

quently a part of broader genetic programs for the entire public. This change will have the beneficial effect of not appearing to single out one ethnic group for special attention. With the recognition that significant numbers of patients with hereditary disorders such as sickling continue to be born, continued emphasis on research and support services leading to better patient care remains an important priority.

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## Factors Affecting the Supply of Minority Physicians in 2000

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#### Synopsis .....

*There was a substantial increase in the number of black and Hispanic physicians between 1970*

*and 1985. During the next 15 years, 1985 to 2000, the increase is projected to continue. The factors that will determine the size of the increase and the changes in physician to population ratios include black and Hispanic population increases, medical school costs, availability of student support, minority enrollment in undergraduate schools and the pool of these students who will be applicants to medical school, attrition during medical school, competition from other professions for talented minority students, and the effects of intervention programs such as the Health Careers Opportunity Program. The most likely outcome would seem to be that the increases in black and Hispanic physicians will continue to 2000 at 1985 levels because the data show neither strong positive nor strong negative net influences for the factors examined.*

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**T**HE MOST RECENT PROJECTIONS of minority health professionals by the Bureau of Health Professions in the Health Resources and Services Administration show an 83 percent increase in black physicians and a 35 percent increase in Hispanic physicians between 1985 and 2000 (1). While these projected increases are sizable, the factors that can affect them are themselves subject to significant change between now and the end of the century. Those factors

include the increase in the population of blacks and Hispanics, costs of a medical education, enrollment in undergraduate and medical schools, the minority student pool of potential medical school applicants, competition for minority students from other occupations, attrition during medical school, and intervention programs intended to recruit and prepare minority medical students for the health professions. In this article we will examine these factors and relate them and

their variability to the projections of minority physician supply in the year 2000.

## Background

In 1970, according to the U.S. Bureau of the Census, there were 6,100 black physicians and 10,300 Hispanic physicians in the United States (2). Although these numbers of minority physicians are not exactly comparable to the Bureau of Health Professions' 1985 estimates and 2000 projections, their use yields a 156 percent increase in black physicians and a 71 percent increase in Hispanic physicians between 1970 and 1985.

As estimated by the Health Resources and Services Administration, the total U.S. physician supply increased from 323,000 to 520,440, or 61 percent, during the same 15 years.

The projected percentage increase for blacks and Hispanics from 1985 to 2000 is about half that of the previous 15 years. What happened in the 1970s to cause the numbers to rise as fast as they did is well known. There was an expansion of the pool of minority students as well as a residue of qualified students from earlier years, scholarships and loans became more easily available, medical schools improved minority recruiting practices, the number of first-year seats in medical schools increased by 50 percent, and special programs were established to assist minority students to strengthen their candidacy for health professions schools.

The supply of minority physicians has continued to grow although black medical school enrollment leveled off after 1975, and the immigration of Hispanic physicians has been considerably restricted. The reason for the continued growth is that the base number of minority physicians, particularly black physicians, was very low before 1970, and the number of new graduates far exceeds those in the preceding decades. The result is that there are many more black graduates entering the labor force each year than leaving it because of death or retirement. The rate of growth of Hispanic physicians is not as great because of lower graduate-to-practitioner ratios each year and of the reduction in immigrant physicians. Despite the growth for both minority groups since 1970, their representation in the physician population is far below half their proportion of the U.S. population.

The precise level of future growth for both black and Hispanic physicians will depend on the factors listed previously; these are discussed in the next section.

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## Factors Affecting the Supply

**Black and Hispanic population increase.** The Census Bureau projects that by 2000 there will be almost 36 million blacks and 25 million Hispanics compared to estimates for 1985 of 29 million blacks and 17 million Hispanics (3,4). The projection for blacks rests primarily on fertility assumptions that can be clearly defined. However, the Hispanic projections will be affected by the Immigration Reform and Control Act of 1986 in ways that are difficult to predict. It is unknown at this time how much future illegal immigration will be controlled or how many formerly illegal immigrants will be granted citizenship by legislative fiat.

If the Census Bureau's projections are accurate and if the Bureau of Health Professions' physician projections are also accurate, physician to population ratios for 2000 would be those shown in table 1.

Although the rate of increase in Hispanic medical students is projected to be greater than that for both white non-Hispanics and blacks, the ratio of Hispanic physicians to Hispanic population is projected to decrease. The rise in numbers of Hispanic medical students and graduates will be more than offset by the nearly 50 percent increase in the Hispanic population and the restricted entry of noncitizen Hispanic physicians. The Hispanic physician ratio will still exceed that for blacks, although both will be substantially below the U.S. ratio.

The importance of the minority physician to minority population ratio is that, even as the total U.S. physician supply has increased, the Health Resources and Services Administration's Area Resource File shows that more than one-third of U.S. counties with 20 percent or more minority popula-

Table 1. Number of physicians and physician to population ratios for the United States, black and Hispanic populations, 1985 and 2000

Group	1985			2000		
	Population	Physicians	Physician to population ratio	Population	Physicians	Physician to population ratio
United States .....	238,631,000	520,700	218.2	267,955,000	696,500	260.0
Black .....	29,074,000	15,600	53.7	35,753,000	28,500	79.7
Hispanic.....	17,289,000	17,600	101.8	25,223,000	23,700	94.0

<sup>1</sup>Hispanic includes Mexican-Americans, mainland Puerto Ricans, and those classified as Other Hispanic but excludes Commonwealth of Puerto Rico

physicians.

SOURCE: References 1, 3, and Reference 4, p. 14.

Table 2. Percent distribution of allopathic medical school tuition increases, 1980 to 1985

Percent of tuition increase 1980-85	Allopathic <sup>1</sup> medical schools	
	Number	Percent
0.0-24.9.....	0	0.0
25.0-49.9.....	14	11.2
50.0-99.9.....	71	56.8
100.0-or more.....	40	32.0

<sup>1</sup>Allopathic medical schools award an MD degree. Osteopathic medical schools award a DO degree.

SOURCE: Reference 6, p. 6.

tions remain medically underserved. Coupled with that statistic is the finding by Keith and co-workers that minority medical school graduates are nearly twice as likely as white graduates to practice in these areas (5). Obviously many white physicians treat minority patients, and the disparity in services received does not match that of the physician to population ratios in table 1, but the overall evidence shows a need for more minority physicians than are being graduated. The deficit will be even greater if the Census Bureau's projections are low or if the Bureau of Health Professions' projections are high, or if both these conditions apply.

The correlation between increase in population and increase in black and Hispanic medical students will probably be slight. The larger portions of the projected black and Hispanic population increase are expected to be at lower income levels and, while black and Hispanic applicants are more likely than whites to be from lower-income strata, the recent trend is for them to be from more affluent families.

In addition, there are no plans to add medical school seats in those States such as Texas, New York, Pennsylvania, Illinois, California, and Florida where the minority population increase is expected to be greatest. Although there will be

some diffusion of graduates from medical schools in other States, the minority physician ratios in the States with highest minority populations cannot be expected to get much higher.

**Costs.** Between 1980 and 1985, 32 percent of American medical schools doubled or more than doubled their tuition (6), and almost 90 percent of schools increased their tuition by at least 50 percent in the 5-year period (table 2).

At the same time that tuitions have been markedly increasing, the reliance on loans, particularly market rate loans, has been growing. In 1984-85, loans accounted for 75.1 percent of all medical student financial assistance compared to 65.7 percent of such aid in 1980-81. The Health Education Assistance Loan (HEAL) program, which offers market rate interest, accounted for only 3.8 percent of medical student aid in 1980-81 but 18 percent in 1984-85. Concomitantly, full scholarship programs, such as the National Health Service Corps (NHSC), fell to almost negligible levels and constituted less than 1 percent of all aid to medical students in 1984-85. There were more than 5,000 NHSC scholarships awarded to medical students in 1980-81 and only 153 in 1984-85. Increased dependence on loans and higher tuitions have led to a significant rise in student indebtedness. Data from the Liaison Committee on Medical Education for 1985 indicate that 87 percent of medical school graduates in that year were in debt. The average burden was \$30,256, an increase of 12.5 percent over the previous year and 96.2 percent over the average in 1980 (7).

There has also been a change in the income levels of parents of minority applicants and acceptees. According to data of the Association of American Medical Colleges, the percentage of applicants whose parents earned more than \$30,000 doubled between 1980-81 and 1985-86 (8).

A logical implication of the trends shown in

table 3 is that minority medical school applicants from low-income families will be fewer, and unless the minority middle class grows at the same pace as tuitions, there may be a diminished number of minority students.

**Undergraduate and medical school enrollments.** A trend toward reduced representation of minorities is not yet evident in the enrollment of first year medical students (table 4). In the last several years numbers of Hispanic students have increased slightly, as black and American Indian students have stayed at the same level and each group's percentage of the total has fluctuated little (8). The total number of applicants to medical school from all racial and ethnic groups dropped from more than 42,000 in 1976-77 to about 31,000 in 1986-87. Minority applicants increased slightly during this period until 1984-85. Since then the number of black, Hispanic, and American Indian applicants have fallen by 10 percent even though the percentage of total applicants who are minorities rose from 10.0 to 10.2 percent in that 2-year period (8). Minorities are keeping pace relative to all other applicants, but they are losing ground in absolute numbers.

The comparison of Hispanics and blacks enrolled in 4-year undergraduate schools shows trends similar to the medical school matriculants. There were 217,000 Hispanic undergraduates in 1980 and 241,000 in 1984, but black undergraduate enrollment fell from 634,000 to 613,000 between 1980 and 1984. Any attendant effects of this decrease on medical school enrollment have not yet become apparent (9).

**Minority student pool of potential medical school applicants.** This pool of minority students has been historically smaller than that for white students. In the 1970s it increased, but it has never reached a number proportionate to the representation of minorities in the U.S. population. A primary cause is usually considered to be deficient academic preparation in science. Data on relative levels of progress of majority and minority students are now being updated by the Educational Testing Service's National Assessment of Education Progress, but there are 1981-82 and 1983-84 data with which to compare the progress in mathematics and reading of 9-, 13-, and 17-year-olds (10).

By age 9, black and Hispanic students have already fallen well below white students in progress in mathematics and reading and never catch up

Table 3. Percentage of minority applicants to and accepted students of allopathic medical schools with parental incomes over \$30,000 in 1980-81 and 1985-86

Income	Percent in 1980-81		Percent in 1985-86	
	Applicants	Accepted students	Applicants	Accepted students
\$30,000-49,999 .....	9.6	11.5	18.6	21.0
\$50,000 and more .....	7.0	8.7	14.8	16.9
Total over \$30,000 ...	16.6	20.2	33.4	37.9

SOURCE: Reference 8, p. 6.

Table 4. First-year enrollment of minority students in allopathic medical schools

Academic year	Total enrolled	Black		Hispanic		American Indian	
		Number	Percent	Number	Percent	Number	Percent
1975-76...	15,295	1,036	6.8	461	3.0	60	0.4
1980-81...	18,197	1,128	6.6	818	4.8	67	0.4
1981-82...	17,268	1,196	6.9	902	5.2	70	0.4
1982-83...	17,254	1,145	6.6	926	5.4	62	0.4
1983-84...	17,150	1,173	6.8	893	5.2	75	0.4
1984-85...	16,997	1,143	6.7	926	5.4	77	0.5
1985-86...	16,963	1,117	6.6	953	5.6	60	0.4
1986-87...	16,819	1,174	7.0	954	5.7	61	0.4

SOURCE: Reference 8, p. 6.

(table 5). At age 17 they are less likely to be prepared for college courses in the sciences and less likely to be premed majors than white students. As early as the third grade their representation in the probable future pool of medical school applicants is disproportionately low.

Trends in educational progress do show greater improvement in minority student scores than for white students since the mid-1970s. For example, reading proficiency scores for 17-year-old black students increased from 244.0 in 1974-75 to 263.5 in 1983-84 and Hispanic 17-year-old students increased their scores from 254.7 to 268.7 during the same period. White students' scores rose only from 290.7 to 294.6. Science and mathematics improvement, albeit slight, was also higher for minority students. However, unless the gap between white and minority students becomes substantially smaller, its constricting effect on the size of the minority pool will persist (11).

**Medical school attrition.** Rates of graduation from medical school for whites are 98 percent, for Hispanics about 95 percent, and for blacks and

Table 5. Academic progress differentials among 9-, 13-, and 17-year-old white and minority students

Minority category and age	Average percent of total correct		Reading proficiency score, 1983-84
	Science 1981-82	Mathematics 1981-82	
<b>White:</b>			
9 years.....	NA	58.8	220.1
13 years.....	54.6	63.1	263.4
17 years.....	62.5	63.1	294.6
<b>Black:</b>			
9 years.....	NA	45.2	188.4
13 years.....	42.6	48.2	236.8
17 years.....	46.1	45.0	263.5
<b>Hispanic:</b>			
9 years.....	NA	47.7	193.0
13 years.....	NA	51.9	239.2
17 years.....	NA	49.4	268.7

SOURCE: Reference 10, p. 16.  
NOTE: NA—not available

American Indians approximately 92 percent. They have not changed in the last several years, and there are no data that would indicate any significant change is likely in the near future. An important feature of the overall graduation rates is the difference among racial and ethnic groups in the number of students taking 5 or more years to graduate. A study by the Association of American Medical Colleges of the class entering medical school in 1977 revealed that 16 percent of all underrepresented minority medical students required more than 4 years to complete their studies (12), compared with only 3 percent of white students. At a time when costs are increasing, one-sixth of the students least able to afford it are paying 25 percent more to get a medical degree. Some students are voluntarily enrolled in a 5-year program, but they are nevertheless paying for an extra year.

**Competition with other professions.** It has been suggested that medicine is losing the competition with other professions for the most able minority students and that the student pool is not as small as it would seem from the number and quality of medical school applicants. This contention is not borne out by an examination of minority enrollments in such other professional schools as dentistry, law, engineering, and business (8, 13-16).

The percentage increase in the number of underrepresented minority students in medical school between 1978 and 1985 is about the same as for dentistry, law, and business (table 6). The percentage increase for engineering schools is much higher, but the 1978 base number was much

smaller than the numbers enrolled in the other three professional schools 9 years ago. It does appear that at this time medicine is not losing the competition to these professions although there may be other fields, particularly computers and communications, that are attracting some of the better minority students. Data are not available on numbers of minority students entering the computer or communications fields.

**Intervention programs.** The major Federal legislation specifically addressing the underrepresentation of minorities and other disadvantaged persons in the health fields, commonly called the Health Careers Opportunity Program (HCOP), is administered by the Bureau of Health Professions, Division of Disadvantaged Assistance (DDA), in the Health Resources and Services Administration. Legislation was initially enacted in 1971, under the comprehensive Health Manpower Training Act of 1971, Public Law 92-157.

Through the HCOP, funds are awarded to health professions schools and public or nonprofit private health or educational entities to identify and recruit persons from disadvantaged backgrounds for education and training in the health professions, facilitate the entry of these persons into a health professions school, provide counseling or other retention services to students enrolled in health professions schools to help them complete their education successfully, provide preliminary education and other enrichment services to undergraduate students to better prepare them for the rigors of graduate education, and publicize existing sources of financial aid.

Since its inception the program has experienced several major changes in size and character. The program grew from \$5 million in 1972 to \$24.4 million in 1986. In 1986, the law retained the 1981 amendments and added a provision that 20 percent of the funds appropriated shall be obligated for stipends to persons of exceptional financial need who are students at schools of medicine, osteopathy, or dentistry.

From 1972 through 1986 approximately 38 percent (\$56 million) of the HCOP funds were awarded to 97 medical schools that participated, for varying lengths of time, in the HCOP. The medical schools provided services to about 50,000 students, primarily facilitating entry and retention. In addition, during this period, recruitment, academic enrichment, financial aid information, and other services were provided by undergraduate and noneducational institutions to thousands of other

Table 6. Change in enrollment of minority students in medical, dental, law, engineering, and business schools between 1978-79 and 1985-86

Type of school and minority group of student	1978-79		1985-86		Difference 1978-79 to 1985-86	
	Number minority students	Percent of total	Number minority students	Percent of total	Number	Percent
<i>Medical schools</i>						
Underrepresented minorities.....	6,004	9.7	7,542	11.3	1,538	25.6
Black .....	3,537	5.7	3,849	5.8	312	8.8
Hispanic.....	2,265	3.7	3,458	5.2	1,193	52.7
American Indian.....	202	0.3	235	0.4	33	16.3
<i>Dental schools</i>						
Underrepresented minorities.....	1,455	6.6	1,859	9.5	404	27.8
Black .....	977	4.4	1,019	5.2	42	4.3
Hispanic.....	414	1.9	790	4.0	376	90.8
American Indian.....	64	0.3	50	0.3	- 14	- 21.9
<i>Law schools</i>						
Underrepresented minorities.....	8,528	7.0	10,193	8.2	1,662	19.5
Black .....	5,350	4.4	6,052	4.9	702	13.1
Hispanic.....	2,788	2.3	3,679	3.0	891	32.0
American Indian.....	390	0.3	462	0.4	72	18.5
<i>Engineering schools</i>						
Underrepresented minorities.....	1,646	2.6	3,251	3.4	1,605	97.5
Black .....	843	1.3	1,423	1.5	580	68.8
Hispanic.....	738	1.2	1,702	1.8	964	130.6
American Indian.....	65	0.1	126	0.1	61	93.8
<i>Business and management schools<sup>1</sup></i>						
Underrepresented minorities.....	10,355	5.8	11,250	5.4	895	8.6
Black .....	7,118	4.1	7,330	3.6	212	3.0
Hispanic.....	2,812	1.6	3,440	1.7	628	22.3
American Indian.....	425	0.1	480	0.1	55	12.9

<sup>1</sup>Data available only to 1984-85. SOURCES: 8, 13, 14, and 16 and spokesperson for the Graduate Management Admissions Council of St. Louis, MO, in June 1987.

students exploring or actively pursuing a medical education.

Complementing the Federal Government's program are the extensive contributions made by nongovernmental institutions and organizations. For example, both the Robert Wood Johnson Foundation and the Josiah Macy Foundation have been, and continue to be, particularly active in supporting efforts to improve the academic preparation of minority students interested in health careers.

## Conclusions

The outlook for 2000 is that there will almost certainly be marked increases in the number of black and Hispanic physicians because medical school graduates will far exceed those retiring and dying who graduated in the 1940s and 1950s when the numbers of minorities in entering classes were much smaller. This will be true even if first-year enrollment percentages of black students drop to the 1969-70 level of about 5 percent and if the Hispanic increase reverts to its 3 percent rate of 1975-76.

What seems just as evident is that the minority physician to minority population ratios will not come much closer to the white ratio than they are now, both because first-year enrollments are unlikely to rise any higher than projected and because the minority population is growing faster than the white population. Increases in tuition and the cost of financial assistance do not yet appear to have affected the number of minority medical school applicants, although the minority applicants come from backgrounds where the parental incomes are higher than they were previously. The studies of academic progress of 9-, 13-, and 17-year-olds do not show enough improvement in the scores of minority students to expect that the pool of qualified minority medical school applicants will increase very soon. Other factors, such as competition from other professions (including dentistry, law, engineering, business and management, and computer science), student attrition during medical school, and intervention programs, remain relatively constant and, unless they change unexpectedly, will not cause reductions in the projected minority physician supply between now and the year 2000.

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## The Area Resource File —a Brief Look

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**A**LMOST ALL RESEARCHERS, policymakers, planners, and program managers reach a point where they need more "hard" data to develop needed analyses, to conduct research, to develop or evaluate programs, or simply to identify and understand recent developments or trends. On many such occasions, however, comparable, easily accessible data are not available. In such situations, the alternatives are to mount a major effort to obtain good data in the right form quickly or to look up a few facts in a reference document and make do with them. Since neither of these options is especially attractive, efficient, or cost-effective, the Bureau of Health Professions (BHPr) of the Health Resources and Services Administration (HRSA) decided on a different approach in the early 1970s and developed the Area Resource File

(ARF). The ARF, a computerized, county-based data system which consolidates a vast array of data into a consistent, current, and compatible set of files, has been maintained by staff in the Office of Data Analysis and Management since then.

The Area Resource File is a compilation from more than 200 sources of the most useful data for assessing the nation's health care resources. The data are merged and summarized at a county level, combined into one computerized file, and then carefully documented. By doing this, the ARF shortcuts many of the steps needed to use data. The file is used for a variety of different purposes and objectives. The general utility of the ARF is reflected in hundreds of uses by and users in government agencies, universities, associations, and consulting firms. This brief look at the ARF is