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*As the state's shortage of health care workers intensifies, there is a growing need for information about the supply of and demand for health care professionals. For that reason, this physician workforce profile was created to provide Minnesota policy makers, employers, educators, consumers, and others with an overview of current information.*

## Physician Workforce Profile

### Findings

- The demand for physicians remains strong — 28 percent growth in employment (1989 to 1999) and a projected employment growth of 19 percent between 1998 and 2008.
- The number of physicians graduating from Minnesota medical schools may not be keeping pace with demand. Since the mid-1980s the number of new graduates from Minnesota medical schools has declined.
- In strict population to provider terms, the ratio of physicians to the population is much lower in rural Minnesota - about 110 physicians for every 100,000 rural Minnesotans compared to roughly 300 physicians for every 100,000 urban Minnesotans.
- One quarter of physicians are older than 55, and will likely reach retirement age within the next ten years.
- In the past two decades, the proportion of female physicians has grown steadily in Minnesota, with females currently accounting for 23.2 percent of the workforce and 31.6 percent of physician residents.
- On average, male physicians work more hours than female physicians in Minnesota. Males work an average of 49.25 hours per week compared to females who work an average of 43.77 hours per week.

Physicians work in a variety of settings, such as private clinics, hospitals, nursing homes, universities, and emergency rooms. They provide treatment, diagnose illnesses, counsel patients, conduct research and teach. In a health care setting, physicians generally provide different types of services based on their specialty. Primary care physicians typically specialize in internal medicine, general and family practice, pediatrics, obstetrics and gynecology. Other non-primary care physicians may specialize in fields such as neurology, cardiology, radiology and psychiatry. Patients are often referred to physicians in specialized fields from their primary care physician.<sup>1</sup>

Physicians are the third largest health care occupation in the state with employment just under 13,000. Only registered nurses and licensed practical nurses had higher employment. Nationally, slightly more than 550,000 people are employed as physicians.<sup>2</sup>

Is there a shortage of physicians in Minnesota? Unfortunately, an analysis of current data on the supply of and demand for physicians does not provide a clear or complete answer to that question. Still, a number of trends do suggest that the supply of available physicians

may not be distributed adequately to meet the current and future demands of employers and consumers.

### The Demand for Physicians

One of the strongest indicators of demand for an occupation in the labor market is wage growth. However, unlike other occupations, analyzing wage trends for physicians can be problematic since their compensation includes more than just a salary. Any real growth in physician earnings may also have been constrained by patient reimbursement practices. Some physicians, especially those in private practice, may not be salaried.

According to national data the median income for all salaried physicians grew by only 4.5 percent from \$157,000 in 1993 to \$164,000 in 1997, compared to an 11 percent growth in inflation.<sup>3</sup> Unfortunately, due to changes in data collection, wage trends for physicians in Minnesota are not easily tracked over time. In 1990 the median wage for all physicians and surgeons employed in Minnesota was \$46.18/hour. When adjusted for

inflation, the 1990 median wage would be equivalent to \$58.83/hour in 1999. However, median wage data for 1999 is only available for a few specific types of physicians. For comparison, the median wage in 1999 for family and general practitioners was \$61.09/hour, internists \$55.60/hour, pediatricians \$54.88/hour, and psychiatrists \$31.15/hour.<sup>4</sup>

Other indicators of physician demand are occupational growth and job openings. In the last ten years (1989 to 1999) the number of physicians employed in the state of Minnesota has grown by 28 percent.<sup>5</sup> Furthermore, physicians and surgeons are considered to be one of the top 30 occupations adding the most new jobs from 1998 through 2008 with an estimated growth of 19 percent.<sup>6</sup> With regard to physician openings, employers reported that 304 physicians were being recruited for positions in greater and underserved Minnesota in 1999 — one third of all physicians being recruited were for primary care positions.<sup>7</sup> Contrary to the limited findings from an analysis of wage trends, occupational growth and the number of job openings suggest that a strong demand for physicians exists.

## The Supply of Physicians

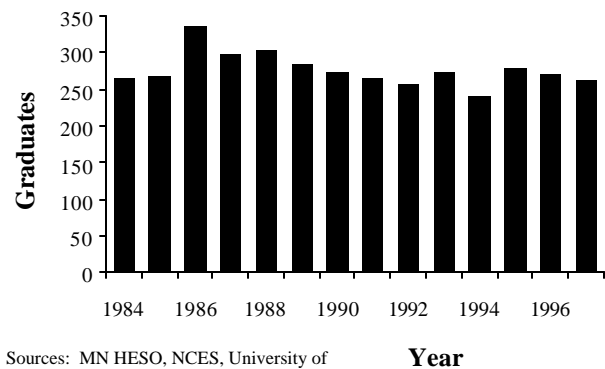
While the demand for physicians has grown, the supply of new physicians entering the profession has remained relatively constant. Two important factors to look at when determining supply are the number of graduates from the state’s medical schools and the composition of the state’s physician workforce.

### Physician Graduation Trends

One way to measure the supply of physicians is to look at graduation rates. It is important to keep in mind that Minnesota graduates alone do not account for the total supply of physicians entering the workforce in the state. Many graduates will leave the state upon graduation and practice out of state. In fact, only 56.6 percent of physicians who graduated from the University of Minnesota in the 1990s still practice in Minnesota.<sup>8</sup> In addition, an unknown number of graduates from other states also make up a part of the state’s physician workforce. However, looking at graduation trends can still provide an estimate of the supply of physicians and the current capacity of medical educational programs.

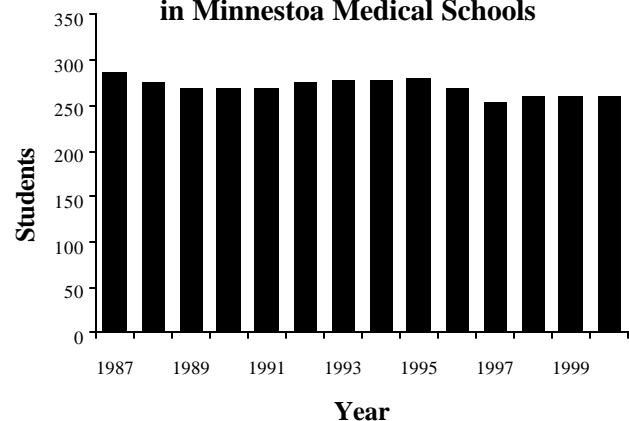
Educational requirements for physicians typically include 4 years of undergraduate school, 4 years of medical school, and 3 to 8 years of internship and residency, depending on the specialty. Training duration may vary depending on the schools attended by the physician. In Minnesota there are currently three

**Figure 1: Medical Student Graduates in Minnesota, 1984-1997**



Sources: MN HESO, NCES, University of Minnesota and Mayo Clinic.

**Figure 2: First Year Students Enrolled in Minnesota Medical Schools**



Sources: University of Minnesota and Mayo Medical School.

institutions with medical programs: Mayo Medical School, University of Minnesota Medical School-Twin Cities, and University of Minnesota – Duluth Medical School.<sup>9</sup> It generally takes a student 7 years, in addition to undergraduate study, to receive an MD degree from the U of M-Twin Cities.<sup>10</sup>

After reaching a peak in 1986, the number of medical school graduates in Minnesota has steadily declined.<sup>11</sup> See Figure 1. Minnesota’s rate of decline was much faster than the rest of the states in our region.<sup>12</sup> Between 1987 and 1997 the number of Minnesota graduates declined by almost 13 percent, compared to a decline of only two percent in the number of regional graduates. Nationally, the number of medical school graduates increased by three percent during the same period.<sup>13</sup> This trend is likely to continue into the future since the number of first year students enrolled did not increase between 1995 and 2000. See Figure 2.

# Physician Workforce Composition and Distribution

The Minnesota Department of Health's Health Service Personnel Survey provides a wealth of information on the current composition and distribution of physicians in Minnesota. An analysis of these data reveals a number of important factors about the supply of physicians, including the large concentration of physicians in Minnesota's metro and urban areas and the changing gender composition of the physician workforce.

## Overview

Of all physicians relicensed through the state in of Minnesota in 2000 only 62.3 percent reported that they actively use their license and are employed in Minnesota. Almost one quarter (23.7 percent) report an active license, but practice in another state. Roughly six percent of these physicians practice in a state bordering Minnesota. Another ten percent do not currently hold an active license to practice medicine. Of these inactive license holders 44.5 percent are retired.

## Employment

Eighty-three percent of Minnesota's physicians practice in the Twin Cities metro area and other urban counties (Olmsted, Saint Louis, and Stearns). A comparison to Minnesota's population distribution, 63 percent urban and 37 percent rural, reveals a higher concentration of physicians in the state's urban areas.<sup>14</sup> In strict population to provider terms, an estimate reveals that the ratio of physicians to the population is lower in rural Minnesota — about 110 physicians for every 100,000 rural Minnesotans and 300 physicians for every 100,000 urban Minnesotans. See Map 1.

This geographic maldistribution may in part be due to the large number of non-primary care physicians practicing in Minnesota's metro and urban regions. Specialized physicians tend to practice in these regions for several reasons, including: larger facilities, location of medical technologies, proximity to research facilities and universities. In addition, a larger population in metro/urban areas usually results in a higher demand for specialized services.

Of physicians employed in Minnesota, 43.7 percent reported that their first specialty was in primary care.<sup>15</sup> However, in rural counties primary care physicians account for almost 61 percent of the workforce. See Table 1. Even though the proportion of primary care physicians is higher in rural Minnesota, the ratio of primary care physicians to the population is still lower in rural Minnesota – 70 physicians for every 100,000

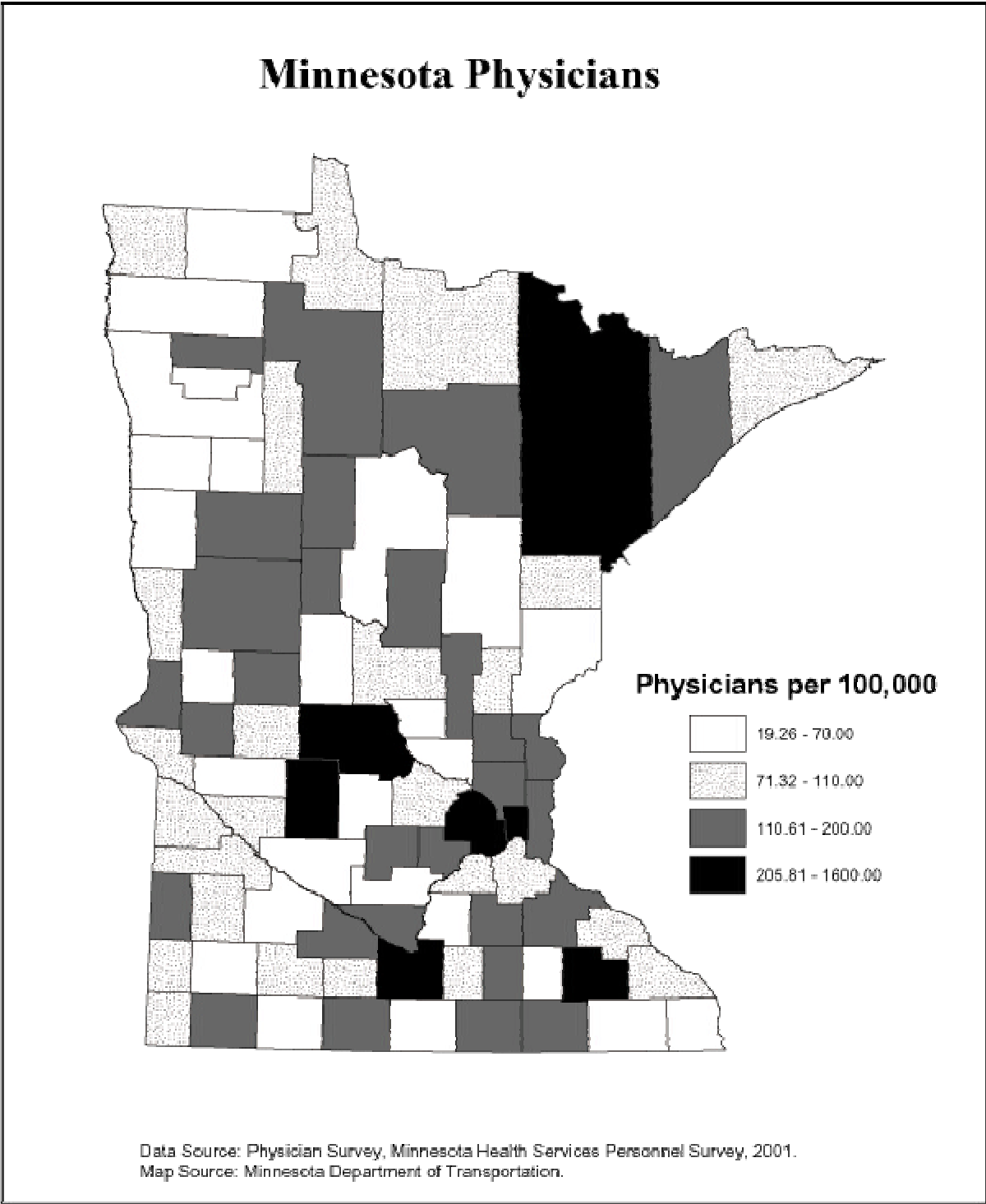
**Table 1: Primary Specialty Distribution of Physicians by Practice Location and Gender\***

	Total 11,330	Urban 9,126	Rural 1,922	Male 8,534	Female 2,658
<b>Primary Care</b>	<b>43.7%</b>	<b>40.1%</b>	<b>60.9%</b>	<b>39.2%</b>	<b>56.8%</b>
Internal Medicine	13.2%	13.7%	10.7%	12.9%	14.0%
General and Family Practice	20.4%	15.4%	44.2%	18.9%	25.4%
Pediatrics	6.4%	7.1%	3.0%	4.6%	11.7%
Obstetrics and Gynecology	3.7%	3.9%	3.1%	2.8%	5.8%
<b>Medical Specialties</b>	<b>5.7%</b>	<b>6.6%</b>	<b>1.4%</b>	<b>6.0%</b>	<b>4.5%</b>
Allergy	0.3%	0.3%	0.1%	0.3%	0.2%
Cardiovascular Diseases	2.4%	2.8%	0.2%	2.8%	1.1%
Dermatology	1.2%	1.3%	0.9%	1.0%	2.2%
Gastroenterology	1.0%	1.2%	0.3%	1.2%	0.5%
Pediatric Cardiology	0.1%	0.1%	0.0%	0.1%	0.1%
Pulmonary Disease	0.7%	0.8%	0.1%	0.8%	0.4%
<b>Surgical Specialties</b>	<b>13.1%</b>	<b>13.3%</b>	<b>12.3%</b>	<b>15.6%</b>	<b>5.2%</b>
Cardiovascular	0.3%	0.3%	0.0%	0.3%	0.2%
Colon and rectal	0.3%	0.3%	0.0%	0.3%	0.2%
General	3.2%	2.9%	4.9%	3.8%	1.5%
Neurological	0.4%	0.5%	0.1%	0.5%	0.2%
Ophthalmology	2.3%	2.3%	2.3%	2.6%	1.3%
Orthopedic	3.5%	3.5%	3.3%	4.3%	0.7%
Otolaryngology	1.2%	1.3%	0.8%	1.4%	0.6%
Plastic	0.6%	0.7%	0.0%	0.6%	0.3%
Thoracic	0.2%	0.3%	0.0%	0.3%	0.0%
Urological	1.0%	1.1%	0.7%	1.3%	0.2%
Vascular	0.2%	0.2%	0.1%	0.2%	0.1%
<b>Other Specialties</b>	<b>20.6%</b>	<b>22.1%</b>	<b>13.3%</b>	<b>21.5%</b>	<b>17.7%</b>
Anesthesiology	3.6%	4.1%	1.4%	4.0%	2.1%
Child Psychiatry	0.4%	0.5%	0.3%	0.4%	0.7%
Diagnostic Radiology	2.3%	2.4%	1.7%	2.6%	1.4%
Emergency Medicine	3.2%	3.3%	2.5%	3.4%	2.3%
Forensic Pathology	0.1%	0.1%	0.0%	0.1%	0.1%
General Preventative Medicine	0.1%	0.1%	0.0%	0.0%	0.1%
Neurology	2.4%	2.8%	0.4%	2.5%	1.9%
Nuclear Medicine	0.1%	0.1%	0.0%	0.1%	0.0%
Occupational Medicine	0.6%	0.7%	0.3%	0.7%	0.5%
Pathology	0.8%	0.9%	0.5%	0.7%	1.0%
Physical Medicine and Rehabilitation	1.0%	1.2%	0.1%	0.9%	1.3%
Psychiatry	4.1%	4.0%	4.6%	3.7%	5.1%
Public Health	0.0%	0.0%	0.1%	0.0%	0.0%
Radiology	1.5%	1.6%	1.2%	1.7%	0.9%
Radiation Oncology	0.5%	0.5%	0.3%	0.5%	0.2%
Other	3.9%	4.6%	1.4%	4.0%	5.9%
Unspecified/Unknown	13.0%	13.4%	10.7%	13.7%	9.9%

Source: Physician Survey, Health Service Personnel Survey, 2000.  
\* Important Note: These numbers reflect the specialties of the 92 percent of physicians who responded to the survey.

rural Minnesotans and 120 physicians for every 100,000 urban Minnesotans. As a result, primary care specialists practicing in rural regions must be able to

**Map 1: Physician to Population Distribution, 2000**

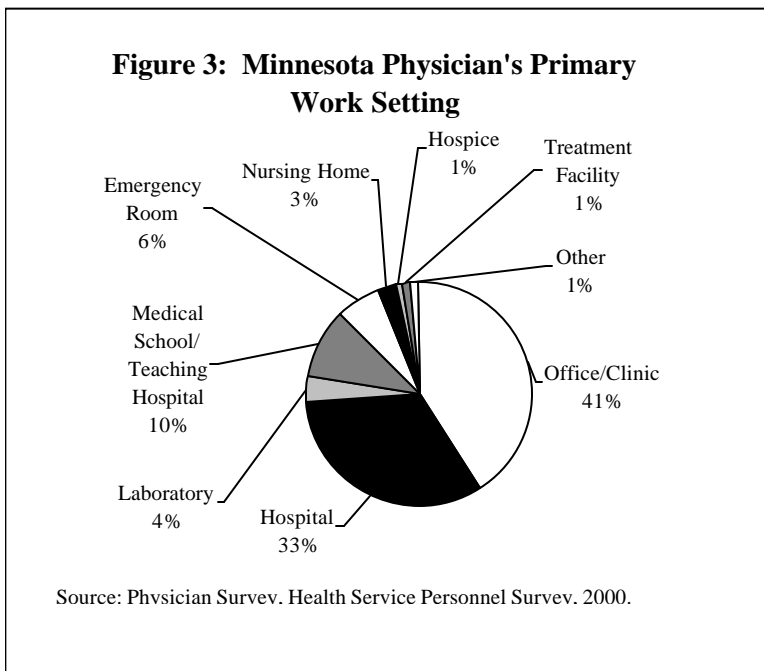


perform a wider variety of services. With fewer rural physicians, rural residents must often travel into the metro and urban regions of the state to receive their specialty, and in some cases, their primary care.

Of those physicians who are residents or in training, the two most common specialties are family practice (22.3 percent) and internal medicine (14 percent). Female residents are more likely to specialize in family practice specialties (30 percent) as compared to male residents (16 percent). The majority of residents (57.3 percent) indicated a non primary care specialty. This suggests that slightly fewer physicians are entering into primary care than in the past. This may be a response to the growth of managed care during the past decade, which has stressed the use fewer primary care physicians in patient care settings.<sup>16</sup>

### Work Setting

The majority of Minnesota physicians reported that they primarily work in either an office/clinic (41 percent) or hospital setting (33 percent). See Figure 3. Eight out of

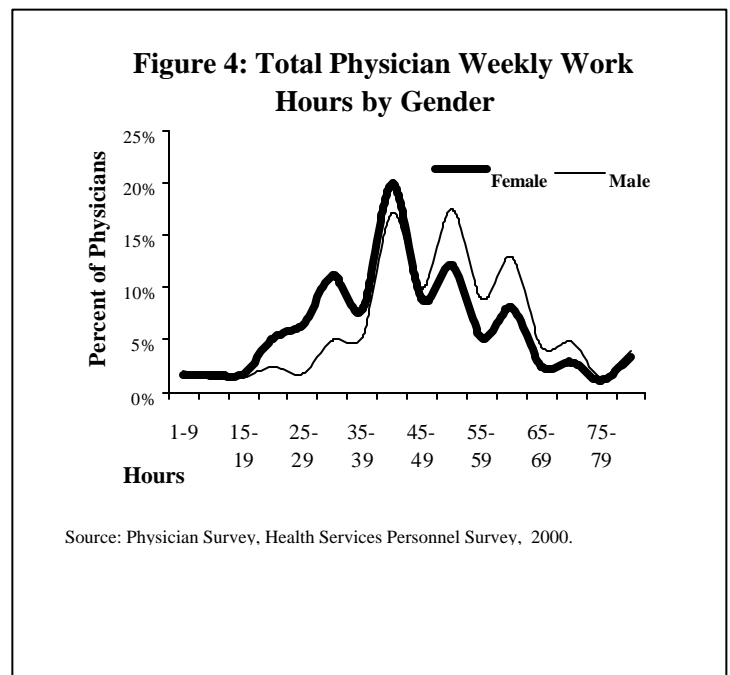


ten physicians work in urban areas. Over 40 percent of physicians work in more than one primary setting. Of those who work in more than one setting almost 90 percent indicated an office or clinic as either a primary or secondary work setting.

On average, Minnesota physicians work 47.9 hours per week. The number of hours worked each week by physicians has grown 11.6 percent from an average of 42.91 hours per week in 1995. Twenty four percent of physicians work more than 60 hours a week in Minnesota, compared to 33.3 percent nationally, and

roughly one out of five physicians in Minnesota works part-time, or less than 35 hours per week.<sup>17</sup>

There is a significant difference in the number of hours worked by males as compared to females. See Figure 4. Male physicians work an average of 49.3 hours and female physicians 43.8 hours per week. However, this difference is not unique to Minnesota. Nationally male physicians work an average of three more hours per week than their female counterparts.<sup>18</sup> The difference in work hours by gender is also visible by physician specialty. For example, male physicians with a family practice specialty work, on average, five more hours than female physicians with the same first specialty.



### Gender

Nationally, females made up 22.8 percent of the physician workforce in 1998. In the past two decades, the proportion of female physicians has grown steadily.<sup>19</sup> The same is also true for Minnesota with females accounting for 23.2 percent of the current workforce and 31.6 percent of current physician residents. The percent of female residents practicing in Minnesota is significantly larger than the percent of females in the current workforce, suggesting that the proportion of female physicians will continue to grow in Minnesota.

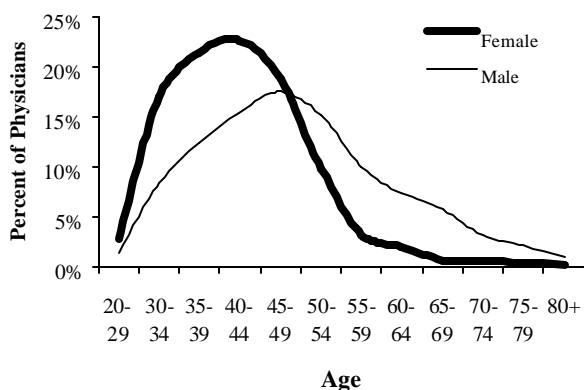
This growth will likely have a large impact on the physician workforce. As previously mentioned, female physicians on average work fewer hours per week than males. As the percentage of females in the workforce increases, the overall supply level may be insufficient to meet the level of care demanded by patients. This assumes, of course, that the hours worked by female physicians do not increase overtime. In addition, since

women have a stronger tendency to enter family practice and primary care the distribution of physicians by specialty may also change from its current composition. See Table 1.

### Age

During the past five years the average age of physicians in Minnesota has remained relatively constant at 46; however, the proportion of physicians older than 50 has grown by almost 7 percent. One quarter of physicians are older than 55, and will likely reach retirement age within the next ten years. When the age of female physicians is compared to male physicians there is a significant difference. The average age for females is 41.8 compared to 47.8 for males, reflecting the more recent influx in women into the profession. The average age for males is higher due to the high concentration of males in the 45 and older age category. Sixty two percent of male physicians are older than 45, compared with only 35 percent of females. See Figure 5.

**Figure 5: Age Distribution of Minnesota Physicians by Gender**



Source: Physician Survey. Health Service Personnel Survey. 2000.

On average physicians in rural areas are about one year older than their colleagues in the Twin Cities and other urban areas. See Table 2. One explanation for this difference may be the large percentage (96.5 percent) of medical residents in the Twin Cities metro area, as the majority (77.3 percent) of medical residents are under age 35. The difference is significant in three specific practice settings: hospital staff, hospital rounds, and the ER. The most significant of these three is in the ER, with an age difference of 4.63 years. Emergency rooms and hospitals in rural Minnesota will likely be the most affected by the aging workforce, as they will likely see a larger proportion of their physicians retire or scale back the number of hours they work.

## Summary and Conclusion

Findings from this profile suggest that the current shortage of physicians is more a matter of maldistribution than an actual shortage. However, how mild or severe the shortage is cannot be adequately gauged using the data currently available. Still, several of the factors described above — the aging of the workforce, declining graduation and enrollment rates, and the increase in female physicians — suggest that the shortage of providers may become more acute and widespread in the future.

Increasing the supply of physicians in the long run will likely require an increase in enrollment in the state’s three medical programs. While this solution seems simple, it presents two main problems. First, medical schools do not have the capacity or the funding to increase the size of their programs. The U of M has already had to cut medical school enrollment by 10 percent over the last six years due to budget issues.<sup>20</sup> Second, many students are deterred from the profession due to the high tuition costs. In 2001, annual tuition for a student enrolling in the University of Minnesota medical school averaged \$72,000 for Minnesota residents and \$130,000 for out-of-state residents. In addition, any changes that do occur in medical school enrollment will not have an immediate impact on the supply of physicians, due to the duration of medical education programs.

The current (and future) shortage is also exaggerated in the state due to the current distribution of physicians. To alleviate this, financial incentives, such as loan repayment and scholarships, may need to be created or enhanced to both encourage students to practice medicine in the state and work in practice sites in regions of the state with the greatest needs, such as hospitals and emergency rooms in rural areas, medically underserved areas (MUA), and health professional shortage areas (HPSA).

**For more information about this profile, please contact Michael Grover by phone at (651) 282-5642 or email at [michael.grover@health.state.mn.us](mailto:michael.grover@health.state.mn.us)**

This information will be made available in alternative format -- large print, Braille, or audiotope -- upon request. Available on the Web at: [www.health.state.mn.us/divs/chs/workforce.htm](http://www.health.state.mn.us/divs/chs/workforce.htm)

## Health Service Personnel Survey and Database

In 1993, the Minnesota Legislature mandated regular surveys of the state's health care providers on a variety of issues. To meet this challenge, the Health Services Personnel Survey and Database Program was created within the Office of Rural Health and Primary Care at the Minnesota Department of Health. The Office maintains a database of about 110,000 Minnesota medical professionals. Although these health practitioners do not have to complete the surveys to renew licensure or registration, response rates vary between 60 percent and 90 percent depending on the position surveyed.

### Which professions are surveyed?

- Physicians
- Registered Nurses
- Licensed Practical Nurses
- Dentists
- Dental Hygienists
- Dental Assistants
- Physical Therapists
- Physician Assistants
- Respiratory Care Practitioners
- Chiropractors
- Pharmacists

### What information do the surveys gather?

- Professional activity
- Work hours
- Practice location
- Practice setting
- Practice specialty
- Educational background
- Job tenure
- Practitioner age and gender

For more information about the survey and database, please contact:

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## Notes

<sup>1</sup> "Physicians," *Occupational Outlook Handbook. 2000-01*, Bureau of Labor Statistics, 2000.

<sup>2</sup> Minnesota Employment Outlook by Industry, MDES, November 2000.

<sup>3</sup> American Medical Association, *Median Unadjusted Net Income Among Non-Federal Physicians*, June 1999.

<sup>4</sup> The consumer price index was used to measure inflation growth., Annual Average, CPI (U), Bureau of Labor Statistics, and 1990 and 1999 Salary Surveys, MDES.

<sup>5</sup> Health Resources and Services Administration, *State Health Workforce Profile: Minnesota*, December 2000.

<sup>6</sup> Minnesota Employment Outlook by Industry, MDES, November 2000.

<sup>7</sup> Minnesota Department of Health, Office of Rural Health and Primary Care, and Minnesota Center for Rural Health, *Minnesota Physician, Advanced Practice Nursing, Physician Assistant and Pharmacy Demand Assessment*, 1999.

<sup>8</sup> Minnesota Medical Foundation, University of Minnesota, *Tally by State; 1990 alumni (md) not lost/not dead*, September 2000.

<sup>9</sup> Associate of American Medical Colleges, *Geographic listing of Medical Schools*, 1995-2000.

<sup>10</sup> University of Minnesota Medical School, *Structure of the Program*, <http://mdphd.med.umn.edu/structure.html>, accessed July 2001.

<sup>11</sup> Data for 1998 to the present, at least for the Mayo Medical School, were not available. Data for the University of Minnesota for that period shows a continued drop in the number of graduates: 247 in 1998, 243 in 1999, 236 in 2000 and 233 in 2001.

<sup>12</sup> The region includes: Minnesota, Wisconsin, Illinois, Indiana, Michigan, and Ohio.

<sup>13</sup> HRSA, *State Health Workforce Profiles: Minnesota*, December 2000.

<sup>14</sup> Minnesota Planning, *1999 State of Minnesota Population Estimates*.

<sup>15</sup> This is in line with the Council on Graduate Medical Education's recommendations of 42 percent generalist and 58 percent specialists. COGME, *Summary of Eight Report: Patient Care Physician supply and Requirements*, November 1996.

<sup>16</sup> COGME, *Summary of Sixth Report: Managed Health Care: Implications for the Physician Workforce and Medical Education*, September 1995.

<sup>17</sup> "Physicians," *Occupational Outlook Handbook. 2000-01*, Bureau of Labor Statistics, 2000.

<sup>18</sup> BLS Monthly Labor Review: The Editor's Desk, *Physician's work the longest weeks*, December 23, 1998.

<sup>19</sup> American Medical Association, *Women in Medicine Data Source*, April 2001.

<sup>20</sup> University of Minnesota, *Prescription for Good Health*, March 2001.

