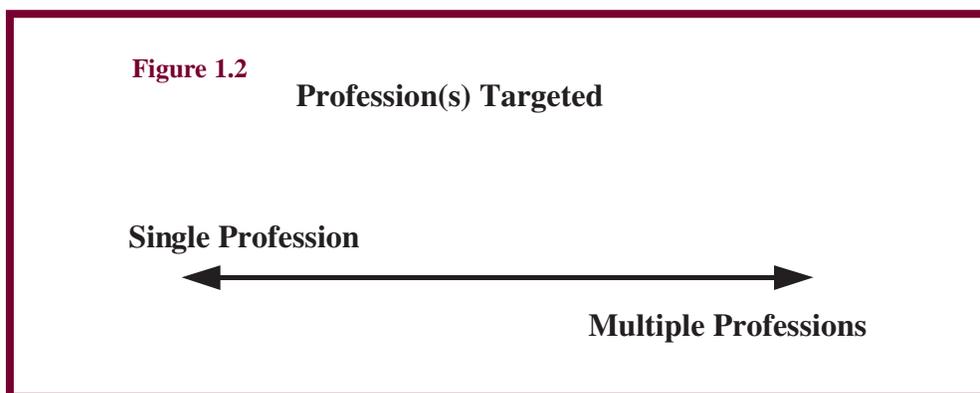
1. The word *programs* is used to refer to major initiatives, usually in reference to the funders of these initiatives. These programs often award funds to institutions that employ a variety of “interventions” (see below) to “operationalize” the program. Examples of programs are the Bureau of Health Profession’s Health Careers Opportunities Program (HCOP) and The California Endowment’s Health Work Force Diversity program.
2. The word *interventions* is used to refer to activity occurring at the institutional level to implement educational or policy change. For example, using funding from the HCOP program, a school, or consortium of schools may develop an intervention to boost math and science achievement among college students or to prepare post-baccalaureate students for applying to medical school.
3. The word *intervention strategies* refers to the particular components of the intervention. For example, a college enrichment intervention may include strategies of mentoring, exposure to health professions, analysis of study techniques, etc.

We also developed a conceptual model to guide our approach to classifying programs and interventions. This three-dimensional conceptual model characterizes programs and interventions on each of three critical axes (Figure 1.1):

1. *Specific health profession targeted,*
2. *Stage along the educational pipeline targeted, and*
3. *Specific strategies used.*



The first axis, type of health profession targeted, is self-explanatory. Many programs target a specific profession (e.g., the Bureau of Health Profession's Nursing Workforce Diversity Program), whereas others promote interest and participation in the health professions in general (e.g., HCOP). (Figure 1.2)

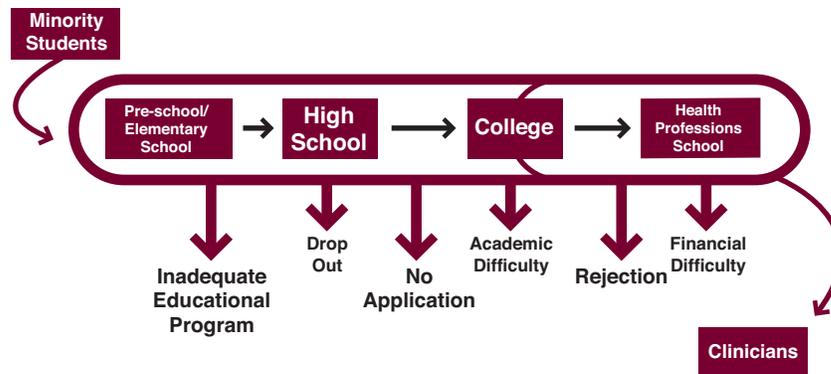


The second axis refers to the stage or stages along the educational pipeline targeted by the program or intervention (Figure 1.3).

A long educational pipeline eventually leads to a URM student matriculating and graduating from a health professions school. Students are at risk of "leaking" at points throughout the course of the educational pipeline; interventions may occur at any stage along the way. Some programs promote interventions at multiple different pipeline stages.

Figure 1.3

Health Professions Educational Pipeline



(Figure 1.3 adapted from Figure 2-1 of “HCOP: Evaluation of the Health Careers Opportunity Program Summer Programs”, Houston Associates, 1994)

The third and final axis categorizes programs and interventions according to the major intervention strategies used (See Table 1.2). We categorize intervention strategies using a modification of classifications published by Carline et al. (1998a, 1998b) and Gándara (1999).

Table 1.2

Strategy	Definition
Mentoring	Explicit mentoring programs pairing students with professionals, faculty, or more advanced students for social support and possibly academic and career guidance
Financial Support	Scholarships, loans, or loan repayment programs
Academic Support	Academic enrichment, tutorials, or admissions preparations to assist students who need additional academic support or to provide more rigorous academic preparation
Psychosocial Support	Counseling, motivational programs, or peer groups to assist students in social adjustment to program
Professional Opportunities	Internships, apprenticeships, or information dissemination meant to expose students to health professions careers

This Report in Context

Many excellent studies and reports have been produced in the past decade addressing racial and ethnic diversity in the health professions. These include a prominent 1994 Institute of Medicine report (*Balancing the Scales of Opportunity*), systematic reviews of the literature (Carline et al., 1998a, 1998b), and evaluations of specific Bureau of Health Professions programs such as the Centers of Excellence and Health Careers Opportunities Programs (Carline et al., 1999; Houston Associates, 1994). Many of the

conclusions in our report echo key findings from these earlier works:

1. Attention needs to be paid to attrition of URM students early in the educational pipeline;
2. Little rigorous research has been conducted evaluating the effectiveness of educational interventions; and
3. Current databases do not permit measurement of important program outcomes.

The consistency of many of our findings and recommendations with those of prior reports emphasizes the formidable nature of many of the problems we address and the persistent difficulties in funding and performing rigorous evaluation research in this area.

A few features of our approach to conducting this study are worthy of comment and, to some degree, distinguish this report from prior studies:

1. We focus as broadly as possible. We include all the major health professions in our report and cover the entire educational pipeline from preschool through health professions school.
2. The values of evidence-based policy guide our review of the literature and our findings and recommendations. We critically analyze the quality of evidence on interventions to improve the academic performance of URM students and the likelihood of URM students matriculating into health professions schools. To the extent possible, we attempt to base our recommendations on solid evidence rather than on expert opinion and other less scientific standards of information.
3. This report is not an evaluation of any particular diversity program administered by The California Endowment, or any other organization; rather it is a synthesis of information about programs and the interventions and intervention strategies they support.

Entering and graduating from a health professions school occur at the “downstream” stage of an educational pipeline that has as its starting point an individual’s earliest schooling experiences. Strong academic performance throughout one’s education is a prerequisite for entry into the health professions. Racial and ethnic disparities in educational achievement are apparent at the initial educational stages. These disparities persist and widen over the progression of education, culminating in much higher high school dropout rates and lower college attendance and graduation rates among URMs. These disparities in educational achievement reduce the proportion of URMs who are academically prepared for health professions education.

Why do some children do poorly when others excel? Where along the pipeline are students lost? This chapter traces the pathways of underrepresented students from early schooling through college in order to identify the significant points of student loss in the pipeline.

Preschool

Differences in preschool attendance exist among the major racial and ethnic groups. Nationally, African American children are more likely to attend preschool than any other group, and Latinos are least likely to attend. (US Dept of Education, 2000). Table 2.1 shows the rates of preschool and kindergarten attendance by ethnicity and age.

Table 2.1
 Percentage of 3 to 5-Year Olds in Center-based Preschool and Kindergarten in US by Ethnicity, 1999

Ethnicity	Preschool Age 3	Preschool Age 4	Kindergarten Age 4	Total Age 4	Preschool Age 5	Kindergarten Age 5	Total Age 5
White	46.0	66.2	1.8	69.3	23.1	54.7	92.9
African American	59.2	79.4	1.3	81.4	20.2	55.2	98.5
Latino	25.0	56.8	5.8	63.6	13.4	66.2	88.6
Other	56.3	65.0	4.5	70.0	23.4	61.1	97.8

Source: US Department of Education, NCES, Digest of Education Statistics, 2000

It is notable that Latino children are much more likely to go to kindergarten at an early age than other groups. A relatively common pattern for Latinos appears to be early enrollment in kindergarten without attending preschool, as Latino children are much more likely than others to be found in kindergarten at ages four and five. Early enrollment in kindergarten is associated with higher risk for less positive educational outcomes, especially when kindergarten has not been preceded by preschool attendance (US Department of Education, NCES, 1999)

While the social class of children does not appear to be highly related to *whether* they attend preschool for all but white children (US Dept of Education, 2000), *the kind* of preschool experience they have *is* related to their family's socio-economic (SES) status. Middle class children may attend a wide variety of private preschools as well as publicly supported programs in the community. More high-quality preschool options exist for those individuals who can afford to pay for them. Moreover, for those middle class children who stay at home, many will receive enriched educational opportunities from well-educated parents and care givers, in more informal contexts. Considerable research evidence exists showing positive effects on cognitive functioning, health status, and socio-emotional adjustment of children who attend high quality preschool programs (Zigler and Styfco, 1993; Karoly, et al., 1998). However, for low-income children the opportunity to attend high quality preschool programs is much more limited. Head Start is the primary federally sponsored program for low-income preschoolers, but its quality is uneven (Zigler and Styfco, 1993), and it is only able to serve about half of all eligible children (Children's Defense Fund, 2000).

Kindergarten

While some research has suggested that children from different ethnic groups begin school with similar skills and that differentiation occurs as a byproduct of schooling (Entwistle and Alexander, 1992), recent national data on kindergartners suggests otherwise. The achievement gaps among groups are noticeable at the earliest stages of formal academic assessment. Table 2.2 shows the percentages of kindergartners in different ethnic groups who score in the lowest or in the highest quartile on reading and math readiness. The lower performance of Latino children vis-à-vis African Americans, in spite of the fact that they outperform African Americans on tests of academic achievement in elementary school, is probably related to the large numbers of Latino kindergartners who are tested in English but do not speak the language when they enter school.

Table 2.2
Percent of Kindergartners in Lowest and Highest Quartile of Reading Skills, by Ethnicity, Fall 1998

Group	% Lowest Quartile for Reading	% Highest Quartile for Reading	% Lowest Quartile for Math	% Highest Quartile for Math
African American	34	15	39	10
Latino	42	15	40	14
Native American	57	9	50	9
Asian	13	39	13	38
White	18	30	18	32

Source: America's Kindergartners, US Department of Education, NCES, 2000.

The very large discrepancies in academic performance among the ethnic groups at the very beginning of schooling suggests that, where preschool was provided, it was not of high enough quality or long enough duration to equalize home advantages. Moreover, these early differences presage a pattern of lower achievement for those students who begin school already behind. If children leave kindergarten with significantly lower reading readiness skills than their peers, they can be expected to be placed in lower reading groups in first grade. This fact augurs poorly for their later academic outcomes. Barr and Dreeben (1983) have shown how, in spite of the best intentions of teachers, the boundaries between reading groups formed early in the first grade often become impermeable barriers to upward advancement in reading groups thereafter. Students have a strong tendency to stay in the groups into which they are initially placed. Those students who come to school with readiness to read—usually those from more advantaged homes that have encouraged early literacy—tend to maintain their advantage over time. This is largely because low level reading groups cover significantly less material than high level reading groups, increasing the gaps in exposure to curriculum content among different reading groups over time. In this way, teachers' early judgments at the beginning of schooling, based in part on preschool experiences, can set the stage for underachievement thereafter. What might be an opportunity to equalize children's life chances is turned into a vehicle for solidifying the status with which they entered school.

Many states have policies that delay the entry of children into kindergarten until they can pass a screening test of school readiness skills (Meisels, 1987). However, if kindergarten is viewed as an opportunity to strengthen students' skills in order to prepare them for first grade, then this policy defeats that goal. Delaying the entry of low-income children and those from backgrounds that may not be able to provide the skills and knowledge valued by schools only sets these children further behind their peers. The primary worthwhile intervention at this stage of development is highly enriched, full-day kindergarten. However, few public schools provide this option.

Elementary Schooling

Researchers studying the academic achievement of children in federally funded programs for low-income, low performing students (Chapter 1 federal programs) found that achievement gaps between white students and Latino and African American students in Chapter 1 schools remain relatively constant across the six elementary grades (Stringfield et al., 1997). This study, known as the *Special Strategies Study*, found that African American students trailed white students on CTBS/4 reading by .71 to .82 standard deviations, while Latino students lagged about one-half standard deviation behind white students on average. Likewise, the 1998 National Assessment of Educational Progress (NAEP) showed similar discrepancies. While 39% of white students in the fourth grade scored at or above Proficient in reading, only 10% of African Americans and 13% of Latinos reached this level (Donahue, Voelkl, Campbell and Mazzeo, 1999). Similarly, African American students remained more than three-quarters of a standard deviation behind white students through elementary school on the mathematics portion of the CTBS/4, while the gap between Latino and white students ranged between one-third and two-thirds of a standard deviation.

One particularly troubling finding from the *Special Strategies Study* was the extent to which low-income students continued to disengage from school throughout the elementary years. Researchers defined disengagement as the downward trajectory of grades for students who initially were high performers. They noted that "the process of disengagement begins at first grade and continues through the sixth grade for high

achieving students of low SES levels [and]... African American students who began third grade at or above the 50th percentile disengage at a significantly faster rate than comparable white students" (Borman et al., 2000, p. 79). It would appear, then, that some of the potentially most academically talented minority students are at great risk of academic failure.

An important predictor in the elementary school years of future academic success is identification and placement in classes for the gifted and talented. Relatively few underrepresented students are placed in these programs (Renzulli, 1997; Callahan, et al., 1994). (See Table 2.3.)

Table 2.3

Percent Participation in Gifted and Talented Classes By Ethnic Group and Percent K-12 Population, 1997

Ethnic Group	Percent of Gifted Population	Percent of K-12 Population
White	76.6	64.0
African American	6.6	17.0
Latino	8.6	14.3
Asian	6.6	3.1
Native American	0.9	1.1

Source: US Department of Education, Office for Civil Rights, 1999.

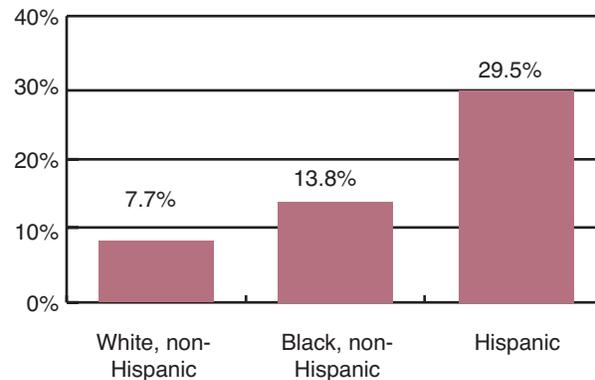
Access to gifted and talented programs in elementary school is important because it predicts placement in high-level math courses in middle school, which determines the level of mathematics a student will be able to complete in high school. Based on analyses of High School and Beyond data, Adelman (1999) concluded that the rigor of the curriculum to which students are exposed is more predictive of long-term academic outcomes than even the powerful variable of family socio-economic status. That is, Adelman argues that the greatest amount of the variance in long-term academic outcomes among ethnic groups can be attributed to the differences in the groups' exposure to high level curricula, most particularly to advanced mathematics. Furthermore, African American and Latino students are least likely to take advanced mathematics courses. Given the important gateway role that classes for the gifted play, many educators have long rued the underrepresentation of minority students in the programs (Figueroa and Ruiz, 1999). The failure to identify and place more minority students in these programs represents another lost opportunity to increase the achievement trajectory of these students.

Secondary Schooling

While grouping practices in elementary school determine to a large extent the breadth and depth of curricula to which students will be exposed, curriculum tracking begins in earnest in the middle school years. Students who are assigned to pre-algebra in the 7th grade and algebra in the 8th grade are on track for a college preparatory

Figure 2.1

High School Dropout Rates in the US, by Race-Ethnicity, 1998



Source: US Department of Education, National Center for Education Statistics, 2000.

curriculum (Adelman, 1999). Those who are held back in more basic mathematics courses will have difficulty catching up and may not be able to complete the college preparatory science prerequisites either. Until recently, most large scale efforts to hold underrepresented students in school and increase their chances of graduating and going on to college have focused on interventions in the high school, when it was usually too late. Middle school has been a long ignored, albeit critical, stage in children's schooling. In fact, recent research suggests that relatively high percentages of dropouts actually begin the process of dropping out in middle school (Rumberger, 2000). Once students enter high school, it is unlikely that their academic achievement will change significantly (Gándara and Bial, 2001).

Despite a long-term trend of increasing school completion in the United States, each year about 5% of all high school students drop out of school (Kaufman et al., 1999). In the 1997-98 school year, 479,000 students dropped out of high school (US Bureau of the Census, 1999). Dropout rates in the US vary widely among major racial and ethnic groups. In 1998, the dropout rates among persons 16 to 24 years old were 7.7% for white, non-Latinos, 13.8 for African American, non-Latinos, and 29.5 for Latinos (US Department of Education, National Center for Education Statistics, 2000). (See Fig. 2.1.)

Fine (1991) has questioned to what extent low-income and underrepresented minority students actually *choose* to drop out of school and to what extent this is a choice made for them — either by a system that is anxious to be rid of them, or by school personnel who are indifferent to their needs so that some students find little point, and few, if any rewards, in staying. There is both a push and pull effect in the phenomenon of exiting school before graduation. Schools push some students out. Pull factors also contribute to disengagement from school. One significant pull factor is primary friendships outside of school, particularly when these friends are school dropouts; students with significant friendships with peers who have left school are more likely to leave school themselves (Epstein and Karweit, 1983; Rumberger, 1981). Another pull factor is employment that intrudes on both time to study and time to attend classes. Students who are employed more than 20 hours per week are at high risk for having lower grades and less engagement with school, which in turn increase their risk of dropping out of school (Steinberg, 1996).

Graduation from high school alone does not ensure that students are prepared to succeed in college. The quality of the high school education also is a critical factor. The particular high school that a student attends can have a significant impact on his or her academic achievement. Schools in more affluent neighborhoods have been shown to provide more rigorous college preparatory and honors courses than schools in lower income communities that largely serve populations of underrepresented students. For example, in a recent study of California schools, Betts et al. (2000) found that the lowest income schools offered only 52% of their classes as meeting college preparatory requirements, while this figure rose to 63% in the highest income schools. Similar patterns held up when the analysis was done by percentage non-white in the school. Likewise, Betts et al. (2000) found that “the median high SES school has over 50% more Advanced Placement (AP) courses than the median low-SES school” (p. 72).

Students who take rigorous AP and honors classes are more likely to score high on college entrance exams, thereby increasing their chances of gaining entry to more selective colleges (Adelman, 1999). For this reason, many of the most successful interventions in the secondary schools have focused on providing underrepresented students with greater access to rigorous coursework through honors and Advanced Placement courses that would otherwise have been closed to them.

The Special Challenges for Limited English Proficient Students

Most students with limited English proficiency also come from low-income homes and confront the same challenges as other underrepresented students. However, additional barriers typically accompany these impediments. A recent study in California—the state with the highest number and proportion of limited English proficient students—showed that these students were the most likely of all students to have a teacher without adequate training as measured by possessing appropriate (or for that matter, any) teaching credentials (Shields et al., 1999). The under-preparation of teachers to serve limited English proficient students has been a longstanding problem in the United States.

Controversies over best methods of instruction have impeded unnecessarily real attention to preparing teachers to meet the needs of these children (August and Hakuta, 1997; Gándara and Maxwell-Jolly, 2000). However, the problem has become more urgent as these students have come to form a larger percentage of the school-age population. While comprising about 6% of students nationwide, they currently account for fully one-fourth of all students in California schools (Rumberger and Gándara, 2000).

In addition to under-prepared teachers, most limited English proficient students face classrooms that either do not take their language needs into account or are structured to provide an impoverished curriculum that often does not prepare them to succeed academically or meet the requirements for high school graduation or college admission (August and Hakuta, 1997; Olsen, 1999; Ruiz-de-Velasco and Fix, 2000). The Prospects Study (Puma et al., 1997), a federally mandated study of student achievement, found that limited English proficient students scored consistently lower than all other children on achievement tests, even when compared to students at similar high-poverty levels. Even highly competent limited English proficient students, who may have mastered the grade-level curriculum in their primary language, can find themselves unable to pass English tests and gain access to the classes they need to graduate from high school or attend college (Minicucci and Olsen, 1992). Disenfranchised and discouraged, they frequently drop out of school altogether (Steinberg et al., 1984; August and Hakuta, 1997). Ironically, research has shown that many of these students—immigrants and children of immigrants—are among the most ambitious and high-aspiring students in our schools (Suárez-Orozco and Suárez-Orozco, 1996; Rumbaut, 1996). Olsen and Jaramillo (1999) have described specific efforts to address the special needs of limited English and immigrant students, but they also concede that relatively little attention has been paid to this increasingly large K-12 population.

Table 2.4

Percent of college students enrolled in two-year colleges, by race/ethnicity: 1976 and 1996

Race/ethnicity	1976	1996
White	33.9	36.8
Asian	39.9	39.4
African American	41.5	41.5
Latino	54.7	56.0
Native American	54.0	51.0
All	35.3	38.7

SOURCE: Almanac of Higher Education, 1998-99; Chronicle of Higher Education, 1999.

College

In 1997, a little more than two-thirds of all high school graduates had enrolled in some college by the time they were 24 years of age. However, the rates at which different racial and ethnic groups enroll in college vary. More than 67% of white high school graduates enroll by age 24, but 60% of African Americans and only 54% of Latinos do so (Wilds, 2000).

Community colleges are pivotal in the pipeline problem for underrepresented students. URMs are more likely than mainstream students to attend community college, and they are also less likely to transfer to a four-year college (Cohen, 1993). The problem of community college transfer is often decried, but recent data on actual transfer rates do not exist. Cohen (1993) found that less than one-fourth of community college students actually transferred to four-year colleges or universities within four years, using national cohort data from the mid-1980s. Looking specifically at three key states with large community college populations (California, Illinois, and Texas), he found very similar patterns. In California, the state with the highest percentage of students attending community colleges, event transfer rates have actually declined over the 1990s, only recently beginning to rebound at the end of the decade (CPEC, 2001). Thus, the patterns of transfer observed in the 1980s appear to be similar, or even somewhat eroded over the period. In Cohen’s study, approximately twice as many students obtained 12 or more credits in community college than actually transferred, raising an important question about the serious drop off of college bound students.

Latinos and Native Americans, in particular, attend community college in much higher percentages than white or Asian students (See Table 2.4). While a little more than one-third of all college students attend two-year institutions, more than half of all Latino and Native American students are found in these institutions (Chronicle of Higher Education, 1999). One primary mission of the community colleges is to provide low-cost, easy, and local access to postsecondary education for students who might not otherwise be able to attend because of limited resources or inadequate preparation for a four-year college. However, these colleges can also divert students off the path to an undergraduate degree (Rendón and Garza, 1996). Burton Clark first identified the “cooling out” function of two-year institutions, citing the multiple ways in which they can dampen, rather than encourage, aspirations of low income youth through organizational, cultural, and curricular features that may fail to meet the needs and expectations of students (Clark, 1980).

Table 2.5

Percent of 25 – 29 Year Olds with BA degrees, by Race-Ethnicity, 2000

Ethnic Group	Percent with BA
Asian	53.9
White	34.0
African American	17.8
Latino	9.7

Source: US Census Bureau Data, 2000

In attempting to explain the failure of many underrepresented students to transfer, Rendón (1994) described the critical importance of *validation* for first-generation college students. Validation is the integration of the student into the life of the college through supportive, personal, human connections that send the message “you belong here.” Rendón identified the lack of such validation as a critical factor in feelings of alienation that result in students dropping out of two-year colleges. Because first-generation college-going students are much more likely than others to need this validation, Rendón

concluded that its absence is a major contributing factor to their failure to persist. Moreover, exposure in the community colleges to a greater number of peers who lack both personal validation and a clear focus than would be the case in four-year colleges cannot be discounted as a factor in the derailing of degree aspirations.

This enormous leakage from the pipeline has particular consequences for the health professions. Community colleges represent an important avenue to many health professional opportunities, through the AA degree and other certifications, as well as in their transfer function.

The current status of college attendance among minorities represents a process of "catching up" after major downturns in these indicators in the 1980s. During the 1960s and 1970s, the nation made significant progress in increasing the college-going rates for underrepresented youth and diversifying the nation's colleges and universities. However, the 1980s represented a period of decline in college-going rates for URM (Wilds, 2000). Only in the 1990s did colleges begin to regain lost ground. While 33.5% of African American high school graduates between ages 18 and 24 were enrolled in

Table 2.6

Bachelor's Degrees Conferred By Degree-granting Institutions

	Total	White, non- Hispanic	Black, non- Hispanic	Hispanic	Asian/ Pacific Islander	American Indian/ Alaskan Native
1976-77	917,900	807,688	58,636	18,743	13,793	3,326
1978-79	919,540	802,542	60,246	20,096	15,407	3,410
1980-81	934,800	807,319	60,673	21,832	18,794	3,593
1984-85	968,311	826,106	57,473	25,874	25,395	4,246
1986-87	991,264	841,818	56,560	26,988	32,624	3,968
1988-89	1,016,350	859,703	58,078	29,918	37,674	3,951
1989-90	1,048,631	884,376	61,063	32,844	39,248	4,392
1990-91	1,081,280	904,062	65,341	36,612	41,618	4,513
1991-92	1,129,833	936,771	72,326	40,761	46,720	5,176
1992-93	1,159,931	947,309	77,872	45,376	51,463	5,671
1993-94	1,165,973	936,227	83,576	50,241	55,660	6,189
1994-95	1,158,788	913,377	87,203	54,201	60,478	6,606
1995-96	1,163,036	904,709	91,166	58,288	64,359	6,970
1996-97	1,168,023	898,224	94,053	61,941	67,969	7,409
1997-98	1,183,033	900,317	98,132	65,937	71,592	7,894

SOURCE: U.S. Department of Education, National Center for Education Statistics, Higher Education General Information Survey (HEGIS), "Degrees and Other Formal Awards Conferred" surveys, and Integrated Postsecondary Education Data System (IPEDS), "Completions" surveys. <http://www.nces.ed.gov/pubs2001/digest/dt265.html> (access date 6/14/01)

post-secondary institutions (both two- and four-year) in 1976, it was not until 1992 that African American students again enrolled at an equivalent rate. By 1997, almost 40% of African Americans in the traditional college-age group were enrolled in college. On the other hand, Latinos took longer to regain the college-going rate that characterized this group in the 1970s. In 1997 Latinos had only finally returned to the level of enrollment that was

equivalent to 1976 (35.8% in 1976 versus 36.0% in 1997). During these two decades, the overall Latino population more than doubled (US Department of Commerce, 2000). In contrast, 45% of whites in the same age group enrolled in college in 1997, compared to just 33% in 1976 (Wilds, 2000).

The disparities between racial and ethnic groups are even greater with respect to college completion. Census Bureau data show that twice as many whites in the 25 – 29 year old age cohort have a BA degree than African Americans, and Asians are more than five times as likely to complete a degree as Latinos (See Table 2.5).

Conclusion

Racial and ethnic disparities in educational achievement are apparent at the earliest educational stages. Gaps between racial and ethnic groups on early indicators such as reading and math readiness in kindergarten not only persist but widen over subsequent educational stages, eventually culminating in much higher high school dropout rates and lower college attendance and graduation rates among URMs. These trends have important effects on the pool of URM students eligible to apply to health professions schools. Health professions programs that enroll students at the college level (e.g., nursing programs) face a “feeder” educational pipeline characterized by rates of high school dropout for African Americans that are double that for whites, and dropout rates for Latinos that are four times greater than those for non-Latino whites. Moreover, those URMs graduating from high schools are much less likely than non-URMs to have experienced challenging, college-preparatory curricula. For health professions schools occurring at the graduate level (e.g., medicine, dentistry, pharmacy), the college pipeline produces a rate of baccalaureate degrees that is twice as high for whites as for African Americans and Latinos. In view of these profound disparities in educational achievement throughout the educational pipeline, it is hardly surprising to find that African Americans and Latinos are extremely underrepresented in health professions schools.

However, not all the trends in educational achievement for URMs are so bleak. The numbers of African Americans and Latinos who graduate from college, while still much lower than that for non-Latino whites, have been steadily increasing in recent years. In particular, the combination of increasing rates of college graduation among Latinos and the rapid recent growth in the Latino population in the US means that more and more Latinos are graduating from college as indicated in Table 2.6. Although the overall growth in the African American population in the US has been much slower than that for the Latino population, nonetheless there has also been an increase in the number of African Americans graduating from college in the past decade. Thus, although “leakage” of URMs at earlier stages of the educational pipeline leads to a relatively shallow pool of URM students eligible to apply to health professions schools, the pool is in fact slowly growing. In the next chapter, we examine trends in applicants, matriculation, and enrollment of URMs in health professions schools to see whether these trends in college graduation are mirrored in trends for health professions schools.

In this chapter, we analyze trends in URM enrollment in schools across a variety of health professions over the past decade. The chapter summarizes data that are available in more detail in our report prepared for the 2001 Herbert Nickens Symposium on Diversity in the Health Professions (Grumbach et al., 2001).

Entry of URMs into the health professions is contingent on four key factors:

1. A pool of URM students academically qualified for demanding health professions school curricula;
2. Interest and motivation among students in this academically qualified pool to apply to health professions schools;
3. URM applicants successfully competing with non-URM applicants to gain entry to health professions schools; and
4. URM students accepted by health professions schools successfully matriculating and graduating from these schools.

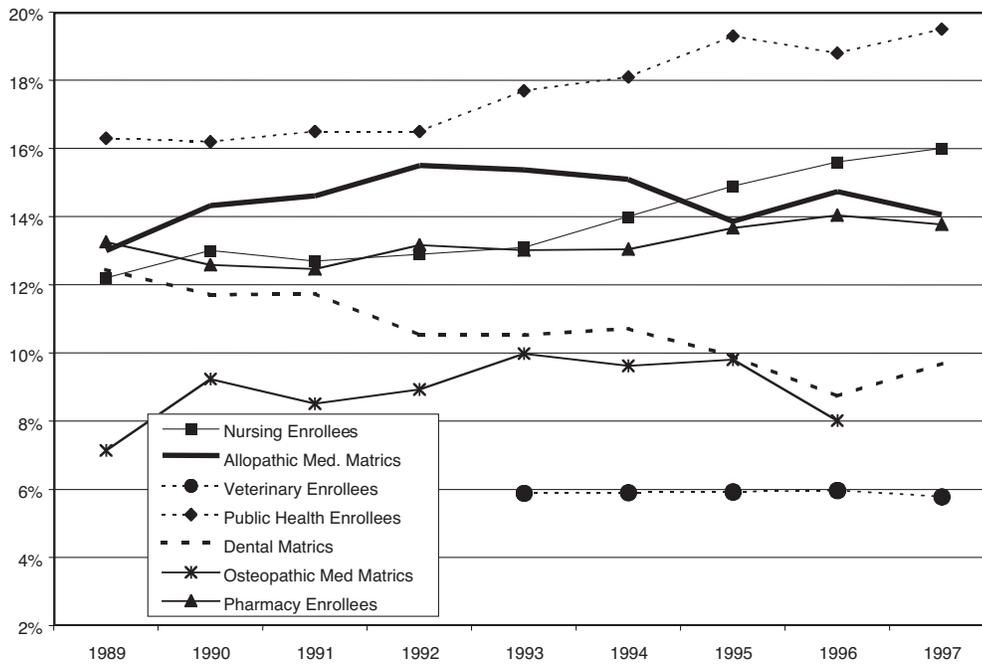
As noted in Chapter Two, URM achievement in the pre-health professions school stages of education obviously exerts a major influence on the first of these factors, the size of the URM pool eligible to apply to health professions schools. However, the three other factors listed above are also key influences on the changing status of URM participation in health professions schools.

URM trends in matriculants and enrollees over the past decade differ across the health professions (See Fig. 1). Nursing, public health, and pharmacy have seen a modest but steady rise in the proportion of matriculants and enrollees who are URMs. Other professions, such as allopathic and osteopathic medicine, experienced initial increases followed by decreases in the late 1990s. Dentistry, in contrast, is a profession with a steady decrease in the proportion of URM matriculants over the entire decade. All health professions fall well short of “population parity” measured against the proportion of URMs in the overall US population; according to 2000 US Census data, African Americans, Latinos, and Native Americans constitute 26% of the US population.¹

The number of URMs matriculating is a function of three components: the number of URMs applying, the proportion of URM applicants accepted, and the proportion of the accepted students who matriculate. These dynamics differ for each profession in producing the patterns shown in Figure 1.

¹ US Census Bureau, Census 2000 Brief, *Overview of Race and Latino Origin 2000*, issued March 2001 <http://www.census.gov/population/www/cen2000/briefs.html>. The US Census separates race from “Latino or Latino” origin. For our purposes we combined Latino or Latino origin (12.5%), with African American or African American (12.3%) and Native American or Alaska Native (.9%). Because of this, the statistic may be slightly inflated because of African Americans or African Americans and Native Americans who are of Latino or Latino origin.

**Figure 1: URMs as % of Matriculants or Total Enrollees
All Professions**



Allopathic Medicine

Medical schools accredited by the Licensing Council for Medical Education (often referred to as allopathic medical schools) experienced a rise and fall in the percentage of matriculants who are URMs, reaching a high of 15.5% in 1994 before falling to 13.8% in 2000. The diminishing number of URMs matriculating into allopathic medical schools is due to both a fall in the number of URM applicants and a decrease in the rate of URM applicants being accepted (See Fig. A-1). There were 6,663 URM applicants in 1996, but only 5,511 by 2000 (a 17% decrease). The large decrease in URM applicants parallels the trend for non-URMs, which dropped from 40,304 to 31,581 (a 22% decrease) during the same time period.

While the number of both URM and non-URM applicants decreased in the later 1990s, trends in acceptance rates for URM and non-URM applicants diverged during this period. Acceptance rates for URM applicants stagnated in the late 1990s, while acceptance rates for non-URMs began to increase in response to declining numbers of applicants. By 1999, acceptance rates for URM applicants had fallen below those for non-URMs (See Fig. A-2).

Fig. A-1: Allopathic Medical School URM trends

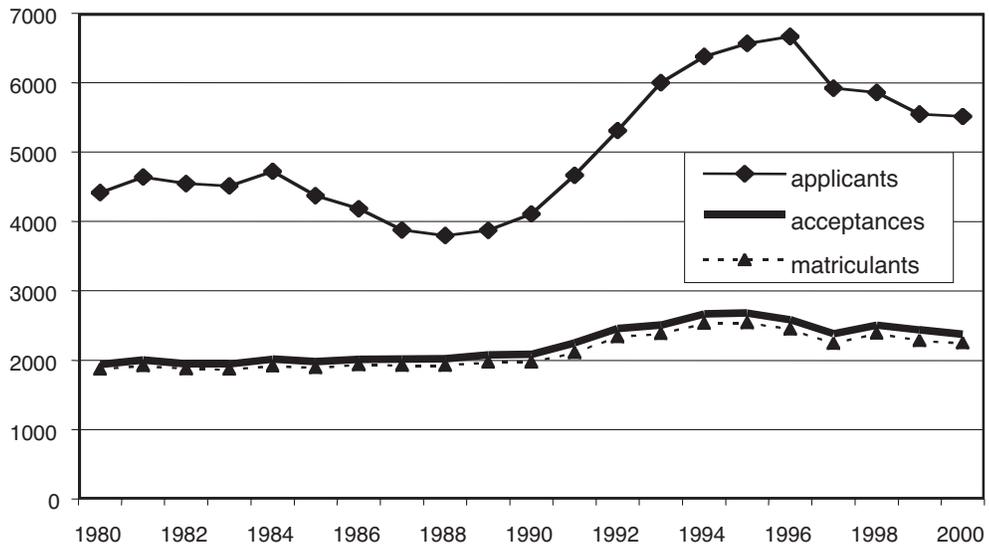
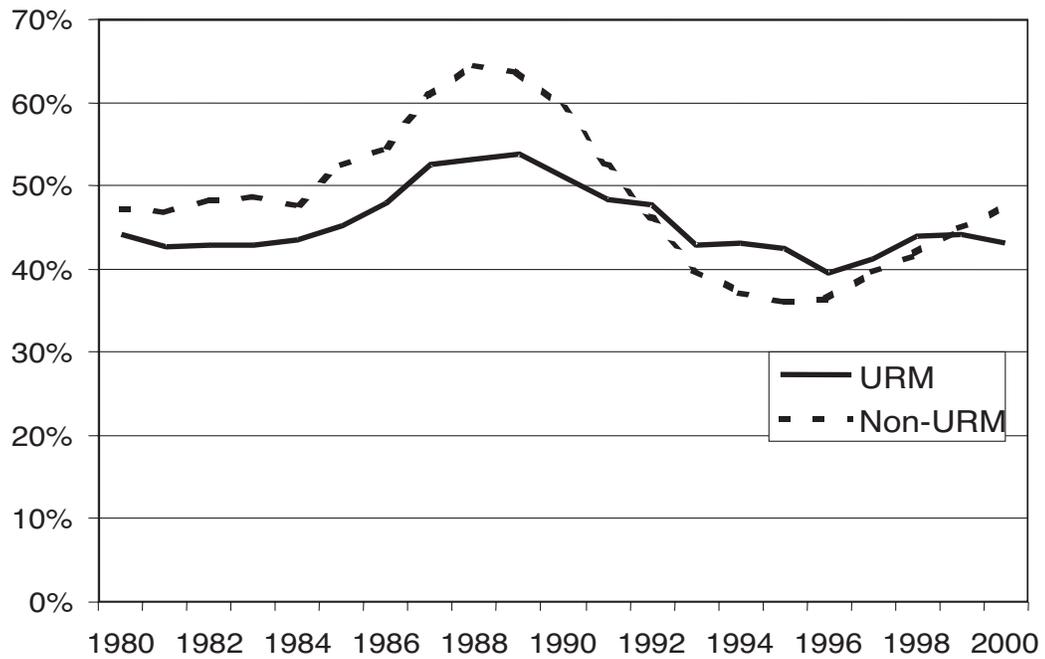
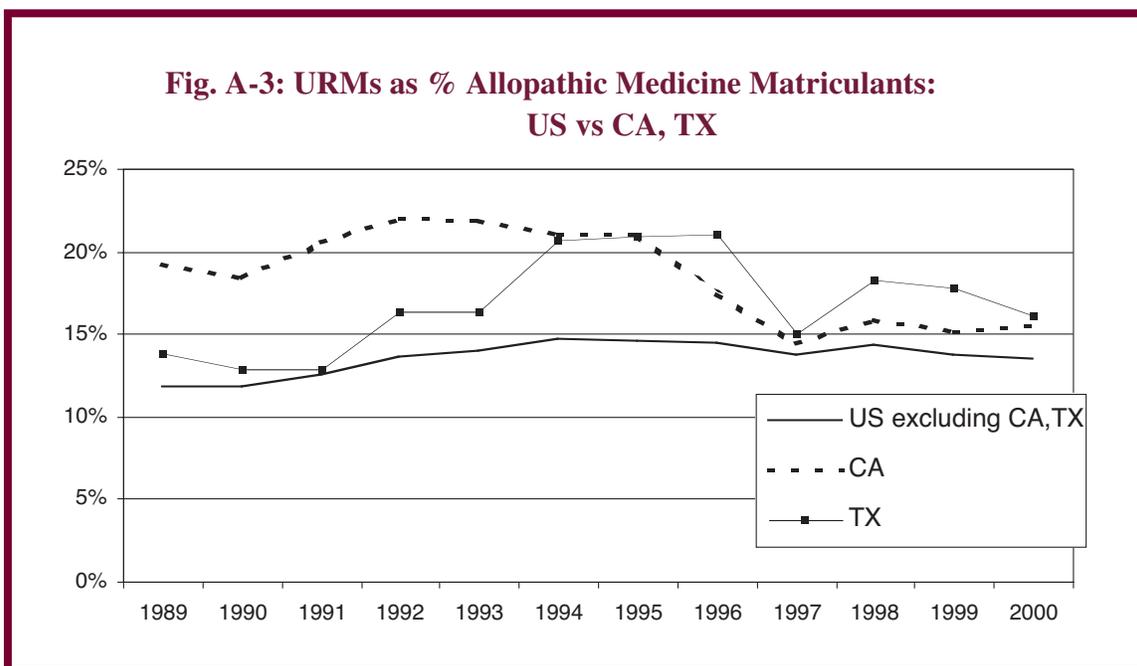


Fig. A-2: Allopathic Medicine Acceptance Rates



Restrictions on the ability of admissions committees to use race and ethnicity as special considerations in evaluating applicants were felt most heavily in California and Texas in the late 1990s, following the UC Regents policy decision on admissions and Proposition 209 in California and the *Hopwood v. Texas* US Circuit Court decision affecting Texas and neighboring states. Medical schools in California and Texas experienced much larger decreases than the nation's remaining schools in the proportion of URMs in entering classes in the late 1990s. In California, the percentage of matriculants who were URMs decreased from a high of 21.9% in 1992 to 15.6% in 2000. In Texas, URMs dropped from 21.0% of matriculants to 15.6% in 2000 (Fig. A-3). These numbers are especially disturbing because of the high proportion of minorities in California and Texas. To reach population parity, California would need 40% of matriculants to be URMs, and Texas would need 43%. In the rest of US, excluding California and Texas, the percentage of matriculants who were URMs decreased much less substantially, from 14.4% in 1996 to 13.4% in 2000 (See Fig. A-3). Thus, most of the overall decline in URM matriculation in medical schools in the US is accounted for by the decreases in California and Texas. In 1995, California and Texas were educating 18.0% of all URMs matriculating in allopathic medical schools in the US. By 2000, the figure was 15.5%.

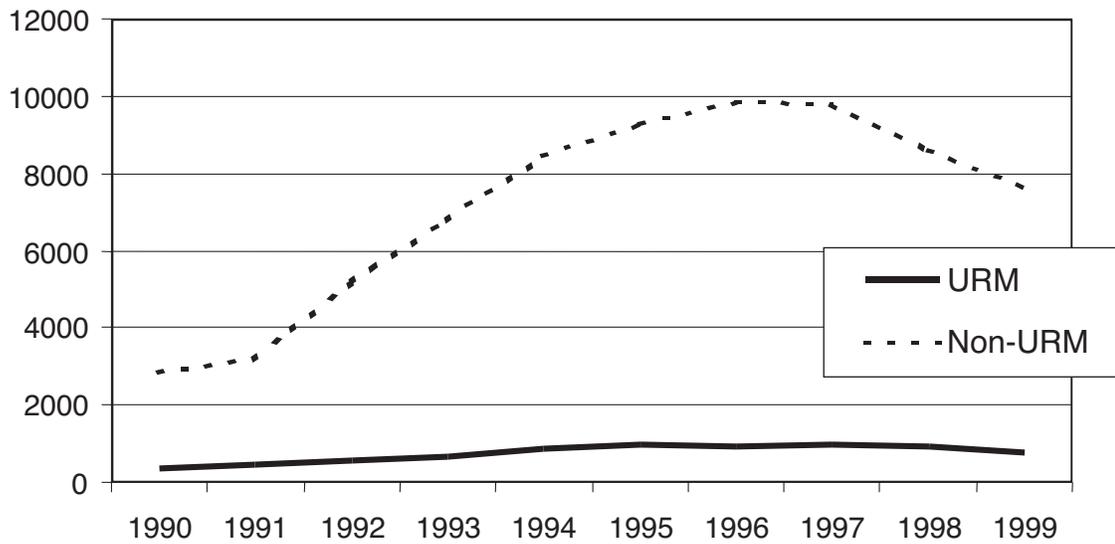


Osteopathic Medicine

Osteopathic medical schools have one of the lowest proportions of URM matriculants among the health professions (See Fig. 1). The trend in URM matriculants in osteopathic medical schools in the 1990s follows the same “rise and fall” pattern of allopathic schools, although the proportion of URMs in entering osteopathic medical school classes is only about half of that in allopathic schools throughout this decade.

One of the most striking health professions school trends in the 1990s was the surge in the total number of applicants to osteopathic medical schools. While the number of applicants to allopathic medical schools approximately doubled in the early 1990s, the number of overall applicants to osteopathic medical schools grew by nearly 350% (See Fig. O-1). The growth in the number of non-URM applicants outpaced that of URMs. The number of applicants to osteopathic schools fell off in the late 1990s, but not to the same degree as allopathic applicants.

Fig. O-1: Applicants to Schools of Osteopathy



As a result of the increasing number of applicants to osteopathic programs, the matriculation rates (that is, the percentage of applicants to osteopathic schools who matriculated in an osteopathic school) fell steeply in the early 1990s, especially for non-URMs. By 1995, the matriculation rate for URMs was about the same as that for non-URMs (See Fig. O-2). However, as was the case for allopathic medicine, matriculation rates for non-URMs—but not for URMs—started to increase in the late 1990s as applicants declined.

**Fig. O-2: Osteopathic Medical Schools:
% of applicants matriculating**

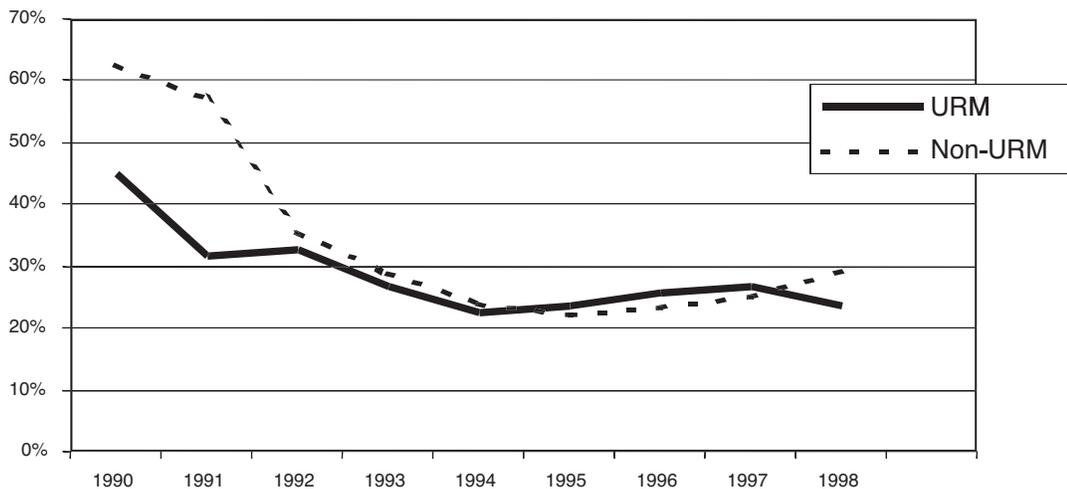
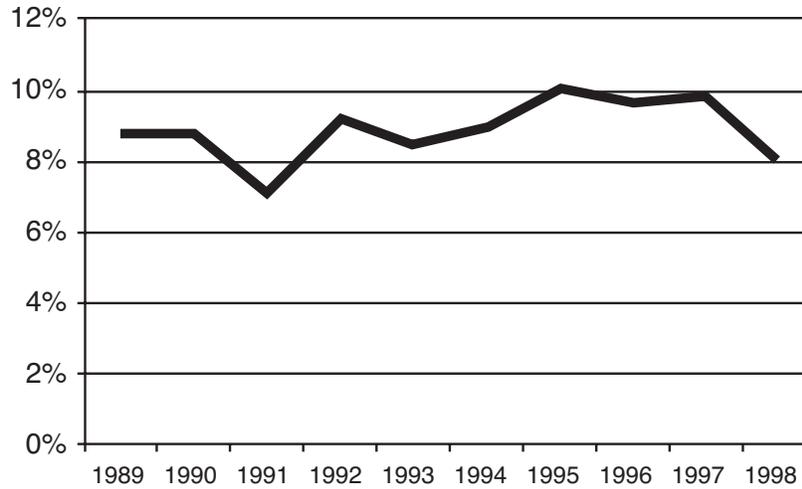


Fig. O-3: URM as % Osteopathic Matriculants



The net result in terms of URM as a percentage of osteopathic matriculants follows many of the same dynamics as observed for allopathic schools. In 1989 URM represented 8.8% of osteopathic matriculants, peaking at 10.0% in 1995, and fell to 8.0% in 1998 (Fig. O-3).

Dentistry

Dentistry is the only major health profession that experienced a steady decrease throughout the 1990s in URM as a proportion of matriculants.

Dental schools experienced a surge in the overall number of applicants in the 1990s,

Fig. D-1: Dental School Applicants

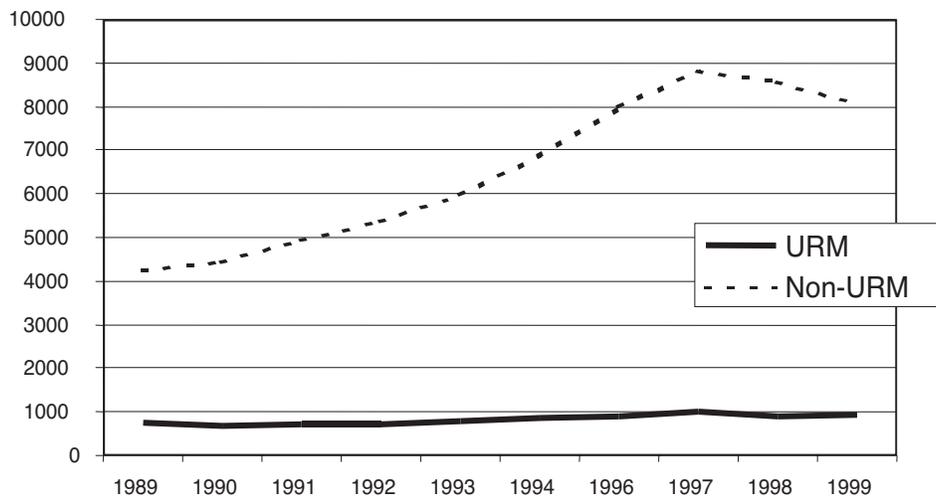
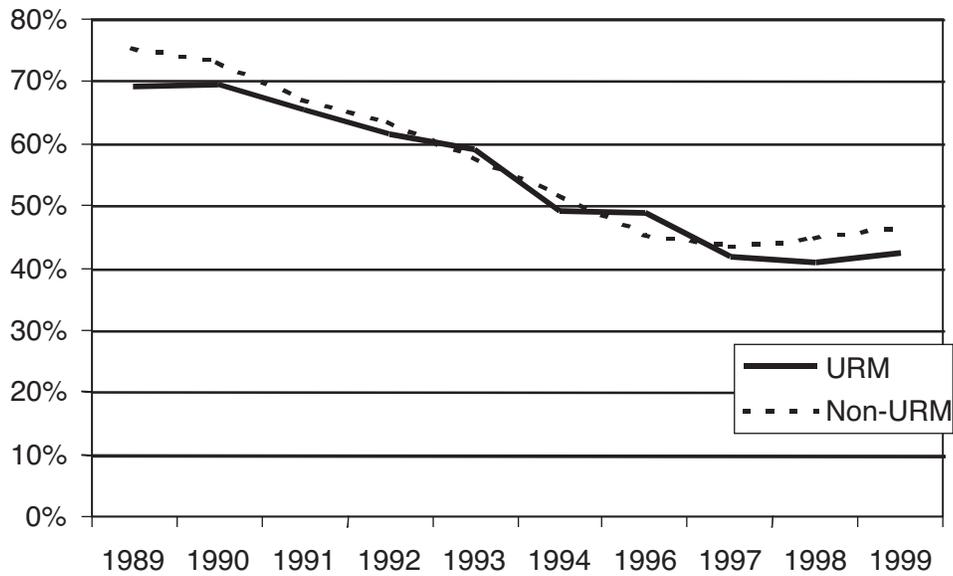


Fig. D-2: Matriculation Rates for Dental Schools



with only a slight fall off in the past few years (Figure D-1). Between 1989 and 1999, the number of non-URM applicants to dental schools increased by 90%, from 4,238 to 8,057. However, the number of URM applicants did not increase proportionally, rising only 26%, from 758 to 953 (See Fig. D-1).

Unlike the situation for allopathic and osteopathic medicine, dentistry started the 1990s with equivalent matriculation rates for both URM and non-URM applicants. The matriculation rates for URM and non-URM followed symmetrical trends through the 1990s, with both dropping steadily as a result of the surge in total number of applicants (See Fig. D-2). Because the number of non-URM applicants increased by a much larger degree than the number of URM applicants, equivalent matriculation rates among URM and non-URMs led to fewer URM matriculants and more non-URM matriculants. URM as a percentage of dental school matriculants fell steadily through the 1990s, from 14.1% in 1989 to 9.7% in 1999 (See Fig. D-3).

As in the rest of the US, in California and Texas the proportion of URM matriculating decreased through the 1990s (Fig. D-4). California's exceptionally low proportion of URM fell from 6.7% to 3.6%. California's population consists of 40% URM, meaning that the percentage of URM dental students in California in 1999 was ten times below population parity.

Fig. D-3: URM as % Dental School Matriculants

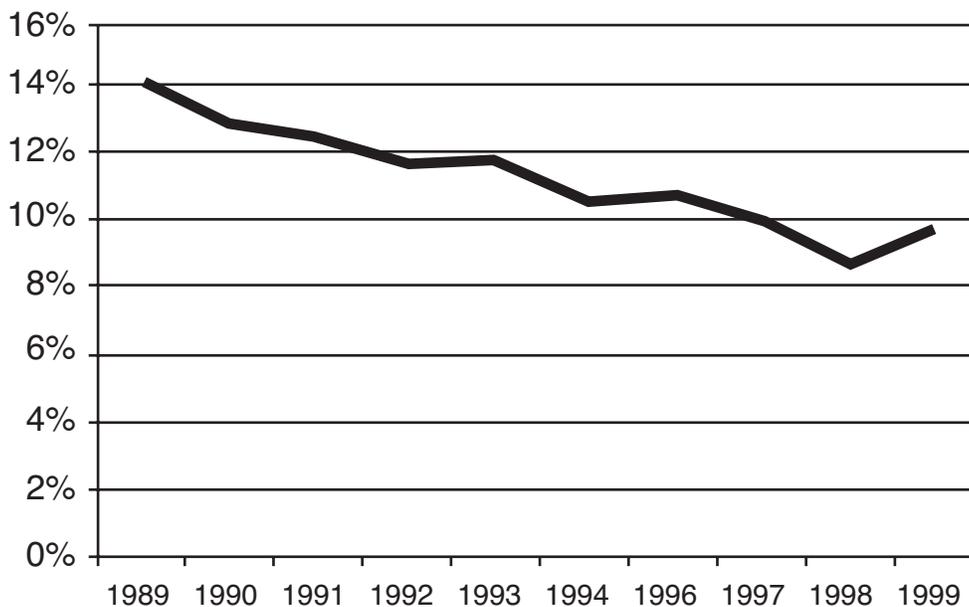
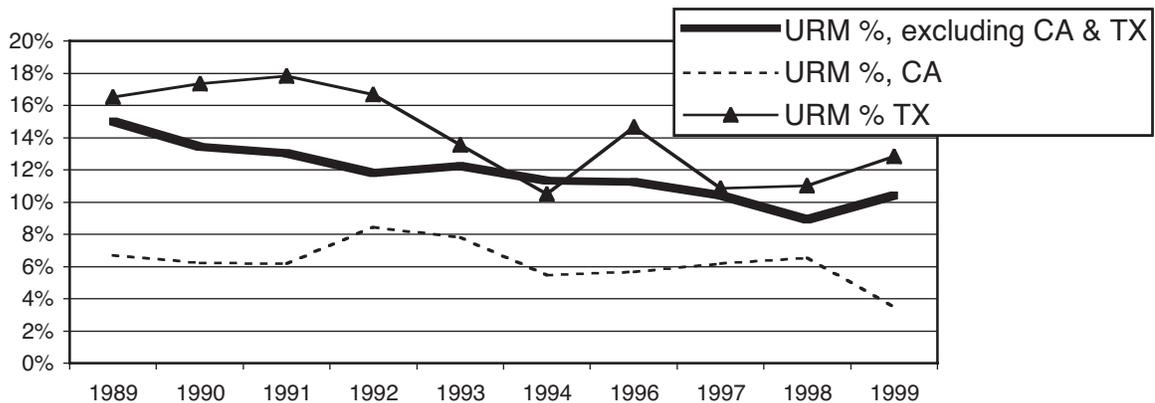


Fig. D-4: URM as % Matriculants: CA & TX vs all other US



Pharmacy

Limited data are available for pharmacy schools, but the available data do indicate that URM enrollment in pharmacy schools has had a modest but steady growth through the 1990s (See Fig. P-1). The number of URM enrolled in pharmacy schools (both in BS and Pharm.D. programs) increased by 19%, from 3,306 in 1990 to 3,939 in 1999 (See Fig. P-1). URM as a percentage of total enrollment increased from 12.5% in 1990 to 13.8% in 1999 (See Fig. P-2). Data on unduplicated counts of applicants are not available to analyze applicant trends.

Fig. P-1: Pharmacy School Total Enrollment

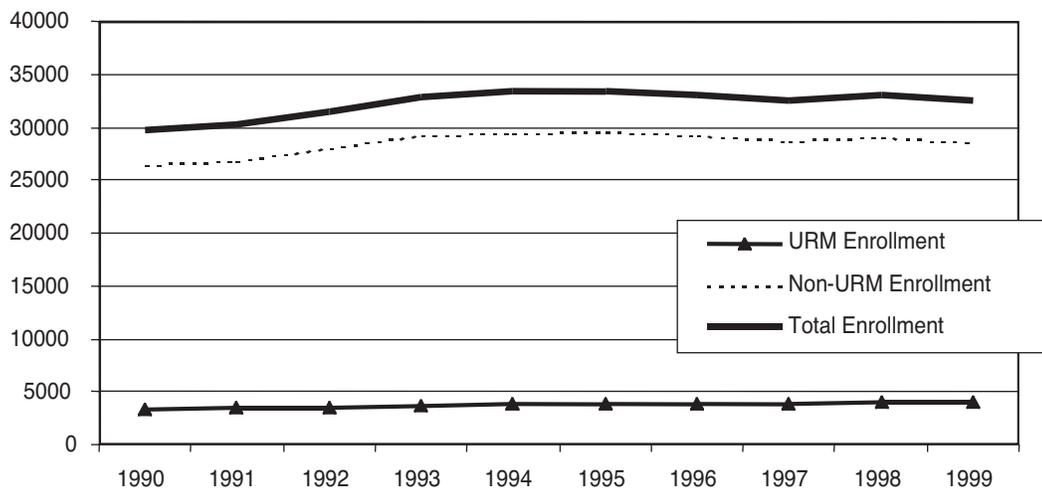


Fig. P-2: URM as % of Pharmacy School Total Enrollment

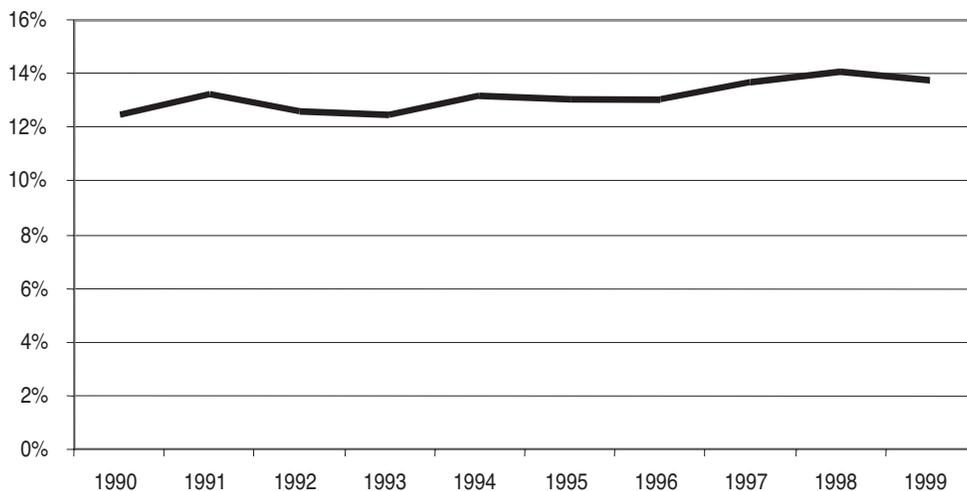
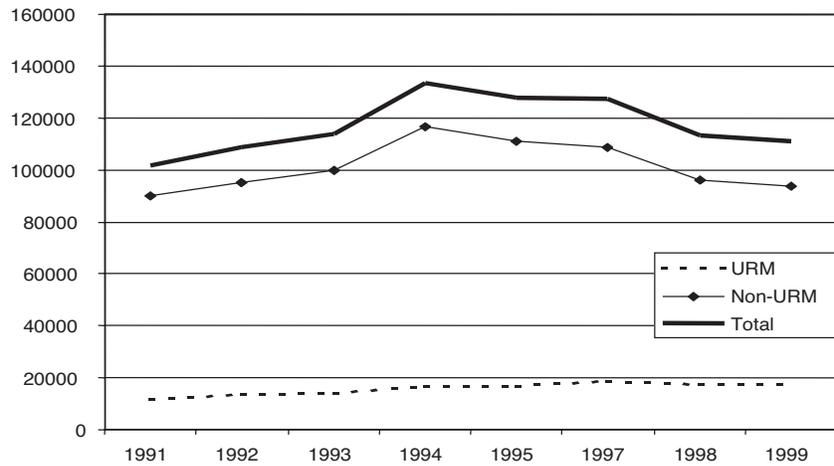


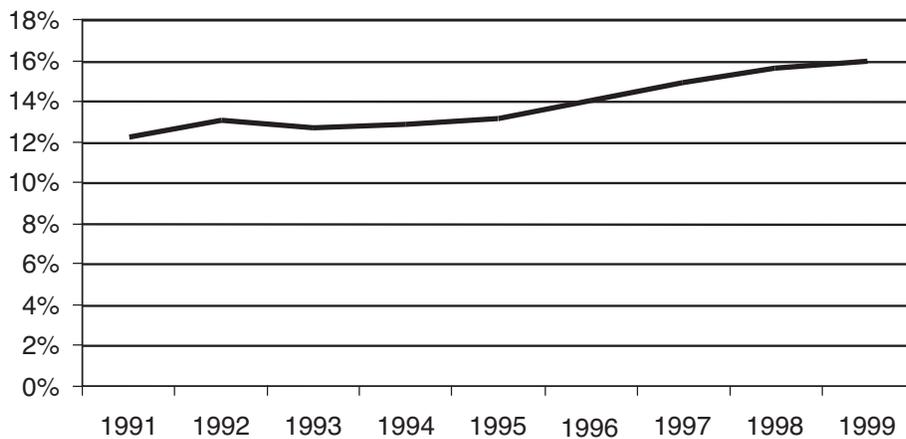
Fig. N-1: Enrollment in US Baccalaureate Nursing Program



Nursing

Of the health professions analyzed, nursing is the only field that does not require a graduate degree for initial licensure for practice. Nursing has a unique opportunity for diversification because of the many educational entry points to the profession. Pre-licensure education is available both at the associate and bachelors level. Of all the clinically-oriented health professions studied, nursing has exhibited the most sustained increase in the proportion of URM students and now has the highest proportion of URM enrollees of any health profession other than public health.

Fig. N-2: URMs as % of Nursing Enrollment in Baccalaureate Nursing Programs



There has been a steady increase in URM enrollment in baccalaureate nursing programs between 1991 and 1999 (See Fig. N-1). URM enrollment increased 48%, from 11,661 to 17,303. This contrasts with a large decrease in non-URM enrollment that began in the mid-1990s. Because of this decrease in the late 1990s, non-URM enrollment increased a modest 5% between 1991 and 1999, from 89,800 to 93,883. The steady increase in URM enrollment and the minimal increase in non-URM enrollment resulted in a growing percentage of URMs in baccalaureate nursing programs (Fig. N-2), rising from 12.2% to 16.0%.

State policies curtailing affirmative action do not appear to have affected nursing enrollment in California. Figure N-3 shows that the proportion of URMs enrolled in nursing programs in California (including both associate degree and baccalaureate degree programs) continued to increase even after the 1996 events, although the rate of growth slowed after 1995. URMs as a proportion of enrollees increased from 15.8% in 1991 to 22.2% in 1997. The persistent gains in URM enrollment in California, despite Proposition 209, may be because most basic nursing education in California is done at the Community College level rather than through University of California schools or California State University Campuses. Seventy-two percent of first-year nursing enrollees in 1998 were enrolled at the associate degree level. At California Community Colleges the admissions process differs from other institutions, in that there is not an admissions committee selecting the most “qualified” or well-prepared applicants. Once applicants to a California Community College meet minimum criteria, positions are allocated either by waiting lists or by a “lottery system”. This admissions process was not affected by Proposition 209.

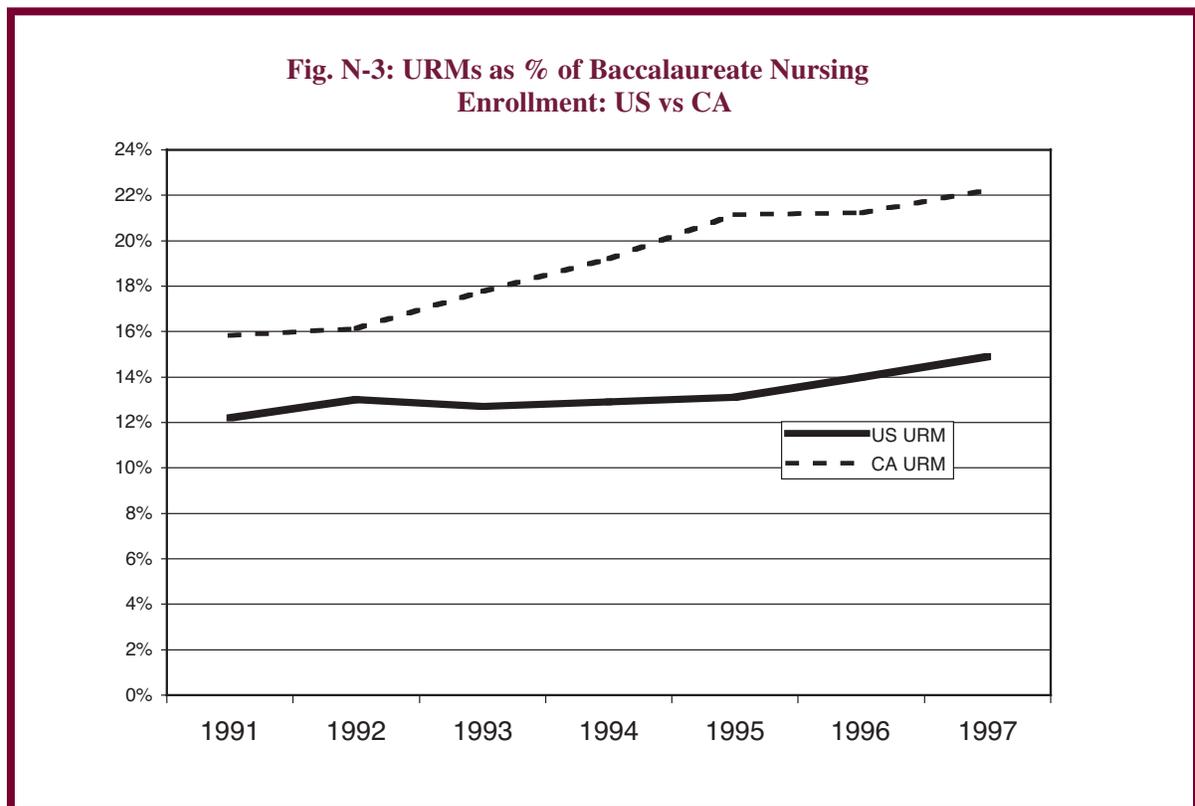
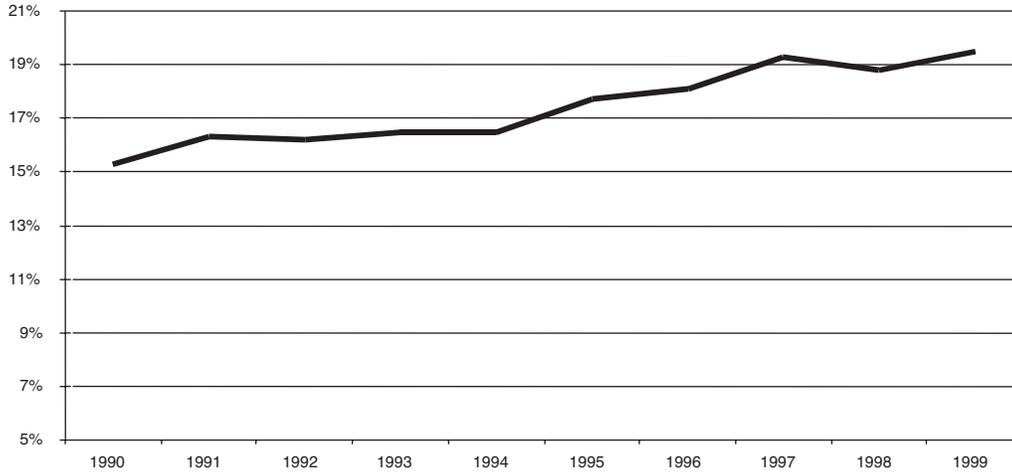


Fig. PH-1: URM as % of Public Health Applicants



Fig. PH-2: URM as % of Schools of Public Health Students



Public Health

Public health programs have the highest proportion of URM applicants and enrollees of the health professions. Figure PH-1 shows that through the 1990s, URM represented 19-21% of applicants to public health programs. The proportion of URM in public health programs has been consistently higher than other health professions, and the percentage has been steadily increasing (See Fig. PH-2). URM represented 15.3% of public health students in 1990 and 19.5% in 1999.

Fig. V-1: URM as % of Veterinary School Applicants

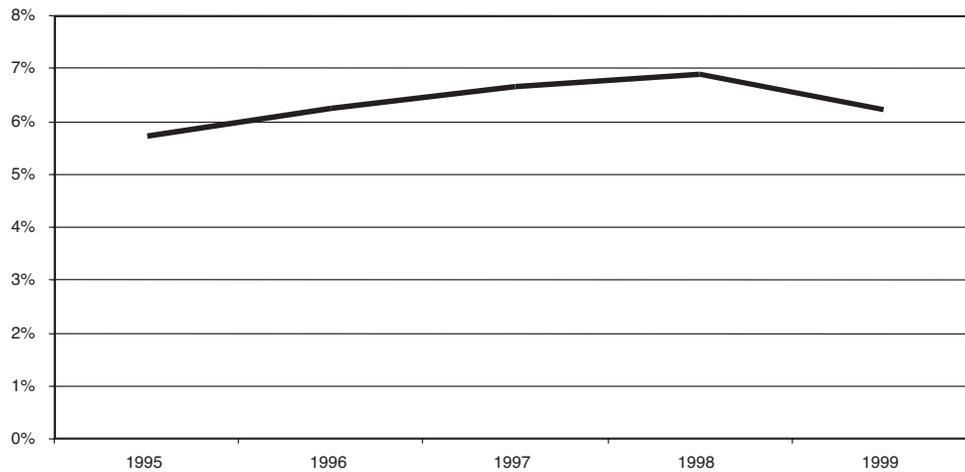
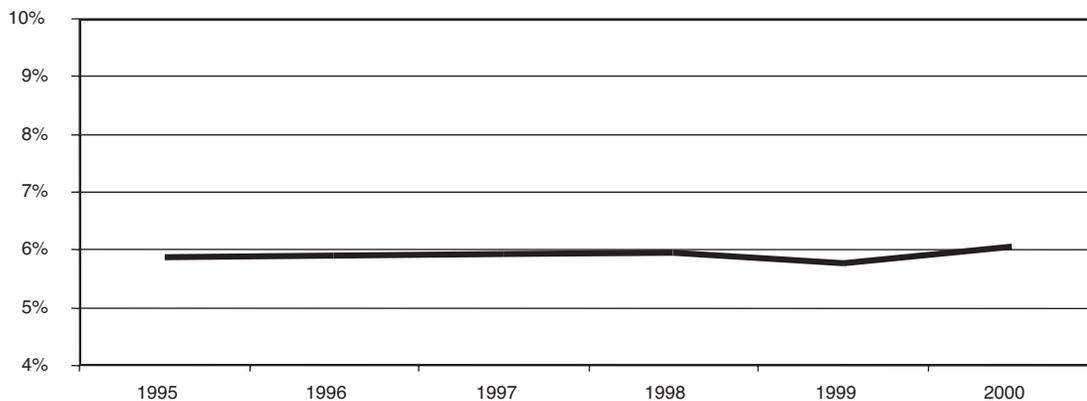


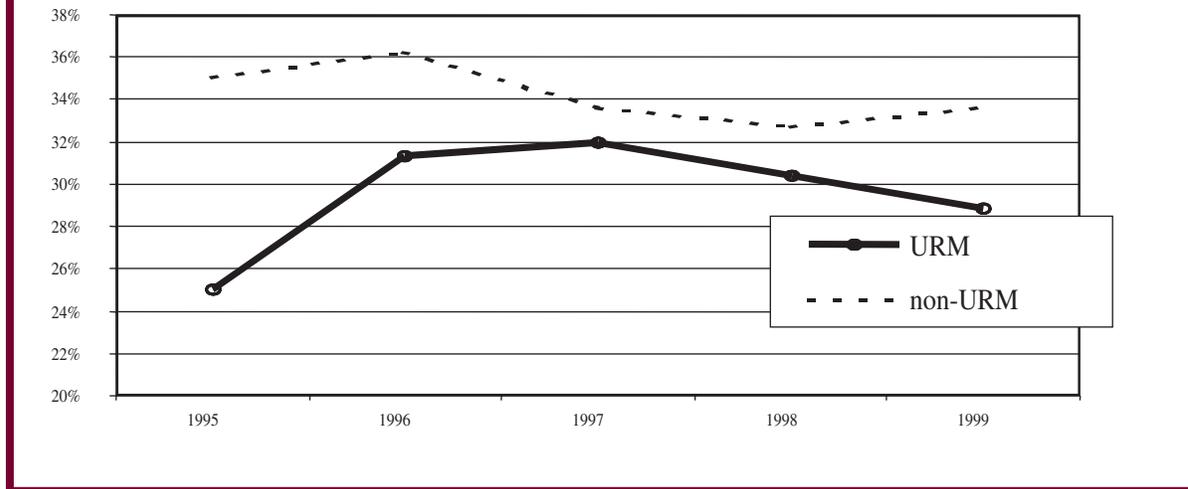
Fig. V-2: URM as % of Enrolled Veterinary Students



Veterinary Medicine

Veterinary medicine has been called “the health profession serving the most diverse patient population.” Veterinary medicine has the lowest proportion of URM applicants, accepted students, and enrollees of the health professions. Figure V-1 shows that in the last five years, approximately 6-7% of veterinary applicants have been URM. The application trends have held steady for the last five years. (Data were not available for the early 1990s.) Enrollment trends have also held fairly steady through the last five years, with URM representing approximately 6% of veterinary students (See Fig. V-2).

Fig. V-3: Veterinary Acceptance Rates



Veterinary medicine has one of the lowest overall acceptance rates of any health profession. In 1995, the acceptance rate for non-URMs was 35%, while the acceptance rate for URMs was 25% (See Fig. V-3). Acceptance rates converged in the 1995-1997 period. However, as was the case for allopathic and osteopathic medicine, acceptance rates for non-URMs, but not for URMs, started to increase again in the late 1990s, suggesting that admissions decisions may have become less favorable towards URMs in recent years.

Conclusion

Disparities in the racial and ethnic composition of the student body of health professions schools continue to exist for all the health professions studied. However, URM matriculation and enrollment does not follow a single trend for all the health professions. While some professions have made improvements, moving closer to racial and ethnic parity with the US population, others seem to be losing ground. Also, some professions have been more successful than others in attracting URM applicants during cycles of rising and lowering popularity of the profession among students overall.

As noted in Chapter 2, the problem of basic educational disparities that results in a shallow pool of URM students eligible to pursue health professions education is a limiting factor for producing large gains in URM enrollment in the health professions. However, the recent decrease in URM applicants and matriculants in medicine and several other post-baccalaureate level health professions cannot entirely be attributed to more "upstream" problems in college graduation rates for URMs. The number of URMs graduating from college in fact increased throughout the 1990s (See Chapter 2, Table 2.6).

What explains this divergence in the late 1990s between trends in the number of URM college graduates and the number of URM applicants to medicine? One explanation may be that URMs are graduating from college less prepared for medical school and are therefore less likely to apply. An alternative explanation is that, like many non-URM college

graduates, a shift is occurring in the career aspirations of URM college graduates to professions other than medicine. In the current health care environment, medicine may be losing some of its prestige, desirability, and financial return on educational investment compared with other health professions and with careers entirely outside of the health professions.

Analysis of educational trends in the 1980s led some observers to conclude that there was little to be gained by more active “marketing” of the health professions to URM college students because such a high proportion of academically qualified college URM students were already applying to medical school or other health professional and biomedical research programs (Nickens and Ready, 1994). The recent divergence between URM college graduation trends and application trends for medicine suggests that this situation has changed and that greater promotion of the health professions to URM college students may have merit.

Although trends in the number of applicants is an important influence of trends in URM matriculation and enrollment in health profession schools, admissions decisions and other factors affecting the likelihood on an applicant being accepted remain another key determinant of matriculation and enrollment trends. In allopathic medicine, osteopathic medicine, dentistry, and veterinary medicine, there is evidence that in recent years a gap is emerging in acceptance and matriculation rates for URM applicants compared with non-URMs, with URM rates falling behind.

Trends in URM matriculation in public health, nursing, and pharmacy are encouraging. Although large disparities remain, the trends in these professions suggest that progress is possible. Continued progress will require ongoing commitment to racial and ethnic diversity in health profession schools.

In Chapters Two and Three we documented the major racial and ethnic disparities that exist in educational achievement in the United States, culminating in the underrepresentation of African American, Latino and Native American students in health professions schools. What is being done to attempt to increase general educational achievement among URM students and enhance the number of URMs entering the health professions?

This chapter provides an overview of existing interventions and programs designed to increase URM educational achievement and entry into the health professions. The goal of this chapter is to present the “lay of the land” in terms of the major national and California programs that seek to enhance academic performance among URM and other disadvantaged students and to promote their entry into the health professions. As defined in Chapter One, *“the word programs is used to refer to major initiatives, usually in reference to the funders of these initiatives. These programs often award funds to institutions that employ a variety of ‘interventions’ to ‘operationalize’ the program.”* The rationale for this description of programs is that strategic planning in this area will benefit from a better understanding of the current array of programs and the similarities and differences between existing programs. Chapter Four does not go into detail about the features of all the interventions operating under the major program initiatives reviewed. The following chapter (Chapter Five) scrutinizes specific interventions and evidence about their effectiveness.

Chapter Four is divided into two sections. Section A provides a concise overview of programs focusing on early education and general educational skills. Because these programs are for the most part decentralized and administered at the local level, it is not feasible to catalogue all the individual programs in operation. We therefore discuss, in general terms, the types of programs that operate at these educational pipeline stages and cite some particularly noteworthy programs.

Section B reviews major national and California programs that specifically focus on health professions education, presenting a much more thorough enumeration and description of programs. Section B catalogues programs with a health professions focus according to funding source to understand the many types of programs that currently exist, the level of funding of these programs, and the different emphases and strategies of these programs. We characterize each program using our “three dimensional” conceptual model of pipeline stage, profession(s) targeted, and intervention strategies used. Programs were assessed that were in place in 2000; programs implemented since 2000 (e.g., The California Endowment’s Central Valley Nursing Workforce Diversity Program) are not included in the summaries provided in this chapter.

Programs Focusing on Early Education and General Educational Skills

There are literally thousands of early intervention programs that are geared specifically toward helping low-income and underrepresented minority students strengthen their academic skills and go on to college (Perna and Swail, 1998). In addition, there are thousands more programs embedded in schools and communities whose objective is to increase the achievement of under-performing students in an effort to enhance their life chances and ultimately increase their probability of attending college. Most college campuses in the country reach out in some fashion to these students through partnership programs with schools and communities, and school districts typically have multiple programs designed with this aim. Moreover, many states sponsor some kind of early intervention program, and the federal government has a longstanding involvement in these efforts through Project Head Start at the preschool level to programs such as

Upward Bound, Talent Search, and Gear Up at the secondary level.

A number of taxonomies of programs have been offered in the literature (Fenske, et al., 1997; Perna and Swail, 1998; Tierney et al., 1999; Gándara and Bial, 2001) as a way of organizing and making sense of the wide array of program offerings, designs, sponsorships, and goals. Early intervention programs occur, by definition, at a point prior to college, but they begin at any point along the educational continuum, from preschool to high school. In spite of the increasing evidence of early gaps in educational preparation, most are focused in the high school years. One useful way of organizing programs is according to their focus, whether they are student-centered or school-centered.

Student-Centered Versus School-Centered Programs

Student-centered programs select particular students to participate—usually on the basis of some kind of eligibility criteria—and provide supplemental personal, social, and educational resources to help these *individual* students strengthen their academic skills and ultimately prepare for college. School-centered programs focus their efforts on improving schooling conditions so that most or all of the students in the school will have the opportunity to improve their academic skills and eventually attend college. Student-centered programs are more likely to demonstrate an immediate pay-off as resources are focused and more intensive for individual students. However, they leave untouched the very circumstances in schools and communities that help to produce discrepancies in achievement. Thus a few students are helped, but most do not benefit directly from these programs. School-centered approaches, on the other hand, attempt to attack the inequities in schooling that produce underachievement, but these strategies are longer-term and more difficult to implement. It is more difficult also to demonstrate immediate returns on this investment, making these interventions more difficult politically to sustain.

Program Sponsorships

Another way to organize programs is by their sponsorship. The sponsoring entity often has a major impact on the program's design and operation because sponsors tend to have different driving philosophies or perspectives, depending on the social sector from which they emanate. Of course, in a number of cases, there may be more than one sponsor, and sponsors may come from multiple social sectors. For example, GEAR-UP seeks sponsorships across public school and community sectors in addition to government funding.

- **Private non-profit programs** originate from foundations, agencies, or even corporate entities with a belief that the focused attention of a benefactor “outside the system” can provide “lighthouse” demonstrations that may later be picked up and integrated into the educational system.
- **Higher Education Partnerships** focus on building relationships between colleges and schools, usually high schools, but sometimes reaching down to the elementary schools, in an effort to share resources, strengthen the schools, and to establish connections between the various educational communities. A 1994 survey by the US Department of Education revealed that about one-third of all colleges and universities offer at least one program designed to increase access for educationally and/or economically disadvantaged pre-collegiate students (Chaney et al., 1995).

- **Government sponsored programs** are usually either state or federally initiated. The federal government is the primary sponsor of preschool education, through its Head Start program, but is also heavily involved in elementary and secondary schools through Title I/Chapter I funding. At least 15 states have launched initiatives to stimulate college going (Perna and Swail, 1998). The impetus for these large-scale programs is often economic—the perception that the state is not preparing enough highly qualified college graduates to fuel its economy. Federal initiatives, on the other hand, tend to stem from an evolving philosophy about the role of the federal government in equalizing educational opportunity.
- **K-12 sponsored programs** are spearheaded by the public school systems throughout the country. Some begin as early as preschool and grammar school. Most that cite eventual college matriculation as their goal are initiated by high schools. Superintendents of public schools or individual principals may begin programs that they believe can help their students succeed in school and also better prepare them for college.
- **Community based programs** are typically initiated as a response to the concerns of individual communities that their children are falling behind academically, placing the whole community at risk. They often pull resources from within their own community, such as tutors and mentors who represent similar backgrounds as those of the children whom they serve and who can simultaneously provide important role models.

Common Features

While there are endless variations of programs, there is also a set of common features that most employ to a greater or lesser degree. These include:

- **Counseling:** personal and/or academic.
- **Academic remediation/intervention:** including specialized curricula such as Success For All (SFA) reading programs, whole school “climate” interventions such as the Comer project, or school change strategies that focus on accelerating the curriculum for underachieving students such as Levin’s (1987) Accelerated Schools program.
- **Academic enrichment:** At the elementary level this can include strategies that focus on increasing the rigor of the curriculum for all students, such as Renzulli’s (1997) School Wide Enrichment model, or at the secondary level, in-school college preparation courses, honors, or AP courses. Supplemental education such as tutoring, after school and summer school enrichment, and test preparation are also included in this category.
- **Parent involvement:** including parent education programs and distribution of college information for parents.
- **Social support:** including field trips, cultural activities, and peer group support activities.
- **Mentoring:** including peer and adult mentors.
- **Scholarship support:** including partial scholarships and full tuition-paid used as both incentives (e.g., I Have A Dream (IHAD) programs that guarantee all students in an elementary school cohort a scholarship if they successfully complete high school) and rewards for academic success.

Programs With a Health Professions Focus

We conducted a thorough search to identify and characterize major national programs that include a focus on increasing educational opportunities for URM students in science and math and in the health professions. Our investigation was guided by a literature search of the Medline/HealthSTAR and the Education Resources Information Center (ERIC) online databases and by discussions with members of our advisory committee. We collected information about specific programs by reviewing documents posted on the Internet and by communicating directly with representatives of sponsoring organizations.

In the review that follows, programs are grouped by whether they are sponsored by a government or private agency. Within these groups, programs are listed according to the specific government agency or private organization sponsoring the program. General summaries are included in this chapter. More detail about each program is provided in Appendix II. Programs that are national in scope are listed first. To the extent possible, the tables summarizing these national programs indicate the amount of funds directed to activities in California. Following the review of national programs, we present information about The California Endowment programs and other programs that have a California-specific focus.

Federal Government Funders

The Bureau of Health Professions

BHP programs with explicit URM educational objectives

The Bureau of Health Professions has eight programs administered through its various divisions that include, as an explicit program objective, the goal of increasing educational opportunities in the health professions for URM and other disadvantaged students (See Table 4.1, Page 53). With one exception, Bureau grants under these programs are awarded to institutions, not to individuals. Grantee institutions are colleges, universities, health professions schools or other health or education entities with a commitment to increasing diversity in the health professions. Institutions applying for such grants receive a funding preference if their enrollment and graduation of persons from disadvantaged backgrounds is above the national average.

The Division of Health Professions Diversity is authorized under Title VII of the Public Health Services (PHS) Act to fund the Health Careers Opportunities Program (HCOP), Centers of Excellence (COE) and the Minority Faculty Fellowships Program (MFFP). HCOP is the most comprehensive and widespread of the Division's programs. The goal of HCOP is to increase the number of individuals from disadvantaged backgrounds in the health and allied health professions, in order to meet the expanding health care needs of underserved populations. Targeted professions include, but are not limited to, medicine, optometry, dentistry, pharmacy, and physician assistant. Nursing programs are not eligible for HCOP grants. (Nursing schools are eligible to participate in the Nursing Workforce Diversity Program, administered by the Division of Nursing, which provides grants for intervention strategies similar to those used by HCOP grantees.) Program sites recruit individuals for education and training relevant to the health professions. Activities include counseling, preliminary education and research training, primary care exposure activities, development of a more competitive applicant pool, and information dissemination regarding financial aid and career opportunities.

The goal of the Centers of Excellence program is to improve the capacity of health professions schools to train underrepresented minority students and thus create a more diverse health professions workforce. Grants are awarded to health professions schools with a significant enrollment of underrepresented minorities. Institutions eligible are schools of medicine, dentistry, pharmacy and graduate programs in psychology and counseling. The COEs are tasked with establishing educational pipelines in the surrounding community in order to expand the health professions applicant pool. The academic performance of those URM students attending the school is enhanced through various academic activities. The institution's capacity to train is strengthened through minority faculty development, information resources, and faculty and student research opportunities. Finally, stipends are made available to provide students with additional support.

The Division's third program is the Minority Faculty Fellowship Program. This program is designed to assist health professions schools to increase the number of URM faculty at their institution. The grantee institution receives funds for 50% of a fellow's salary and agrees to provide matching funds. The fellow(s) funded through MFFP receive training and preparation that will enable them to secure a tenured position at the school. Fellows also provide health services in medically underserved areas in addition to undertaking academic endeavors.

The Division of Interdisciplinary and Community Based Programs is authorized by the Health Professions Partnerships Act of 1998 to fund the Area Health Education Centers (AHEC). The primary mission of the AHEC is to improve the supply, distribution, and quality of the health workforce in order to improve the quality of health care services in underserved areas. One of the objectives included in the AHEC mission is to improve the diversity of the health workforce. AHEC undertakes recruitment and educational enhancement activities targeted towards elementary and secondary school students from underrepresented minority populations. They also conduct outreach activities in high schools as well as colleges and universities in their catchment area. Although some AHEC funds support interventions related to URM educational achievement, AHEC has a broader mission than programs in the Division of Health Professions Diversity.

The Health Education and Training Centers (HETC) are similar to AHEC in their primary goal of improving the health of underserved populations, with a more specific focus on the development of a diverse health workforce in Florida and along the United States-Mexico border. HETC is authorized under Section 752 of the Health Professions Partnership Act of 1998 (PL 105-392). Each HETC, in conjunction with academic institutions as well as other diversity programs such as the Health Careers Opportunities Program, provides educational incentives to students who want to pursue careers in health. HETC utilizes such strategies as mentoring, academic enrichment, and professional opportunities.

The Bureau supports the development of the nursing workforce primarily through the Division of Nursing. The Division is authorized under Title VIII of the Public Health Service Act to award grants to institutions to increase nursing opportunities for individuals from disadvantaged backgrounds. The Health Professions Education Partnerships Act of 1998 specifically authorized the Nursing Workforce Diversity Program. The goal of the Program is to increase nursing workforce diversity by increasing the number of students from disadvantaged backgrounds who have the skills to successfully complete a professional nursing program. Eligible institutions (e.g., schools of nursing, nursing centers, academic health centers, state or local governments, and other non-profit organizations) are

awarded funds to support academic preparation activities, retention efforts, and the disbursement of student stipends.

The Bureau primarily awards financial assistance to students through the Division of Student Assistance. This division administers three financial assistance programs specifically for individuals from disadvantaged backgrounds: Scholarships for Disadvantaged Students; Loans for Disadvantaged Students; and Disadvantaged Faculty Loan Repayment Program. The scholarships and loans are awarded to health professions schools and other educational entities with health professions education programs. The institutions in turn award the loans and scholarships to students based on financial need. The Disadvantaged Faculty Loan Repayment Program is the only mechanism through which funds are awarded directly to individuals. In exchange for loan repayment, individuals agree to serve as faculty in eligible health professions programs. It is important to recognize that BHP's investment in financial aid programs is dwarfed by that of the Department of Education. The Department of Education's Student Financial Assistance programs provide over \$42 billion per year in scholarships, loans, and work-study assistance, more than ten times BHP's annual expenditures for financial assistance for disadvantaged students.¹

A new effort initiated by the Bureau in 2001 is Kids Into Health Careers (KIHC). The goal of Kids Into Health Careers is to raise awareness of the variety of health careers and to motivate a greater number of youth to enter the health professions. In this way, the Bureau hopes to positively impact the access to health care of underserved populations by increasing the pool of minority applicants. BHP staff members have developed a comprehensive Kids Into Health Careers information kit designed for use in schools from elementary to the secondary levels. It includes information on the wide array of health careers as well as useful information about specific programs and funding opportunities available. This program receives no funding itself. Grantees are encouraged to include a Kids Into Health Careers component in the proposal they submit. Grantees are encouraged as part of KIHC to make regular visits to schools with a large population of students from disadvantaged backgrounds to present the materials both to students and to faculty and counselors.

BHP spends about \$110 million annually on the programs listed in Table 4.1. As noted above, some of these program funds support activities that are not necessarily URM-focused.

BHP programs with indirect URM educational objectives

In addition to sponsoring programs with the specific objective of increasing racial/ethnic diversity in the health professions, the BHP also has policies in place for many of its training grant programs that attempt through less direct methods to promote URM entry into the health professions. These policies primarily consist of "funding factors" that increase the likelihood that BHP grants are awarded to health professions schools with strong track records in educating disadvantaged/minority students, among other school accomplishments.

Office of Minority Health, HRSA

The overall mission of the Health Resources and Services Administration's Office of Minority Health (OMH) is to improve the health status of racial and ethnic minorities in the United States. OMH seeks to increase the number of disadvantaged/minority health

¹ US Department of Education web site.
<http://www.ed.gov/finaid.html>

professionals by increasing the proportion of BHP grants awarded to Historically African American Colleges and Universities and Latino Serving Institutions and Tribal Colleges, often referred to collectively as minority-serving institutions. (See Table 4.2, Page 54). This strategy is derived from White House Initiatives on Educational Excellence for Latino Americans, Historically African American Colleges and Universities, and Tribal Colleges and Universities. These initiatives established goals for allocating federal funding to such institutions. OMH staff members believe this strategy is important because minority-serving institutions have extensive experience with recruitment and retention of health professions students from disadvantaged and minority backgrounds. They also provide a supportive environment that can help disadvantaged and minority students excel academically.

Minority-serving institutions may have difficulty in competing for BHP grants because they typically have fewer resources than majority institutions, especially large research universities with prestigious health professions schools. They usually have lower endowments and less funding from other federal agencies, such as the National Institutes of Health. As a consequence, faculty at minority-serving institutions may be required to teach more classes and may have less administrative support than their colleagues at research universities. OMH staff address this disparity by providing technical assistance to faculty at minority-serving institutions applying for grants from BHP and other HRSA bureaus to assist them in strengthening their applications. The proportion of BHP grants awarded to minority-serving institutions has increased since these technical assistance activities were instituted, but the impact of these activities has not been systematically evaluated.

National Institutes of Health

The National Institutes of Health provide professional opportunities and financial assistance as strategies to increase the participation of persons from minority backgrounds in biomedical research (See Table 4.2). The National Institute of General Medical Sciences (NIGMS) houses the most extensive array of programs designed to increase minorities in biomedical research. The Minority Biomedical Research Support (MBRS) Program has three grant mechanisms whereby it provides grants to minority-serving colleges and universities to support research by faculty, provide internship opportunities for students, and enhance its research infrastructure. The Support of Continuous Research Excellence (SCORE) program assists biomedical research faculty at minority-serving institutions to develop competitive research programs and increase the number of underrepresented minorities in biomedical research. SCORE provides financial assistance to competitive developing research programs in all areas of biomedical and behavioral research at institutions with significant underrepresented minority student enrollment. The Research Initiative for Scientific Enhancement (RISE) Program seeks to enhance the research environment at minority-serving institutions by enhancing the institutions' teaching capabilities and funding faculty and student development activities. The Initiative for Minority Student Development (IMSD) of MBRS funds innovative programs at institutions that enhance the academic and research skills of underrepresented minorities interested in pursuing biomedical research careers.

The Minority Access to Research Careers (MARC) of the NIGMS is comprised of several programs. Grants are made to institutions via the Undergraduate Student Training in Academic Research (U*STAR) and the Post-Baccalaureate Research Education Program (PREP). Institutions receive funds to support paid internship positions for underrepresented minorities with the goal of encouraging them to pursue biomedical

research careers. MARC awards are made to individuals under the Pre-doctoral Fellowships, Faculty Pre-doctoral Fellowships, Faculty Senior Fellowships, and Visiting Scientist Fellowships. These grants go to minority individuals at the graduate and faculty level to enable their participation in research.

The NIGMS Research Supplements for Underrepresented Minorities provide additional funding to existing NIH grantees so that they may hire more research staff. New staff funded by the supplements must be individuals from underrepresented minority groups. The Institutional Research and Academic Career Development Awards of NIGMS are mentored, post-doctoral research experiences at minority-serving institutions. The goal of these awards is to enhance the career opportunities of persons at minority-serving colleges and universities. Through the Bridges to the Future program, NIGMS facilitates the transition of students from community colleges to four-year institutions and from master's to doctoral degree-granting institutions, with the goal of producing highly-trained minority researchers.

The Office of Loan Repayment and Scholarship administers the Undergraduate Scholarship Program and the Loan Repayment Program. Each funding cycle, individuals are awarded financial support in return for serving as paid researchers on NIH projects for a designated number of years. The National Center for Research Resources' Science Education Partnership Awards fund cutting edge science education projects to be implemented in schools, museums, and science centers. The Fogarty International Center and the National Center on Minority Health and Health Disparities fund underrepresented minorities through the Minority International Research Training Program to do biomedical and behavioral research abroad.

The National Institutes of Health spend over \$210 million annually on these programs listed in Table 4.2.

National Science Foundation

The Division of Human Resource Development (HRD) within the National Science Foundation is committed to enhancing the quality of science, mathematics, engineering, and technology (SMET) education and research through broadening participation by underrepresented groups and institutions (See Table 4.2). Programs within HRD have a strong focus on partnerships and collaborations in order to maximize the preparation of a well-trained scientific and instructional workforce. Grants are awarded to colleges and universities as well as to other research institutions. Efforts include the recruitment and retention of minority students into doctoral SMET programs, recruitment of minority faculty, and the strengthening of research capabilities of Historically African American Colleges and Universities. The programs sponsored by the HRD are: Louis Stokes Alliances for Minority Participation, Alliances for Graduate Education and the Professoriate, HBCU Undergraduate Program, and Centers of Research Excellence in Science and Technology.

The National Science Foundation also seeks to strengthen the nation's science and math education at the kindergarten-12th grade levels through three programs within the Division of Educational System Reform. The Urban Systemic Initiative, Rural Systemic Initiative, and the Comprehensive Partnership for Math and Science Achievement aim to reform science education in participating school districts in order to foster interest in science and enhance SMET learning. Emphasis is placed on selecting school districts with a large population of underrepresented minority students. The programs facilitate and

promote relationships between school districts and two- and four-year colleges and universities. Strategies include curriculum revision, teacher instruction, and leadership development.

Total annual funding for these National Science Foundation programs is about \$55 million.

Centers for Disease Control and Prevention

The Centers for Disease Control and Prevention hope to increase awareness of and participation in public health of African Americans and other underrepresented minorities through the Minority Student Training Program (See Table 4.2). The strategy employed by the CDC is to recruit students from minority-serving institutions to participate in summer and academic year enrichment programs. The programs are administered through two partnerships with the Minority Health Professions Foundation and the Morehouse College Public Health Sciences Foundation. The Centers for Disease Control programs spend approximately \$1 million annually on these programs.

Indian Health Service

The Indian Health Service sponsors a scholarship program (See Table 4.2). This program is designed to diminish the financial barrier to pursuing a career in the health professions for Native American individuals. Grants are awarded to individuals who are enrolled in a health professions program at the undergraduate and graduate level. Total annual funding for this Indian Health Service program is approximately \$12 million.

Private Organizations with a National Scope

The Robert Wood Johnson Foundation and the Kellogg Foundation

Private endowments make a significant contribution to the advancement of minority participation in the biomedical and health sciences (See Table 4.3, Page 57). The Robert Wood Johnson (RWJ) Foundation and the W.K. Kellogg Foundation jointly sponsor the Health Professions Partnership Initiative (HPPI). The strategy of the initiative is to build a cohesive health professions pipeline through the collaborative efforts of medical schools, other health professions schools, and schools with predominantly minority enrollment at the kindergarten to college levels. As students make their way through the pipeline, the HPPI program is focused on helping disadvantaged students to attain high academic achievement, awareness of the different health careers and the motivation to pursue higher education. In addition to HPPI, the Robert Wood Johnson Foundation also sponsors the Minority Medical Education Program (MMEP). This six-week intensive summer program is aimed at preparing minority students to apply to medical school. By providing guidance and academic preparation to students, RWJ hopes to increase the rate of admission of minorities to medical schools. The Association of American Medical Colleges (AAMC) serves as the National Program Office for both the HPPI and MMEP programs. Total annual funding for the HPPI program is approximately \$2.5 million. Total annual funding for the MMEP program is approximately \$4.5 million.

Josiah Macy, Jr. Foundation

The Josiah Macy Junior Foundation funds Ventures In Education, Inc. for the Ventures Scholars Program. The Ventures Scholars Program facilitates networking between colleges

and universities and prospective minority applicants. In this way, institutions committed to increasing minority enrollment have access to a pool of high achieving high school students who in turn benefit from a direct link to opportunities at the participating institutions.

Howard Hughes Medical Institute

The Howard Hughes Medical Institute (HHMI) focuses on providing opportunities for professional experience as well as academic enhancement to students at the high school and undergraduate levels. At the college level, HHMI sponsors the Undergraduate Biological Science Education program, which provides academic and practical training. The Precollege Outreach Efforts K-12 Program operates at the high school level to strengthen science and math training as well as to expose students to the various health fields. The Howard Hughes Medical Institute spends approximately \$17.5 million annually on these programs.

National Medical Fellowships

The National Medical Fellowships offers financial support to minority medical students. The financial support comes in the form of scholarships, fellowships, and special awards. The goal of the National Medical Fellowships is to alleviate the financial strain felt by many underrepresented minorities as they pursue a career in medicine. Total annual expenditures for the National Medical Fellowships are approximately \$1 million.

California-Specific Programs (Table 4.4)

Private Funders

The California Endowment

The California Endowment funds several projects throughout the state of California with the goal of increasing minority participation in the health professions. Three projects target students at the high school level, providing them with academic support and professional opportunities. These projects are: Health Professions Internship Program, *Jovenes por la Salud*, and Health Professions Preparatory Academy. All three programs are run by staff in an area hospital, clinic, or health professions school. A fourth Endowment-sponsored program is the Improving Access and Embracing Multicultural Health Through Health Professional Education program. The strategy of this program is to provide financial support in the form of scholarships and loan repayment to underserved and low-income youth pursuing health careers.

In 1999, The California Endowment spent \$2.3 million on these programs (The California Endowment has initiated several large, new workforce diversity programs since 2000 that are not included in this summary).

California Wellness Foundation

Health professions diversity is a new priority area for the California Wellness Foundation. The Diversity in the Health Professions program has the goal of increasing diversity in the health professions in California. Grants fund organizations to provide pipeline programs, scholarships, mentoring programs, internships, and fellowships that support and advance career opportunities for minorities in a variety of health professions.

Table 4.5

Number of Programs in Each Pipeline Level

<i>Pipeline</i>	<i>Number of Programs</i>
K-12	23
College	32
Post-Baccalaureate	4
Professional/Graduate	30

Table 4.6

Number of Programs that Target Each Profession

<i>Profession Targeted</i>	<i>Number of Programs</i>
Non-specific Health or Math and Science	23
Medicine	14
Biomedical Research	8
Pharmacy	7
Allied Health	7
Dentistry	9
Nursing	11
Other Profession	15

This program also funds organizations that educate policymakers about public and institutional policies that promote diversity in the health professions. In the past the Wellness Foundation has also used special project funds to support activities in health professions diversity.

Other California Organizations

The California Health Professions Education Foundation administers financial aid programs for a variety of health professions, awarding more than \$1 million annually. The Health Care Foundation for Orange County also has initiatives specifically focusing on workforce diversity.

State Government Programs

Office of Statewide Health Planning and Development

The California Office of Statewide Health Planning and Development administers the Health Professions Careers Opportunities Program (HPCOP). In many ways modeled on the federal BHP HCOP program, the HPCOP program provides grants to undergraduate

Table 4.7
Number of Programs that Employ Each Strategy

<i>Strategy</i>	<i>Number of Programs</i>
Professional Opportunities	30
Academic Support	23
Financial Support	19
Psychosocial Support	6

schools to support activities to enhance minority student achievement in pre-health education and support their advancement into health professional training programs. Annual funding for HPCOP is \$160,000.

University of California

The California State Legislature funds the University of California to administer outreach and enrichment interventions for disadvantaged students. UC medical schools and other UC health professions schools conduct a variety of outreach and enrichment activities across a broad spectrum of educational pipeline stages, often matching state funds with support from federal government and foundation programs supporting minority and disadvantaged student interventions. These interventions are described in more detail in the Special Report on Medical Student Diversity prepared by the University of California Medical Student Diversity Task Force in 2000.

Analysis of Characteristics of Health Professions-Focused Programs

We analyzed the national programs listed in Tables 4.1, 4.2, and 4.3 according to each of the three key dimensions of pipeline level, profession(s) targeted, and strategies used. As shown in Table 4.5, the majority of the programs operate “downstream” at the college and graduate levels. Thirty-two of the programs implement an intervention at the college level and 30 at the graduate/faculty level. The next most common level of intervention is high school. Several of the programs listed as a “high school” intervention also include a middle school or elementary school component. The Systemic Initiatives of the National Science Foundation are the only interventions listed that exclusively operate at the lower grade levels. Two programs, the Health Education and Training Centers of AHEC and the Centers of Excellence, sponsor academic enrichment programs at the post-baccalaureate level of the pipeline. More agencies may sponsor post-baccalaureate programs as part of graduate level initiatives, without specifically identifying post-baccalaureates as a target group.

Table 4.6 shows the number of national programs that target each profession. The most common type of program is one that does not target any specific health profession, but rather addresses the strengthening of math and science skills. The profession most often specifically targeted is medicine, with 14 programs emphasizing medicine. The next most frequently targeted profession is biomedical research with eight programs. Pharmacy is targeted by seven programs. Seven programs target allied health and dentistry. Nursing is the principal focus of five programs and is included in seven others. Fifteen programs also cover other health-related professions in addition to those mentioned above. Several programs are specifically focused on a single profession. The Robert Wood Johnson

Foundation’s Minority Medical Education Program targets medicine, eight NIH programs target only biomedical research, and the Nursing Workforce Diversity Program of the Bureau for Health Professions focuses solely on Nursing.

National programs emphasize a variety of general strategies for the interventions they fund (See Table 4.7). The strategy most often employed is the funding and/or coordination of professional opportunities for students and faculty, with 30 programs using it as a means of improving minority participation. The next most employed strategies are academic support (23 programs) and financial support (19 programs). Six programs allot resources to a psychosocial support program component.

Table 4.8
AAMC Member Medical Schools Participating in Enrichment Activities for Disadvantaged Students, According to Pipeline Stage

<i>Enrichment Program Grade Level</i>	<i>Number of Schools with Program</i>	<i>Percentage of Schools with Program</i>
Elementary/Junior High School	43	34%
High School	91	73%
Undergraduate College	93	74%
Pre-matriculation to the specific medical school	72	58%
Combined College/MD Programs for High School Students	38	30%
Post-baccalaureate	34	27%
Educational Partnerships (non-HPPI)	56	45%
Extended Programs	22	18%
<i>Total number of Schools</i>	<i>125</i>	

* The total number of schools does not total 127 because one school may have more than one program.

** The percentages do not total 100 because percentages were calculated using the number of schools as the denominator, and one school may have more than one program.

Source: Summary statistics of HPPI Enrichment Programs table, page 291, Minority Student Opportunities in United States Medical Schools 2000, AAMC

California-specific programs tend to be more eclectic in their approach, with fewer limitations on the professions or pipeline stage targeted. High school interventions have featured prominently in The California Endowment sponsored programs. Many California institutions also draw from federal and national programs to support a wide variety of activities across a spectrum of pipeline stages, ranging from outreach and science partnerships with local school districts to post-baccalaureate interventions for students applying to health professions schools.

From National Programs to Institutional Responses

The view we have presented thus far in this Chapter is one from an altitude of 30,000 feet. We have used a wide-angle lens to try to capture the major national and California initiatives that channel resources into interventions to promote URM educational achievement and entry to the health professions. But it is at the level of individual institutions that the actual implementation of interventions occurs. Throughout the nation, institutions are grappling at the local level with efforts to address the problem of underrepresentation of minorities in the health professions. Many of these institutional efforts have been described in case study formats in previous publications (Nickens and Ready, 1994). Institutions often draw from a variety of sources to fund the interventions they administer, mixing funds from the national programs described above with funds from local sources and considerable in-kind institutional resources.

A Case Study of the Baylor College of Medicine

To illustrate how national programs interact with local institutions, we describe the example of the Baylor College of Medicine. The Baylor College of Medicine has a medley of programs designed to increase the number of qualified applicants to medical schools and other biomedical science programs. The focus of Baylor programs is to increase the minority applicant pool. The approach has been to establish interventions at the elementary school, high school, and undergraduate levels of the health professions pipeline, using various intervention strategies accordingly.

At the elementary school level, the focus is on faculty training and development of supplemental learning materials. The National Science Foundation sponsors Science Connection, a partnership among Baylor, the Houston Museum of Natural Science, and a publishing firm, that works to develop supplementary science materials. Another Baylor program at this level, the Houston Elementary Science Alliance, provides training in hands-on science materials for teachers from ten regional school districts.

The main interventions at the high school level are academic enrichment activities and internships, mainly through the establishment of specialized high schools and summer programs. Baylor partners directly with school districts in underserved areas to establish health science magnet schools. These schools offer a rigorous curriculum and facilitate internship opportunities with Baylor faculty. Each year, thirty Houston-area students are selected to participate in a summer laboratory-based program run by Baylor and Rice University.

Baylor operates three summer enrichment programs at the undergraduate level. The US Department of Education and Pew Charitable Trusts fund the Summer Medical and Research Training Program, which pairs undergraduates with faculty to work on laboratory projects. Baylor and Rice University collaborate each year to run the Honors Premedical Academy, a pre-medical preparation program funded by the Robert Wood Johnson Foundation through the Minority Medical Education Program. And, using HCOP funding, Baylor conducts activities to encourage minorities to enter the health professions through the Summer Minority Enrichment Program. Many other health professions schools rely on a similar mix of program funding to support a spectrum of activities similar to those occurring at Baylor, although Baylor is noteworthy for the scope and degree of its commitment to these types of activities.

The Association of American Medical Colleges and the 3000 by 2000 Initiative

Although cataloguing major national programs, as we have done in this chapter, presents its own challenges, it is even more difficult to systematically tabulate the myriad activities occurring at the institutional level across all the pipeline stages and involving all the different health professions. One unique effort in this regard has been that of the Association of American Medical Colleges. The AAMC regularly surveys all its member institutions about their activities to increase opportunities for URMs in medicine and other health professions. This effort has been part of the “3000 by 2000” initiative of the AAMC. Project 3000 by 2000 was launched in 1991 to address minority underrepresentation in US medical schools. The initial goal of the Project was to increase the number of URM students matriculating in medical schools. The Project has expanded to collaborate with other health professions schools to provide leadership, publications and technical assistance in health professions student diversity.

The Minority Student Opportunities Handbook is part of the AAMC’s effort to increase the number of qualified minority applicants to medical schools. The handbook provides students, pre-medical advisors, counselors, and others with current information on programs designed to provide opportunities for underrepresented minority students. Surveys conducted by the AAMC, and reported in their annual Minority Student Opportunities Handbook, display the range of activities occurring at individual medical schools. Of the 125 medical schools in the AAMC, the vast majority are involved in partnership programs with more upstream educational institutions to try to enhance science education and interest in the health professions among URM and other disadvantaged students. (See Table 4.8.) Most schools sponsor interventions at the high school or college levels. More than half of the participants run pre-matriculation interventions specifically for those individuals who will matriculate at their institution the following fall. Thirty-four percent of the participating institutions have an elementary or middle school component, and 30% have combined college/MD programs targeted at high school students. Twenty-seven percent of the medical schools implement interventions at the post-baccalaureate level for students who have achieved an undergraduate degree and seek entry into professional school.

Conclusion

Many interventions have been implemented in the US to improve the academic performance and educational advancement of URM and disadvantaged students along all phases of the educational pipeline. Interventions range from Head Start preschool programs administered in thousands of school districts throughout the US to pre-medical “enrichment” programs targeted to a relatively small number of higher achieving URM and disadvantaged college students. A panoply of government and private funders and sponsors are involved in these programs. Many different government agencies, at different levels of government, sponsor programs. Within agencies, there is not always clear articulation of how individual programs may complement each other or mesh to produce an integrated plan for promoting URM educational achievement and entry into the health professions. The result is discontinuity of interventions across regions and across stages of the educational pipeline, making it difficult to sustain gains from one educational stage to the next.

Given the diversity of program sponsors and the depth and breadth of the educational problem, it is hardly surprising that there is room for improved coordination among programs and sponsors. Nonetheless, there is considerable opportunity for

improving coordination and articulation between programs and funders. Greater awareness of existing programs and greater exchange of information between programs have the potential to lead to better program coordination and better strategic planning to fill gaps between existing programs.

The majority of health science-related interventions for URMs at the high school and college levels focus on career goals of biomedical research (or engineering science) and medicine. Some professions, such as nursing, are not receiving a commensurate investment in diversity-promoting interventions. Although enhancing academic performance in general science and math courses strengthens URM preparation and competitiveness for entry into all health professions, current interventions may not be promoting careers in professions such as nursing and dentistry to the same degree that they are promoting career aspirations in biomedical research and medicine. For example, the Bureau of Health Professions spends over \$50 million of Title VII funds on diversity-enhancing programs that target professions other than nursing, while spending only \$4 million of Title VII funds on nursing diversity programs. The National Institutes of Health invest over \$150 million annually in diversity programs focusing on biomedical research careers, almost none of which assist students pursuing nursing careers. Similarly, private foundations have focused more on medicine and biomedical science than on nursing, dentistry, and pharmacy.

The key question, however, for all programs is whether the interventions that they fund are actually effective in increasing URM educational achievement and entry into the health professions. In the next chapter, we critically review the evidence of the effectiveness of specific interventions.

Table 4.1
Federal Government Programs: Bureau of Health Professions

Funding Source	Program Name	Total Funding for Last Cycle (year)		Total Number of Grantees for Last Cycle		Pipeline Level(s)	Major Strategies	Professions Targeted
		National	California	National	California			
Division of Health Professions Diversity	Health Careers Opportunities Program	\$27,264,835 (2000)	Not Available	88 institutions	4 institutions	K-12, college, graduate	Academic support, professional opportunities, financial support	Medicine, allied health, pharmacy, dentistry, other
	Centers of Excellence	\$24,017,570 (2000)	Not Available	25 institutions	Not Available	K-12, college, post baccalaureate graduate	Academic support, professional opportunities, financial support	Medicine, dentistry, pharmacy, other
	Minority Faculty Fellowships Program	\$280,857 (2001)	Not Available	3 institutions	Not Available	Graduate	Professional opportunities	Non specific health professions
Div. of Inter-disciplinary and Community Based Programs	Area Health Education Centers	~\$28,000,000 (2000)	~\$634,063 (2000)	~40 institutions	8 institutions + 1 non-federally funded	K-12, college, post baccalaureate, graduate	Academic support, professional opportunities	Non-specific health professions
	Health Education and Training Centers	~\$3,600,000 (2000)	\$675,035 (2000)	9 institutions	6 California awardees	K-12, college, post baccalaureate, graduate	Academic support, professional opportunities	Non-specific health professions
Division of Nursing	Nursing Workforce Diversity Program	\$4,010,000 (2000)	Not Available	18 institutions	Not Available	K-12, college	Academic support, financial support	Nursing
Division of Student Assistance	Scholarships for Disadvantaged Students	\$31,670,011 (2000-2001)	\$5,131,136 (2001)	401 institutions	32 institutions	Graduate	Financial support	Non-specific health professions
	Loans for Disadvantaged Students	\$92,123 (2000-2001)	\$20,253 (2001)	8 institutions	2 institutions	Graduate	Financial support	Medicine, dentistry, pharmacy, other
	Disadvantaged Faculty Loan Repayment	\$849,313 (2000)	\$182,308	26 individuals	4 individuals	Graduate	Professional opportunities	Medicine, dentistry, pharmacy, allied health, other
Grants Office	Kids Into Health Careers	\$0	\$0	0 (Distribution May 2001)	0	K-12	Professional opportunities	Non-specific health professions

Table 4.2
Federal Government Programs: Other Agencies

Funding Source	Program Name	Total Funding for Last Cycle (year)		Total Number of Grantees for Last Cycle		Pipeline Level(s)	Major Strategies	Professions Targeted
		National	California	National	California			
Office of Minority Health, HRSA								
	White House Initiative on Educational Excellence for Hispanic Americans	\$0	Not applicable	Not applicable	Not applicable	K-12, college, graduate	Provides coordination and oversight of grant activity.	Non-specific health professions
	Association of Hispanic-Serving Health Professions Schools	\$0	Not applicable	Not applicable	Not applicable	K-12, college, graduate	Provides coordination and oversight of grant activity.	Non-specific health professions
	White House Initiative on Historically Black Colleges and Universities	\$0	Not applicable	Not applicable	Not applicable	K-12, college	Professional opportunities	Non-specific health professions
	White House Initiative on Tribal Colleges and Universities	\$0	Not applicable	Not applicable	Not applicable	College	Provides monitoring and oversight of grant activity to TCU's	Medicine, nursing, allied health, pharmacy, dentistry, other
National Institutes of Health								
Office of Loan Repayment and Scholarship, Office of Intramural Research, Office of the Director	Undergraduate Scholarship Program for Students from Disadvantaged Backgrounds	\$1,000,000 (2001)	Not Available	26 individuals	Not Available	College, graduate	Professional opportunities, financial support	Biomedical research
	Loan Repayment Program	\$1,500,000 (2001)	Not Available	20 individuals	Not Available	Graduate	Professional opportunities, financial support	Biomedical research

Table 4.2 (continued)

Federal Government Programs: Other Agencies

Funding Source	Program Name	Total Funding for Last Cycle (year)		Total Number of Grantees for Last Cycle		Pipeline Level(s)	Major Strategies	Professions Targeted
		National	California	National	California			
National Institutes of Health								
National Center for Research Resources	Science Education Partnership Awards (SEPA)	\$14,153,000	(2000)	22 institutions	institutions	K-12	Professional opportunities, academic support	Non-specific science and math
National Institute of General Medical Sciences	Minority Biomedical Research Support (MBRS)	\$86,000,000 (2000)	\$17,100,000	115 institutions	19 institutions	College, graduate	Professional opportunities	Biomedical Research
	Minority Access to Research Careers (MARC)	\$28,000,000 (2001)	\$3,140,122 (2001)	62 institutions	12 institutions	College, graduate	Professional opportunities	Biomedical Research
	Research Supplements for Underrepresented Minorities	\$47,600,000 (1999)	Not Available	1,121 institutions	13 institutions	K-12, college, graduate	Professional opportunities	Biomedical Research
	Institutional Research and Academic Career Development Awards	\$3,570,000 (1999)	\$695,000 (2001)	4 institutions	1 institutions	Graduate	Professional opportunities	Biomedical Research
	Bridges to the Future	\$11,000,000 (2000)	\$8,790,950	80 institutions	3 institutions	College, graduate	Professional opportunities	Biomedical Research
Fogarty International Center & National Center on Minority Health and Health Disparities	Minority International Research Training	\$5,442,000 (2000)	\$1,072,346 (2000)	28 institutions	5 institutions	College, graduate	Professional opportunities	Biomedical and Behavioral Research

Table 4.2 (continued)
Federal Government Programs: Other Agencies

Funding Source	Program Name	Total Funding for Last Cycle (year)		Total Number of Grantees for Last Cycle		Pipeline Level(s)	Major Strategies	Professions Targeted
		National	California	National	California			
National Science Foundation								
Division of Human Resource Development	Louis Stokes Alliances for Minority Participation	\$25,800,000 (2001)	\$2,000,000 (2001)	27 institutions	2 institutions	College	Academic support, professional opportunities, psychosocial support	Non-specific science and math
	Alliances for Graduate Education and the Professoriate	\$11,400,000 (2001)	\$1,210,000 (2001)	19 institutions	4 institutions	Graduate	Psychosocial support	Non-specific science and math
	HBCU Undergraduate Program	\$9,700,000 (2001)	\$0	17 institutions	0 institutions	College	Academic support	Non-specific science and math
	Centers of Research Excellence in Science and Technology	\$8,600,000 (2001)	\$999,273 (2001)	10 institutions	1 institutions	Graduate	Professional opportunities	Non-specific science and math
Division of Educational System Reform	Urban Systemic Initiative	Not available	Not available	44 school districts	3 school districts	K-12	Academic support	Non-specific science and math
	Rural Systemic Initiative	Not available	Not available	7 regions	1 regions	K-12	Academic support	Non-specific science and math
	Comprehensive Partnership for Math & Science Achievement	Not available	Not available	23 states	3 states	K-12	Academic support	Non-specific science and math
Centers for Disease Control and Prevention	Minority Student Training Programs	\$1,090,197 (2000)	0 (2000)	2 institutions	0 institutions	College, graduate	Professional opportunities	Public Health
Indian Health Service	Scholarship Program	\$12,000,000 (2001)	Not Available	527 individuals	Not Available	College, graduate	Financial support	Nursing, medicine, pharmacy, allied health, other

Table 4.3
Private Foundation Programs

Funding Source	Program Name	Total Funding for Last Cycle (year)		Total Number of Grantees for Last Cycle		Pipeline Level(s)	Major Strategies	Professions Targeted
		National	California	National	California			
Private Funders								
Robert Wood Johnson Foundation W.K. Kellogg Foundation	Health Professions Partnerships Initiative (AAMC)	\$2,470,000 (2001)	\$140,000 (2001)	26 institutions	2 institutions	K-12, college	Academic support	Medicine, nursing, public health
Robert Wood Johnson Foundation	Minority Medical Education Program (AAMC)	\$4,500,000 (2001)	\$0 (2001)	11 institutions	0 institutions	College	Academic support, professional opportunities,	Medicine
Josiah Macy, Jr. Foundation	Ventures in Education	\$50,000+ (2001)	\$1500+ (2001)	151 institutions	4 institutions	K-12	Other	Non-specific science and math
Howard Hughes Medical Institute	Undergraduate Biological Science Education Program	~\$12,575,000 (2001)	\$3,000,000 (2000)	53 institutions	3 institutions	College	Academic support, professional opportunities	Non-specific health professions
	Precollege Outreach Efforts K-12 Students and Teachers	\$5,000,000 (2001)	Not Available	100 institutions	3 institutions	K-12	Academic support, professional opportunities	Non-specific health professions, science and math
National Medical Fellowships	Scholarships	\$1,218,050 (1999-2000)	Not Available	368 individuals	Not Available	Graduate	Financial support	Medicine

Table 4.4
California-Specific Funders*

Funding Source	Program Name	Total Funding for Last Cycle (year)	Total Number of Grantees for Last Cycle	Pipeline Level(s)	Major Strategies	Professions Targeted
Private Funders						
The California Endowment	Health Professions Internship Program	\$600,000 (2000-2003)	1 institution	K-12	Professional opportunities	Non-specific health professions
	Jovenes Por La Salud	\$600,000 (2000-2003)	1 institution	K-12	Academic support, professional opportunities	Medicine, other
	Health Professions Preparatory Academy	\$600,000 (2000-2003)	1 institution	K-12	Academic support	Non-specific health professions
	Improving Access and Embracing Multicultural Health Through Health Professional Education	\$500,000 (2000-2003)	1 institution	College, graduate	Financial support	Non-specific health professions
The California Wellness Foundation	Diversity in the Health Professions Priority Area Grants	Not Available	Not Available	K-12, college, graduate	Academic support, financial support, professional opportunities, psychosocial support	Non-specific health professions
	Increasing Diversity in the Health Professions	\$1,730,000 over two years (years not available)	9 institutions	K-12, college, graduate	Academic support, financial support, professional opportunities	Medicine, allied health, nurse, public health
Health Professions Education Foundation	Health Professions Education Scholarship Program	\$149,000 (2000-2001)	17 individuals	Graduate	Financial support	Dentistry, nursing, other
	Health Professions Education Loan Repayment Program	\$241,619 (2000-2001)	21 individuals	Graduate	Financial support	Dentistry, nursing, other

*Includes program operating in 2000

Table 4.4 (continued)
California-Specific Funders*

Funding Source	Program Name	Total Funding for Last Cycle (year)	Total Number of Grantees for Last Cycle	Pipeline Level(s)	Major Strategies	Professions Targeted
Health Professions Education Foundation	Kaiser Permanente Allied Healthcare Scholarship Program	\$34,500 (2000-2001)	19 individuals	College, graduate/certificate	Financial support	Allied health
	Associate Degree Nursing Pilot Scholarship Program	\$80,000 (2000-2001)	21 individuals	College	Financial support	Nursing
	Registered Nurse Education Scholarship Program	\$288,000 (2000-2001)	51 individuals	College	Financial support	Nursing
	Registered Nurse Education Loan Repayment Program	\$494,030 (2000-2001)	63 individuals	Graduate	Financial support	Nursing
The Healthcare Foundation for Orange County	Orange County Ethnic Workforce Initiative	\$595,623 (2001)	1 institution	College	Financial support, psychosocial support, academic enhancement	Nursing, other
	Latino Healthcare Professionals Project	\$122,111 (2001)	1 institution	College	Academic support, professional opportunities	Medicine, other
State Government Funders						
Office of Statewide Health Planning and Development	Health Professions Career Opportunities Program	\$160,000 (2000)	21 institutions	College	Academic support, psychosocial support, professional opportunities	Medicine, allied health, pharmacy, dentistry
California State Legislature	University of California Outreach Programs	Not Available	1 institution	K-12, college, post-baccalaureate, graduate	Academic support, psychosocial support, professional opportunities	Medicine, dentistry, other

*Includes program operating in 2000

This chapter summarizes essential findings from our comprehensive review and analysis of research evaluating the effectiveness of interventions to improve educational performance of URMs and other disadvantaged students and to increase the numbers of URMs entering the health professions. The chapter is divided into 5 sections. Section A presents the methods used to identify studies for review and our system for rating the quality of the evidence in the studies reviewed. Section B reviews research evidence on general educational interventions at the pre-college stages, and Section C reviews the evidence at the college-to-health professions school stages, as well as high school interventions specifically focused on health professions objectives. In Section D, we review evidence on the role of financial aid in promoting access to higher education for low-income and minority students. The final section, Section E, discusses evidence about the effects of admissions decisions, and public policies affecting these decisions, on URM enrollment in health professions schools.

Section A: Methods Used to Identify Research Literature

For the literature review we primarily used searches of the computerized MEDLINE/HealthSTAR and ERIC (Educational Resource Information Center) databases. The MEDLINE/HealthSTAR database contains citations from the National Library of Medicine, the Health Planning Administration, and the Health Services/Technology Assessment Research databases. The ERIC database contains education and related social sciences citations. Because each bibliographic database has a different subject focus, we adjusted our search terms accordingly. Search terms in MEDLINE/HealthSTAR included: minority, diversity, education, attrition, premed, applicants, admissions, health professions applicants, student diversity, and minority education. In the MEDLINE/HealthSTAR database we searched articles published between 1980-2001. In the ERIC database search terms included: health professions, minority health, minority education, and minority programs. The ERIC database includes literature from 1966 to the present. As a follow-up, we searched using the CINAHL (Cumulative Index to Nursing and Allied Health Literature) database, which includes nursing and allied health journals, and used the following terms: diversity programs, diversity education, minority program, and minority education. The CINAHL search included literature from the years 1982-1997.

We obtained and reviewed all articles identified from these searches that appeared to study interventions to improve educational performance of URMs and other disadvantaged students and to increase the numbers of URMs entering the health professions. We reviewed the bibliographies of many of these articles to identify additional evaluations that may not have surfaced in our subject search or that were not catalogued in the bibliographic databases.

Additionally, we queried members of our advisory panel and other individuals familiar with diversity programs about other possible evaluations that we may not have found in the library databases. We were especially interested in unpublished evaluations with a high quality of methods and study design.

We excluded articles that did not present any data on intervention outcomes. This process excluded many articles that simply described the content or operations of interventions without presenting data on outcomes. We included studies that examined outcomes that were short-term or intermediary (e.g., improvement in grade point average or MCAT scores) as well as those measuring “harder” outcomes such as actual matriculation in a health professions school. Although very few of the interventions studied limited eligibility exclusively to URM students, participants in all the interventions studied were predominantly URM.

Rating the Quality of the Evidence

The current state of the art in literature reviews is to use explicit criteria for rating the quality of research studies and, when possible, to perform formal quantitative meta-analysis of the data reported in individual studies. Because the studies we reviewed varied so widely in their quality, design, subject matter, and outcomes analyzed, it was not possible to perform a quantitative meta-analysis. However, we did develop a rating scheme for evaluating each study and set a minimum level of rigor of study design, to identify studies of acceptable research quality.

We first grouped studies according to their overall study design. All studies were observational in nature; that is, none used a true experimental design with randomization of participants. Observational studies used two general designs: 1) cohort studies, and 2) pre-post intervention studies. Cohort studies analyze a group exposed to the intervention compared with a concurrent group not exposed to the intervention. Pre-post designs measure the same study subjects before and after exposure to an intervention. The unit of analysis may be either individual students (e.g., MCAT scores before and after participation in a special enhancement intervention) or institutions and other more aggregate units of analysis (e.g., the annual percentage of URMs at a college applying to health professions schools before and after an intervention was implemented at the college).

Table 5.1
Quality of Research Evidence: Scoring Methods

STUDY DESIGN (“D” Score)	
Cohort Studies	1 = control group, individual level baseline data on both intervention and control group, formal adjustment (matching or regression methods) for potential differences in baseline characteristics 2 = control group, individual level baseline data on both intervention and control group, but no formal adjustment for potential differences in baseline characteristics 3 = control group without measurement of baseline characteristics 4 = no control group
Pre/Post Studies	1 = pre-post data both on intervention and external control groups 2 = no external control group data
STATISTICAL ANALYSIS (“S” Score)	
	1 = adequate statistical power and formal tests of significance
	2 = inadequate statistical power, formal tests of significance performed (but usually not significant due to low power)
	3 = no formal tests of significance

Both cohort and pre-post studies were then rated on two basic criteria: 1) the rigor of the study design (criteria “D”), and 2) the statistical methods used in the analysis (criteria “S”). Table 5.1 summarizes the rating scheme for the “D” and “S” criteria.

For cohort studies, a rating of 1 for design required that the study included a control group, that individual level baseline data were measured and reported for both the intervention and control groups, and that the study formally adjusted for potential differences between intervention and control groups in baseline characteristics (either by matching on key baseline variables or using regression models in the analysis). A grade of 2 for design was assigned if the cohort study used a control group and measured baseline characteristics of intervention and control groups but did not formally adjust for any possible differences in baseline characteristics. Studies that included a control group but failed to measure or comment on baseline characteristics of intervention and control groups received a design grade of 3. Studies with no control group were assigned a grade of 4.

Ratings of study design for pre-post studies differed from those for cohort studies. Pre-post studies have by definition at least one form of control group—the “pre-intervention” phase. However, the most rigorous pre-post studies also include an external control group to control for secular trends that may confound the study findings. For example, a rigorous pre-post study of MCAT scores before and after an intervention would ideally also measure MCAT scores for students who took the MCAT exam twice but did not participate in the intervention. Pre-post studies that used an external control group were given a design grade of 1, and those that did not use an external control group received a grade of 2.

Studies were assigned a statistical grade of 1 if they had adequate statistical power to detect a meaningful difference in outcomes and performed formal tests of significance. Studies that used formal tests of significance but had small sample sizes and therefore low statistical power were given a grade of 2. Many of the studies receiving a statistical grade of 2 reported fairly large differences in outcomes between intervention and control groups but simply included too few participants to permit these differences to achieve statistical significance. A grade of 3 was assigned to studies that did not report any formal tests of significance.

Section B: Evidence on General Educational Interventions at the Pre-College Stages

Stage 1: Preschool Evidence

A substantial body of research has demonstrated that very early intervention can prevent negative outcomes for at-risk students (Haskins, 1989; Karoly et al., 1998; Schweinhart et al., 1986). Some recent research also demonstrates that high quality early intervention can actually enhance both cognitive and behavioral outcomes of program participants over the long-term. Karoly et al. (1998) reviewed nine preschool interventions that served low-income children and had been carefully evaluated. Included in the study was the now-famous Perry Preschool Program (Schweinhart et al, 1986). While cognitive effects as measured by IQ tests were not sustained over time for the Perry preschoolers, intervention participants had higher rates of high school completion and employment and lower rates of delinquency and teen pregnancy than the control group, which had not been exposed to any preschool intervention. Other interventions reviewed in this meta-analysis also showed small, but significant gains on cognitive measures.

Campbell and Ramey (1995) reported on a carefully designed study of the effects of high quality preschool intervention on at-risk youngsters. The Carolina Abecedarian Project involved four groups of students: a preschool and early elementary intervention group, a preschool only group, an early elementary intervention only, and a control group. Altogether 111 children and their families were involved in the experiment; 98% were African American. All of the children were considered at risk for poor developmental outcomes, and the intervention involved parent training as well as extensive educational enrichment for the treatment children. On the basis of a longitudinal study of the children

Table 5.2
Summary of Studies on General Educational Interventions at the Pre-College Stages

	Study Grade	Results
Stage 1 Preschool		
Campbell and Ramey, 1995	D2S1	Higher cognitive functioning
Karoly et al., 1998	D2S2	Better behavioral adjustment; some academic gains
Currie and Thomas, 1996	D2S2	Increased achievement; decreased grade repetition
Stage 2 Grades K-6		
Opuni, 1997-98	D3S1	Increase in college-going rate and academic achievement
Fashola and Slavin, 1999	D2S1	Increased reading levels
Cook, Hunt and Murphy, 2000	D1S1	Small increase in achievement levels and improved school social climate
Stage 3 Middle School		
Tierney and Jun, 1998	D4S3	Higher college-going rates
Stage 4 High School		
Gándara et al., 1998	D1S1-2	Higher college going; higher Aspirations; better attitudes toward schooling
Bailis et al., 1999	D4S3	Higher college-going rates
Stage 5 College Bridge		
Hume, 1995	D2S3	Increase in academic achievement and retention rates

seven to ten years after the intervention had ceased, the researchers concluded that early intervention in infancy resulted in superior academic outcomes including maintenance of IQ advantages and higher academic achievement than the control group or the early elementary group. The research supports the idea of intervening early and intensively in

the lives of low-income and minority youth and suggests that when intervention occurs both early and extends over a lengthy period, intellectual gains may be sustained over time.

Head Start is the primary program supported by the federal government to intervene in the lives of low-income and minority children, but Zigler & Styfco (1993) note that because Head Start is a funding source and not a specific intervention, there is large variation in the way it is implemented. Nonetheless, a recent study of the effects of selected Head Start programs for children from different racial and ethnic backgrounds found that cognitive gains may be substantial and persistent for Mexican American children. When compared to stay-at-home siblings, some programs were able to narrow the test score gap with white children by at least one-quarter and to close the gap in the probability of having to repeat a grade by about two-thirds (Currie and Thomas, 1996). The investigators did not find gains of the same magnitude for African American children, and they attributed this, at least in part, to the greater likelihood that the African American children attended significantly inferior schools after Head Start, thus eroding their gains.

In sum, the evidence suggests that early intensive enrichment can have long-term effects on cognitive functioning, behavioral measures, and reduced likelihood of being held back in grade. While the outcomes appear to differ by subgroup, they are nonetheless very encouraging with respect to the potential for significant positive intervention in the lives of poor children.

Stage 2: K- 6 Evidence

Many school reform efforts geared toward increasing the achievement of low-income and minority children in the K-6 grades are underway across the nation. Unfortunately, very few rigorously evaluate their activities, and so it is difficult in most cases to know what is working and why. One exception is the work of Cook et al. (1998). They performed a very careful longitudinal study of ten elementary schools in Chicago that had implemented the Comer Program. The Comer Program is a school-wide reform effort that focuses on bringing the community into meaningful contact with the schools in an effort to fundamentally change the schools' climate—the attitudes and aspirations that school personnel have for their students (Comer, 1988). The investigators compared the reforming schools with nine others in the district that had similar demographic characteristics and were statistically controlled for baseline differences. They found that where the intervention was carefully implemented and also had a strong focus on strengthening the rigor of the curriculum to which students were exposed, there were small but significant and positive differences in both behavioral indicators (decreased behavioral problems) and academic achievement. While the differences were not earth shattering in size, the findings were nonetheless very important. Detecting differences in anything in whole school efforts, with all the messy variation that exists across classrooms, teachers, and students, can be viewed as an indicator of probable larger effects if only evaluation instruments were more sensitive and the samples more stable.

Project GRAD, a Ford Foundation sponsored program that began in Houston, Texas is another such beacon of hope in the evaluation literature. Project GRAD is a large-scale effort now being implemented in several sites around the country. Its goal is to provide every student with a greater opportunity to learn. It involves research-based instructional reforms and addresses many of the shortcomings of low-income, inner city schools. Although it is relatively new, it appears to be already creating important changes in school climate and some student achievement indicators. A recent evaluation of the Houston site

reveals that referrals to the principal's office across the feeder elementary schools declined by 74% since the inception of the program in 1994-95. Student achievement is also on the upswing. Across all cohorts of students in the original feeder elementary school cluster, as well as in the 10th grade of the high school, Project GRAD students are outperforming their comparison schools in math and, in some cases, in reading on the Texas Assessment of Academic Skills (TAAS) test (Opuni, 1998). Such programs appear to demonstrate that the achievement of underrepresented students can be enhanced on a large scale, with structured, sustained efforts. A centerpiece of many of these reform efforts is the incorporation of research-based curricular interventions such as Success for All.

Slavin and Fashola (1998) reviewed the findings for Success for All and *Lée Conmigo*—the Spanish language version of Success for All (Slavin et al., 1996) as part of a larger study of the effectiveness of K-6 intervention programs. Among the school-wide reform efforts they reviewed, they concluded that Success for All and *Lée Conmigo* were effective at increasing the reading achievement of participants, and Roots and Wings (Slavin et al., 1996) was effective at increasing the math and science skills of participants, when compared to matched controls. All of these programs are highly prescriptive, with detailed, “teacher proof” lesson plans. Thus, the consistency of curriculum and the tendency to even out the instruction provided by teachers of differing ability may be responsible for a significant portion of the students’ improvement. It should be noted that some researchers have registered skepticism about these findings as they do *not* represent independent evaluation studies—the evaluators were also the program designers. Moreover, they were unable to identify any interventions that they had not designed that they deemed effective. However, Project GRAD has found small, but significant gains in reading scores using the Success for All program, and it is only fair to reiterate that few interventions provide rigorous evaluations that allow for a test of their effectiveness.

Summarizing the evidence on K-6 interventions, it is reasonable to conclude that well-designed curricular programs that are applied consistently across grades can increase basic skills achievement, at least minimally, for low achieving students. Moreover, carefully implemented whole-school reform efforts can affect campus climate and marginally increase student achievement scores. Even small increases in achievement and other behavioral measures are reason for optimism inasmuch as our measurement tools are still relatively primitive with respect to identifying effects in whole-school contexts, with all the methodological difficulties that are implied. One finding that is clear and consistent across studies, however, is that program effects are quickly lost when the interventions are not sustained over time, and significant academic achievement effects are won only by long-term and consistent intervention (Gándara and Bial, 2001).

Stage 3: Middle School

Although many educators agree that middle school is a critical point in young people’s development with serious consequences for their long-term academic outcomes (Eccles et al., 1993), there is actually relative little attention paid to intervention at this juncture in students’ school lives (California Department of Education, 1987). The United States Department of Education’s more than \$200 million investment in its new GEAR UP (Gaining Early Awareness and Readiness for Undergraduate Programs) that focuses on middle school students is a tacit acknowledgement of the lack of attention to this stage in the academic pipeline. Not surprisingly, then, there are few rigorously conducted studies to draw upon for guidance about “what works.” One program, however, that has

received a great deal of attention in the popular media is the Neighborhood Academic Initiative program, sponsored by the University of Southern California.

The Neighborhood Academic Initiative (NAI) intervention began in 1990 as an attempt by USC to have a direct impact on access to higher education in its own community. The intervention is limited to the area surrounding the USC campus. This area, located in the central part of Los Angeles, is largely low-income, and most residents are either African American or Latino. Approximately 40 “average” seventh grade students (with mostly B’s and C’s) are selected into the program from one school in the surrounding area based on two criteria: 1) their stated willingness to learn, and 2) a parent or guardian’s willingness to support the “scholar” by attending classes and meetings and ensuring that the student can attend all required activities. The intervention lasts the six years from 7th to 12th grades, and it is intensive. Students are bused every morning for two hours of math and English enrichment classes at USC, and both students and parents meet on Saturdays for four hours of workshops. Students also receive tutoring twice a week for an hour and a half and have a counseling session on Friday mornings that deals both with college preparation activities and socio-emotional issues. During the summer students are enrolled in additional classes. If they persist through the program, graduate, and meet minimum eligibility criteria, they are awarded a full-ride scholarship to the University of Southern California, a selective, independent school where tuition is about \$20,000 per year.

Tierney and Jun (1998) evaluated the NAI, following two cohorts of students who had completed the entire six years of the program. Of those students entering in 7th grade, 64% persisted to graduation. Of those who graduated, over 60% went on to a four-year university. In other words, about 38% of the original cohort went to a four-year college. Fifty-two percent of these attended USC, and 96% went on to some form of post-secondary education. Although no comparison data were provided by the evaluators, it is well known that in the high risk neighborhoods and schools from which these students came, very few students go on to four-year universities. Certainly there were selection effects with respect to the students who were chosen to participate—the program takes so few students, that those who are selected must have some notable characteristics in order to be recommended. Moreover, little is known about how the students fare once they are in college. Nonetheless, by providing an extremely intensive academic intervention, with almost equally intensive parent involvement, the program appears to be successful in delivering a significant number of students to four-year colleges who almost certainly would not have otherwise achieved this goal. The level of commitment—both human and financial—required to implement this program does, however, raise concerns about its replicability.

Stage 4: High School Interventions

By far, most interventions geared toward increasing the college-going rates of underrepresented students take place in high schools. There are literally thousands of such interventions (Perna and Swail, 1998), and they take primarily two basic forms—school-centered and student-centered. School-centered programs attempt to reform the whole school so that more students at the school will be able to access higher education. This is necessarily a long-term strategy, often with relatively modest outcomes in the short term. Student-centered programs generally take the view that because whole-school reform is so labor intensive and takes so long, it is best to focus on particular students and to eschew the broader problems faced by the school. Unfortunately, few of either kind of program are rigorously evaluated. We have selected to highlight two interventions,

however, that were evaluated in a reasonably rigorous manner and yield some evidence of the kinds of strategies that may be effective in increasing college going among underrepresented students.

High School Puente is a student-centered program that serves a largely Latino clientele. It enrolls students in the 9th grade and provides services to them through the 12th grade. It has three major components: a two-year college preparatory English class, a Puente counselor, and a mentoring program. The English class is taught by a Puente-trained English teacher, and it integrates community-based writing, portfolio assessment, and Latino-authored literature into the core college-preparatory curriculum. The Puente counselor works closely with students and parents to ensure that students are enrolled in college preparatory courses, that they are making good progress, and that parents have the information they need to support their children's academic success. A Community Mentor Liaison (CML) recruits and trains successful, college-educated mentors from the community and assigns them to the Puente students.

The Puente program was evaluated by Gándara et al. (1998) using several samples of students. Data were collected on more than 900 Puente students and 900 non-Puente students over four years in all four grades of high school on aspirations, attitudes toward school and achievement, and preparation for college. Data were also collected on 75 Puente students from three schools who were matched with 75 non-Puente students from the same schools on age, ethnicity, gender, and 8th grade GPA and reading scores. This sample was followed longitudinally for the four years of high school and used to test for differences in high school GPA, college preparatory course-taking, and college matriculation. Additionally, ethnographies were conducted on a sample of 27 students in the same three high schools to help interpret the quantitative data. Evaluators found that Puente students were significantly better prepared to enter college than their non-Puente peers with respect to students' own assessment of their knowledge of what was needed to apply successfully to college and their record of admissions test-taking. Puente students were also significantly more likely to place a high value on going to college and to be willing to give up other important things in their lives in order to achieve this goal. They also chose to be known as a "good student" (a finding that countered the common problem students report of not wanting to appear to be a "nerd") significantly more often than the comparison students. Because pre-test data were not collected on the samples, it is impossible to know to what extent selection factors may have had a role in producing differences on attitudinal measures. However, longitudinal data suggest that selection was almost certainly not a factor in measures of college preparation or participation.

With respect to academic outcomes, there were no significant differences between Puente students and their non-Puente controls on high school retention, GPA, or course-taking by the end of 12th grade. However, differences in college matriculation were substantial. Forty-three percent (43%) of Puente students went on to four-year colleges, compared to just 24% of the controls. A total of 84% of Puente students went to *either* a two- or four-year college compared to 75% of non-Puente students. Because the evaluation study ended in the same year that the students entered college, the evaluators did not collect data on students' persistence in college, and so longer-term outcomes were not reported.

College Bound is a school-centered program that was launched in 1989 by the GE Fund as an ambitious, ten-year, \$20 million effort to double or significantly increase the college-going rate in selected high schools. The major requirements for the grant were that the schools agree to make necessary changes in curriculum and practice that will

operate to raise the achievement of students in the schools and that they involve GE personnel in the design of the program and, to the extent possible, as volunteers working within the program. Additional requirements for participation included plans for teacher and staff professional development, curricular modification, structural changes in the school (e.g., block scheduling), and student enrichment activities. Nonetheless, local communities are given a great deal of flexibility to design a reform intervention that works best in their local context.

The GE College Bound program was evaluated by Bailis et al. (1999). The evaluators had to base their analyses on data that had been collected by each of the schools in the program, and this was not always consistent or adequate for their purposes. They also found it impossible to identify appropriate control schools or groups of students for each of the varied experiments. So for points of comparison, they chose the schools' baseline college-going rates and national samples. Given these limitations, the findings for the study are promising. Bailis et al. report that college going was increased significantly at seven of the ten programs for which there were sufficient data to draw conclusions, and the effects were greatest for those schools where the initial college-going rate was lowest. College-going rates more than doubled at four of the five sites with initial rates below 50%.

Summarizing the findings from these and a few other studies, we conclude that high school interventions that are well-designed and implemented and that last over a number of years can increase students' aspirations and effectively double the college-going rate of underrepresented high school students. We find little evidence, however, that they have a major impact on standard measures of academic achievement such as GPA or test scores. As with the primary grade school reform projects, few good evaluations of these programs exist. However those that have been conducted provide us with some insights into what can and cannot be accomplished over the high school years. The best of these programs appear able to significantly increase the college-going rates of participants and to ratchet up students' aspirations. Students who might otherwise have only attended a two-year college will more often attend a four-year college, and those who were not headed for college at all are more likely to enroll in local community college. These changes in students' college-going behavior may set them on an entirely different life trajectory from which they had once aspired. However, the challenge of significantly changing most students' academic profiles (grades and test scores) appears to be more than a single program can usually deliver. To change this would require the more long-term and intensive efforts of systemic school reform (Gándara and Bial, 2001). Nonetheless, such programs appear to lift some participants over the final hurdles to college and to help ensure that well-prepared students from low-income and minority backgrounds actually get there—an outcome that is far from certain even for the best prepared students from disadvantaged backgrounds.

Stage 5: High school to College Transition

Summer bridge programs are relatively common in the literature, and we have found numerous examples of such programs offered by higher education institutions. Many colleges offer some kind of summer experience to their incoming freshmen, usually targeted to students who are first in their family to go to college, designed to help students make the adjustment to college life. Such programs commonly report that students adapt better to college life than those who do not attend and that they become more quickly integrated into the college, a known predictor of college retention (Tinto, 1987). As with all other interventions, however, there is little in the way of rigorous evaluation. The

Challenge Program at Georgia Tech offers a particular kind of summer bridge program that has been reported on widely in the popular press. Program leaders have devoted a great deal of time and effort to modifying the design of the program and testing its effectiveness over a number of years.

The Challenge Program intervention provides a four to five week course of study for underrepresented students in the core classes that science and engineering students will encounter in their freshman year. However, there is no set curriculum for the summer program. Faculty can teach whatever they choose, but they are the same faculty that students will have in their first year of college. One of the informal objectives of the coursework is to expose students to a range of teaching—from very good to mediocre—and to go over a significant portion (though intentionally not all) of the first semester's curriculum. The program discourages faculty from covering the entire first semester's material because students can become complacent, believing that since they have already covered the material they do not need to put in the same level of effort during the regular school year. However, by essentially getting exposure twice to a significant portion of the first semester's curriculum, Challenge students generally do better than non-Challenge students on first semester GPA, and as a result both their standards and their self-confidence are higher as well.

Hume (1997) studied the GPA and retention rates of the cohorts of students who participated in the summer bridge program in the summers of 1990 through 1997 and compared them to the students who did not participate in the program, controlling for initial GPA. He found that with respect to GPA, the Challenge students significantly outperformed the non-Challenge minority students and equaled or surpassed the performance for all Georgia Tech students in the first semester. The students who entered in 1990 and 1991 were also retained at Georgia Tech at higher rates than the students in the school as a whole. The findings, however, were almost wholly attributable to the Latino students who outperformed both African American and all other students on both grades and rates of retention. The study did not control for socio-economic status, and the particular Latino students who attended Georgia Tech tended to come from high SES homes both in the US and abroad. It was nonetheless notable that African American Challenge students (who were also much more likely to be lower income) consistently outperformed African American non-Challenge students on both GPA and retention, and retention rates approached those of the school as a whole by the mid-1990's.

It would appear that the lesson to be learned from the Georgia Tech experience is that summer bridge interventions can have a significant impact on first semester GPA when the intervention is rigorous, intensive, and carefully designed to consider issues of motivation. Affecting the first semester GPA can also have a number of other positive consequences, including raising the personal standards and self-confidence of students, as well as providing them with a slight cushion to offset potentially lower grades as the curriculum becomes more demanding in the second semester and beyond.

Summary of Evidence on Pre-College Stage Interventions

It is clear from the foregoing summary of evaluation studies that carefully designed, intensive interventions that usually last over an extended period of time can have a significant impact on underrepresented students' achievement and educational attainment. A subtext of many of these studies, however, is the finding that aspirations may be easier to affect than academic gains. Good and rigorous instruction almost certainly has an impact on learning, but gains in GPA are hard to achieve in a few years

Table 5.3a
Pipeline Stage: High School

<u>Study</u>	<u>Study Grade</u>	<u>Program/ Intervention, Site</u>	<u>Profession</u>	<u>Strategies</u>	<u>Outcome</u>	<u>Results</u>
Philips 1981	Cohort D1S 1	AHEC, UTMB	Multiple	Professional opportunities	Health prof school/job	Increased enrolled/ working in health prof (esp nursing)
Thomson 1992	Pre-Post D2S 1	HPSA, Baylor	Allied Health	Academic support, psychosocial support	Test scores, career knowledge	Increased MGIPS scores and career knowledge
Bediako 1996	Pre-Post D2S 3	Ventures in Education	General	Academic support, psychosocial support	Health prof school application, admission, matriculation	Increased all outcomes
Slater 1991	Cohort D3S 3	Gateway to Higher Education	General	Mentoring, academic support, psychosocial support, professional opportunities	Test scores	Improved test scores

with an intervention that focuses on the student alone rather than the entire schooling (and probably community) context. Ad hoc or autonomous interventions that exist separately from the core functioning of the schools that students attend are unlikely to have long-term sustained effects. However, the few examples we have of school-wide and longitudinal efforts that stretch over significant portions of students' developmental span suggest reason for optimism about the possibilities of real improvement that is sustained over time.

Section C: Evidence on Interventions at the College-to-Health Professions School Stages

High School

Four controlled studies have evaluated outcomes of interventions at the high school level that were specifically designed to promote URM and disadvantaged student entry into the health professions. All showed that the interventions had positive effects, although the studies vary in their methodological rigor and meaningfulness of the outcomes measured. The best of this group of studies was conducted by Philips et al. (1981), who evaluated an intervention at the University of Texas Medical Branch (UTMB). This intervention gave high school and college students a summer experience to expose students to a variety of health careers and to build academic, communication, and interpersonal skills. The intervention was funded in the early stages of the BHP AHEC program (and remains one of the few AHEC interventions to have been evaluated in a well-controlled study). This cohort study investigated career outcomes for intervention participants and non-participant controls. The control group consisted of students who had applied to the UTMB summer session but had not been accepted due to space constraints. Controls were matched for sex, age, ethnicity, and parental occupation. Six-

years after participating in (or applying to) the UTMB intervention, a greater proportion of participants than of controls were employed in health professions (38% vs. 10%, $p=.001$), with most employed in nursing. This study is particularly noteworthy for its matched control group design and its measurement of the “hard” outcome of ultimate success in entering a health profession.

Thomson et al. (1992) evaluated the Health Professional Summer Academy directed by the Baylor College of Medicine. At the time of this study, Baylor participated in a partnership with the local school district for special High Schools for the Health Professions. Although these schools emphasized preparing students for the more competitive health professions, Thomson and colleagues recognized that the schools should also address the needs of students at these schools who were not at the top of their classes. The 3 week Health Professional Summer Academy was open to entering 9th graders who were at the bottom third of their classes in academic ranking and was designed to increase interest in and skills for allied health careers. Students’ scores on the Middle Grades Integrated Process Skills test were measured before and after the intervention. Mean scores improved significantly on the post-intervention tests. Scores also improved on a test measuring knowledge about health careers. There was no control group and no follow-up to know whether participants entered allied health or other health fields.

Two published studies using weaker study designs examined two special high school enrichment programs. The Josiah Macy, Jr. Foundation-funded Ventures in Education program supported curricular enrichment interventions at over 50 high schools throughout the US serving disadvantaged students. The interventions consisted of a strong, basic academic curriculum, including college preparatory math and science, as well as tutoring and counseling, but did not attempt to “break new educational ground” incurricular innovation (Bediako et al., 1996). An evaluation of students participating in Ventures interventions at five of the schools funded in the early phase of the program found that 11.1% applied to medical school, 7.6% were accepted, and 7.3% matriculated (Bediako et al., 1996). The researchers asserted that “[a]ll of these percentages were considerably greater than zero, which is the approximate percentage of students at these high schools who...applied to, were accepted by, and matriculated into medical school before the Ventures program.” However, the researchers did not systematically track high school graduate outcomes prior to the Ventures program, nor did they specify how students were selected within participating schools for the special Ventures interventions. Although the medical school outcomes seem impressive, the study design raises questions about the validity of the pre-Ventures control group measurements and lack of adjustment for likely selection bias.

The City University of New York and the New York City Board of Education sponsor the Gateway to Higher Education program in five New York City high schools. The interventions provide comprehensive academic enrichment and support. Using a very weak study design, Slater and Iler (1991) found that intervention participants had higher pass rates on the New York State Regents exam than other students at the same high schools, and had a higher mean SAT score than the national mean SAT score for all SAT-takers and the national mean SAT score of African Americans. No attempt was made to control for the selection of higher achieving students into the Gateway interventions, making it difficult to attribute outcomes to the intervention rather than selection bias.

Table 5.3b
Pipeline Stage: College

<u>Study</u>	<u>Study Grade</u>	<u>Program/ Intervention, Site</u>	<u>Profession</u>	<u>Strategies</u>	<u>Outcome</u>	<u>Results</u>
Cantor 1998	Cohort D1S 1	MMEP (multi-site)	Medicine	Academic support	Med school acceptance	Increased med school acceptances
Strayhorn 2000	Cohort D2S 1	MEDP, UNC	Medicine	Academic support	Med School acceptance and grad	Increased med school acceptance and grads
Carline 1999	Cohort D1S 1	Gen'l enrichment programs	Medicine	Academic support	Score on interview for UW med school	No difference in interview score
Thomson 2001 (unpub)	Pre-Post D2S 3	Pre-med Honors College Program, UT Pan-Am & Baylor College of Med	Medicine	Academic support	Med School entry	Increased med school entry among students attending S Texas colleges
Lewis 1996	Pre-Post D2S 3	HCOP, SDSU	General (med)	Academic support, mentoring, psychosocial support	Health prof appl and acceptance	Increased all outcomes
Pisano 1983	Pre-Post D2S 3	MEdREP, Tulane	Medicine	Academic support	MCAT scores	Improved MCAT scores
Pisano 1983	Cohort D3S 3	MEdREP, Tulane	Medicine, other	Academic support	Acceptance to MODVOPP school	Increased acceptances
Maton 2000	Cohort D1S 1	Meyerhoff Scholars, UMD	Science, math, engineering	Academic support, financial support, mentoring, psychosocial support, professional opportunities	College GPA, SME grad school, med school	Increased science GPA, entry into SME grad school, med school entry
Fullilove & Tressman 1990	Pre-Post D1S 1	Math Workshop Program, UCB	Math	Academic support	1 st yr math grades, BS	Increased math grades and BS degrees
Villarejo & Tafoya, 1995 (unpub)	Cohort D1S 1	BUSP, UC Davis	Science, math	Academic support, professional opportunities, psychosocial support, financial support	College calculus, gen chem grades	Increased chem, calculus grades
Hesser 1993	Pre-Post D1S 1	MAAP, Med College of GA	Allied Health	Academic support, psychosocial support	Retention in school	Increased graduation rate
Hesser 1996	Pre-Post D1S 1	MAAP, Med College of GA	Nursing	Academic support, psychosocial support	Retention, grades, board passage	Increased GPA (trend to increased grad rate and board passage)

College

Considerably more and better quality research has investigated college interventions. Seven studies evaluated college enrichment interventions to prepare students for post-baccalaureate health professions schools; five of these interventions specifically targeted medical school entry. Another group of three studies examined college interventions designed to improve math and science achievement without a specific health professions focus. Two additional studies evaluated interventions at a single institution to enhance educational success at baccalaureate-level health professions training programs, one in allied health and one in nursing. Almost all of these studies found that interventions had a positive effect, although the methodological rigor and quality of the evidence is not consistently high across studies.

Preparation for Post-Baccalaureate Level Health Professions Schools

Cantor et al. (1998), in one of the best-designed educational evaluation studies, investigated the Minority Medical Education Program (MMEP) funded by the Robert Wood Johnson Foundation and coordinated by the AAMC. This competitive, six-week residential summer educational program for pre-medical college students focuses on training in the sciences and improvement of writing, verbal reasoning, studying, test taking, and presentation skills. The MMEP program funds interventions at several medical schools, with interventions relatively standardized across sites. Investigators compared rates of medical school acceptance among MMEP participants and non-participants, using regression methods to carefully adjust for differences in many baseline characteristics between participants and non-participants. On unadjusted analysis, 49.1% of MMEP participants and 41.6% of non-participants were accepted into medical school (odds ratio=1.37). On adjusted analysis, the odds ratio of acceptance was 1.69 for participants relative to non-participants.

Strayhorn (2000) examined a pre-medical college enrichment intervention at a single institution, the Medical Education Development Program at the University of North Carolina at Chapel Hill. Seventy-six percent of students who participated in the nine-week summer intervention were accepted into medical school. This percentage compares favorably to the acceptance rate nationally for all URM medical school applicants (47%) and non-URM applicants (54%) during the same time period. However, unlike Cantor et al. (1998), Strayhorn did not formally adjust for possible differences between intervention participants and non-participants. Strayhorn did observe that the average grade point average and MCAT scores of intervention participants were similar to those of all URM medical school applicants nationally, suggesting that there may not have been a major selection bias for intervention participants.

We were able to find only a single study among all the research we reviewed that reported that an intervention was not effective. Carline (1999) examined URM applicants to the University of Washington School of Medicine and determined which applicants had participated in some type of pre-medical college enrichment program. The investigator hypothesized that because these interventions often provide training in interviewing skills, intervention participants would have received higher scores than non-participants on their interview evaluations at University of Washington. However, no difference in interview scores was detected. This study is somewhat limited by its focus on only a single institution and on the single intermediary outcome of interview scores.

Two studies with weaker methodologies investigated the Medical Education Reinforcement and Enrichment Program (MEdREP) at Tulane University School of Medicine. This summer program provided clinical experiences, MCAT preparation, and

other forms of academic enrichment. Pisano and Epps (1983a) compared MEdREP participants in 1976 with applicants from the same year who did not participate in the intervention. Sixty-five percent of participants were accepted to a health professions school compared to 37% of non-participants. No possible differences in baseline characteristics between participants and the control group were reported, nor were formal tests of significance performed. In a separate publication on the same intervention, Pisano and Epps (1983b) also performed a pre-post study of MCAT scores. Among MEdREP participants who had taken the MCAT prior to the intervention, scores improved when they retook the exam after the intervention. However, sample sizes were small, there was no comparison group to adjust for possible effects of simply taking the exam for the second time, and no tests of statistical significance were performed.

In contrast to the relatively brief summer enrichment interventions that were the subject of the studies discussed above, two studies examined more sustained college health professions enrichment interventions. Thomson (2001) examined the Premedical Honors College Program, a special pre-medical track at the University of Texas-Pan American (UT-PA) administered by Baylor College of Medicine and UT-PA and funded in part by BHP. Through a highly competitive selection process, approximately 25 high school seniors graduating from South Texas schools each year are accepted into the Premedical Honors College Program. Throughout college at UT-PA they receive a rigorous structured curriculum focused on science, math, communications, and technology as well as academic and career counseling. Program participants receive conditional acceptance to Baylor College of Medicine at program entry, contingent on successfully completing the Premedical Honors College Program and meeting Baylor College of Medicine prerequisites and minimum required MCAT scores. Program participants receive full tuition and fee waivers for both college at UT-PA and medical school at Baylor.

Thomson (2001) examined the number of students from all five South Texas colleges matriculating into any US medical school. In 1996, four South Texas college graduates matriculated into medical school. In 1998-2000, the years that the first three cohorts of Program participants graduated from college, 29 South Texas college students matriculated into medical schools. Although no formal tests of significance were performed, the large increase in medical school matriculants would almost certainly be a statistically significant finding. One particularly noteworthy aspect of the design of the Thomson study is that it used an "ecological" perspective, examining outcomes not just for intervention participants and individual controls but also for the overall geographic region. This design helps to avoid selection bias because it looks at overall net effects for an entire population of students. Interestingly, Thomson found that the increase in the number of medical school matriculants from South Texas was not only attributable to the achievement of Program participants at UT-PA. The number of matriculants also increased among UT-PA students who did not participate in the Program, suggesting that the entire pre-medical culture at UT-PA may have been influenced by the Premedical Honors Program. One limitation of this study is that it only cited matriculation data for a single pre-intervention year rather than using several years of baseline data to avoid possible single-year random effects.

The San Diego State University Health Careers Opportunity Program funded by BHP was studied by Lewis (1996). This college intervention used multiple intervention strategies to attempt to promote successful application to schools in a variety of health professions. In 1986-1990, prior to the HCOP intervention, 46 URMs from San Diego State University applied to health professions, and 38 were accepted (83% acceptance rate). In 1991-1995, during the HCOP intervention, 95 URM students applied to health

professions schools, and 78 were accepted (82% acceptance rate). Mean college grade point averages for URM pre-health students also improved following implementation of the HCOP intervention. Weaknesses of this study are the lack of formal tests of significance for comparing the pre- and post-HCOP outcomes and the lack of data on trends in the overall numbers of URMs enrolled at San Diego State University which might affect the number of URM applicants over time. The intervention appears to have primarily been associated with increases in the number of applicants and not in the acceptance rate, and the former may be confounded by possible growth in overall URM enrollment at the school.

College Math and Science Enrichment

Three studies examined interventions to improve URM achievement in math and science courses in college without an explicit goal of encouraging health careers. Maton et al. investigated the Meyerhoff Scholars Program at the University of Maryland Baltimore County (UMBC). This highly competitive program provides a comprehensive array of intervention strategies including academic enrichment, financial aid, advising and social support. The objective is to increase the number of URMs pursuing graduate doctoral degrees in science, engineering, and math. Maton et al (2000) performed a comprehensive and well designed study that included both a cohort design and a pre-post study design. For the first study component, the investigators compared three years of Meyerhoff Scholars with students who were accepted but declined to participate in the Meyerhoff Programs during the same years. Meyerhoff Scholars were nearly twice as likely as control students to graduate in science, engineering, or math majors (83% vs. 46%), were five times more likely to enter a graduate school program in science, engineering, or math, and had significantly higher college grade point averages in science, engineering,

Table 5.3c
Pipeline Stage: Post-Baccalaureate and Health Profession School Pre-Matriculation

<u>Study</u>	<u>Study Grade</u>	<u>Program/ Intervention, Site</u>	<u>Profession</u>	<u>Strategies</u>	<u>Outcome</u>	<u>Results</u>
McGlinn 1999	Pre-Post D1S 3	MEDPREP, S. IL. School of Med	Medicine	Academic support, psychosocial support, professional opportunities	MCAT scores	Increased MCAT scores
Ugbolue 1987	Cohort D2S 1	PEP, BU	Medicine	Academic support, psychosocial support	1 st yr grades and retention	Increased grades (trend for increasing pass to year 2)
Hesser 1992	Cohort D2S 2	SPP, Medical College of GA	Medicine	Academic support, psychosocial support	1 st year grades, retention	Improved trend for grades and retention

and math courses than controls. The investigators also compared the Meyerhoff Scholars to a group of UMBC students from the pre-intervention era, with the control students selected to match Meyerhoff Scholars on a variety of demographic and baseline academic characteristics. Results were similar to the cohort study, with higher science, engineering, and math achievement and graduate school matriculation.

Two slightly less ambitious and selective interventions to improve college math and science achievement have also been evaluated using rigorous research methods. The Math Workshop Program at the University of California, Berkeley developed small study groups and additional academic supports to promote success in the freshman year math course. Fullilove and Treisman (1990) performed a high quality study that compared intervention participants with contemporary non-participants and historical controls at UC Berkeley. Sub-analyses were performed after stratifying intervention and control students according to baseline demographic and educational characteristics. Intervention students were much more likely to receive higher grades in freshman year math and to ultimately graduate from UC Berkeley.

Villarejo and Tafoya (1995) evaluated the Biology Undergraduate Scholars Program at University of California, Davis. Designed to improve URM performance in college calculus and basic chemistry courses at UC Davis, this intervention involved a summer pre-matriculation session followed by a multidimensional intervention during freshman and sophomore years. The study used methods to adjust for baseline differences between intervention and control students. Compared to historical controls, intervention students achieved significantly higher grades in chemistry and had a trend towards higher math grades. The intervention appeared to raise URM students' performance in calculus and basic science to that of their non-URM contemporaries with comparable baseline academic characteristics.

Achievement in Baccalaureate Level Health Professions Schools

Table 5.4
Summary of 19 Controlled Studies in Section B According to Pipeline Stage of Intervention

Evidence Grade	Number of Studies			
	High School	College	Pre-matric	Post-bacc
D1S1	1	7	0	0
D1S3	0	0	0	1
D2S1	1	1	1	0
D2S2	0	0	1	0
D2S3	1	3	0	0
D3S3	1	1	0	0

In the 1980s, the Medical College of Georgia implemented the Minority Academic Advising Program to improve retention of URM students in the allied health and baccalaureate nursing training programs. Hesser et al. (1993, 1996) used a pre-post design to evaluate the outcomes of this intervention, using non-URM student data to control for secular trends at the College. In allied health, graduation rates for African American students increased from 72% before the intervention to 83% after the intervention. Graduation rates for non-African American students remained relatively constant during the same period. In nursing, the mean grade point average for African American students increased significantly, and the GPA gap between African Americans and other students narrowed. Graduation rates for African American nursing students, which were already high (92%) in the pre-intervention period, increased somewhat to 97%, a change which did not reach statistical significance. Passing rates at first sitting for nursing board exams increased from 49% to 64% over the pre- and post-intervention periods, although this difference also did not achieve statistical significance due to the small sample size.

Table 5.5

Summary of 19 Controlled Studies in Section B According to Profession Targeted

Evidence Grade	Number of Studies				
	General Health Professional	Medical	Allied Health	Nursing	Math and Science
D1S1	1	2	1	1	3
D1S3	0	1	0	0	0
D2S1	0	2	1	0	0
D2S2	0	1	0	0	0
D2S3	1	2	0	0	1
D3S3	0	1	1	0	1

Post-baccalaureate and Health Professions School Pre-matriculation Stage

Although post-baccalaureate interventions are fairly common, we were able to find only a single controlled study evaluating the effects of this intervention on URM students. Moreover, this study by McGlenn et al. (1999) of the Medical/Dental Education Preparatory Program (MEDPREP) at Southern Illinois University School of Medicine examined an intermediary outcome, MCAT scores, rather than actual entry into medical school. MEDPREP, funded in part by the BHP HCOP program, is an extensive and

Table 5.6

Summary of 19 Controlled Studies in Section B According to Strategy

Evidence Grade	Number of Studies				
	Mentoring	Financial Support	Academic Support	Psychosocial Support	Professional Opportunities
D1S1	1	2	7	4	3
D1S3	0	0	1	1	1
D2S1	0	0	3	2	0
D2S2	0	0	1	1	0
D2S3	1	0	4	2	0
D3S3	1	0	2	1	1

multifaceted intervention intended to increase the competitiveness of college graduates applying to medical school and other health professions schools. McGlenn et al. (1999) examined MCAT scores of participants pre- and post-intervention, comparing these scores to all MCAT examinees in the same year who had also previously taken the MCAT. Intervention students had much greater improvement in MCAT scores than did all MCAT re-takers, although no formal tests of significance were performed on these differences.

Two studies examined pre-matriculation interventions to enhance retention and academic success of URM students accepted into medical school. Ugbolue et al. (1987) evaluated the Pre-entrance Enrichment Program at the Boston University School of Medicine, also supported by BHP HCOP funds. URM participants were compared to URM non-participants, although no adjustment was made for differences in baseline characteristics and sample sizes were small. Participants received higher grades in first year medical school classes and had a non-significant trend towards a higher rate of successful passing into the second year. Hesser and Lewis (1992) evaluated a similar intervention at the Medical College of Georgia. Both intervention and control students had over 90% retention rates for the first year of medical school, although there was a slight trend for intervention students to be less likely to leave, withdraw or repeat the first year. There was also a non-significant trend of higher biochemistry grades for intervention students. The sample sizes were small, limiting the study's statistical power.

Summary

A summary of the evidence from Section C is tabulated in Tables 5.4, 5.5 and 5.6. In addition, each study is described in more detail in Appendix III. Only 8 of the 19 studies achieved the highest grade of scientific rigor (D1S1), with most of the best studies examining college-level interventions (See Table 5.4). When sorted according to professions targeted, there is considerable variation in research quality within each profession. Half of the studies examined interventions specifically focused on medicine. (See Table 5.5.) Studies of interventions focused specifically on nursing were rare, and we found no controlled study that investigated interventions specific to dentistry or pharmacy. The interventions evaluated used a variety of specific strategies, with academic support being the single most common strategy (See Table 5.6). No studies directly compared different strategies targeting the same population and outcomes, making it impossible to determine whether certain strategies are more effective than others. We found dozens of additional studies in the published literature that used uncontrolled designs and did not meet our minimum standards for quality of evidence.

What can be concluded from these 19 controlled studies? The most rigorously designed studies indicate that special summer enrichment programs can boost the success of URM pre-medical students in applying to medical school by approximately 25%. Studies using somewhat less rigorous methods also suggest that special college interventions sustained over the entire college period can increase the number of URM students at these colleges who matriculate into medical school and other health professions schools, and the magnitude of this effect may be greater than that of short-term summer interventions. Other studies demonstrate that these types of college or post-baccalaureate interventions may also improve URM performance on more intermediary outcomes measures such as MCAT scores.

Reasonably good evidence also exists that college interventions can improve URM achievement in science and math courses. A positive effect has been found both for intensive interventions that aim to produce URM students pursuing math and science PhDs, to more limited interventions that strive to improve URM achievement in early college math "gateway" courses. Well-designed studies also suggest that interventions at baccalaureate-level health professions training programs can enhance retention and successful graduation for URM students. At the post-graduate level, special pre-matriculation interventions for accepted URM students may also promote success in the first year of health professions school.

Much less can be concluded with confidence about interventions implemented at the high school level that aim to increase URM entry into the health professions. Few controlled studies of interventions at this level have been performed. There is a suggestion that outreach interventions to instill interest in health careers may increase the number of URM students entering health professions, especially for professions that do not require post-baccalaureate education. However, this evidence derives from only a single study. Evidence about the long-term health professions outcomes of special high school academic interventions, such as those sponsored by the Ventures in Education and Gateway to Higher Education programs, is of much poorer quality.

Common Issues in Evaluation Research on Educational Interventions

One problem common to the studies reviewed in Sections B and C is that they do not disentangle the effects of individual intervention strategies. Interventions are evaluated *in toto*, making it impossible to identify whether particular components of the intervention were critical to the effectiveness observed.

Ideally, evaluation research would be sufficiently robust and precise to produce evidence for each three-dimensional cell within our conceptual model. That is, it would allow us to answer precise questions such as:

- Are interventions that use strategies of mentoring targeted to URM high school students to promote entrance into nursing effective?
- Are mentoring strategies effective for URM college students to promote entry into dentistry?
- Is skill building in test-taking critical to the effectiveness of college enhancement programs for URM pre-medical students?

Unfortunately, the ability to characterize and classify interventions far exceeds the state of research knowledge about effectiveness according to discrete profession, pipeline, and strategy characteristics. At best, evaluation research allows some inferences to be made according to professions targeted and pipeline stage. Virtually no research allows disentangling of the multiple strategies used by each intervention in order to isolate the effectiveness of specific intervention strategies.

The general scarcity of high-quality studies in this field also reveals the difficulties in performing evaluation research. Evaluators typically encounter major hurdles in identifying appropriate control groups and measuring key predictor and outcome variables, especially outcomes that occur over time such as long-term educational progress. Equally challenging is the fact that rigorous evaluations (in particular evaluations that may find that programs are not effective) are almost never in the interest of the involved parties. Both program implementers and program funders have some degree of conflict of interest with regard to evaluation, tending to desire results that confirm the ingenuity and success of the program developers and the wisdom of the funders in investing in those particular programs. “Negative results” may imperil survival of the individual program and the entire funding initiative. These conditions also may dispose to publication bias, whereby negative studies that have been conducted are never published. Only one of the 19 studies reviewed in Section C failed to detect a positive effect for the intervention (although in many studies of “effective” interventions, formal statistical tests were not performed and “soft” intermediary outcomes were evaluated). This pattern of results suggests that some publication bias may exist.

Section D: Evidence on Financial Aid

Financial aid as a specific strategy to increase URM participation in the health professions deserves its own discussion. As noted in Table 5.6, financial support is a component of some of the interventions evaluated in Section C. However, these evaluations do not dissect out the individual contribution of financial aid to the success of the overall package of strategies included in the intervention. Several of the programs summarized in Chapter 4, such as BHP Division of Student Assistance programs and the National Medical Fellowships program, are exclusively devoted to administering financial aid. However, these specific financial aid programs have not been subjected to rigorous evaluation.

A substantial body of literature has studied the costs of higher education as a barrier to academic advancement and the effect of financial aid and related strategies in mitigating this barrier. These studies almost exclusively examine costs and financial aid in relationship to college entry and retention and do not investigate these issues specifically for health professions training. However, these studies have findings that have implications for financial aid strategies for health professions training. In this section, we review this general evidence on financial aid and its policy implications.

Income and Educational Costs as Barriers to Higher Education

Even if underrepresented minority students had no other impediments to accessing higher education, financial constraints would continue to be a major factor in their post-secondary choices. While there is some debate over the role of financial constraints as a major factor in students leaving college (Tinto, 1987), there is little debate that it is critical in deciding whether or not a young person will go to college at all (Adelman, 1999; Cabrera et al., 1992). Low-income students are significantly less likely to attend college than upper income students, even when their test scores are similar. Akerhielm et al. (1998) found that within the top test score group of the NELS: 88 achievement test, 75% of low income, 86% of middle income, and 95% of high income students went on to college. Stated differently, one out of every four high school graduates scoring at the top of their class, but coming from a low-income family, did *not* go to college.

The cost of a college education encompasses more than the cost of tuition for young people from low-income families. They must also weigh heavily the costs of forgone income, and the fact that they will not be able to help their families financially while they are in college. Therefore, even if college costs are covered by grants and/or loans, it can be a difficult decision for some low-income youth to forgo helping their families at an age when they can be productive wage earners. In a study of high achieving, low-income Chicano students, Gándara (1995) found that it was relatively common for older siblings to forgo college in favor of work so that younger siblings might have the opportunity to study as family finances were augmented by the incomes of the older siblings. Some students, and their families, may take themselves out of the running for higher education based on perceptions that do not fit reality. For example, research shows that many students are unclear about the costs of a college education and about the options that exist for paying college tuition (Akerhielm et al., 1998). “Sticker shock” has been shown to scare off some low-income students who lack adequate information about grants and loans that can make college possible, or who fear going into debt for school because it is perceived as too burdensome on the family. Moreover, students tend to overestimate the costs of college, imagining an even greater barrier than actually exists (King, 1996).

The disparities between academic advancement among students of differing income status is not simply a matter of differences in ability to afford higher education. Students from low-income families have a cluster of characteristics associated with lower socioeconomic status that impede access to higher education. Among these factors are attendance at primary and secondary schools with inferior educational resources as well as lack of family members who have attended college and “know the ropes” for planning and applying for college and obtaining financial aid (Terenzini et al., 2001). Some research has found that those low-income students who were able to successfully navigate their secondary education to take college preparation courses and SAT tests and to apply to college had almost as great a likelihood of attending four-year colleges as similarly prepared students from higher income families (Berkner and Chavez, 1997). Financial aid alone is unlikely to remove these types of non-cost barriers to higher education experienced by students from lower income families.

Lower income students are also less likely to successfully complete college once enrolled. For example, one study found that 81% of college students in the highest SES quartile had earned a degree or were still in college five years after matriculation, whereas only 51% of students in the lowest SES quartile had earned degrees or were still in college (Berkner et al., 1996). Low SES students who graduate from college are also much less likely than higher SES graduates to go on to attend graduate school (Berkner et al., 1996). Difficulties affording the costs of a college education have been implicated in the lower retention of lower income college students. Low-SES college students are significantly more likely than their higher-SES counterparts to work off-campus and to work more than 30 hours per week (Terenzini et al., 2001). Students who worked more hours while in college tended to borrow less for their college education, suggesting that low-SES students work more during college to avoid greater loan debt after college. This strategy is detrimental in two ways. First, it reduces the chance of degree completion. Second, it detracts from the student’s cognitive and psychosocial development. School-related academic and social activities are highly associated with college persistence. Not only are students who work off-campus less likely to graduate, they are also missing opportunities to learn and develop while in college (Pascarella and Terenzini, 1991).

The Effectiveness of Financial Aid

Research has shown that low-income students’ decisions to attend college are highly sensitive to tuition costs and financial aid. Perceived access to financial aid improves the likelihood of college attendance for low-SES students. Low-income students who anticipate receiving financial assistance are more likely to aspire to college (King, 1996). Students from low-SES backgrounds are more likely to apply to college when offered financial aid (Jackson, 1978) and are more likely than students from higher income families to report that access to financial aid influenced their decision to enroll in college (Leslie et al., 1977).

Berkner and Chavez (1997) demonstrated that financial aid removed “ability to pay” as a deterrent to college attendance for qualified lower income students. Research by St. John found that different types of financial aid had different effects on students’ likelihood of attending college, depending on the income status of the student. Financial aid in the form of grants had a large effect on increasing college attendance among students in the lowest income group. However, financial aid provided as loans was not significantly associated with college enrollment rates for these low-income students. In contrast, the availability of both grants and loans was associated with increased college attendance among middle-income students (St. John, 1990 and 1994; Terenzini et al., 2001).

Research on the role of financial aid in promoting retention of low-income college students has come to less consistent conclusions (Terenzini et al., 2001).

The average cost of attending college has increased faster than the average financial aid available to cover those costs. For example, at public colleges and universities, tuition and fees have risen by 114% and 113% respectively in the decade from 1988-89 to 1998-99. During the same period, however, aid for full-time equivalent students rose only 68%, and the maximum Pell grant awards, considered the foundation of the federal student aid program, lost 15% of its purchasing power (The College Board, 1999). Thus, financial aid has not only failed to keep up with need, it has failed to keep up with inflation. The decreasing real dollar benefits for low-income students through Pell grants and the increasing shift from grants to loans has served to make the financing of higher education more and more difficult for low-income minority families (The College Board, 1999).

In an attempt to strengthen students' academic achievement and encourage them to go to college, some states have instituted guaranteed scholarships for students who meet their state university's admission requirements and who maintain an acceptable grade point average. Georgia's HOPE Scholarship is such an example. Touted as an important strategy in the state's education reform efforts, the greatest beneficiaries of the scholarship program have been middle class students whose parents could have afforded to pay the tuition without the subsidy (Mortenson, 1999). This redistribution of tax dollars to the middle class has, in fact, reduced funds available for programs for lower income students. Nonetheless, similar strategies have been gaining in popularity across the nation, and the federal government has followed suit with similar merit-based, rather than need-based strategies. In 1997, Congress enacted the Hope Tax Credit, which is modeled after Georgia's program. In the ten-year period from 1988-89 to 1998-99, the share of federal need-based student aid dropped from 78% to 61% (The College Board, 1999). Thus, the declining availability of grants and a greater emphasis on merit-based aid and tuition tax credits, coupled with increasing costs of tuition and fees, combined to reduce the accessibility of higher education for the nation's underrepresented students.

In stark contrast to the trends in the rest of the nation, in 2000 the California legislature passed SB 1644, changing its student aid program (the Cal Grant) into an entitlement program. Virtually all low-income students eligible for the state's four-year institutions of higher education (and some of those enrolling in the community colleges) were also made eligible for student aid to cover basic college expenses. However, significantly fewer students took advantage of the new program than had been anticipated in its initial two years of implementation. The reasons for this are varied but most analyses have suggested that many eligible students failed to receive information about how to apply for the grants, the grant applications themselves were inordinately complex, and the offer to cover basic college costs did not solve the problem of foregone income and other associated costs of attending four-year colleges. As Gladieux and Swail (1998) point out, simply offering financial aid is not enough. A history of lack of access to higher education breeds its own impediments.

Financial Aid, Underrepresented Minorities, and Health Professions Education

In considering the role of financial aid in promoting access to health professions careers for underrepresented minorities, it is important to recognize that "low-income" and "minority" are not synonymous. Although minority students are more likely than white students to come from families with lower SES, the majority of low-income students in

the US are in fact white. Financial aid, particularly in the form of grants, appears to have a positive influence on college enrollment by economically disadvantaged students. But financial aid based on economic need is not a strategy that selectively targets underrepresented minorities. To make this observation is neither to diminish the importance of financial aid as a strategy for expanding educational opportunities for disadvantaged students nor to disagree with the principle that financial need should be a major determinant of eligibility for financial aid. However, need-based financial aid will benefit many students who are not underrepresented minorities and will not reach those underrepresented minorities who are not from lower income families.

Section E: Evidence on Policies Affecting Admission Decisions at Health Professions Schools

In Chapter Three, we noted that entry of URMs into the health professions is contingent on four key factors:

1. A pool of URM students academically qualified for demanding health professions school curricula,
2. Interest and motivation among students in this academically qualified pool to apply to health professions schools,
3. URM applicants successfully competing with non-URM applicants to gain entry to health professions schools, and
4. URM students accepted by health professions schools successfully matriculating and graduating from these schools.

The previous sections in this chapter have focused on interventions designed to improve the academic performance of URM students and increase their interest in health careers. These interventions address each of the four factors listed above. However, the third factor—URM applicants successfully competing with non-URM applicants to gain entry to health professions schools—may be viewed from a perspective other than one simply focusing on the academic achievement of individual URM applicants. Institutional responses to URM applicants are also a key influence on how successfully URM applicants compete with non-URM applicants for acceptance to health professions schools.

Political controversy over affirmative action and special consideration of race and ethnicity in admissions decisions has created a charged climate for discussing these institutional policies. Both advocates and detractors of special consideration of race and ethnicity in admissions decisions often find common ground in policies to promote educational skills and career interests among individual URM and disadvantaged students to increase motivation and competitiveness for applying to health professions schools. Most of the interventions reviewed in this chapter are of this type. However, as suggested by the data presented in Chapter Three on URM enrollment trends in health professions schools, admissions policies remain a key influence over the numbers of URM students matriculating at these schools. It is not possible to discuss strategies to increase the numbers of URMs in the health professions without directly addressing the issue of admissions policies.

Is there research evidence that documents whether special consideration of race and ethnicity in admissions decisions is “effective” in increasing the number of URMs entering the health professions? Admissions guidelines and the many judicial and legislative factors influencing these policies are much more difficult to formally evaluate than the types of

focused, individual educational interventions reviewed in earlier sections of this chapter. However, considerable circumstantial evidence exists indicating that flexible admissions policies that allow explicit consideration of race and ethnicity do result in greater numbers of URMs being accepted into health professions schools.

One source of evidence comes from longitudinal tracking of URM matriculation trends and assessing possible changes in these trends that may be temporally associated with major policy decisions. The 1978 Supreme Court decision in the Bakke case coincided with the onset of a sustained period of lack of growth in URM matriculation in US medical schools. A study that we performed comparing URM trends in health professions schools in California and Texas with trends in the rest of the US suggests that recent public policy decisions and court rulings have also been associated with downturns in URM matriculation in medical schools in states affected by these decisions, although it is less clear that trends in other health professions schools have followed the same pattern (Grumbach et al, 2001).

Another type of evidence comes from modeling the hypothetical effects of eliminating flexible admissions policies and moving more completely to decisions based on quantitative factors such as grades and test scores. The AAMC determined that requiring URM applicants to have the same MCAT scores and grades as white applicants would have resulted in an 80% reduction in URM acceptances in 1996 (AAMC, 1998). Modeling analyses have reached similar conclusions about URM acceptances to US colleges (Bowen and Bock, 1998) and law schools (Wightman, 1997). Research has also shown that medical students accepted under special consideration programs have been as likely as those accepted under “traditional” tracks to graduate from medical school and residency and pass qualifying board exams (Davidson, 1997).

Although major progress in enrolling more URMs into the health professions will depend on increasing the pool of URM applicants, evidence suggests that admissions decisions remain a key influence in determining the number of URMs entering the health professions—particularly in professions such as medicine for which there remain many more URM applicants than URM acceptances. In the face of growing judicial and legislative constraints on consideration of race and ethnicity in admissions decisions, many schools are struggling to develop flexible approaches to admissions decisions that are in compliance with these legal constraints. A comprehensive strategic plan to increase the number of URM students in the health professions cannot disregard efforts to address public policies affecting admissions decisions and to assist health professions schools in developing and maintaining flexible admissions policies.

Findings

1. African Americans, Latinos, and Native Americans remain extremely underrepresented in the health professions and health professions schools.

Trends over the past decade in the number of URMs matriculating in health professions schools differ across the health professions. Nursing, public health, and pharmacy have seen a modest but steady rise in the proportion of matriculants and enrollees who are URMs. Other professions, such as allopathic and osteopathic medicine, experienced initial increases in the early 1990s followed by decreases later in the decade. Dentistry, in contrast, is a profession with a steady decrease in the proportion of URM matriculants over the entire decade. All health professions fall well short of “population parity” measured against the proportion of URMs in the overall US population. According to 2000 US Census data, African Americans, Latinos, and Native Americans are 26% of the US population. URMs constitute 20% and 16%, respectively, of the students in public health schools and baccalaureate nursing programs, with URMs constituting less than 15% of students in all other health professions. The reversal of earlier encouraging trends in medicine and the persistent lack of progress in many other health professions are particularly concerning.

2. The underrepresentation of minorities in the health professions is a public health crisis.

Although underrepresentation of African Americans, Latinos, and Native Americans is ubiquitous among all professions, the problem of underrepresented minorities in the health professions is an especially compelling concern for public policy. Minority communities experience poorer health and access to health care compared with communities populated primarily by non-Latino whites. Minority communities are less likely to have adequate supplies of health professionals practicing in these communities. Considerable research has documented that minority health professionals are more likely to practice in underserved, minority communities and serve disadvantaged patients, such as the uninsured and those insured by Medicaid. There is also some evidence that many minorities prefer to receive care from physicians of the same race/ethnicity and are more satisfied with care provided by physicians of concordant race/ethnicity. Thus, the underrepresentation of minorities is not only a matter of fairness of opportunity. It has profound implications for racial and ethnic disparities in access to care and in health status.

Moreover, the US population is more racially and ethnically diverse than at any time in our nation’s history. The three racial/ethnic groups traditionally underrepresented in the health professions – African Americans, Latinos, and Native Americans – now account for one-quarter of US residents. The US population is likely to become more racially/ethnically diverse in the future because Latino and Asian American populations are growing more rapidly than non-Latino whites. Young persons in these racial/ethnic groups are the future workforce in health care and other economic sectors. Enhancing the ability of health professions schools to recruit and retain racially/ethnically diverse students is critical to meeting the health care needs of our nation’s future voters and taxpayers.

3. The dynamics underlying the trends in URM enrollment vary across the different types of health professions schools.

Entry of URM students into the health professions is contingent on four key factors:

1. A pool of URM students academically qualified for demanding health professional school curricula,
2. Interest and motivation among students in this academically qualified pool to apply to health professions schools,
3. URM applicants successfully competing with non-URM applicants to gain entry to health professions schools, and
4. URM students accepted by health professions schools successfully matriculating and graduating from these schools.

Across the different health professions, there is variation in the importance of, and interplay between, each of these four factors in producing the following patterns of URM enrollment in health profession schools:

- **Allopathic medicine:** An increase in the number of URM matriculants in the early 1990s followed by a fall later in the 1990s due to a decrease in URM applicants and a decrease in the rate of URM applicants being accepted.
- **Osteopathic medicine:** A lower proportion of URM matriculants compared with allopathic medicine, but the same pattern of a rise and fall in the 1990s due to changes in URM applicant numbers and acceptance rates.
- **Dentistry:** A steadily decreasing proportion of URM matriculants throughout the 1990s, with a surge of non-URM but not URM applicants, and decreasing matriculation rates for URM students.
- **Pharmacy:** Slow gains in the proportion of URM enrollees throughout the 1990s.
- **Nursing:** Steady enrollment of URM students in baccalaureate programs in the face of a drop in non-URM enrollment, resulting in an increase in URM students as a proportion of nursing students.
- **Public health:** Major gains in URM enrollment in the 1990s to become by 2000 the profession with the highest proportion of URM students.
- **Veterinary medicine:** URM students a very small proportion of matriculants with a rise and fall pattern of applicants and matriculants in the 1990s.

Further research is needed to determine the extent to which trends in URM enrollment in health professions schools are driven by factors specific to URM students, such as lower rates of college going and repeal of affirmative action policies, relative to factors that affect persons from all racial/ethnic groups. For example, the number of applicants to medical school from all racial/ethnic groups rose dramatically in the early 1990s and then fell equally dramatically during the latter years of the decade. This trend may reflect shifts in the perception of the medical profession among all young persons and the types of opportunities available to them in other sectors of the economy. A better understanding of the factors driving general trends in application to health professions schools would facilitate more realistic assessment of the ability of diversity-focused interventions to increase enrollment of URM students in health professions schools.

4. Lack of basic educational opportunities and achievement for many minority groups is the fundamental problem leading to the underrepresentation of these groups in the health professions.

Racial and ethnic disparities in educational achievement appear in early primary grades and widen over the course of K-12 education. The barriers to educational achievement experienced by many URM students during these early stages of the educational pipeline markedly reduce the size of the pool of URM students who are academically equipped to enter health professions schools. These large disparities in educational achievement reflect a national crisis of inequality of opportunity in primary education and in the conditions necessary for promoting scholastic performance. It is unlikely that major progress in increasing the numbers of underrepresented minorities in the health professions can occur without major reforms of primary educational opportunities for minority children and youth in the US and without other major community initiatives to enhance social and family conditions conducive to academic performance by minority and disadvantaged students.

5. There is considerable opportunity for better coordination among agencies that fund and implement programs designed to improve the educational success of URM students and increase their participation in the health professions.

Many interventions have been implemented in the US to improve the academic performance and educational advancement of URM and disadvantaged students along all phases of the educational pipeline. Interventions range from Head Start preschool programs administered in thousands of school districts throughout the US, to pre-medical “enrichment” programs targeted to a relatively small number of higher achieving URM and disadvantaged college students. A panoply of government and private funders and sponsors are involved in these programs. Many different government agencies, at different levels of government, sponsor programs. Within agencies, there is not always clear articulation of how individual programs may complement each other or mesh to produce an integrated plan for promoting URM educational achievement and entry into the health professions. The result is discontinuity of interventions across regions and across stages of the educational pipeline, making it difficult to sustain gains from one educational stage to the next.

Given the diversity of program sponsors and the depth and breadth of the educational problem, it is hardly surprising that there is room for improved coordination among programs and sponsors. Nonetheless, there is considerable opportunity for improving coordination and articulation between programs and funders. Greater awareness of existing programs and greater exchange of information between programs have the potential to lead to better program coordination and better strategic planning to fill gaps between existing programs.

6. The majority of health science-related interventions for URMs at the high school and college level focus on career goals of biomedical research and medicine. Some professions, such as nursing, are not receiving a commensurate investment in diversity-promoting interventions.

Although enhancing academic performance in general science and math courses strengthens URM preparation and competitiveness for entry into all health professions, current interventions are not promoting careers in professions such as nursing and

dentistry to the same degree that they are promoting career aspirations in biomedical research and medicine. For example, the Bureau of Health Professions spends over \$50 million of Title VII funds on diversity-enhancing programs that target professions other than nursing, while spending only \$4 million of Title VII funds on nursing diversity programs. The National Institutes of Health invest over \$150 million annually in diversity programs focusing on biomedical research careers, almost none of which assist students pursuing nursing careers. Similarly, private foundations have focused more on medicine and biomedical science than on nursing, dentistry, and pharmacy.

7. There is a paucity of high quality research evaluating the effectiveness of these interventions in improving educational achievement and advancement for URMs and disadvantaged students.

Almost no research on interventions to enhance general URM educational achievement, or on interventions more specifically oriented towards increasing URM entry into health professions schools, has been conducted using a true randomized experimental design. Very little research using quasi-experimental observational designs has used appropriate control groups to account for the selection effects that invariably occur in the implementation of these programs. (“Selection effects” refer to such phenomena as academic enrichment programs attracting applicants who are especially motivated to succeed and may differ in other ways from students who did not participate in the programs.) Also, the design of existing studies does not disentangle the effects of individual intervention strategies. Interventions are evaluated *in toto*, making it impossible to identify whether particular components of the intervention were critical to the effectiveness observed.

Conducting rigorous evaluation research faces both technical and political challenges. However, the scarcity and methodological limitations of existing research in this area hamper efforts to develop evidence-based policy recommendations.

8. The few rigorously conducted research studies that have been performed do consistently indicate that interventions can have a positive impact.

Research on interventions in the K-12 educational pipeline stage has demonstrated that these interventions can boost academic performance, educational aspirations, and ultimate educational advancement, including the likelihood of URM students matriculating at a four-year college. However, for these interventions to be successful, they must start early, must be intensive and extensive, and must be sustained. In addition, research on interventions targeting later pipeline stages, especially those examining college interventions specifically focused on promoting URM entry into the health professions, has indicated that these interventions can improve the ability of URM students to perform well in math and science courses, successfully compete for admission to competitive health professions schools, and complete their education in science and health fields.

9. Despite the considerable resources invested in diversity programs, academic achievement and entry into the health professions by URMs have not increased significantly.

The considerable existing investment in interventions to promote URM academic achievement and entry into the health professions, and the existence of a slight but favorable body of evidence suggesting that these types of interventions can promote

academic success, calls to the fore the question of why the proportion of URM students is not increasing in most health professions (and is decreasing in some professions). There are several possible explanations for this apparent paradox:

The research evidence provides a misleading picture of the effectiveness of interventions in actual practice (e.g., studies focus on exemplary programs that are not representative of most programs, studies do not always measure “hard” long-term outcomes and fail to fully account for selection bias, etc.).

Existing interventions are effective, but the current level of investment in these types of interventions is insufficient to reach enough students with enough support to boost overall URM trends in health professions schools. The magnitude of the problem is far greater than appreciated and requires a much more sustained, intense, and coordinated investment in URM educational achievement. Interventions at a single educational stage may be producing short-term gains that are not maintained over time in the absence of sustained and coordinated interventions across educational stages.

Countervailing forces are neutralizing any possible positive effects of existing interventions (e.g., political events affecting affirmative action policies, growing income disparities, diminished attractiveness of health professions careers). Stated another way, URM trends would have been even worse without the existing interventions. The underlying conditions affecting URM educational achievement and entry into the health professions are deteriorating. Existing interventions have prevented URM trends from being even less favorable.

We believe that while all three of these explanations are true to some degree, the latter two explanations account for most of the observed patterns of URM enrollment in health professions schools in recent years. Although high quality studies are not abundant and there is a compelling need for more rigorous evaluation research, studies consistently suggest that interventions can have a positive effect. However, the challenges of reducing racial and ethnic disparities in educational achievement and health professions participation should not be underestimated. The problems defy quick fixes or short-term solutions and call for a renewed national commitment to educational opportunity and to valuing diversity in institutions of higher learning.

10. URM students are more likely than non-URM students to come from low-income families, and are therefore disproportionately affected by the rising costs of higher education and adverse trends in the availability of financial aid.

Financial aid, particularly in the form of grants, has a positive influence on college enrollment by economically disadvantaged students. However, in recent years the declining availability of grants and a greater emphasis on merit-based aid and tuition tax credits, coupled with increasing costs of tuition and fees, combined to reduce the accessibility of higher education for economically disadvantaged students. URM students are more likely than white students to come from families with lower SES, and therefore, financial aid is important for enhancing opportunities in higher education for many URM students. However, it should also be acknowledged that the majority of low-income students in the US are not URM; need-based financial aid will thus benefit many students who are not URM and will not reach those URM who are not from lower income families.

11. Special consideration of race and ethnicity in admissions decisions has been an important tool for maintaining URM enrollment in health professions schools.

Although major progress in enrolling more URMs into the health professions will depend on increasing the pool of URM applicants, admissions decisions remain a key influence in determining the number of URMs entering the health professions. This is particularly true in professions such as medicine for which there remain many more URM applicants than URM acceptances. The recent decrease in URM matriculants in medicine and several other post-baccalaureate health professions cannot entirely be attributed to more “upstream” problems in college graduation trends for URMs. The number of URMs graduating from college in fact increased throughout the 1990s.

There is considerable circumstantial evidence indicating that flexibility in allowing admissions committees to consider race and ethnicity as one of several factors influencing admissions decisions leads to greater representation of URMs in health professions schools than would have otherwise occurred without these flexible admissions policies. Flexibility in admissions decisions may only shift the proportion of URMs matriculating into schools by a few percentage points. However, in view of the gravity of the underrepresentation of these groups in the health professions and the recent trend of decreasing proportions of URM students in many health professions, a shift of a few percentage points can make a big difference in terms of maintaining a critical mass of URM students in the health professions.

12. Funders interested in promoting greater racial and ethnic diversity in the health professions face a dilemma in deciding how to prioritize resources between “upstream” early education pipeline interventions and “downstream” pipeline interventions targeting students near the health professional stages of their education.

Clearly, long-term, sustainable increases in URM participation in the health professions will require major enhancement of early educational experiences for URM students. Achieving greater diversity in health professions schools ultimately must rely on creating a larger pool of academically qualified and motivated URM students. Appreciation of this broader educational context has logically prompted many health professions funders and organizations to develop initiatives that intervene at earlier stages of the educational pipeline (e.g., medical school/K-12 school district partnerships).

Despite the appealing policy logic of investing in more upstream interventions, this approach has one important drawback: the more upstream the intervention, the larger and less differentiated the pool of students targeted by the program and, consequently, the greater the financial investment required. Reaching millions of elementary school children to enhance their educational achievement requires an effort several orders of magnitude greater than that needed to reach a few thousand pre-medical or pre-dental students to boost their competitiveness for applying to health professions schools. Thus, funders face a dilemma in deciding whether to invest in short-term, relatively cost-effective interventions affecting a small number of students or to emphasize more comprehensive educational initiatives that are much less cost-effective for the outcome of producing more URMs in health professions schools, but would potentially create a more sustained growth of URMs in higher education.

Recommendations

- 1. Place in the national limelight the widening gap between the racial and ethnic composition of the US population and the composition of the health workforce.**

The recent release of the 2000 US Census data is a stimulus for a national call to action on the need for greater racial and ethnic diversity in the health professions. The 2000 Census report's clear exposure of the growing diversity of the US population makes it a catalyst for a reinvigorated national discussion about the importance of increasing the participation of URM in the health professions. Although this message has been articulated repeatedly in the past, policymakers often fail to maintain it as an active policy issue. All relevant agencies and organizations need to establish a central theme for an informational campaign that highlights racial and ethnic disparities in the health professions and the importance of a diverse health workforce for access to care in underserved communities. This message is particularly critical in California, the nation's most racially and ethnically diverse state.

The California Endowment-Specific Recommendations:

- Publish a concise briefing paper and fact sheet highlighting essential messages about diversity in the health professions.
 - Collaborate with other national and California foundations and with government agencies to incorporate these workforce diversity messages into public information campaigns about racial and ethnic disparities in health.
 - Produce an event for the media that uses the new 2000 Census data to highlight the widening gap between the racial and ethnic composition of the California population and the health professions in the state.
- 2. Convene a national working group on health workforce diversity that meets regularly to coordinate activities among the many program sponsors and to develop a national strategic plan for promoting URM academic achievement and entry into the health professions.**

Many different public and private agencies sponsor programs to enhance both URM educational achievement in general and, more specifically, URM entry into schools of health professions. Program development in this area would benefit from a national working group to promote greater coordination and communication among program sponsors. This working group should be composed of senior staff of sponsoring government agencies (e.g., BHP, NIH), private foundations such as The California Endowment, and associations of health professions schools. The Department of Education and K-12 education groups should be included in order to address educational equity issues. The group should meet regularly, perhaps on a quarterly basis. Potential benefits are a greater understanding of existing programs and how they complement each other, shared promotion of programs to students and educational institutions, and more coordinated planning to produce greater synergy between programs and funders. Ideally, sponsors and other interested groups should strive to develop a shared, coherent national strategic plan for promoting URM educational achievement and entry into the health professions.

This working group should take the next step to move beyond the content of informational events that have documented the problem of underrepresented minorities

and the need to improve diversity in higher education and the health professions. The proposed working group should be a working meeting among participants actively involved in sponsoring and administering programs and interventions. The working group should have a pragmatic agenda that includes developing a concrete action plan for improving coordination of programs and interventions, disseminating evidence about effective interventions, and sharing practical information on implementation methods.

The California Endowment-Specific Recommendations:

- Participate in the planning committee for the working group.
 - Co-sponsor the working group.
- 3. Develop a strategic plan, with assistance from professional associations, at every health professions school to improve the racial and ethnic diversity of the school's student body.**

Leadership is essential for enhancing URM representation in the health professions. Leadership is needed at every level, from individual health professions schools to national academic organizations. One tangible evidence of leadership would be for every health professions school to have an explicit policy statement acknowledging the importance of racial and ethnic diversity in the health professions and committing the school to promotion of a racially and ethnically diverse student body. Because the specific dynamics affecting URM participation differ across the health professions, across schools within each profession, and across regions in the US, each school should evaluate the most critical institutional and regional factors influencing its enrollment and retention of URM students and should develop an institution-specific strategic plan. These plans will need to acknowledge regional variation in the judicial and political constraints affecting outreach and admissions decisions. The plan should thoughtfully review the school's current policies and environment as they affect recruitment and enrollment of URMs, assess the school's current enrollment and retention of URMs, and identify opportunities for improving URM representation. Admissions committees at each school remain a critical factor in determining the composition of matriculating classes and should be engaged in the national and institutional dialogue about the importance of a diverse health care workforce.

National academic organizations have a key role to play in facilitating these strategic plans. The 3000 by 2000 initiative of the Association of American Medical Colleges is a model of a well-articulated national plan to attempt to address the underrepresentation of minorities in one health profession. Other academic organizations have also issued policy reports and recommendations on URM participation (Bessent, 1997 and Sinkford et. al 2001). Academic organizations in all professions should consider developing a comprehensive, formal initiative to enhance racial and ethnic diversity in the profession and assist individual schools in making progress towards this goal.

The California Endowment-Specific Recommendations:

Request or require that health profession schools applying for The California Endowment grants indicate in their applications whether their educational institution has a written strategic plan for addressing racial and ethnic diversity in its student body and that they include a copy of the plan when available.

Create and advertise a Web-based resource that provides examples of well-designed strategic plans that schools have developed.

- 4. For funders such as The California Endowment that have the specific objective of increasing the number of URM and other disadvantaged students matriculating in health professions schools, develop a strategy of working from downstream-to-upstream in terms of prioritizing funding along the educational pipeline.**

Funders and agencies that are health professions focused simply do not have the resources or mission to single-handedly produce the changes in early educational opportunities that would create a widespread increase in URM academic achievement at these stages of education. Due to limited resources and the need to maximize the cost-effectiveness of funds spent, funders should first consider the most “high yield” interventions in terms of short-term success. These interventions tend to be ones that give reasonably competitive URM students a boost to succeed in the application and transition to a health professions school. Once these short-term investments have been maximized, funders should move upstream along the educational pipeline towards earlier educational stages and invest in programs that target reasonably high-achieving URM students and enhance their educational progress and interest in the health professions.

For health professions with entry-level education occurring at the post-baccalaureate stage (e.g., medicine, dentistry, pharmacy), this means prioritizing interventions such as pre-matriculation programs, post-baccalaureate programs, and college-level interventions that enhance qualifications for entry to a health professions school. For nursing and other professions that award professional degrees at the college level, high school is the pre-professional educational stage; these professions therefore are uniquely positioned to focus on high school interventions as the logical pre-professional educational stage for professional entry.

One educational stage that deserves particular attention is community college. Community college, often overlooked in policy considerations in this area, is a key stage that may have relevance for all health professions. Many URMs enter community college but never progress to complete baccalaureate degrees at four-year colleges. For nursing, community college may be either an initial stage leading to baccalaureate nursing education or, for associate degree programs, the actual stage of receiving a nursing degree.

The California Endowment-Specific Recommendations:

- Require that applicants perform a local or regional needs assessment in regards to educational interventions for URM and disadvantaged students that assesses needs and opportunities for interventions at specific educational stages. Encourage applicants to consider interventions at “high yield” stages (i.e., stages in the educational pipeline close to the stage of applying to a baccalaureate or graduate level health professions program). Applicants that plan to emphasize more “upstream” interventions should justify why these interventions should be given priority over more “downstream” interventions. For example, an applicant requesting funding for a high school intervention should present a needs assessment that indicates why this intervention was prioritized over a community-college level intervention.

- Enhance dissemination of evidence to program applicants about interventions that have been found to be effective. For example, create a Web-based document based on the literature review in this report and/or other reports and encourage all applicants to review the document prior to submitting their application. Require that applicants cite supporting evidence from this literature about the likely effectiveness of their planned interventions.
- 5. Health professions funders should continue to consider funding programs that target more upstream, early educational stages (e.g., academic health center/K-12 school partnerships) as demonstration projects with rigorous evaluations.**

As noted above, health professions schools and organizations are unlikely to shape widespread reforms in early schooling that will reach a substantial proportion of the school age URM population in the US. However, involvement of health professions schools and organizations may have a strategic role in effecting broader change in K-12 education. These interventions should be valued for their potential “leverage” and “role model” effects. Health professions schools may be a valuable resource for school districts committed to educational reforms. Funding of these types of health professions partnerships may exert leverage on school districts to invest additional resources in school enhancements such as innovative science curricula. These types of partnerships may also serve as models that may be generalized throughout school districts and regions. This status as potentially high-profile model programs makes it all the more essential that these “upstream” interventions have rigorous evaluations built in as intrinsic elements of program development and implementation.

Because of its focus on a single state, The California Endowment may have a unique opportunity to invest in comprehensive interventions spanning both “upstream” and “downstream” educational stages in a few select communities. This option would involve concentrating resources in a few demonstration communities and funding a continuum of well-coordinated interventions in these communities for several years.

The California Endowment-Specific Recommendations:

- Require that applicants planning interventions at the primary or secondary school level indicate how the intervention may lead to more widespread reform in the local and regional school districts.
 - Consider concentrating resources in two to three communities in California to fund comprehensive, coordinated interventions across educational stages in these communities. Develop a careful evaluation study to be implemented concomitantly with the interventions.
- 6. Form coalitions between organizations and institutions committed to racial and ethnic diversity in the health professions and advocates for educational opportunity along all stages of the educational pipeline.**

Programs such as partnerships between health professions schools and local school districts represent one tangible form of engagement between health professions schools and more “upstream” educational institutions. However, equally important will be greater collaboration between health professions organizations and organizations working to improve the quality—and equality—of overall primary school education for URM and disadvantaged students. The objective of these coalitions must transcend a narrow health

professions agenda and promote the importance of overall educational opportunity and resources for URM and disadvantaged students. Health professions schools and organizations need to recognize that advocacy for high quality Head Start programs and reduced K-12 class size is a vital component of a long-term strategy to increase the number of URM students entering the health professions.

The California Endowment-Specific Recommendations:

- Explore opportunities for collaborative activities with organizations advocating support for general educational improvement in California.
- 7. Target more resources specifically to interventions to increase the number of URM students in nursing programs.**

Nursing is the largest health profession in the United States. Yet, much less funding is available to nursing schools for implementing diversity interventions than is available to other health professions schools, particularly medical schools. Nursing may therefore be particularly deserving of attention from funders of diversity-promoting interventions.

The California Endowment-Specific Recommendations:

- Consider developing a program specifically devoted to increasing diversity in nursing schools.
- 8. Maintain growth in financial aid per recipient to the rate of inflation of the costs of higher education, and place more emphasis on grants and paid, on-campus internship opportunities for minority and disadvantaged students as opposed to student loans.**

In view of the national trend of college costs increasing more rapidly than financial aid, funders of financial aid should attempt to stem further erosion of financial aid “purchasing power” for higher education. In addition, funders should reverse the recent trend of a greater share of financial aid being in the form of loans rather than grants. Although loans require less financial outlay than grants on the part of funders, since loans must eventually be repaid by student recipients, evidence suggests that loans are much less effective than grants in helping low-income students overcome financial barriers to higher education.

- 9. Establish a national clearinghouse to offer technical assistance to health professions schools about formulating flexible admissions policies that are in compliance with judicial rulings and state and federal laws.**

In the face of growing judicial and legislative constraints on consideration of race and ethnicity in admissions decisions, many schools (both health professions schools and other graduate schools and colleges) are exploring flexible approaches to admissions decisions that are in compliance with these legal constraints. A consortium of academic health professions organizations could serve as a repository of information about the approaches being used by different schools, the impact of these policies on URM admissions, and how these policies have fared under legal scrutiny. The workshops on assessing non-cognitive variables that the AAMC holds for medical school admissions committees could serve as a model for this type of activity.

The California Endowment-Specific Recommendations:

- Work with the AAMC to disseminate the AAMC workshop model to other health professions educational organizations.
- Cosponsor workshops with the AAMC and educational organizations from other health professions.

10. Prioritize funding of rigorously conducted evaluation research in addition to funding interventions themselves.

There is simply too little research, of too poor quality, to provide a solid base of evidence for guiding policymaking in this area. The following are key considerations for a research agenda:

Both public and private funders should appreciate the need to fund formal, high quality evaluations that investigate long-term outcomes in a scientifically rigorous manner. It is unreasonable to expect program implementers to conduct such evaluations using program staff and funds meant for the actual program activities. In addition, program staff may not have the knowledge and skills required to conduct rigorous evaluations. Those evaluations that are usually conducted to meet grant requirement should be continued as valuable process-monitoring tools. However, rigorous evaluations must be conducted using funds specifically allocated for research and employing researchers who are sensitive to the issues under study but independent from the implementing agency.

Evaluation research should be planned concurrently with design and implementation of interventions, and not only as a retrospective “after-thought.” Building rigorous evaluations into project development enhances the likelihood that meaningful data will be measured and collected and that appropriate control groups will be identified. The lack of appropriate control groups is a key flaw of many evaluation efforts conducted in the past.

Funders of interventions should require that a minimum, uniform data set be collected by all funded projects. Data should include features such as unique identifying information for all program participants (e.g., Social Security numbers) to allow longitudinal tracking of participants. Although regulations on privacy of information may present challenges to building longitudinal databases for cohorts of students, every effort should be made to develop these types of databases. A panel that includes researchers with expertise in evaluation science and individuals who administer interventions should advise program funders about the technical requirements and feasibility of a uniform data set for all diversity interventions regardless of the source of funding.

Researchers in this field should be uncompromising in their willingness to scrutinize interventions and report fully about both successful and unsuccessful interventions. Funders should not necessarily interpret initial evaluations showing lack of effectiveness as reason to immediately withdraw funding for interventions. Instead, they should explore reasons for lack of greater effectiveness and work with programs to modify interventions based on evidence about what works. A Continuous Quality Improvement model should guide this interaction between intervention implementation and evaluation research, whereby evaluation is welcomed as part of an ongoing, constructive feedback process.

More research should be conducted at the “ecological” level and not only at the level of individual students. For many interventions, the ecological (i.e., geographic or population level) is the most relevant unit of analysis and helps to minimize problems of selection bias. For example, an evaluation of the effect of establishment of a new magnet high school should not only evaluate outcomes for individuals attending the magnet school. It should also evaluate whether educational outcomes for the school district’s overall student population improved after establishment of the magnet school. The study by Thomson (2001) is a good example of this evaluation design.

The California Endowment-Specific Recommendations:

- Be realistic about the limitations of process-oriented evaluations performed by grantees as part of the routine program and of “post-hoc” evaluations that rely on secondary data routinely collected by grantees.
- Increase investment in formal evaluation research measuring “hard” outcomes using rigorous, controlled scientific designs. Use an RFP process for evaluation research grants and contracts that is separate from the core awards process for funding the actual program interventions.
- Fund a state center to provide ongoing technical assistance for evaluation research for The California Endowment programs. Charge this center with tasks such as developing guidelines about rigorous and feasible study designs, composing descriptions of studies that achieved high scientific standards, and sharing practical information about methods for working with intervention and control sites to collect required data.

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(Arranged Alphabetically)

Alliances for Graduate Education and the Professoriate

Funded by:	Division of Human Resource Development, Directorate of Education and Human Resources, National Science Foundation
Professions:	Science, math, engineering, and technology (SMET) related professions.
Pipeline level:	Graduate
Eligibility:	Funds are awarded to colleges, universities, and other research institutions.
Purpose/goals:	To increase significantly the numbers of URMs receiving doctoral degrees in the SMET fields and who ultimately enter the professoriate in these disciplines.
Program description:	The specific objectives of the program are <ol style="list-style-type: none"> 1) to develop and implement innovative models for recruiting, mentoring, and retaining minority students in SMET doctoral programs and 2) to develop effective strategies for identifying and supporting URMs who want to pursue academic careers.
Reference:	Correspondence with Norman Fortenberry, nfortenb@nsf.gov http://www.ehr.nsf.gov/HER/HRD/amp.asp

Area Health Education Centers

Funded by:	Division of Interdisciplinary and Community Based Programs, Bureau of Health Professions, HRSA
Professions:	Non-specific health professions
Pipeline level:	High school, college, graduate
Eligibility:	Students in the catchment area of the regional AHEC.
Purpose/Goals:	The mission of the AHEC Program is to improve the supply, distribution, quality, utilization, and efficiency of the health workforce to ultimately improve delivery of quality health care in underserved areas. The major AHEC objective that is relevant to diversity is: Improve the diversity of the health care workforce through recruitment, health career awareness, and educational enhancement activities targeted towards elementary and secondary students from underrepresented minority populations.
Program description:	Each AHEC site has flexibility in how it strategizes to meet this objective. For example, the East Texas AHEC engaged in recruitment activities in 323 independent school districts in 1997-1998 and provided enrichment activities to 562 disadvantaged students. Other AHECS concentrate their recruitment activities at community colleges. The dollar amount and number of grantees listed in the Funding Table are for all of AHEC, and not specifically for pipeline programs. The most recent federal authorization for AHEC is the Health Professions Partnerships Act of 1998; PL105-392, which re-authorized AHEC and established funding preferences.
Reference:	Summary Information Diversity Strategies Meeting, October 18, 2000. http://www.nationalahec.org/ http://bhpr.hrsa.gov/interdisciplinary/ahec.html

Association of Hispanic-Serving Health Professions Schools

Funded by:	Not funded; Initiative within Office of Minority Health
Professions:	Non-specific health professions
Pipeline level:	High school, college, graduate
Eligibility:	Minority-serving institutions
Purpose/goals:	The role of the Association is to provide national leadership to improve education, training, distribution, utilization, supply and quality of the Nation's health personnel.
Program description:	The main focus is on expanding the pool of qualified Hispanics in the health professions by creating an educational pipeline of linkages with institutions at local, state, and federal levels. The Association is comprised of presidents of health sciences centers, deans of medical schools, and high-level administrators of Hispanic-serving institutions. The Office of Minority Health provides technical assistance.
Reference:	http://hrsa.gov/OMH/OMH/main2_projects.htm . Phone conversation with Laura Diaz Shepherd, (301) 443-9966

Bridges to the Future Program

Funded by:	National Institute of General Medical Sciences, National Institutes of Health
Professions:	Biomedical research
Pipeline:	College, graduate
Eligibility:	Research institutions. The institution may be a public or private two- or four-year college, university, or health professional school.
Purpose/goal:	To make available to the biomedical science research enterprise and to the nation the intellectual talents of an increasing number of URM group members.
Program description:	The program aims to facilitate the transition of students from associate to baccalaureate degree granting institutions and from master's to doctoral degree granting institutions. The program promotes inter-institutional partnerships that lead to improvement in the quality and quantity of URM students being trained as scientists. Each institution determines how it will administer funds. Activities include research internships for students, curriculum articulation between institutions, faculty development, advising, and tutoring.
Reference:	Correspondence with Irene Eckstrand, ECKSTRAI@nigms.nih.gov . http://nigms.nih.gov/funding/bridgesfaq.htm

Centers of Excellence

Funded by:	Division of Health Professions Diversity, Bureau of Health Professions, HRSA
Professions:	Medicine, osteopathic medicine, dentistry, pharmacy, and mental health
Pipeline level:	K-12, college, graduate
Eligibility:	Grants are awarded to schools of medicine, osteopathic

medicine, dentistry, pharmacy, and graduate programs in mental health with URM student enrollments significantly above the national average. Hispanic COEs must give priority to activities with respect to Hispanic individuals and Native American COEs must also establish an arrangement with one or more Tribal college or university.

- Purpose/goal:** To assist health professions schools in supporting programs of excellence in health professions education for minority individuals. To develop a large competitive applicant pool and establish an educational pipeline for health professions careers.
- Program description:** Grantee institutions establish or strengthen programs to enhance an education pipeline and improve the academic performance of URMs. Grantees must improve the capacity of the institution to recruit and retain URM faculty. Information dissemination, clinical education, and curricula development also take place at COEs. The grantee must also facilitate research opportunities for URM students and faculty. Finally, stipends are provided to students.
- Reference:** COE Brochure, COE Funds table.

Center of Research Excellence in Science and Technology

- Funded by:** Division of Human Resource Development, Directorate of Education and Human Resources, National Science Foundation
- Professions:** Science, math, engineering and technology (SMET) related professions.
- Pipeline level:** College, graduate
- Eligibility:** Funds are awarded to colleges, universities, and other research institutions.
- Purpose/goals:** To develop outstanding research centers through integration of training and research.
- Program description:** The program makes substantial resources available to upgrade the capabilities of the most research-productive minority-serving institutions.
- Reference:** Correspondence with Norman Fortenberry, nfortenb@nsf.gov, <http://www.ehr.nsf.gov/HER/HRD/amp.asp>

Disadvantaged Faculty Loan Repayment

- Funded by:** Division of Student Assistance, Bureau of Health Professions, HRSA
- Professions:** Medicine, osteopathic medicine, public health, nursing, dentistry, physician assistants, veterinary medicine, optometry, pharmacy, podiatric medicine, allied health, chiropractic, pharmacy, and psychology
- Pipeline level:** Graduate
- Eligibility:** Funds are awarded to accredited schools of medicine, osteopathic medicine, public health, nursing, dentistry, physician assistants, veterinary medicine, optometry, pharmacy, podiatric medicine, allied health, chiropractic, pharmacy, and with graduate programs in psychology.

Purpose/goal: Increase career opportunities in the health professions to individuals from disadvantaged backgrounds.

Program description: The Disadvantaged Faculty Loan Repayment Program provides for repayment of educational loans up to \$20,000 for each year of service for individuals from disadvantaged background. Each loan repayment recipient must agree to serve as a faculty member for at least two years.

Reference: Program Summary for Academic Year 2000-2001, <http://bhpr.hrsa.gov/dsa/pages/programs.htm>

Diversity in the Health Professions Priority Area Grants

Funded by: The California Wellness Foundation

Professions: All health professions including allied health and public health.

Pipeline level: K-12, college, graduate

Eligibility: The Foundation funds nonprofit organizations that are tax exempt under Section 501(c)(3) of the Internal Revenue Code and are deemed as "not a private foundation" under Section 509(a). TCWF also funds government agencies.

Purpose/goal: Increase career opportunities in the health professions for people of color.

Program description: The goal of this priority area is to support multiple strategies to increase diversity in the health professions in California. Grants will be given to organizations that provide pipeline programs, scholarships, mentoring programs, internships, and fellowships that support and advance career opportunities for people of color in the health professions, including allied health and public health professions. Organizations that support people of color in the health professions through strategic partnerships, leadership development, continuing education, and networking activities are also eligible for funding. In addition, the Foundation will fund organizations that educate policymakers about public and institutional policies that promote diversity in the health professions. This grant mechanism came into effect July 1, 2000, and there are no currently funded programs as of yet.

Reference: Telephone conversation with Alicia Procello, Program Director, <http://www.tcwf.org>

FACES For the Future: Health Professions Internship Partnership

Funded by: The California Endowment, through the Children's Hospital Medical Center of Northern California

Professions: Non-specific health professions

Pipeline level: High school

Eligibility: Students of underserved areas of Oakland and Berkeley

Purpose/goal: To increase awareness of health professions among high school students in Oakland and Berkeley.

Program description: This is an internship program specifically for high school

students who reside in medically underserved areas of Oakland and Berkeley. Strategies employed are: hospital-based internships, mentoring, tutoring, and psychosocial support. Mentors are college students from U.C. Berkeley, medical students from Stanford University, and medical residents.

Reference: Phone conversation with Coordinator Dr. Tomas Magaña, (510) 428-3681, Grantee information sheet provided by The California Endowment.

Health Careers Opportunity Program

Funded by: Division of Health Professions Diversity, Bureau of Health Professions, HRSA

Professions: Medicine, osteopathic medicine, public health, dentistry, physician assistants, veterinary medicine, optometry, pharmacy, podiatric medicine, allied health, chiropractic, pharmacy, psychology.

Pipeline level: K-12, college, graduate

Eligibility: Eligible applicants include schools of medicine, osteopathic medicine, public health, dentistry, physician assistants, veterinary medicine, optometry, pharmacy, podiatric medicine, allied health, chiropractic, pharmacy, and psychology. Nursing programs are not eligible under HCOP. Types of institutions are two or four-year colleges and universities, government educational agencies, health, or educational associations.

Purpose/goal: To increase the number of individuals from disadvantaged backgrounds in the health and allied health professions in order to meet the expanding health care needs of underserved populations.

Program description: The HCOP program strives to develop a more competitive applicant pool to build diversity in the health professions. Grantees identify and recruit individuals for education and training. They develop programs to assist students in gaining entry to professional schools. Grantees provide counseling services, tutoring, financial aid information, and exposure to primary care activities. Authorization for this program comes from Title VII of the Public Health Service Act.

Reference: HCOP Brochure, HCOP 2000 Funds Table.

Health Education and Training Centers

Funded by: Division of Interdisciplinary and Community Based Programs, Bureau of Health Professions, HRSA

Professions: Non-specific health professions

Pipeline level: High school, college, graduate

Eligibility: Students in the catchment area of the regional HETC.

Purpose/Goals: The mission of the HETC Program is to improve the supply, distribution, quality, utilization, and efficiency of the health workforce to ultimately improve delivery of quality health care in underserved areas, especially in the State of Florida and along the United States-Mexico Border.

Program description: The Health Education and Training Centers is authorized under

Section 752 of the Health Professions Partnership Act of 1998 (PL 105-392). Each HETC, in conjunction with other health professions diversity programs, such as the Health Careers Opportunities Program and Jovenes Por La Salud, provides educational incentives to students who want to pursue careers health. HETC utilizes such strategies as mentoring, academic enrichment, and professional opportunities.

Reference: Summary Information Diversity Strategies Meeting, October 18, 2000, <http://bhpr.hrsa.gov/interdisciplinary/ahec.html>

Health Professions Careers Opportunities program

Funded by: Office of Statewide Health Planning and Development, State of California

Professions: Medicine, allied health, pharmacy, dentistry

Pipeline level: College

Eligibility: Undergraduate institutions in California

Purpose/goal: To aid minority pre-health students successfully complete pre-health curriculum.

Program description: The HPCOP provides grants to undergraduate programs to support activities designed to help minority students complete successfully their pre-health education and gain entry into health professional programs. Activities include remedial courses, test preparation, counseling, and social support.

Reference: Meeting with Ed Mendoza.

Health Professions Partnership Initiative

Funded by: Robert Wood Johnson Foundation and Kellogg Foundation through the American Academy of Medical Colleges

Professions: Medicine, nursing, public health

Pipeline level: High school, college

Eligibility: Health professions institutions

Purpose/goals: To improve student achievement and thereby enable many more minority students to progress through the health professions education pipeline.

Program description: The strategy employed by the HPPI is to work collaboratively with educators based in predominantly minority public schools, undergraduate colleges, and professional schools to improve curricula and develop other long-term strategies to improve student achievement.

Reference: <http://aamc.org/newsroom/pressrel/980702.htm>

Health Professions Preparatory Academy

Funded by: The California Endowment through the University of California San Francisco, Fresno, CA.

Professions: Non-specific health professions

Eligibility: Students at Sunny Side High school in Fresno, CA.

Pipeline level: High school

Purpose/Goal: To provide scholastic training and exposure to the health professions.

Program description: This program provides academic enhancement activities as well as talks and field trips that are aimed at exposing students to the different health professions.

Reference: Grantee information sheet provided by The California Endowment.

Historically Black Colleges and Universities Undergraduate Program

Funded by: Division of Human Resource Development, Directorate of Education and Human Resources, National Science Foundation

Professions: Science, math, engineering and technology (SMET) related professions.

Pipeline level: College

Eligibility: Funds are awarded to Historically Black Colleges and Universities.

Purpose/goals: To enhance the quality of undergraduate SMET education at Historically Black Colleges and Universities as a means to broaden participation in the nation's SMET workforce.

Program description: The program provides support for the implementation of comprehensive institutional strategies to strengthen SMET teaching and learning in ways that improve access and retention of underrepresented groups in SMET. Strategies include SMET course and curricular reform, faculty professional development, supervised research for SMET undergraduates, student support, and other activities that meet institutional needs.

Reference: Correspondence with Norman Fortenberry, nfortenb@nsf.gov, <http://www.ehr.nsf.gov/HER/HRD/amp.asp>

Improving Access and Embracing Multicultural Health Through Health Professional Education

Funded by: The California Endowment through the Minority Health Professions Education Foundation, Sacramento, CA.

Profession: Non-specific health careers

Pipeline level: College

Eligibility: Underserved and low-income students.

Purpose/goal: To provide financial support to students from underserved and low-income backgrounds who are pursuing health careers.

Program description: This is a scholarship and loan repayment program.

Reference: Grantee information sheet provided by The California Endowment.

Institutional Research and Academic Career Development Awards

Funded by: National Institute of General Medical Sciences, National Institutes of Health

Professions: Biomedical research

Pipeline: College, graduate

Eligibility: Research institutions with substantial minority enrollment. The institution may be a public or private two- or four-year college, university, or health professional school with a significant URM enrollment.

Purpose/goal: To facilitate the progress of postdoctoral candidates toward research and teaching careers in academia, to provide a resource to motivate scientists at minority-serving institutions, and to promote linkages between research-intensive institutions and minority-serving institutions.

Program description: This program combines a traditional mentored postdoctoral research experience with an opportunity to develop teaching skills through mentored assignments at minority-serving institutions.

Reference: Correspondence with Clifton Poodry, PoodryC@nigms.nih.gov, <http://www.nigms.nih.gov/funding/grntmech.html>

Increasing Diversity in the Health Professions

Funded by: The California Wellness Foundation

Professions: Medicine, allied health, nursing.

Pipeline level: K-12, college, graduate

Eligibility: The Foundation funds nonprofit organizations that are tax exempt under Section 501(c)(3) of the Internal Revenue Code and are deemed as “not a private foundation” under Section 509(a). TCWF also funds government agencies.

Purpose/goal: Increase diversity in the health professions.

Program description: The California Wellness Foundation has funded various organizations to aid in the effort to increase the number of minorities in the health professions. Grant recipients include Charles R. Drew University of Medicine, Glide Health Clinic, San Francisco State University, and the University of California, to name a few. A variety of programs have been funded. One program provided training for low-income minority high school students to enter into the allied health profession. A Nurse-practitioner-run clinic of San Francisco’s Tenderloin District has received funding for operating costs. The Foundation has funded fellowships and scholarships to help minority students pursue careers in medicine. Various other activities have been funded to directly help minority students enter graduate programs in the health professions.

Reference: Grantee information sheet provided by the California Wellness Foundation, <http://www.tcwf.org>

Jovenes Por La Salud

Funded by: The California Endowment through the Multicultural Area Health Educational Center of Los Angeles, CA.

Professions: Non-specific health professions.

Pipeline level: High school

Eligibility: Latino high school students in the catchment area of the Multicultural Area Health Education Center of Los Angeles, CA.

Purpose/goal: Expose Latino high school students to and prepare them for professional careers and opportunities in health care and medicine.

Program description: This is a comprehensive program that aims to enable students to be motivated, informed and prepared to enter a health professions school. Strategies include academic enrichment,

internships, computer training, scholarships, and volunteer work. There is also a strong parent involvement component of the program. Parents attend many of the students' activities as well as attend seminars on higher education, preparation necessary to get into college, and other topics relevant to the health professions.

Reference: Grantee information sheet provided by The California Endowment.

Kids Into Health Careers

Funded by: Not funded; administered through the Grant Office of the Bureau of Health Professions, HRSA

Professions: Non-specific health professions

Pipeline level: High school

Eligibility: Bureau grantee institutions

Purpose/goals: Developed to supplement efforts to increase the pool of qualified applicants to health professions training programs who are from minority and disadvantaged backgrounds. The specified objectives of the program are:

- 1) inform students and parents about health professions careers,
- 2) motivate students,
- 3) information dissemination about financial aid, and
- 4) increase awareness about the need for minority involvement in the health professions.

Program description: The Kids Into Health Careers (KIHC) is a new BHP program that was implemented in April 2001. The target audiences are students, teachers, counselors, and school administrators from pre-elementary through high school. The KIHC is a CD-ROM instructional guide and directory that will be distributed to all grantees who include a KIHC component in their grant proposals.

Reference: Phone conversation with Anthony Hollins(301) 443-0734, Fact Sheet, HRSA newsletter, August 2000, <http://bhpr.hrsa.gov/kidscareers/greeting.htm>

Loans for Disadvantaged Students

Funded by: Division of Student Assistance, Bureau of Health Professions, HRSA

Professions: Medicine, osteopathic medicine, public health, dentistry, physician assistants, veterinary medicine, optometry, pharmacy, podiatric medicine, allied health, chiropractic, pharmacy, psychology

Pipeline level: Graduate

Eligibility: Funds are awarded to accredited schools of allopathic medicine, osteopathic medicine, dentistry, optometry, podiatric medicine, pharmacy, and veterinary medicine.

Purpose/goal: Increase educational opportunities in the health professions to individuals from disadvantaged backgrounds.

Program description: The Loans for Disadvantaged Students Program provides long-term, low-interest rate loans to full-time, financially needy students from disadvantaged backgrounds pursuing degrees in allopathic medicine, osteopathic medicine, dentistry, optometry, podiatric medicine, pharmacy, and veterinary medicine.

Reference: Program Summary for Academic Year 2000-2001, <http://bhpr.hrsa.gov/dsa/pages/programs.htm>

Loan Repayment Program

Funded by: Office of Loan Repayment and Scholarship, Office of Intramural Research, Office of the Director, National Institutes of Health

Professions: Biomedical research

Pipeline level: College

Eligibility: Individuals from disadvantaged background

Purpose/goals: To attract highly qualified physicians, nurses, and scientists from disadvantaged backgrounds to conduct research at the NIH.

Program description: The Loan Repayment Program repays a maximum of \$35,000 a year towards each participant's outstanding eligible educational debts. In return, participants must sign a contract agreeing to conduct appropriately qualified research activities as NIH employees for a minimum of two years or three years, depending on the specific loan repayment program.

Reference: Correspondence with Mark Horowitz (301) 402-5666, <http://ugsp.info.nih.gov/info/rp.htm>

Louis Stokes Alliances for Minority Participation

Funded by: Division of Human Resource Development, Directorate of Education and Human Resources, National Science Foundation

Professions: Science, math, engineering and technology (SMET) related professions.

Pipeline level: High school, college

Eligibility: Funds are awarded to colleges, universities and other research institutions.

Purpose/goals: The long-term goal is to increase the production of PhD's in the SMET fields, with an emphasis on entry into faculty positions.

Program description: The program is designed to develop comprehensive strategies necessary to strengthen the preparation and increase the number of minority students who successfully complete baccalaureate degrees in the SMET fields. Each awardee is required to establish meaningful partnerships among academic institutions. Supported activities include collaborative learning, skill development, mentoring, curricula improvement, and summer activities for students.

Reference: Correspondence with Norman Fortenberry, nfortenb@nsf.gov, <http://www.ehr.nsf.gov/HER/HRD/amp.asp>

Minority Access to Research Careers (MARC)

Funded by:	National Institute of General Medical Sciences, National Institutes of Health
Professions:	Biomedical research
Pipeline:	College, graduate
Eligibility:	Research institutions with substantial minority enrollment and individuals at such institutions.
Purpose/goal:	To increase the number and capabilities of scientists from underrepresented minority groups who are engaged in biomedical research and to strengthen science curricula and student research opportunities at institutions with substantial minority enrollments in order to prepare minority students for research careers.
Program description:	MARC is comprised of a medley of programs geared at improving research opportunities for minority scholars at the undergraduate, graduate and faculty levels. The Undergraduate Student Training in Academic Research (USTAR) Awards provide support for students to improve their preparation for graduate training in biomedical research. This program can also be used to strengthen the research infrastructure at institutions. One grant per eligible institution is awarded. Post-Baccalaureate Research Education Program (PREP) Awards encourage URMs who hold a recent baccalaureate degree in a biomedically relevant science to pursue a research doctorate. PREP scholars are paid a salary to work as apprentice scientists. Awards are made to institutions with graduate programs in biomedical and behavioral sciences. The following MARC programs are fellowships made to individuals at the graduate or faculty level: MARC Predoctoral Fellowships; MARC Faculty Predoctoral Fellowships; MARC Faculty Senior fellowships; MARC Visiting Scientist Fellowships. The remaining MARC Program is the Ancillary Training Activities, which are grants made to institutions and scientific or professional societies to support meetings, conferences and technical workshops that are in step with the overall MARC objectives.
Reference:	Correspondence with Director, Adolphus Toliver, ToliverA@nigms.nih.gov, http://www.nigms.nih.gov/funding/trngmech.htm

Minority Biomedical Research Support (MBRS) Program

Funded by:	National Institute of General Medical Sciences, National Institutes of Health
Professions:	Biomedical research
Pipeline:	College, graduate
Eligibility:	Research institutions
Purpose/goals:	The goal of MBRS (program of the National Institute of General Medical Sciences) is to increase the number of researchers who are members of minority groups that are underrepresented in the biomedical sciences.
Program description:	MBRS has three major grant mechanisms. The first is Support of

Continuous Research Excellence (SCORE), which develops biomedical research faculty at minority-serving (above national average) institutions who are committed to increasing the number of URMs in biomedical research. The Research Initiative for Scientific Enhancement (RISE) seeks to enhance the research environment at minority-serving institutions in order to increase the interest, skills, and competitiveness of students and faculty. The Initiative for Minority Student Development has the goal of encouraging the development and expansion of programs to improve the academic and research competitiveness of URM students at the undergraduate, graduate, and postdoctoral levels. Grantees are two or four-year colleges and universities and health professions schools with substantial enrollments of minorities. The grants support research by faculty members, strengthen the institution's research capabilities and provide opportunities for students to work as part of a research team. Specific strategies include internships, workshops, and academic activities. In 1996 MBRS underwent internal policy changes, of which the main outcome was the current implementation of monitoring and evaluation plans for all grants. A baseline for the 1994-1996 cohorts will be available in the next two years.

Reference: Phone conversation with Ernest Marquez (301) 594-3900, http://www.nigms.nih.gov/about_nigms/overview.html

Minority Faculty Fellowships Program:

Funded by: Division of Health Professions Diversity, Bureau of Health Professions, HRSA

Professions: Medicine, dentistry, other.

Pipeline: Graduate

Eligibility: Fellowships are awarded through professional schools to individuals who are underrepresented minorities.

Purpose/goal: To assist health professional schools increase the number of URM faculty members.

Program description: The grantee institution agrees to recruit and select minority individuals who have the potential for teaching, administration, or conducting research at the health professional school. The institution provides the necessary training and guidance to enable the individual to obtain a tenure faculty position. Such training includes: pedagogical skill, program administration, design and conduct of research, grant writing, and preparation of articles suitable for peer review. The grantee institution agrees to make available to the fellow \$1 for every \$1 of federal funds.

Reference: MFFP Brochure, FY 1999 grants record.

Minority International Research Training Program

Funded by: Fogarty International Center & National Center for Minority Health and Health Disparities, National Institutes of Health

Professions: Biomedical research

Pipeline Level: College, graduate
Eligibility: Research institutions
Purpose/Goals: The program is part of NIH's long-term goal of reducing health disparities between minority and majority groups in the United States.

Program description: This program is funded by the Division of International Training and Research, Fogarty International Center (FIC), and the National Center on Minority Health and Health Disparities (formerly the Office of Research on Minority Health) at NIH. These are grants made to colleges and universities who in turn fund undergraduate and graduate students from minority backgrounds to do biomedical and behavioral science research abroad.

Reference: Phone conversation with Public Affairs Officer Jennifer Cabe (301) 496-2075 and Program Specialist Rachel Park (301) 594-9778,
<http://www.nih.gov/fic/programs/mirt.html>

Minority Medical Education Program

Funded by: Robert Wood Johnson Foundation through the American Academy of Medical Colleges
Professions: Medicine
Pipeline: College, post-baccalaureate
Eligibility: Schools of medicine
Purpose/goal: To prepare students to gain acceptance into medical school.
Program description: The MMEP is primarily intended for students from underrepresented minority groups. It is a free six-week summer program offering eligible students intensive and personalized medical school preparation. Currently the program is located at eight sites around the country. Each site develops its own curriculum that includes academic enrichment in pre-med courses and critical thinking and writing skills, test preparation, and clinical experiences with physician-mentors.

Reference: <http://www.aamc.org/meded/minority/mmep/whatis.htm>

Minority Student Training Programs

Funded by: Centers for Disease Control and Prevention
Professions: Public Health
Pipeline Level: College, graduate
Purpose/goals: Designed to increase the knowledge and skills of African Americans and other under-represented minorities in specific disciplines in biomedical sciences, as well as to encourage students to choose public health careers.

Program description: CDC's office of the Associate Director for Minority Health administers summer and academic year training and enrichment programs for minority students. They are administered through external partnerships with the Minority Health Professions Foundation (MHPF), and the Public Health Sciences Institute (PHSI) of Morehouse College. Each partner is encouraged to be proactive in recruiting students from Hispanic Serving

Institutions, Tribal Colleges and Universities as well as Historically Black Colleges and Universities.
Reference: Phone conversation with Yvonne Lewis (404) 639-7220, CDC/ATSDR Minority Student Training Programs, Office of the Associate Director for Minority Health, Summary Report, October 2000.

National Medical Fellowships Scholarships

Funded by: National Medical Fellowships
Professions: Medicine
Pipeline level: Graduate
Purpose/goal: To increase the representation of minority physicians in the United States.
Program description: The NMF offers scholarships, fellowships, and special awards to minority medical students.
Reference: Correspondence and phone conversation with Gary Ma, (212) 483-8880, National Medical Fellowships Brochure.

Nursing Workforce Diversity Program

Funded by: Division of Nursing, Bureau of Health Professions, HRSA
Professions: Nursing
Pipeline level: K-12, college
Eligibility: Public and nonprofit private schools or departments of nursing and other public or private nonprofit entities. Student participants are from educationally and/or financially disadvantaged backgrounds.
Purpose/goal: To improve the racial and ethnic diversity of the basic nursing workforce. To increase nursing education opportunities for individuals from disadvantaged backgrounds.
Program description: Activities are designed to enhance the academic abilities and preparation of students from disadvantaged backgrounds to increase their competitiveness for entry to and graduation from a professional nursing program. Grantee institutions also motivate and recruit potential candidates for a professional nursing education. The Nursing Workforce Diversity Program is authorized by the Health Professions Education Partnerships Act of 1998.
Reference: Program Brochure, Annual Report, FY 2000.

Precollege Outreach Efforts K12 Students and Teachers

Funded by: Howard Hughes Medical Institute
Professions: Math and science related fields.
Pipeline level: K-12
Eligibility: Biomedical research institutions
Purpose/goal: To develop and conduct educational activities in modern biology or in other disciplines integrated with biology.
Program description: The four-year grants to biomedical research institutions enable the institutions to develop partnerships with neighboring schools. The program encourages a greater role for practicing

scientists in education, including textbook and curriculum development and teacher training. Institutions work with K-12 students through schools, youth organizations, and community groups. Activities include laboratory experiments, mentoring, teacher development, summer science camps, and classroom-based hands-on experiences.

Reference: <http://www.hhmi.org/grants/precollege/overview/biomed.htm>

Research Supplements for Underrepresented Minorities

Funded by: National Institute of General Medical Sciences, National Institutes of Health
Professions: Biomedical Research
Pipeline level: High school, college and graduate
Eligibility: Research institutions with an existing NIH grant
Purpose/goal: The aim of the research supplements is to attract and encourage minority individuals to biomedical and behavioral research careers.

Program description: They are designed to provide support for research experiences at grantee institutions throughout the continuum from high school to the faculty level. The idea is to attract more minorities into research, and not to additionally support minority individuals already working for the grantee. The proposed research experience must be an integral part of an ongoing research of the parent grant. Grantee institutions are colleges and universities as well as independent research centers. The statutory authorities for the grants are sections 301, 510, 515, and 504 of the Public Health Service Act.

Reference: Correspondence with Anthony Rene, ReneA@nigms.nih.gov, <http://grants.nih.gov/grants/guide/pa-files/PA-99-104.html>

Rural Systemic Initiatives

Funded by: Division of Educational System Reform, Directorate for Education and Human Resources, National Science Foundation
Professions: Science, math, engineering and technology (SMET) related professions.
Pipeline level: K-12
Eligibility: Consortia of rural school districts
Purpose/goal: To stimulate interest, increase participation, improve achievement, and accelerate career advancement and success for all students of the participating rural school districts.

Program description: The RSI is a K-12 –based program that promotes systemic reform of science and mathematics education for all students. It fosters partnerships between school districts and two- and four-year colleges and universities. Strategies include teaching workforce enhancements, curriculum innovation, and leadership development among teachers and administrators.

Reference: <http://www.her.nsf.gov/HER/ESR/usp.asp>

Scholarship Program

Funded by:	Indian Health Service
Professions:	Nursing, medicine, pharmacy, physical therapy, public health, physician assistant, clinical psychology
Pipeline level:	College, graduate
Eligibility:	Students must be American Indian or Alaska Native, federally or state recognized
Purpose/goal:	To provide the quantity and quality of health services which will permit the health status of Native Americans to be brought to the highest possible level and encourage the maximum participation of Native Americans in the health professions.
Program description:	The Indian Health Care Improvement Act, Public Law 94-437 authorizes the Indian Health Service to conduct scholarship programs to train professional health personnel. The scholarships provide financial assistance to American Indian and Alaska Native students to enroll in pre-health courses or health and allied health professional programs.
Reference:	Correspondence with Rose Jerue, rjerue@hqe.his.gov, http://www.his.gov/JobCareerDevelop/DHPS/SP/spTOC.asp

Scholarships for Disadvantaged Students

Funded by:	Division of Student Assistance, Bureau of Health Professions, HRSA
Professions:	Medicine, osteopathic medicine, public health, nursing, dentistry, physician assistants, veterinary medicine, optometry, pharmacy, podiatric medicine, allied health, chiropractic, pharmacy, psychology
Pipeline level:	Graduate
Eligibility:	Funds are awarded to accredited schools of medicine, osteopathic medicine, public health, nursing, dentistry, physician assistants, veterinary medicine, optometry, pharmacy, podiatric medicine, allied health, chiropractic, pharmacy, and with graduate programs in psychology.
Purpose/goal:	Increase educational opportunities in the health professions to individuals from disadvantaged backgrounds.
Program description:	The Scholarships for Disadvantaged Students Program provides scholarships to full-time, financially needy students from disadvantaged backgrounds enrolled in health professions and nursing programs.
Reference:	Program Summary for Academic Year 2000-2001, http://bhpr.hrsa.gov/dsa/pages/programs.htm

Science Education Partnership Awards (SEPA)

Funded by:	National Center for Research Resources, National Institutes of Health
Professions:	Biomedical science
Pipeline level:	High school

Eligibility: Research institutions
Purpose/goals: Advance science education among K-12 teachers, students, and the general public, in part, focusing on minorities.
Program description: The SEPA Program (National Center for Research Resources, NIH) currently funds 58 wide-ranging, health related projects. This is a partnership program among biomedical and/or behavioral scientists, science education experts, community organizations, academic institutions, science centers and museums, public school systems, and others. SEPA grants provide up to five years of support for the innovative and cutting-edge science education projects.
Reference: <http://www.ncrr.nih.gov/ncrrprog/sepa1.pdf>,
<http://www.ncrr.nih.gov/ncrrprog/sepa2.pdf>

State Systemic Initiatives

Funded by: Division of Educational System Reform, Directorate for Education and Human Resources, National Science Foundation
Professions: Science, math, engineering and technology (SMET) related professions.
Pipeline level: K-12
Eligibility: States and commonwealths
Purpose/goal: To stimulate interest, increase participation, improve achievement, and accelerate career advancement and success for all students of the participating school districts.
Program description: The SSI is a K-12 –based program that promotes systemic reform of science and mathematics education through comprehensive systemic changes in the education systems of states.
Reference: <http://www.her.nsf.gov/HER/ESR/usp.asp>

Undergraduate Biological Sciences Education Program

Funded by: Howard Hughes Medical Institute
Professions: Biomedical science research and teaching
Pipeline: College
Eligibility: Colleges and universities
Purpose/goals: To strengthen science education and encourage talented students to pursue research and teaching careers.
Program description: The Undergraduate Biological Sciences Education Program provides grants to selected undergraduate institutions. The institutions provide students with opportunities to conduct laboratory research., recruit tenure-track faculty, develop laboratory and classroom curricula, and conduct outreach programs for K-12 students. Activities to broaden access to science for women and underrepresented minorities are also supported.
Reference: <http://www.hhmi.org/grants/undergraduate/overview/index.htm>

Undergraduate Scholarship Program for Students from Disadvantaged Backgrounds

Funded by:	Office of Loan Repayment and Scholarship, Office of Intramural Research, Office of the Director, National Institutes of Health
Professions:	Biomedical research
Pipeline level:	College
Eligibility:	Individuals from disadvantaged background
Purpose/goals:	The goal is to help students from disadvantaged backgrounds pursue educational and career opportunities in biomedical research.
Program description:	The scholarships are awarded to undergraduate and graduate students from disadvantaged backgrounds who are committed to careers in biomedical research. Students are obligated to serve as paid employees in NIH research laboratories during summer vacations and after graduation.
Reference:	Correspondence with Mark Horowitz (301) 402-5666, http://ugsp.info.nih.gov/InfoUGSP.htm

Urban Systemic Program

Funded by:	Division of Educational System Reform, Directorate for Education and Human Resources, National Science Foundation
Professions:	Science, math, engineering and technology (SMET) related professions.
Pipeline level:	K-12
Eligibility:	Urban school districts
Purpose/goal:	To stimulate interest, increase participation, improve achievement, and accelerate career advancement and success for all students of the participating urban school districts.
Program description:	The USP is a K-12 –based program that promotes systemic reform of science and mathematics education for all students. It fosters partnerships between school districts and two- and four-year colleges and universities.
Reference:	http://www.her.nsf.gov/HER/ESR/usp.asp

Ventures Scholars Program

Funded by:	Josiah Macy Jr. Foundation
Professions:	Non-specific science and math
Pipeline level:	High school
Eligibility:	Students must be minority high school students who show academic achievement and who express interest in the health professions. Institutions are colleges and universities who are committed to increasing the number of minorities in the health professions
Purpose/goals:	The mission of the Ventures Scholars Program (a program of Ventures In Education, Inc.) is to increase the number of professionals who have been historically underrepresented in medicine and related health professions, engineering, and other science and math-based careers.
Program description:	The program works with the College Board's Student Search

Service to identify high achieving students. Those students are then connected with member colleges and universities who provide opportunities via enrichment programs and scholarships. Member institutions are colleges and universities that are eager to increase the presence of minorities in the careers mentioned above. Most of the funding for the program comes from the fee paid by the member institutions as well as from the Josiah Macy Jr. Foundation, which used to administer the program as Minorities In Medicine.

Reference: E-mail correspondence with Director, Jessica Arkin, JArkin@ventures.org, <http://www.venturescholar.org>

White House Initiative on Educational Excellence for Hispanic Americans

Funded by: Not funded
Professions: Non-specific health professions
Pipeline level: High school, college, graduate
Eligibility: Hispanic-serving institutions
Purpose/goals: The goal of the Initiative is to “strengthen the Nation’s capacity to provide high quality education and to increase opportunities for Hispanic Americans to participate in and benefit from Federal education programs.”
Program description: The Office of Minority Health provides coordination and oversight of grant activity to Hispanic-serving institutions. OMH monitors the implementation of the Initiative within HRSA; it does not provide funding nor does it administer any programs.
Reference: http://hrsa.gov/OMH/OMH/main2_projects.htm, Phone conversation with Laura Diaz Shepherd (301) 443-9966.

White House Initiative on Historically Black Colleges and Universities

Funded by: Office of Minority Health, HRSA
Professions: Non-specific health professions
Pipeline level: High school, college
Eligibility: Historically Black Colleges and Universities
Purpose/goals: The primary purpose of the Initiative is to strengthen the capacity of HBCUs to provide quality education and to increase opportunities to participate in and benefit from federal programs.
Program description: The Office of Minority Health provides technical assistance in the form of conferences and seminars to HBCUs to meet this goal. The Initiative was established in 1980 by Executive Order 12876.
Reference: http://hrsa.gov/OMH/OMH/main2_projects.htm, Phone conversation with Dr. Roscoe Dandy (301) 443-6582.

White House Initiative on Tribal Colleges and Universities

Funded by: Not funded; Administered through the Office of Minority Health
Professions: Non-specific health professions
Pipeline level: College

Eligibility: Tribal colleges and universities

Purpose/goals: By a 1996 Executive order the Initiative aims to increase access by tribal colleges to opportunities afforded by federal programs.

Program description: The objectives are:

- 1) increase educational opportunities;
- 2) enhance technology at TCUs;
- 3) provide internship opportunities;
- 4) increase health care services to American Indian populations;
- 5) disseminate information and provide technical assistance to TCUs; and
- 6) recruit American Indians to HRSA advisory boards. The Office of Minority Health provides coordination and oversight of grant activity to tribal colleges and produces an annual report. OMH monitors the implementation of the Initiative within HRSA; it does not provide funding nor does it administer any programs.

Reference: http://hrsa.gov/OMH/OMH/main2_projects.htm, The HRSA White House Initiative on Tribal Colleges and Universities FY2000 Annual Federal performance Report, Phone conversation with Karen Garthright (301) 443-9424.

- Bediako, M. R., B. A. McDermott, et al.** (1996) "Ventures in education: a pipeline to medical education for minority and economically disadvantaged students." *Academic Medicine* 71(2): 190-2.
- Grade:** Pre/Post D2 S3
- Program:** Ventures in Education
- Pipeline Level:** High School
- Profession:** General health sciences
- Program Interventions:** challenging academic curriculum, educational enrichment, and tutoring
- Evaluation Design:** Pre/Post comparing Ventures graduates outcomes to school-wide rates before program implementation.
- Outcome(s) Measured:** Health professions school applications and matriculation, used AAMC SAIMS (Student and Applicant Information Management System) database for outcomes
- Results:** Analyzed outcomes of Ventures graduates from the first five classes (1985-89) of the original five participating high schools. (n=981 students). 136 (13.9%) took the MCAT, 109 (11.1%) applied to medical school, 75 (7.6%) were accepted to a medical school, and 72 (7.3%) matriculated to medical school. Before program was implemented approximately 0% of students at these high schools took MCAT or eventually matriculated to medical school. Approximately 0.6% of the general population matriculates to medical school. Compared to the general population, medical-school matriculation rate 1% (p< .05).
- Statistical Analysis:** No formal tests of significance comparing students in the same high schools before Ventures implementation or comparing non-Ventures students enrolled during the same period.
- Cantor JC, Bergeisen L, Baker L,** "Effect of an intensive educational program for minority college students and recent graduates on the probability of acceptance to medical school." *Journal of the American Medical Association* 280 (9): 772-6
- Grade:** Cohort D1 S1
- Program:** Minority Medical Education Program (MMEP) (8 sites)
- Pipeline Level:** Undergraduates and recent graduates
- Profession:** Medicine
- Program Interventions:** Six week residential summer educational program focused on training in the sciences and improvement of writing, verbal reasoning, studying, test taking, and presentation skills. Focus is on enrichment not remediation
- Evaluation Design:** Cohort study, compared participants to non-participant minority applicants to medical school using AAMC Student and Applicant Information Management System.
- Outcome(s) Measured:** Probability of acceptance to at least one medical school.
- Results:** In the 1997 medical school application cohort 49.3% of MMEP participants were accepted compared with 41.6% of minority non-participants (P=.002) (N= 452 participants and 3378 non-participants). Program effects were also observed

in students who participated in the MMEP early in college as well as those who participated later

Statistical Analysis: Thorough statistical analysis and adjustment of socioeconomic variables, academic factors that were observable prior to MMEP participation, plus variables that may have been influenced by MMEP participation.

Note: Many non-MMEP URMs may have participated in other enrichment programs.

Carline J, Hunt D, Patterson D, Garcia C, " Participation in Enrichment Programs and Its Effect on Interview Scores of Applicants to the University of Washington School of Medicine." *Academic Medicine* 74(4): 360-2

Grade: Cohort D1 S1

Program: Unspecific (Participation in any enrichment program, either academic or research)

Pipeline Level: College

Profession: Medicine

Program Interventions: Academic and research enrichment

Evaluation Design: Retrospective Cohort- Compared URM applicants to University of Washington School of Medicine (UWSOM) between 1993-1995, enrichment participants vs. no enrichment participation

Outcome(s) Measured: Interview Scores. n= 227 URM applicants interviewed by UWSOM between 1993-1996. 97 participated in some type of enrichment program. 130 had not participated in any formal enrichment program.

Results: Participation in any type of enrichment program had no effect on an applicant's interview score. (Participants = 51.16, Non-participants=49.23) Only statistically significant predictive variable were sex (women received higher scores) and MCAT verbal reasoning score (higher verbal reasoning scores were associated with higher interview scores). Participants had lower GPAs (3.24 vs. 3.34), lower MCAT verbal reasoning (8.65 vs. 9.14), and lower MCAT physical sciences (8.27 vs. 9.06) scores than non-participants. Found small (not statistically significant) effect that applicants were more likely to get interviews if they had participated in enrichment programs.

Statistical Analysis: Statistical tests of significance performed for all outcomes measured.

Fullilove, R., Treisman, P.U., "Mathematics Achievement Among African American Undergraduates at the University of California, Berkeley: An Evaluation of the Mathematics Workshop Program," *Journal of Negro Education*, Vol. 59, No. 3. (Summer, 1990), pp. 463-478.

Grade: D1/S1

Program: Mathematics Workshop Program, University of California, Berkeley

Pipeline Level: College

Profession: General mathematics

Program Interventions: Academic enrichment via workshop in mathematics problem-solving.

Evaluation Design: Cross-section comparing workshop participants to non-participants and to historical control group.

Outcome(s) measured: Final grade in math course, persistence and graduation of African American participants versus non-participants.

Results: Analyzed data from 646 African American students who enrolled in Math 1A between 1973 and 1984. Since the program was implemented in 1978, the 1973-1977 group served as a historical control group. Achievement analyzed by categorization as "workshop student." 54% of participants earned course grade of B- or better versus 16% of non-participants and 22% of control group during 1978-1982 ($P<.0000$). 58% of participants earned grade B- or better versus 23% of non-participants ($P<.0000$) during 1983-1984. 65% of participants were still enrolled or had graduated as of Fall 1985 versus 41% non-participants and 39% of historical control group.

Statistical Analysis: Chi-square test was used to test the association between groups and outcome measures.

Hesser, A., E. Pond, et al. (1996) "Evaluation of a supplementary retention program for African American baccalaureate nursing students." *Journal of Nursing Education* 35(7): 304-9.

Grade: Pre/Post D1 S1

Program: Minority Academic Advising Program (MAAP), at the Medical College of Georgia

Pipeline Level: Undergraduate

Profession: Nursing

Program Interventions: Supplementary retention activities. Special advising efforts to address academic, personal, social and financial issues.

Evaluation Design: 1. Pre/Post for URM students at the institutional level.
2. Cohort study comparing pre-MAAP cohort

Outcome(s) Measured: 1. Retention to graduation rate.
2. GPA, board-passing rate on first try.

Results: Baseline: Black students in MAAP had lower SAT scores than comparison group. Graduation rate for Black students, 92.1% before MAAP implementation, 97.4% after implementation (not statistically significant). Black student nursing program GPAs improved, from 2.91 to 3.13 (from pre-MAAP to MAAP period. ($p=.002$). The disparity in nursing program GPAs between Black students and non-Black students decreased, from .45 points lower for Black students to a .21 difference. (Although this difference remained statistically significant.) First time board-passing rates increased for Black students, from 49% before MAAP to 64% after implementation (not statistically significant). Cohort comparisons between Black and non-Black students: Generally performance measures (nursing program GPA and Nursing Boards first time pass rates) non-Black students continued to perform better than Black nursing students. The graduation rates of Black students did improve, exceeding non-Black students, (97.4%

	vs.96.1%, not significant), (Pre-MAAP, Black rates were 92.1% compared to 96% for non-Black students
Statistical Analysis:	Extensive statistical analysis of results between Pre-MAAP and MAAP periods, and the sample group (Black students) and comparison group (non-Black).
Hesser, A., L. Lewis, et al.	(1993) "Evaluation of a supplementary retention program for black allied health sciences students." <i>Journal of Allied Health</i> 22(2): 175-82.
Grade:	Pre/Post D1 S1
Program:	Minority Academic Advising Program (MAAP), at the Medical College of Georgia (MCG)
Pipeline Level:	College
Profession:	Allied Health
Program Interventions:	Retention program; advising to help with academic, personal, social, financial, vocational, and other concerns
Evaluation Design:	Pre/post, compares retention variables of Black undergraduates across two time periods, pre-MAAP, 1978-1982, and MAAP time period, 1984-1988.
Outcome(s) Measured:	Retention in school
Results:	Baseline: SAT scores were equivalent between the Black students in the Pre-MAAP group and MAAP group. The Black student graduation rate increased 11% between the two groups from 72% to 83% after MAAP implementation. (p=.051) Comparison group (non-Black students) went from 86% to 85%.
Statistical Analysis:	Extensive statistical analysis of results between Pre-MAAP and MAAP periods, and the sample group (Black students) and comparison group (non-Black).
Hesser, A. and L. Lewis	(1992) "Evaluation of a summer pre-matriculation program for black and other nontraditional students." <i>Academic Medicine</i> 67(4): 270-2.
Grade:	Cohort D2 S2
Program:	Summer Pre-matriculation Program (SPP) at the Medical College of Georgia
Pipeline Level:	Pre-Matriculation
Profession:	Medicine
Program Interventions:	Provides an introduction to basic science courses taken in the first year, develops medical and learning skills, academic and social interactions with classmates, and faculty.
Evaluation Design:	Cohort study comparing participating invitees and non-participating invitees from the 1980-89 (All entering Black medical students and other entering nontraditional students deemed at risk are invited to participate).
Outcome(s) Measured:	Medical school grades, pass rates, retention rates.
Results:	n=115 participants, n= 82 comparison non-participants. No statistically significant differences found across outcomes measured. Participants had lower MCAT scores than non-participants, but higher biochemistry grades, (Intervention group = 2.52 (SD=.8), Control = 2.26 (SD=.9)). Overall pass rates for the two groups: Fall: Intervention group=94.8%, Control group=93.2%.

	<p>Winter: Intervention group: = 94.2%, Control group = 92.4%. The intervention group had a higher rate of advancing to the second year of medical school (82% compared to 77% in the control group).</p>
Statistical Analysis:	<p>Statistical analysis performed on baseline and performance measures—for all types of data collected, there were no statistically significant differences. (Authors indicate that several factors may have obscured the results, including the effects of tutoring services open to all matriculating students in jeopardy. Statistical power was limited. The letter grading scale [wherein F=0, A=4] restricted the numerical score differences).</p>
Lewis, Cynthia,	<p>“A State University’s Model Program to Increase the Number of its Disadvantaged Students Who Matriculate into Health Professions Schools,” <i>Academic Medicine</i> 71 no. 10 (1996): 1050-1057.</p>
Grade:	Pre/Post D2 S3
Program:	San Diego State University Health Careers Opportunity Program (HCOP)
Pipeline Level:	Undergraduate
Profession:	Multi-profession, (Dental, Medicine, Veterinary, and Physician Assistants)
Program Interventions:	Multiple components, including a summer academic program (before first-year), enrichment instruction, mentoring, counseling/advising structure, research and summer programs, alumni conference, test preparation (MCAT, DAT, GRE).
Evaluation Design:	Institutional-level pre/post study without parallel control group.
Outcome(s) Measured:	<p>Pass rates for entry-level competencies, GPA, and applications and acceptance to health professions schools. The aggregate GPA of HCOP students was compared to minority pre-health students in the years before HCOP implementation. The number of minority applicants and acceptances to health professions schools (not counting those to nursing or public health) were analyzed as well. Additional outcomes: Mentoring journals (that mentors kept, recording interactions with protégés) indicate that students’ feelings of confidence and success are correlated with a higher GPA.</p>
Results:	<p>Summer Academic Program participants had higher pass rates for the math and writing entry level competency tests compared to other SDSU students those years. GPA of minority pre-health students before HCOP (53 students) in 1988 = 2.59. GPA of HCOP minority pre-health students = 3.04 (51 students, 1992); 3.23 (77 students, 1993); 3.05 (77 students, 1994); 3.05 (83 students, 1995). Underrepresented minority applicants to health professions schools: Pre-HCOP (1986-90) 46 applicants, 38 acceptances (83% acceptance rate). Post-HCOP (1991-95) 95 applicants, 78 acceptances (82% acceptance rate)</p>

Statistical Analysis:	No tests of significance for HCOP vs. non-HCOP performance. No data on overall URM enrollment at SDSU, non-URM application/acceptance trends at SDSU, or of a non-HCOP control school.
Maton K, Hrabowski F, Schmitt C, "African American College Students Excelling in the Sciences: College and Post-College Outcomes in the Meyerhoff Scholars Program" Journal of Research in Science Teaching, 2000.	
Grade:	Cohort D1 S1
Program:	Meyerhoff Scholars Program at the University of Maryland, Baltimore County (UMBC)
Pipeline Level:	Undergraduate
Profession:	Science and engineering. The program's focus is on increasing the number of Ph.D. level researchers in science, engineering, and math (SEM).
Program Interventions:	Comprehensive financial aid, a summer enrichment program the pre-freshman summer, promotion of study groups, and academic and social support system for students. Advising, tutoring, and exposure programs.
Evaluation Design:	Controlled cohort study. Compared Meyerhoff students to those accepted to the program who declined and went to another university. Also compared students in the first three UMBC Meyerhoff Program cohorts to a pre-Meyerhoff sample of African American students who met the entrance requirements of the program. Used a sample of matched controls as well.
Outcome(s) Measured:	GPA's, grades in "gateway" courses, and science and engineering GPA's. Graduation rates in science, engineering, or math (SEM) disciplines.
Results:	Comparison between accepted students matriculating in the Meyerhoff program (n=93) and those students who declined and entered another university (n=35). Meyerhoff students were nearly twice as likely to graduate in SEM majors as those declined the program. (83% vs. 46%, p<.01). Meyerhoff students achieved significantly higher SEM GPA's than the declined sample (3.16 vs. 2.89, p<.01). There were no significant differences between the two groups in terms of overall GPA. Meyerhoff students were more likely to attend SEM graduate school. Relatively equal numbers attended medical school. UMBC Comparison Samples: Matched historical comparisons of African American, Asian, Caucasian and Meyerhoff students (Pre-Meyerhoff period, and current samples). The matched Meyerhoff participants had significantly higher graduation rates in SEM majors than the historical comparisons or the concurrent comparisons of Asian and Caucasian students. (Meyerhoff group had a 90% graduation rate in the SEM majors, compared to 55% of matched African Americans pre-Meyerhoff, and compared to 42% of Asians, and 29% of Caucasians during the Meyerhoff period, p<.01.) Adjusted overall GPA's were higher in the Meyerhoff group (3.30) than

	in the historical African American group (2.84) or the current Asian (3.17) or Caucasian (3.07) group (p.01).
Statistical Analysis:	Thorough statistical analysis. Also analyzed males and females separately with similar results. Groups were matched for gender, SAT-Math, SAT-Verbal, high school GPA, number of freshman science courses, and (within time period) time of entry.
	McGlinn, S., E. W. Jackson, et al. (1999) "Post baccalaureate Medical/Dental Education Preparatory Program (MEDPREP) at Southern Illinois University School of Medicine." <i>Academic Medicine</i> 74(4): 380-2.
Grade:	Pre/Post D1 S3
Program:	Medical/Dental Education Preparatory Program (MEDPREP) at Southern Illinois University School of Medicine (HCOP affiliate?)
Pipeline Level:	Post baccalaureate
Profession:	Medical/Dental
Program Interventions:	Assists students in improving their credentials to health professions schools. Designs individual curricula; offers academic and personal counseling.
Evaluation Design:	Pre/Post. Compares scores of participants to all others repeating the MCAT April 1993 to August 1994
Outcome(s) Measured:	MCAT scores.
Results:	On each section of the MCAT, repeaters who participated in MEDPREP achieved larger gains on average than all repeaters (nearly two to six times greater than the overall changes). Mean score changes on MCAT: Biological Sciences: MEDPREP repeaters, D= 2.24 (SD=1.6), All repeaters, D =.55 (SD=1.5). Physical Sciences: MEDPREP repeaters, D= 1.18 (SD=1.5), All repeaters, D= .51 (SD=1.4). Verbal Reasoning: MEDPREP repeaters, D=.1.23 (SD=1.9), All repeaters, D=.62 (SD=1.6). Writing Sample: MEDPREP, D=1.59 (SD=2.1), All repeaters, D=.28 (SD=1.8).
Statistical Analysis:	No tests of significance. No adjustment of other confounding factors.
	Philips BU, Mahan JM, Perry RR, "Minority Recruitment to the Health Professions: A Matched Comparison Six-Year Follow-up" <i>Journal of Medical Education</i> 56, (9 pt 1): 742-7.
Grade:	D1 S1
Program:	University of Texas Medical Branch (UTMB) Area Health Education Center (AHEC)
Pipeline Level:	Undergraduate
Profession:	Multiple Professions
Program Interventions:	Summer program. Exposure programs, allowing participants to rotate through hospitals and teaching facilities. Program focused on academic, communication, and interpersonal skills.
Evaluation Design:	Cohort study. Six-year follow-up of participants and non-participants who had applied to the program, but who had

not been accepted (because of space constraints). (78 Participants and 78 control individuals were sent questionnaires; 59 and 50 were returned, respectively.) Controls were matched for sex, age, ethnicity and parental occupation.

Outcome(s) Measured: Employment in a health profession, location of employment (Texas AHEC area or not), and attainment of career choice.

Results: A greater proportion of participants were employed in health professions than the control group (38% compared to 10%, ($p=.001$)). While not statistically significant, the results also suggest that respondents employed in health professions tended to be employed in the Texas area (71%). Location of education (AHEC area or not) was found to also be a factor in employment location ($p=0.000$).

Statistical Analysis: Controls were matched for sex, age, ethnicity, and parental occupation. No significant difference between participants and non-participants were found for those variables. Rigorous statistical analysis.

Pisano, J. C. and A. C. Epps (1983) "The impact of a medical-school-based summer program on the acceptance of minority undergraduate students into health professional schools." Journal of the National Medical Association 75(1): 17-23.

Grade: Cohort D3 S3

Program: Medical Education Reinforcement and Enrichment Program (MEdREP), Tulane University School of Medicine

Pipeline Level: Undergraduate, sophomores and juniors

Profession: Medicine and other health care fields (MODVOPP)

Program Interventions: Ten-week summer program, academic enrichment clinical exposure and preparation for the MCAT, and preceptorship experience. Competitive application process.

Evaluation Design: Compared 1976 participants to 1976 nonparticipating applicants. Also compared application rates of all participants (1972-1979).

Outcome(s) Measured: Application and acceptance rates to MODVOPP schools.

Results: Overall participants had higher GPAs and acceptance rates to health professions schools than non-participants. 1972-79 participants ($n=303$): science GPA= 3.04, accepted to MODVOPP schools=70%. 1976 participants ($n=46$): science GPA= 3.01, accepted to MODVOPP schools=65%. 1976 non-participating applicants ($n=212$): science GPA =2.82, Accepted to MODVOPP schools=37%. Data indicates that even those participants with low relatively low GPAs had fairly high acceptance rates to health professions schools. (e.g. 64% acceptance rate for participants with science GPAs less than 2.6).

Statistical Analysis: No tests of significance done between groups.

Pisano, J. C. and A. C. Epps (1983) "The impact of MCAT intervention efforts on medical student acceptance rates." Journal of the National Medical Association 75(8): 773-7.

Grade: Pre/Post D2 S3

Program:	Medical Education Reinforcement and Enrichment Program (MEdREP) at Tulane School of Medicine
Pipeline Level:	Undergraduate, sophomores and juniors
Profession:	Medicine and other health care fields (MODVOPP)
Program Interventions:	Ten-week summer program, academic enrichment clinical exposure and preparation for the MCAT, and preceptorship experience. Competitive application process.
Evaluation Design:	Two studies: 1. Analyzes MCAT (vs. GPA) as a predictor of medical school acceptance 2. Compares MCAT scores before and after a MEdREP MCAT review. Also compares participants to national minority mean.
Outcome(s) Measured:	MCAT scores
Results:	(of the second study) Pre/post test participants n=54. Average score before review- 34.8, after the review 41.9. 48 participants (89%) showed an improvement on overall MCAT score, one student had no change; five (2%) students decreased their scores. Participants who only took the test after the review course scored the same (41.2) as those who had taken the test prior to the test (Improvement in scores unlikely to be a result on simple exposure to the MCAT).
Statistical Analysis:	No statistical tests of significance.
Slater, M. and E. Iler	(1991) "A program to prepare minority students for careers in medicine, science, and other high-level professions." <u>Academic Medicine</u> 66(4): 220-5.
Grade:	Cohort D3 S3
Program:	Gateway to Higher Education
Pipeline Level:	High School
Profession:	General health sciences
Program Interventions:	Comprehensive academic enrichment and support
Evaluation Design:	Compares Gateway students to peers in their schools
Outcome(s) Measured:	New York State Regents subject test scores, PSAT, and SAT scores
Results:	Gateway students had higher pass rates than their peers on the New York State Regents examination. Comparing outcomes to national averages, the Gateway seniors as a whole had an average SAT score, which was 75 points higher than the national average (978 vs. 903). Of Black students, Gateway students had exceeded the national average for Black students by 237 points (974 vs. 737).
Statistical Analysis:	Gateway selects higher achieving students, no comparison to a similar group (although the Gateway participants are included in the Peers averages).
Strayhorn, G.	(2000) "A pre-admission program for underrepresented minority and disadvantaged students: application, acceptance, graduation rates and timeliness of graduating from medical school." <u>Academic Medicine</u> 75(4): 355-61.
Grade:	Cohort D2 S1
Program:	Medical Education Development Program (MEDP) at University of North Carolina at Chapel Hill
Pipeline Level:	Undergraduate

Profession: Medicine
Program Interventions: Nine-week intensive academic program
Evaluation Design: Prospective cohort study
Outcome(s) Measured: Medical School application, acceptance, graduation, and years of medical school
Results: Students with better MEDP performance rating increase odds of application, acceptance, and graduation. MEDP participant acceptance rate is significantly higher than national URM and non-URM rates (76% compared to 47% and 54% respectively).
Statistical Analysis: Crude comparison without adjustment for selection effects (although average GPA and MCAT of URM MEDP participants are approximately the same as the nation URM averages).

Thomson, W. A., J. P. Denk, et al. (1992) "Results of a summer academy to increase minority student access to allied health and other health professions." *Journal of Allied Health* 21(2): 79-93.

Grade: Pre/Post D2 S1
Program: Baylor College of Medicine, Health Professional Summer Academy
Pipeline Level: High School
Profession: Allied Health
Program Interventions: Three-week summer program for entering 9th grade students at two Texas high schools (Students eligible for program if in bottom one-third of academic ranking).
Evaluation Design: Pre/Post test. Compares scores on test administered to participants before intervention to scores after intervention. Average scores for two academy sites reported
Outcome(s) Measured: Results of the Middle Grades Integrated Process Skills (MGIPS) Test. The MGIPS test is designed for students in middle school to measure student knowledge of science skills. Maximum score on the MGIPS test is 36. Also administered the Health Professions Questionnaire, designed to determine student's knowledge and perceptions of allied health and other health careers.
Results: Students scores improved after program. Total combined (Houston and South Texas students) average (n=165) on MGIPS: pre-program: 20.81, post-program: 24.33 (p<.001). Houston students improved less on the test than the South Texas cohort: Houston students- pre= 21.58, post=22.13 (not statistically significant), South Texas- pre=20.29, post=25.84 (p<.001).
Statistical Analysis: Tests of significance performed. No test to estimate improvement due to previous test experience.

Thomson, William, "Update Report: Premedical Honors College Program," Baylor College of Medicine, Houston TX, January 2001.
Grade: Pre/Post D2 S2
Program: Premedical Honors College Program, University of Texas-Pan American (UT-PA) and Baylor College of Medicine partnership

Pipeline Level:	Undergraduate, with conditional acceptance to Baylor College of Medicine
Profession:	Medicine
Program Interventions:	Rigorous structured curriculum focused on science, math, communications, and technology. Counseling and support; exposure to medicine and medical careers. Participants were required to attend six-week summer enrichment program after their freshman year.
Evaluation Design:	Pre/Post for South Texas region, looking at college attendees before and after implementation
Outcome(s) Measured:	Medical school application and matriculation for students in the South Texas region
Results:	Before program, the highest number of medical school matriculants to medical school in a single year from South Texas universities (total enrollment approximately 30,000 students) was nine. In 1996, only four students from South Texas universities matriculated to medical school. The first PHC class (graduating in 1998) had eight students matriculate into US medical schools. Of the first three classes (total of 63 participants), 29 students are matriculating to medical school. Additionally, PHC appears to have influenced the culture of UT-PA, increasing the health-related interests generally. Since PHC was established, the number of freshman biology majors declaring themselves as pre-medical students has more than doubled. UT- PA is now contributing significantly more students to the pool of medical school matriculants. Not simply only PHC graduates, but the number of non-PHC students matriculating to medical school has been increasing as well. In 1998, there were eight PHC and six non-PHC medical school matriculants; in 1999 there were 11 PHC and six non-PHC matriculants; in 2000 there were 12 PHC and 14 non-PHC matriculants.
Statistical Analysis:	No formal tests of significance were performed on the increase in medical school matriculants from UT-PA. Additional analysis was done to identify factors that had the strongest influence on PHC students' MCAT score. The GPA for pre-medical prerequisites appears to be the strongest indicator of success on the MCAT (Compared to overall GPA at UT-PA and the science GPA at UT-PA).
Ugbolue, A., P. N. Whitley, et al. (1987) "Evaluation of a pre-entrance enrichment program for minority students admitted to medical school." <i>Journal of Medical Education</i> 62(1): 8-16.	
Grade:	Cohort D2 S1
Program:	Pre-entrance Enrichment Program (PEP), Boston University
Pipeline Level:	Pre-Matriculation
Profession:	Medicine
Program Interventions:	Six-week pre-matriculation academic enrichment for minority and disadvantaged students admitted to BU School of Medicine

Evaluation Design:	Cohort Study, comparing first-year performance of minority participants to minority non-participants
Outcome(s) Measured:	First-year grades, retention rates
Results:	N= 52 participants and 45 minority non-participants, from 1979-80 through 1984-85. Baseline: Participants had lower MCAT scores than non-participants, the two groups had similar undergraduate GPAs. No socioeconomic or racial and ethnic differences between the two groups. Post-Intervention: Participants had significantly higher proportions of pass and honors grades than minority non-participants (In Endocrinology, 80% vs. 54.8%; in Histology 66% vs. 45.2% ($p < .05$); other courses showed differences that we not recognize as statistically significant).
Statistical Analysis:	Statistical analysis for many variables, but small numbers may have reduced statistical significance.
Villarejo M, Tafoya S,	“Enhanced Science Achievement By Underrepresented Minority Undergraduates: an Evaluation of the Biology Undergraduate Scholars Program”, Howard Hughes Medical Institute Undergraduate Biological Sciences Education Program, University of California, Davis, February 1995
Grade:	Cohort D1 S1
Program:	Biology Undergraduate Scholars Program (BUSP), University of California, Davis
Pipeline Level:	Undergraduate
Profession:	Aimed at improving performance in the sciences
Program Interventions:	Academic enrichment, financial aid, four-week summer matriculation program.
Evaluation Design:	Compared BUSP students to a cross-section of matched biology contemporaries (n=139), as well as to matched students pre-BUSP (1986-87) (n=63)
Outcome(s) Measured:	Chemistry and calculus grades, number of science graduates with GPAs 3.0 or higher.
Results:	BUSP group compared to pre-BUSP group: The pre-BUSP group had lower SAT-Math scores (by 56 points) and was 80% female, compared to 65% of the BUSP group. Thirty-six percent of the BUSP group received a B or better in Chemistry, while only 8% of the comparison group did. ($p = .01$) Thirty percent of BUSP students received a B or better in the calculus series, compared to 3% of the pre-BUSP group. BUSP compared to cross-section of UCD biology students: Two groups matched for gender, math skills, admission status (special vs. regular), and year of entry. (28% were URMs). There were no statistically significant differences between the two groups in calculus or chemistry performance. (The BUSP group performed slightly better in chemistry, while the cross-sectional group performed slightly better in the calculus series.) Persistence in the chemistry series was much better in the BUSP group than in either the pre-BUSP group or the cross-sectional group. Fifty-eight percent of the BUSP group completed the series compared to 38% of the pre-BUSP group and 48% of the cross-sectional group. None of the pre-BUSP students completed a BS with a cumulative GPA of 3.0 or greater, compared to

Statistical Analysis:

43% of the BUSP group. Forty-six percent of the cross-sectional group completed a BS with a 3.0 or greater. Rigorous statistical analysis.

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