

Options for Increasing the Supply of Primary Care Physicians in Rural Minnesota

Prepared by:

**Ira Moscovice, Ph.D., Professor and Director
Michelle Casey, M.S., Senior Research Fellow
Rural Health Research Center
Division of Health Policy and Management
School of Public Health
University of Minnesota**

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INTRODUCTION

This report was prepared in response to a request from Frank Cerra, M.D., Senior Vice President of the Academic Health Center at the University of Minnesota. Dr. Cerra asked us to examine whether an increase was needed in the supply of primary care physicians practicing in rural Minnesota and, if so, to present options for increasing the number of physicians who choose rural primary care practice.

We focused on three main research questions:

- Is there a current or impending primary care physician shortage in rural Minnesota?
- What roles do the University of Minnesota and other key stakeholders play in producing primary care physicians to practice in rural Minnesota?
- What actions can the University of Minnesota, the Minnesota Legislature and other key stakeholders take to ensure an adequate supply of primary care physicians to meet the health care needs of the entire state population?

The report is organized around responses to these three questions. The next section presents information on national and Minnesota trends in physician supply and distribution and describes research on factors that affect physicians' choice of primary care practice and rural practice locations. The third section addresses the role of the University of Minnesota medical school in producing primary care physicians who practice in rural areas, while the fourth focuses on Minnesota residency programs. The fifth and sixth sections address financial factors related to primary care practice and federal and state support for medical education. The final section presents options for increasing the supply of primary care physicians in rural Minnesota.

In preparing the report, we used several sources of information. We reviewed the recent literature on medical education, primary care and rural practice in peer-reviewed health care journals. We obtained national and comparative state data from published reports and websites of national organizations such as the Association of American Medical Colleges and the American Academy of Family Physicians, and from contacts with physician workforce experts and state programs in selected states. References for these sources are listed at the end of the report. Data on physician supply and medical education in Minnesota came from reports and personal contacts with the Minnesota Department of Health, the University of Minnesota medical schools in Duluth and the Twin Cities, and residency programs. We conducted interviews with several individuals at key organizations in the Twin Cities and Duluth to obtain their perspectives on the three main research questions addressed in the report (see Appendix A for a list of interviewees).

There are multiple definitions of primary care. Most definitions of primary care include family medicine, general internal medicine and general pediatrics, but some primary

care definitions also include obstetrics and gynecology or other specialties such as geriatrics. For this report, we used available data on primary care and noted differences in the primary care definitions used by each data source.

Multiple federal and state definitions of rural areas also exist, including county-based and census tract-based definitions that take into account population density and other factors such as proximity to an urban area, economic dependency, and commuting patterns. Minnesota covers a large geographic area and includes diverse rural areas ranging from thinly populated frontier counties to micropolitan counties with population centers of 10,000 or more. Definitions that take into account the diversity of rural areas are more useful for analyzing healthcare workforce issues than simply dividing the state into the Twin Cities metropolitan area and Greater Minnesota, or into metropolitan areas and non-metropolitan areas. For this report, we used available data and noted differences in the rural definitions used by each data source.

PHYSICIAN SUPPLY AND DISTRIBUTION

To address the question of whether there is a current or impending primary care physician shortage in rural Minnesota, we examined national and Minnesota data on trends on physician supply and distribution and the research literature on factors affecting physicians' choice of primary care practice and rural practice.

National Trends in Physician Supply and Distribution

- Several national trends suggest that the US faces a physician shortage in the near future. On the demand side, the population is growing rapidly; and the largest growth is in the population over age 65, which consumes the greatest amount of health care resources. On the supply side, medical school enrollment has been virtually flat for the last 25 years; one-third of active physicians are over 55 years old and likely to retire by 2020; and the newest generation of physicians is unlikely to work the same long hours as prior generations (Salsberg and Grover, 2006).
- An increasing proportion of physicians are pursuing sub-specialty training, while the number in primary care specialties has leveled off after peaking in the mid 1990s. The US primary care medical workforce of the future will include more women, international medical graduates and osteopathic physicians (Brotherton, Rockey and Etzel, 2005).
- Migration is another factor affecting physician distribution. Between 1981 and 2003, 13% of actively practicing primary care physicians moved from one region of the country to another. The Midwest region had the highest outflow, with 18% of the workforce moving out of the region (Vanasse et al., 2007)

Potential Factors Influencing Selection of Primary Care and Rural Practice

- Multiple studies have assessed the importance of pre-medical school, medical school, and residency factors associated with physicians' selection of primary care specialties and decisions to begin and continue practicing in rural areas. The factors examined include medical student demographics, such as rural upbringing, gender, age, and socioeconomic status; characteristics of medical schools and residencies, such as rural mission, location, and length and type of primary care and rural training experiences; and financial factors such as level of indebtedness, compensation, and incentives such as loan repayment.
- Based on their analysis of 21 studies about factors influencing recruitment and retention of rural physicians, Brooks et al. (2002) concluded that rural upbringing and an expressed desire to become a family physician have consistently been found to be positively associated with practice in a rural community, and that the experiences students have in medical school and especially in residency training have a significant impact on their decisions to practice in rural areas. Senf et al. (2003) reviewed 36 articles related to choice of family medicine, and concluded that students who have a rural background, believe primary care is important, have lower income expectations, and plan a career in a disadvantaged or rural area are more likely to choose family medicine.
- Wheat et al. (2005) developed a "rural commitment index" representing the degree to which a medical school has developed programs to address rural issues, such as special rural admissions considerations and rural training experiences. They found that increased commitment to rural programs and policies is significantly related to a higher percentage of graduates who practice rural primary care.
- Using data from the AAMC 1996-2003 Medical School Graduation Questionnaires, Dorsey et al. (2005) found that the change in preference for controllable lifestyle specialties accounted for a large proportion of the variability in specialty choices for both women and men from 1996-2003. Using data from surveys of fourth-year medical students from two medical schools in 1998 to 2004, Newton et al (2005) found significant differences between specialties in the relative contribution of lifestyle and income. Students' perceptions of specialties existed on a continuum of lifestyle friendly (e.g., radiology) to lifestyle unfriendly (e.g., obstetrics-gynecology). Contrary to previous reports, the students' responses indicate they perceived the primary care specialties as lifestyle intermediate compared to other specialties.

Recommendations of National Organizations Regarding Physician Supply and Medical Education

- The Association of American Medical Colleges (AAMC) has recommended a 30% increase over the 2002 level in enrollment in Liaison Committee on Medical

Education (LCME) accredited medical schools and expansion in the aggregate number of graduate medical education positions to accommodate additional graduates from accredited medical schools (AAMC, 2006).

- The US Council on Graduate Medical Education (COGME) has recommended an increase of 3,000 medical school graduates by 2015 to meet rising demand and need (COGME, 2005).
- The American Academy of Family Physicians has concluded that medical school expansion without consideration of physician distribution will likely perpetuate the concentration of physicians in urban areas and near major medical centers. It recommends policies supporting preference for rural-born applicants to medical schools, rural training tracks in medical schools and residencies, financial support for rural physicians, and increased awareness of federal bonus payments for underserved areas (Hyer et al., 2007).

Minnesota Physician Supply and Distribution

- AAMC (2007) reported that Minnesota ranked 14th in the physician to population rate among the 50 states in 2006, with 255 actively practicing physicians per 100,000 population, and 10th in the number of active primary care physicians¹ per 100,000 population.
- However, according to Minnesota Department of Health (MDH) data, excluding the Twin Cities counties and Olmsted County, the remaining Minnesota counties have only 131 physicians per 100,000 people. Olmsted County, home of the Mayo Clinic, has more than 1,300 physicians per 100,000 people, but many Mayo physicians serve patients from a broader region, the nation and the world (MDH, 2005a).
- The 46 most rural counties in Minnesota have a smaller share of the state's physicians than their share of the population, compared to the 21 counties in metropolitan areas and the 20 micropolitan counties (rural counties with a population center of 10,000 or more) (Table 1).
- Rural Minnesota physicians are more likely to be primary care physicians, and in particular, family physicians, than urban physicians. Statewide, an estimated 47% of physicians report a primary care² specialty as their first specialty. Over three-fourths (77%) of physicians in the 46 most rural counties report a primary care specialty, compared to 57% of physicians in micropolitan counties and 44% of physicians in metropolitan counties (MDH, 2006).

¹Defined as family medicine, general practice, geriatric medicine, internal medicine, internal medicine/pediatrics, pediatrics or adolescent medicine.

²Defined as family medicine, general internal medicine, pediatrics, or obstetrics and gynecology.

- Minnesota ranks 50th among the states in the percent of active physicians who are age 60 and older (18% compared to a median of 22% for all 50 states) (AAMC, 2007).
- Nearly one in five (19%) actively practicing Minnesota physicians expect to quit practicing within 5 years, including 30% of physicians aged 55 to 64 and 70% of those aged 65 and older. The median age of physicians is slightly higher in the 46 most rural Minnesota counties (49.4) than in metropolitan (48.3) or micropolitan (48.8) counties (MDH, 2005b).
- In 2007, 91 health care employers in Greater Minnesota³ reported that they had 168 physician vacancies and were recruiting 284 physicians (MDH, 2007a). Primary care⁴ accounted for 56% of the physician vacancies and positions being recruited. The overall vacancy rate for primary care physicians was 9.4%. Among specialties with at least 50 positions (currently practicing physicians plus vacancies), estimated vacancy rates were highest for psychiatry (17%); orthopedic surgery, general internal medicine, and emergency medicine (13% each); hematology (12%); OB/GYN (10%) and family medicine (9%).
- In interviews conducted for this report, opinions varied about the extent to which Minnesota is currently experiencing an overall shortage of primary care physicians. However, interviewees agreed that many rural areas of the state have an insufficient supply of physicians, and that this situation is likely to worsen absent additional efforts to expand the supply of physicians willing to practice in rural areas. The greatest need is for primary care physicians, but there are also shortages in some specialties, including psychiatry and other mental health professionals.
- Interviewees confirmed that national trends affecting physician supply and demand are also affecting Minnesota. These include:
 - Changing lifestyle expectations for physicians (e.g., reluctance to work full-time and a desire for balance between work and personal lives, resulting in the need to recruit more than one physician to replace each retiring physician).
 - More internists are specializing, leaving family medicine as the specialty providing much of adult primary care.
 - Some hospitals are increasing use of hospitalists to ease call burden on physicians.

³Defined as the 80 counties outside of the old Twin Cities metropolitan area (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington counties). 52% of surveyed employers responded; the Mayo Clinic is not included in these data.

⁴Defined as family medicine, general internal medicine, pediatrics, or obstetrics and gynecology.

- Interviewees identified several factors that could influence the number of primary care physicians that will be needed in Minnesota in the near future, including:
 - The extent to which a team approach to patient care can be implemented (e.g., physicians working with other health care professionals such as nurse practitioners who are responsible for patient education).
 - The extent to which older physicians can be encouraged to delay retiring (e.g., by implementing alternatives for on-call coverage).

Summary Points

- Minnesota’s overall supply of primary care physicians is comparable to or better than many other states, but many rural areas in the state are experiencing physician shortages. The need for primary care physicians is expected to increase in the near future because of national trends that also are affecting rural and urban areas in Minnesota.
- Research has identified pre-medical school, medical school, residency and practice factors that are associated with physicians’ selection of primary care specialties and decisions to begin and continue practicing in rural areas.

THE UNIVERSITY OF MINNESOTA’S ROLE IN PRODUCING PRIMARY CARE PHYSICIANS TO PRACTICE IN RURAL MINNESOTA

To examine the role of the University of Minnesota in producing primary care physicians to practice in rural Minnesota, we examined data on medical school admissions at the Twin Cities and Duluth campuses, clinical experiences during medical school, and medical students’ residency choices.

Medical School Admissions

- From 2002-2006, total class size at the University of Minnesota Medical School (including students who started at the Twin Cities campus and those who spent their first two years at the Duluth campus) was consistently in the range of 218-221 students. In 2007, the Twin Cities campus entering class increased significantly to 183 students as a result of a higher than expected enrollment rate among accepted applicants (Table 2).
- Minnesota ranks 29th among the states in the number of students enrolled in medical schools⁵ per 100,000 population in 2007 (22 compared to a median of 26 for the 45 states with medical schools) and 21st among the states in the

⁵Includes students at the Mayo Medical School, which has a 2007 class of 43 students, 11 of whom are Minnesota residents, as well as at the University of Minnesota Medical School.

number of students enrolled in *public* medical schools per 100,000 population (AAMC, 2007).

- Minnesota ranks 31st among the 45 states with medical schools in the percent of first year medical students who matriculated to a medical school in their legal state of residence in 2006 (59% compared to a median among states of 67%) (AAMC, 2007).
- The medical school admission processes in the Twin Cities and Duluth are separate. The selection criteria at both campuses require medical students to be academically qualified to complete the medical school curriculum and to demonstrate past experience and commitment of service to others through volunteer or community service activity; a strong motivation for a career in medicine, excellent interpersonal and communication skills, maturity, and compassion; and the skills and talents necessary to develop mastery of the foundations of a medical education. In addition, the Twin Cities admissions criteria include contributing to the diversity of the medical student body and/or demonstrating a commitment to serving the health needs of a diverse society, and the Duluth criteria include demonstrating a strong motivation for a career in rural family practice or other primary care specialty in a rural area.
- The Early Admission Rural Health Scholars is a new pilot program for students enrolled in the College of Science and Engineering at UMD. Five students per year will be selected as juniors. They will receive a bachelor's degree and a medical degree in 7 years. Applicants must be Minnesota residents, have spent a significant amount of time in a small community and be motivated to practice in rural Minnesota or Native American communities.
- Minnesota state residency is a medical school admission preference, but not a requirement. Over the past six years, the percent of Minnesota residents among medical student entering classes has ranged from 67% to 82% in the Twin Cities and from 87% to 98% in Duluth (Table 2).
- The University of Minnesota medical school has one of the highest in-state tuition costs of any public medical school in the country (AHC, 2006).
- Through MED 2010, the medical school began offering a flexible M.D. program in which students entering in 2005 have the option of finishing medical school in as few as three and a half and as many as six years.

Clinical Experiences during Medical School

- University of Minnesota Medical school clerkships for 3rd and 4th year medical students are offered at Twin Cities and Duluth sites and through the Rural Physician Associate Program (RPAP), a 36 week elective program for 3rd year medical students. RPAP and Duluth site options include both required and

elective clerkships. Some required rotations are only offered in the Twin Cities (e.g., Medicine II and Psych rotations).

- RPAP began at the University of Minnesota Medical School in 1971. Through the program, 30 to 40 students are placed each year in Minnesota communities with community physician preceptors. A total of 1,127 medical students have completed RPAP in 110 communities ranging in size from 1,000 to 30,000.
 - Of 892 RPAP participants who have completed medical school and residency and are in practice, 575 are practicing in Minnesota locations. Of these, 361 (63%) are in rural communities⁶ and 214 (37%) are in urban or suburban Minnesota locations. Of the 361 physicians in rural Minnesota communities, 89% are in primary care and 82% in family medicine (Halaas, 2007).
 - 30% of the 892 RPAP participants currently in practice spent the first two years of medical school in Duluth and 70% began medical school on the Twin Cities campus.
- The 163 students who spent the first two years of medical school in Duluth and graduated from the University of Minnesota Medical School in the Twin Cities in 2005-2007 had the following clinical experiences during medical school:
 - 40% of students had clinical rotations in Duluth and Twin Cities sites
 - 30% participated in RPAP and clinical rotations in Duluth and Twin Cities
 - 23% of students had clinical rotations in Twin Cities sites only
 - 7% participated in RPAP and clinical rotations in Twin Cities
- The Minnesota Area Health Education Center (AHEC) was established in 2002. It is a collaboration of the University of Minnesota Academic Health Center's six health professions schools, and works in partnership with communities around the state. Regional AHECs have been set up in Northeast, Southern, Central and Northwest Minnesota. AHEC activities include creating and coordinating programs such as preceptor resources, stipends and housing identification for health professions students completing experiential education rotations in rural Minnesota and development of statewide interprofessional education sites.

Medical Students' Residency Choices

- Compared to all other Liaison Committee on Medical Education (LCME) accredited medical schools, the University of Minnesota ranks very highly on the number and percent of medical school graduates who chose family medicine

⁶Defined initially as communities with less than 50,000 population. More recently, Twin Cities suburbs were excluded and RPAP began using the Ranally city rating system, which classifies cities based on their economic function.

residencies. In 2006, it ranked 2nd out of 125 medical schools in the number of graduates choosing family medicine and 8th in the percent of graduates choosing family medicine (Pugno et al, 2007).

- Over the last five years, 47% of University of Minnesota medical school graduates matched with a primary care residency,⁷ including 62% of students who spend their first two years on the Duluth campus and 42% of those who began in the Twin Cities (Table 3).
- However, the number and percent of University of Minnesota medical school graduates entering primary care residencies has decreased over the last five years from 101 graduates (49%) in 2003 to 97 (43%) in 2007. The number and percent of graduates entering residencies in family practice, internal medicine and pediatrics all trended downward over this time period. Medicine/pediatrics graduates increased from 3 to 10, but account for a relatively small proportion of the overall primary care numbers.
- Among graduates who started medical school on the Twin Cities campus, the number entering primary care residencies was relatively stable (70 to 68) from 2003 to 2007. However, the percent entering primary care residencies decreased from 45% to 40% as class size increased during this time period. The number of students who spent their first two years of medical school on the Duluth campus and enter primary care residencies was relatively stable from 2003 to 2007 (31 to 29). Reflecting the Duluth campus' focus on primary care, the percent of students who spend their first two years there and enter primary care residencies has been consistently high, but decreased to 55% in 2007.
- In 2005-2007, 51% of graduating University of Minnesota medical students matched with a residency located in Minnesota (Table 4). The Minnesota residency programs with the highest numbers of University of Minnesota medical school graduates were located at the University of Minnesota Medical School, Hennepin County Medical Center and the Mayo Graduate School of Medicine.

Summary Points

- Minnesota has a lower medical student to population ratio than 28 other states with medical schools, and more state residents attending medical school out of state than 2/3 of the states with medical schools.
- The University of Minnesota Medical School produces more family physicians than most other medical schools. The Medical School in Duluth and the Rural Physician Associate Program are nationally renowned for nurturing medical students' interests in rural primary care practice.

⁷ Defined as a residency in family practice, internal medicine, pediatrics, or medicine/pediatrics.

- Over the last five years, 47% of University of Minnesota medical school graduates matched with a primary care residency. However, following national trends, the number and percent of University of Minnesota medical school graduates entering primary care residencies has decreased over the last five years.
- From 2005-2007, almost half of University of Minnesota medical school graduates went to out of state residencies.

MINNESOTA RESIDENCY PROGRAMS

To examine the role of Minnesota residency programs in producing primary care physicians to practice in rural Minnesota, we examined state rankings on the number of residency positions, and data on primary care residency applications, matches, and post-residency practice plans for residency graduates.

State Rankings on Residency Positions

- Minnesota ranks 12th among the 50 states in the total number of residents and fellows in Accreditation Council for Graduate Medical Educations (ACGME) accredited residencies and fellowships per 100,000 population (41 compared to a state median of 27) (AAMC, 2007).
- Minnesota ranks 41st among the 50 states in the percent change from 1997-2006 in the number of residents and fellows in ACGME accredited residencies and fellowships (2% compared to a state median of 8%) (AAMC, 2007).

Residency Positions, Applications and Matches

- Table 5 lists the sponsoring institution, approved ACGME positions, and participating institutions and rotations for the 11 Family Medicine, four Internal Medicine, two Pediatrics and one combined Medicine/Pediatrics residency programs in Minnesota.
- Seven Family Medicine residency programs are affiliated with the University of Minnesota Medical School: University of Minnesota Fairview Medical Center/Smiley Clinic, North Memorial, St. Cloud, St. Joseph, St. John's, Methodist, and Mankato. The other four Family Medicine programs are the Hennepin County Medical Center, Mayo, Duluth Graduate Medical Education Council, and Allina/United Family Medicine programs. Internal Medicine residency programs are at Abbott-Northwestern Hospital, Mayo, Hennepin County Medical Center, and the University of Minnesota; the two Pediatrics residency programs are at Mayo and the University of Minnesota, and the combined Medicine/Pediatrics residency program is at the University of Minnesota.

- From 2001 through 2005, the University of Minnesota Department of Family Medicine residencies had between 285 and 370 applications per year, with 41 to 43 residents enrolled (Table 6). In the same time frame, the Department of Pediatrics had between 226 and 286 applications and 22 to 23 residents enrolled per year. Between 29% and 61% of Pediatrics residents were from Minnesota; data on the percent of residents from Minnesota was not available for Family Practice residents.
- From 2003 to 2007, the number of Family Practice residency positions offered in Minnesota ranged from 71 to 94 (Table 7). The rate of residents matching to these positions in the National Resident Match Program (NRMP) varied by site. One site closed during this time period, and a few others reduced or added positions. In 2007, 72 of the 78 positions offered (92%) were filled in the NRMP and an additional 5 positions (6%) were filled in the scramble for unmatched residents and positions.

Post-Residency Practice Locations for Graduates of Minnesota Residencies

- 107 primary care⁸ medical residents completing Minnesota residencies in 2005 responded to an MDH survey about their future plans. Fifty-six respondents planned to go directly into clinical practice. Of these, 68% planned to locate in Minnesota. Among those with jobs (n = 40), 25% had positions in major cities; 43% in suburban locations; and 33% in small cities and rural areas (Unpublished data from MDH).
- Previous MDH surveys of graduating primary care and non-primary care medical residents in 2001-2003 found that important predictors of remaining in Minnesota to practice included: 1) graduating from a Minnesota high school; 2) graduating from a Minnesota medical school; and 3) completing a primary care residency (75% vs. 41% for non-primary care residencies) (MDH, 2005c).
- Data were available on post-residency initial practice locations for graduates of the Duluth Graduate Medical Council and University of Minnesota family practice residency programs (Mankato, Methodist, North Memorial, St. John's, St. Joseph's, Smiley's/UMMC, and the joint Family Practice/Psychiatry residency) from 2001 through 2006 (Table 8).
 - During this time, 204 (76%) of 267 residents graduating from these University of Minnesota family practice residencies had initial practice locations in Minnesota (range 67% to 92%). During the same time period, 31 (58%) of the 53 residents who graduated from the Duluth residency program stayed in Minnesota to practice.

⁸Defined as family practice, general internal medicine, general pediatrics, and medicine/pediatrics.

- Using county-based rural/urban definitions, the residency programs with the largest number of graduates going to rural practice in Minnesota are: Duluth (15 graduates, 29% of all graduates); Mankato (14 graduates, 52%), Methodist (9 graduates, 25%), and North Memorial (9 graduates, 16%). Using a broader rural definition that includes smaller communities in metropolitan counties that have rural characteristics, the trends are similar, with the same four programs having the highest percent of all residency graduates going to initial rural practices in Minnesota.
- From 2003-2007, 31 (66%) of University of Minnesota Medicine/Pediatrics combined residency program graduates stayed in Minnesota to practice primary care; 6 (13%) entered primary care practice outside of Minnesota; and 10 (21%) entered subspecialty fellowships (Table 9).

Retention of Medical Students and Residents

- Minnesota ranks 8th among the 50 states both in the percent of all actively practicing physicians who are actively practicing in the state from which they graduated from medical school and in the percent of all actively practicing physicians who are actively practicing in the state from which they graduated from a *public* medical school. Among all actively practicing physicians in the US who graduated from a medical school in Minnesota, 53% are actively practicing in Minnesota as of 2007 (compared to a median of 40% among states). Among all actively practicing physicians in the US who graduated from a *public* medical school in Minnesota, 53% are actively practicing in Minnesota as of 2007 (compared to a median of 45% among states) (AAMC, 2007).
- Minnesota ranks 31st among the 50 states in the percent of all actively practicing physicians in the US who are actively practicing in the state where they completed graduate medical education (GME). Among all actively practicing physicians in the US who completed GME in Minnesota, 43% are actively practicing in Minnesota, compared to a median among states of 45% (AAMC, 2007).
- Minnesota ranks 18th among the 50 states in the percent of all actively practicing physicians who graduated from a medical school in the state, completed GME in the state, and are actively practicing in the state (72% compared to a state median of 67%) (AAMC, 2007).

Summary Points

- Minnesota does better than many other states in retaining physicians who graduate from medical school here, but not as well retaining physicians who complete GME here.

- From 2001 through 2006, 76% of graduates from University of Minnesota family practice residency programs and 58% of Duluth Graduate Medical Council graduates chose initial practice sites in Minnesota. The Mankato, Duluth, Methodist, and North Memorial residency programs had the largest number of graduates choosing an initial practice site in rural Minnesota.

FINANCIAL FACTORS RELATED TO PRIMARY CARE PRACTICE

To help assess the role of financial factors related to practice decisions, we reviewed data on compensation for primary care physicians, physician indebtedness and loan repayment programs.

Physician Compensation

- Nationally, salaries for primary care physicians are significantly lower than for many specialty physicians. The American Medical Group Association Compensation Survey Data Report (2007) reported the following median salaries for primary care physicians nationally: Family Medicine \$185,740, Family Medicine with Obstetrics \$190,649, Pediatrics \$185,913 and General Internal Medicine \$193,162. Median salaries for non-primary care specialties were much higher; for example, Anesthesiology \$344,691; Specialty Cardiology \$389,243 - \$435,000; Gastroenterology \$356,388; Ophthalmology \$295,510; Orthopedic Surgery \$436,481; and Diagnostic Radiology \$414,875-\$471,976.
- The AAFP Practice Profile Survey (2006) reported national median salaries of \$144,000 for urban family physicians and \$150,000 for rural family physicians. The median salary for a family physician in the West North Central Census Division, which includes Minnesota, was \$170,000.
- Interviewees for this report described \$130,000 to \$170,000 as starting salaries for primary care physicians in Minnesota, with systems offering large signing bonuses as well.

Physician Indebtedness

- Using data from the AAMC 2002 Medical School Graduation Questionnaire, Rosenblatt and Andrilla (2005) examined the relationship between graduating medical students' level of educational debt and intention to enter primary care, controlling for students' demographic characteristics. They found an inverse relationship between the level of debt and intention to enter primary care. However, the effect was modest when demographic characteristics such as gender and race were taken into consideration.

- In a 2005 national survey of physicians completing family practice residencies, respondents reported a median debt of \$163,000; 44% had a debt of \$175,000 or more (AAFP, 2006).
- In surveys of medical residents completing Minnesota residencies in 2001-2003, respondents completing primary care (defined as family practice, internal medicine, pediatrics and Medicine/Pediatrics) and non-primary care residencies reported similar levels of debt (\$94,900 and \$89,100), but non-primary care respondents were more likely to be debt-free (34.6%) than primary care respondents (18.1%). International Medical Graduates (IMGs) reported significantly lower debt than U.S. medical school graduates (MDH, 2005).
- Including pre-medical and medical school debt, the average indebtedness for all University of Minnesota Medical School graduates in 2007 was \$141,691, compared to the national average of \$137,437. Five percent of University of Minnesota graduates had no debt; 81% had more than \$100,000 in debt (Table 12).

Loan Repayment Programs

- Pathman et al. (2004) studied all 69 state programs providing financial support to medical students, residents and practicing physicians in exchange for a period of service in underserved areas. Compared to non-obligated physicians, physicians serving obligations to state programs practiced in needier areas, cared for more Medicaid and uninsured patients, and remained longer in their practices. Service completion rates were uniformly high for loan repayment, direct incentive, and resident support programs.
- Minnesota has a federal/state funded loan repayment program for primary care physicians willing to practice in a federally designated Health Professional Shortage Area. Up to \$20,000 per year in loan repayment funds per physician per year are available. The majority of physician participants in recent years (7 of 8 since Fiscal Year 2003) have been at urban practice sites in the Twin Cities and Duluth. (See Appendix B for additional information.)
- Minnesota also has a state funded loan repayment program for primary care physicians willing to practice primary care⁹ in designated rural areas.¹⁰ As of 2007, up to approximately \$17,000 in loan repayment funds per physician per year are available. Four to seven physicians per year are usually funded. In FY 2004-2008, a total of 30 physicians qualified to receive loan repayment. In a survey of physicians who received loan forgiveness between 1999 and 2006, 88% reported that the program was important to very important in influencing

⁹Defined as family practice, pediatrics, internal medicine, obstetrics/ gynecology or psychiatry.

¹⁰Outside Hennepin, Ramsey, Anoka, Carver, Dakota, Scott, Washington counties and the cities of Duluth, Mankato, Moorhead, Rochester, and St. Cloud.

their decision to practice in a rural area, and 61% continued medical practice at their placement site for three or more years following completion of their service obligation (MDH, 2007b) (See Appendix C for additional information.)

- Interviewees for this project expressed a need for greater awareness about the availability of loan repayment programs and questioned whether the amount is sufficient to influence practice decisions.

Summary Points

- Salaries for primary care physicians are significantly lower than for many specialty physicians.
- On average, University of Minnesota Medical School graduates have a higher amount of debt than medical school graduates nationally (\$141,691, compared to the national average of \$137,437 in 2007).
- National research has found uniformly high service completion rates for state physician loan repayment programs; participants cared for more Medicaid and uninsured patients, and remained longer in their practices than non-participating physicians.
- Minnesota has loan repayment programs for rural physicians, but a limited number of slots are available each year. The majority of Minnesota physicians who have received state loan repayment funds report that the program was important to very important in influencing their decision to practice in a rural area,

FEDERAL AND STATE SUPPORT FOR MEDICAL EDUCATION

- Medicare pays each teaching hospital a portion of a hospital-specific capitated amount based on the hospital's DGME costs in FY 1984 or 1985. Hospitals receive slightly higher payments for residents training in primary care specialties¹¹ and slightly lower amounts for residents in subspecialties. After the period required for initial board certification in the first specialty of training (not to exceed 5 years), Medicare pays only 50% of its share of the per resident amount. Medicare limits the number of residents it supports, based on the number of FTE residents in approved training programs, before application of the 50% weighting factor, based on the hospital's most recent costs report ending on or before December 31, 1996. Hospitals are allowed to count the time residents spend in settings outside the hospital, such as freestanding clinics, subject to certain agreed-upon conditions (AAMC, 2007).

¹¹ Defined as family medicine, general internal medicine, geriatric medicine, general pediatrics, preventive medicine, osteopathic general practice and obstetrics/gynecology.

- In Minnesota, the Medical Education and Research Costs (MERC) fund was established in 1996 to compensate hospitals and clinics for a portion of costs of clinical training. Funding applications are submitted by sponsoring organizations, which are obligated to forward the grants on to the clinics or hospitals where their students' or residents' training was provided. Nine provider types are eligible for grants, including medical students and residents. In 2006, MERC grants totaling \$64.5 million were distributed to 22 sponsoring institutions representing 171 training programs and 586 training sites. Medical residents accounted for 61% of FTEs and 75% of the grant distribution and medical students for another 7.7% of grant funds.
- MERC funding has shifted several times since the program was established. It is currently funded by cigarette taxes, a carveout of medical education funds from the Prepaid Medical Assistance Program/Prepaid General Assistance Medical Care program, and federal Medicaid matching funds obtained by the Minnesota Department of Human Services. From 2004 to 2007, the formula for distribution of MERC funds was based on 67% of relative teaching costs at each facility and 33% on relative public program volume at each facility. New legislation in 2007 changed the distribution formula which begins in 2008. The new formula will be based 100% on relative public program volume at each facility after \$5.35 million is distributed directly to the following sites: \$1.475 million to the University of Minnesota Medical Center – Fairview, \$2.075 million to the University of Minnesota Dental School, and \$1.8 million to the Academic Health Center. Sites with 0.98% relative public program volume or higher will receive a supplemental grant of 20% on top of their original grant. The costs of the supplemental grants are borne by those with less than 0.98% relative public program volume.

Summary Points

- Medicare gives hospitals slightly higher payments for residents training in primary care specialties than other specialties, but capped the number of residency slots it funds in the 1997 Balanced Budget Act, effectively halting growth in residency positions.
- The MERC fund has received acclaim as a “model state GME financing initiative” (COGME, 2004). A significant portion of MERC funds go to medical residency training.

OPTIONS FOR INCREASING THE SUPPLY OF PRIMARY CARE PHYSICIANS IN RURAL MINNESOTA

Our synthesis of available data and literature suggests that the overall supply of primary care physicians in Minnesota compares favorably to most other states in the U.S. Several of our AHC educational training programs (e.g. the Medical School in Duluth and the RPAP program) are viewed nationally as outstanding educational models that

promote rural physician primary care practice. Nonetheless, many rural areas in Minnesota currently have primary care physician shortages. In addition, future demographic and health professions education trends indicate the likelihood of an impending shortage of primary care physicians in Minnesota overall and particularly in rural portions of the state.

Given the land grant mission of the University of Minnesota, the AHC is clearly a key stakeholder in the above issue but it cannot address this issue by itself. It needs strategic partnerships with the state legislature, health systems, and others who share the responsibility for assuring access to primary care services for the citizens of our state.

Potential options for increasing the supply of primary care physicians in rural Minnesota include:

- **Increase the number of University of Minnesota medical school students who are likely to select primary care practice in a rural Minnesota location.**

Many medical schools in the U.S. are considering an increase in their class size in response to the environmental trends described earlier. Most experts agree that simply increasing the class size is not likely to affect the geographic or specialty distribution of physicians. A substantial portion of any increase in the University of Minnesota Medical School class size should be allocated to the UMD program and/or to the Twin Cities program with admissions criteria giving preference to state residents with a rural Minnesota background and interests in primary care.

- **Expand opportunities for rural experiences during medical school, including RPAP and rural rotations.**

Previous studies have shown the importance of the length and type of primary care and rural training experiences on physicians' selection of a primary care specialty and rural practice. RPAP has been identified as an exemplary model in this regard. Financial support from the state legislature and AHC should be increased to improve the incentives for preceptors and students to participate in RPAP as well as other rural community-based clinical placements. Per the recent AHC Task Force Report on Health Professional Workforce, strategies need to be developed to assure campus-based faculty and community-based preceptors are rewarded for participating in community-based partnerships. New models (e.g. sites for training medical students without residents, distance learning) should also be examined. For example, community mental health centers likely are better sites for mental health training for physicians than hospital psychiatric wards. The Minnesota AHEC is an important resource for supporting the expansion of rural training experiences during medical school.

- **Expand the number of family medicine residency slots in Minnesota and create incentives for University of Minnesota Medical School graduates to apply to them.**

The literature indicates that training in rural areas results in more physicians going to rural areas to practice. However, nationally rural family residency programs have lower match rates than urban programs. With the cap on Medicare payments for residencies, it will be necessary to target additional state funds and/or MERC funds for rural primary care residencies. Decisions on the specific residency program that should be expanded will depend on several factors including program match rates, retention of graduates in Minnesota, proportion of graduates who go to rural areas to practice, and the capacity of sites to expand.

- **Apply for a grant from the federal Health Resources and Services Administration to plan and implement alternative models for rural primary care residency training programs (e.g. Rural Training Tracks where residents spend their first year in traditional block format rotations in an urban area, traveling to the RTT site once or twice a week, with most second and third year rotations in the RTT site).**

Nationally, RTTs have been successful in producing graduates who practice in rural communities but the match rates for RTTs are lower than for urban-based programs. Our border state Wisconsin has developed several RTTs but it has a different geography than Minnesota. The new Wisconsin Academy for Rural Medicine (WARM) program in Wisconsin is using large communities (e.g. Marshfield, La Crosse, Green Bay) in conjunction with rural rotations. HRSA is a potential funding source to support the planning and development of alternatives to traditional primary care residency training programs.

- **Expand funding for state loan forgiveness for rural primary care practice.**

State loan repayment programs have been shown to positively affect the recruitment and retention of rural primary care physicians. Minnesota has several loan repayment programs for rural physicians, but few slots are available each year due to the limited availability of funds and statutory requirements that give the Commissioner of Health the authority to allocate funds from the overall appropriation to specific professions. Expansion of the state loan forgiveness program for rural primary care physicians will require additional funding support from the state legislature and a change in the statute to allow the additional funds to be targeted to rural primary care physicians.

- **The AHC should develop strategic regional partnerships with health care systems and health plans to address the primary care needs of rural Minnesotans.**

Health care systems in the Twin Cities (e.g. Allina and Fairview) and Duluth (e.g. SMDC and St. Luke's) and Rochester (e.g. Mayo) have strong interest in participating in the effort to meet the primary care needs of Minnesotans. They need to be strategic partners with the AHC in a range of activities, including developing rural primary care preceptors and residency sites; developing alternative primary care training program models; and developing and testing new care delivery models using a team-based approach and the expanded use of nurse practitioners, physician assistants, and clinical pharmacists. The AHC should engage interested partners in discussions about how to cooperatively develop and implement strategic regional partnerships to address the primary care needs of the rural population in our state. One option for obtaining funding to initiate these activities is to develop a grant proposal for a local foundation(s) (e.g. Bush, Blandin or McKnight Foundation).

If our state wants to be a leader in meeting the primary care needs of rural communities, the time for action by key stakeholders is now. The above list of options for increasing the supply of primary care physicians in rural Minnesota is not necessarily a complete list but rather is a starting point to stimulate discussion on this issue. No matter which options are pursued in the effort to improve access to primary care in rural Minnesota, it is clear we need to develop a uniform information system that tracks individuals through medical school, residency, and post-residency practice. This will allow us to better understand the short-term and long-term factors related to entering and staying in primary care practice in rural Minnesota.

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Table 1. Minnesota Physician Supply and Distribution

	Population	% Population	% Physicians
Statewide	5,145,106	100.0%	100.0%
Metropolitan counties	3,732,499	72.5%	85.0%
Micropolitan counties	752,857	14.6%	10.1%
Rural non-core counties	659,750	12.8%	4.9%

Source: Minnesota Department of Health, Minnesota Physicians Facts and Data 2006

Table 2. University of Minnesota Medical School Admission Statistics, 2002-2007

	2007	2006	2005	2004	2003	2002
Twin Cities Campus						
Applicants	3,093	2,528	2,285	2,166	1,987	1,645
Enrolled	183	165	165	165	165	166
% from MN	82%	79%	72%	77%	67%	78%
Duluth Campus						
Applicants	1,330	1281	954	625	458	647
Enrolled	58	56	55	53	53	55
% from MN	91%	89%	93%	92%	98%	87%

Source: University of Minnesota Twin Cities and Duluth Medical Schools

Table 3. University of Minnesota Medical School Primary Care Residency Matches by Specialty, 2003-2007

	2007	2006	2005	2004	2003	Total 2003-2007
All U of M Medical Students	225 students	225 students	223 students	208 students	205 students	1,086 students
Family Practice	39 (17.3%)	35 (15.6%)	40 (17.9%)	44 (21.2%)	47 (22.9%)	205 (18.9%)
Internal Medicine	35 (15.6%)	40 (17.8%)	50 (22.4%)	33 (15.9%)	35 (17.1%)	193 (17.8%)
Pediatrics	13 (5.8%)	19 (8.4%)	14 (6.3%)	18 (8.7%)	16 (7.8%)	80 (7.4%)
Med/Peds	10 (4.4%)	9 (4.0%)	5 (2.2%)	6 (2.9%)	3 (1.5%)	33 (3.0%)
Primary care total	97 (43.1%)	103 (45.8%)	109 (48.8%)	101 (48.7%)	101 (49.3%)	511 (47.1%)
1st 2 years on Duluth Campus	53 students	53 students	57 students	46 students	50 students	259 students
Family Practice	18 (34.0%)	19 (35.8%)	24 (42.1%)	23 (50.0%)	18 (36.0%)	102 (39.4%)
Internal Medicine	8 (15.1%)	10 (18.9%)	10 (17.5%)	3 (6.5%)	5 (10.0%)	36 (13.9%)
Pediatrics	2 (3.8%)	4 (7.5%)	1 (1.8%)	2 (4.3%)	7 (14.0%)	16 (6.2%)
Med/Peds	1 (1.9%)	1 (1.9%)	2 (3.5%)	1 (2.2%)	1 (2.0%)	6 (2.3%)
Primary care total	29 (54.8%)	34 (64.1%)	37 (64.9%)	29 (63.0%)	31 (62.0%)	160 (61.8%)
Started in Twin Cities	172 students	172 students	166 students	162 students	155 students	827 students
Family Practice	21 (12.2%)	16 (9.3%)	16 (9.6%)	21 (13.0%)	29 (18.7%)	103 (12.5%)
Internal Medicine	27 (15.7%)	30 (17.4%)	40 (24.1%)	30 (18.5%)	30 (19.4%)	157 (19.0%)
Pediatrics	11 (6.4%)	15 (8.7%)	13 (7.8%)	16 (9.9%)	9 (5.8%)	64 (7.7%)
Med/Peds	9 (5.2%)	8 (4.7%)	3 (1.8%)	5 (3.1%)	2 (1.3%)	27 (3.3%)
Primary care total	68 (39.5%)	69 (40.1%)	72 (43.4%)	72 (44.4%)	70 (45.2%)	351 (42.4%)

Source: University of Minnesota Twin Cities Medical School

Table 4. University of Minnesota Medical Student Residency Matches by Residency Program, 2005-2007

	2007	2006	2005	Total 2005-2007
Residency Program				
University of Minnesota Medical School	50	46	45	141
Hennepin County Medical Center	11	18	19	48
Mayo Graduate School of Medicine	15	15	14	44
Abbott Northwestern Hospital	7	7	7	21
University of Minnesota/North Memorial	4	3	5	12
Duluth Grad Med Ed Council	8	7	7	22
Regions/Health Partners	1	5	2	9
University of Minnesota/St. John's	6	5	5	16
University of Minnesota/Methodist	4	5	5	14
University of Minnesota/Smiley's	1	0	2	3
Allina Family Residency Program	4	5	4	13
University of Minnesota/St. Cloud	1	0	0	1
University of Minnesota/St. Joseph's	1	0	0	1
Ramsey Family & Community	0	0	0	0
Minnesota total	113	116	115	344
Out of state total	104	100	101	305
Deferring residency	8	9	7	24
Total	225	225	223	673

Source: University of Minnesota Twin Cities Medical School

Table 5. Family Medicine, Internal Medicine, Pediatrics and Medicine/Pediatrics Residency Programs in Minnesota

Specialty	Sponsoring Institution	Approved ACGME Positions	Participating Institutions and Rotations
Family Medicine	University of Minnesota Medical Center Program	18	University of Minnesota Medical Center – Fairview; Methodist Hospital; Children's Hospitals and Clinics, Minneapolis
	University of Minnesota/Mankato Program	15	Immanuel St Joseph's-Mayo Health System; Madelia Community Hospital; Methodist Hospital; Children's Hospitals and Clinics, Minneapolis
	University of Minnesota/St. Cloud Program	12	CentraCare Clinic (River Campus), St. Cloud Hospital, Fairview Northland Regional Healthcare, Monticello-Big Lake Community Hospital, St. Cloud Orthopedic Associates, Neurology Clinic of St. Cloud, Central Minnesota Surgeons, St. Cloud Ear, Nose and Throat -Head-Neck Clinic, HealthPartners Central Minnesota Clinics, St. Cloud Medical Group
	University of Minnesota/HealthEast St. Joseph's Hospital Program	24	HealthEast St Joseph's Hospital, Children's Hospitals and Clinics, St Paul and Minneapolis; HealthEast Woodwinds Hospital; HealthEast St John's Hospital
	University of Minnesota/Methodist Hospital Program	18	Methodist Hospital, Hennepin County Medical Center; Children's Hospitals and Clinics, Minneapolis
	University of Minnesota/North Memorial Health Care Program	30	North Memorial Health Care; Children's Hospitals and Clinics, Minneapolis
	University of Minnesota/St. John's Hospital Program	18	HealthEast St John's Hospital; Hennepin County Medical Center; Children's Hospitals and Clinics, St. Paul
	Hennepin County Medical Center	36	Hennepin County Medical Center, Minneapolis
	College of Medicine, Mayo Clinic	24	Mayo Clinic; St. Mary's Hospital, Rochester; Rochester Methodist Hospital; Albert Lea Medical; Austin Medical; Wabasha Clinic; Owatonna Clinic
	Duluth Graduate Medical Education Council	30	St. Luke's Hospital, Duluth; St. Mary's Medical Center, Duluth
	Allina - United Family Medicine Residency Program	18	Children's Hospitals and Clinics, St. Paul; United Hospital; Unity Hospital; Mercy Hospital
Internal Medicine	University of Minnesota Medical School	81	Regions Hospital; University of Minnesota Medical Center –Fairview; Veterans Affairs Medical Center, Minneapolis
	Abbott-Northwestern Hospital/Allina Health System	30	Abbott-Northwestern Hospital/Allina Health System
	Mayo	169	Mayo Clinic, St. Mary's Hospital, Rochester; Rochester Methodist Hospital
	Hennepin County Medical Center	60	Hennepin County Medical Center
Pediatrics	University of Minnesota Medical School	70	University of Minnesota Medical Center-Fairview, Children's Hospitals and Clinics, St. Paul and Minneapolis; Hennepin County Medical Center; Gillette Children's Hospital
	Mayo	30	Mayo Clinic; St. Mary's Hospital, Rochester; Rochester Methodist Hospital
Medicine/Pediatrics	University of Minnesota Medical School	48*	University of Minnesota Medical Center -Fairview; Regions Hospital; Hennepin County Medical Center; Children's Hospitals and Clinics, St Paul and Minneapolis; Veterans Affairs Medical Center, Minneapolis; Gillette Children's Hospital, St. Paul

Source: ACGME. Accredited Program Search. Available at: <http://www.acgme.org/adspublic/default.asp>. *Medicine/Pediatrics is a 4 year residency.

Table 6. University of Minnesota Family Medicine & Community Health and Pediatrics Residency Applications and Enrollment, 2003-2007

Year	Family Medicine & Community Health			Pediatrics		
	Applicants	Enrolled	% from MN	Applicants	Enrolled	% from MN
2005	370	42	Not avail.	285	23	35%
2004	350	41	Not avail.	280	23	61%
2003	324	42	Not avail.	226	22	29%
2002	285	43	Not avail.	226	23	44%
2001	324	43	Not avail.	286	23	48%

Source: University of Minnesota Workforce Taskforce, Workforce Data for the School of Medicine.

Table 7. Minnesota Family Practice Residency Positions Offered and Filled in National Resident Matching Program, 2003-2007

Residency Program	2007			2006			2005			2004		2003		Percent of Total Positions Filled in Match 2003 – 2007
	O	M	S	O	M	S	O	M	S	O	M	O	M	
Hennepin County Medical Center	10	10		8	3		12	9	3	12	6	12	4	59.3%
Mayo	8	8		8	8		8	8		8	8	7	7	100.0%
North Memorial	10	10		10	7	3	10	10		10	10	10	10	94.0%
Duluth	10	9	1	10	10		10	10		10	9	12	11	94.2%
Regions/Health Partners	Closed			Closed			3	0	3	10	3	7	5	40.0%
St. John's	6	6		5	5		5	5		6	6	6	6	100.0%
Methodist	6	6		5	5		6	6		6	6	6	6	100.0%
Smiley's Clinic	6	5	1	6	1	5	9	2	4	9	5	10	8	51.2%
Allina	6	6		6	6		6	6		6	6	5	5	100.0%
St. Cloud	5	5		4	4		4	4		4	4	4	4	100.0%
St. Joseph's	6	6		6	5	1	8	8		8	5	7	7	88.6%
Mankato	5	1	3	3	0	1	6	6*		5	1	3	0	36.4%
Total	78	72	5	71	54	10	87	77	10	94	69	89	73	82.3%

Source: University of Minnesota Department of Family Medicine & Community Health

O = Offered; M = Filled in match; S = Filled in Scramble

*4 filled in DO (doctor of osteopathy) match

Table 8. Post-Residency Initial Practice Locations for Graduates of Duluth Graduate Medical Council and University of Minnesota Family Practice Residencies, 2001- 2006

Residency Program	Total graduates	Number and percent of all graduates with initial practice location in Minnesota ¹	Number and percent of all graduates with initial practice locations in rural and urban Minnesota							
			Using county-based metropolitan, micropolitan and non-core Census definitions ²					Using broader rural definition ³		
			Urban Metropolitan	Rural			Not known	Urban/Suburban	Rural	Not known
				All rural	Micro-politan	Non-core				
Duluth GMC	53	31 (58%)	16 (30%)	15 (29%)	4 (8%)	11 (21%)	0 (0%)	11 (21%)	20 (38%)	0 (0%)
UofM FP Residencies										
FP/Psychiatry	7	6 (86%)	3 (43%)	2 (29%)	0 (0%)	2 (29%)	1 (14%)	3 (43%)	2 (29%)	1(14%)
Mankato	27	18 (67%)	4 (15%)	14 (52%)	4 (15%)	10 (37%)	0 (0%)	2 (7%)	16 (59%)	0 (0%)
Methodist	36	33 (92%)	24 (67%)	9 (25%)	5 (14%)	4 (11%)	0 (0%)	20 (55%)	13 (36%)	0 (0%)
North Memorial	56	40 (71%)	31 (55%)	9 (16%)	4 (7%)	5 (9%)	0 (0%)	25(45%)	15 (27%)	0 (0%)
St. Joseph's	46	31 (67%)	25 (54%)	1 (2%)	1(2%)	0 (0%)	5 (11%)	24 (52%)	2 (4%)	5 (11%)
St. John's	36	30 (83%)	26 (72%)	2 (6%)	2 (6%)	0 (0%)	2 (6%)	22 (61%)	6 (17%)	2 (6%)
UMMC/Smiley's	59	46 (78%)	46 (78%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	42 (71%)	4 (7%)	0 (0%)
Total U of M	267	204 (76%)	159 (60%)	37 (14%)	16 (6%)	21(8%)	8 (3%)	138 (52%)	58 (22%)	8 (3%)

Data sources: Duluth Graduate Medical Council; University of Minnesota Department of Family Medicine Oracle Database. Data was not available from the St. Cloud residency program.

¹Includes University of Minnesota FP residency graduates practicing in an academic setting (8), fellowships (3) and emergency care (7).

²As of 2003, Minnesota had 21 metropolitan counties (Anoka, Carver, Chisago, Dakota, Hennepin, Isanti, Ramsey, Scott, Sherburne, Washington, Wright, Benton, Carlton, Clay, Dodge, Houston, Olmsted, Polk, St. Louis, Stearns, Wabasha), 20 micropolitan counties (Goodhue, McLeod, Rice, Kandiyohi, Mower, Otter Tail, Wilkin, Winona, Beltrami, Blue Earth, Brown, Cass, Crow Wing, Douglas, Freeborn, Lyon, Martin, Nicollet, Nobles, and Steele) and 46 rural non-core counties. Some counties were reclassified in 2003. Graduates for 2001-2002 were classified based on the county status prior to reclassification; graduates for 2003 and later were classified using the new classifications.

³Rural includes micropolitan and non-core counties, and communities in Chisago, Isanti, and Wright counties; Sherburne and Stearns counties outside of St. Cloud; Carlton and St. Louis counties outside of the Duluth area.

Table 9. Post Residency Plans for Graduates of University of Minnesota Internal Medicine and Medicine/Pediatrics Combined Residencies, 2003-2007

Internal Medicine				
Year	Total Residents	Primary Care in MN	Primary Care Not in MN	Subspecialty Fellow
2007	23	7	1	15
2006	27	9	3	15
2005	25	11	3	11
2004	29	12	4	13
2003	25	10	2	13
Total	129	49 (38%)	13 (10%)	67 (52%)
Medicine/Pediatrics				
2007	7	5	2	0
2006	9	4	2	3
2005	9	7	1	1
2004	11	8	0	3
2003	11	7	1	3
Total	47	31 (66%)	6 (13%)	10 (21%)

Source: University of Minnesota Medical School.

Table 10. Level of Indebtedness for 2007 Graduates from the University of Minnesota Medical School and All US Medical Schools

Debt Level	University of Minnesota Medical School	All US Medical Schools
No debt	4.8%	12.0%
\$1 to 24,999	4.0%	3.2%
\$25,000 to \$49,999	3.2%	5.2%
\$50,000 to \$74,999	0.8%	6.2%
\$75,000 to \$99,999	6.5%	7.1%
\$100,000 to \$124,999	12.9%	13.5%
\$125,000 to \$149,999	18.5%	11.8%
\$150,000 to \$174,999	23.4%	16.4%
\$175,000 to \$199,999	16.1%	9.4%
\$200,000 or more	9.7%	15.2%

Source: 2007 AAMC Graduation Questionnaire data, available at the University of Minnesota Medical website at <http://www.meded.umn.edu/financial/debt.php>

Appendix A

The following individuals were interviewed for the report:

Macaran Baird, MD, MS, Professor and Head, Department of Family Practice and Community Health, University of Minnesota Medical School – Twin Cities

Barbara Brandt, PhD, Assistant Vice President for Education and Director of AHEC, Academic Health Center, University of Minnesota

Frank Cerra, MD, Senior Vice President, Academic Health Center, University of Minnesota

Ray Christensen, MD, Associate Dean, University of Minnesota Medical School, Duluth

Gary Davis, PhD, Senior Associate Dean, University of Minnesota Medical School, Duluth

Tom Day, MD, Director, Family Practice Residency Program, University of Minnesota Medical School, Duluth

Gwen Halaas, MD, MBA, Director, Center for Interprofessional Education, Academic Health Center, University of Minnesota

Peter Person, MD, CEO, St. Mary's Duluth Clinic/Essentia Health

Deborah Powell, MD, Dean, University of Minnesota Medical School – Twin Cities

Jonathan Ravdin, MD, Professor and Head, Internal Medicine Department, University of Minnesota Medical School – Twin Cities

John Strange, President and CEO, St. Luke's Clinic, Duluth

Paul White, JD, Director of Admissions, University of Minnesota Medical School – Twin Cities

The following individuals provided additional information for the report:

Jim Boulger, University of Minnesota Medical School, Duluth

John Coombs, MD, Professor and Vice Dean, University of Washington Medical School

Jay Fonkert, Office of Rural Health and Primary Care, Minnesota Department of Health

Kevin Grumbach, MD, Professor and Chair, UCSF Department of Family and Community Medicine

Deb Jahnke, Office of Rural Health and Primary Care, Minnesota Department of Health

Laura Pham, Admissions/Recruitment Coordinator, Dept. of Family Medicine and Community Health Residency Programs, University of Minnesota Medical School, Twin Cities

Howard Rabinowitz, MD, Garber Professor of Family Medicine, Jefferson Medical College

Tom Ricketts, PhD, Professor, School of Public Health, University of North Carolina

Roger Rosenblatt, MD, Professor and Vice Chair, Department of Family Medicine, University of Washington

Diane Rydrych, Division of Health Policy, Minnesota Department of Health

Mark Schoenbaum, Director, Office of Rural Health and Primary Care, Minnesota Department of Health

Tim Size, Executive Director, Rural Wisconsin Health Cooperative

Appendix B.

Additional Rural Models for Rural Experiences in Medical School and Residency

Wisconsin Academy for Rural Medicine

- The University of Wisconsin Medical School is creating a new medical degree program, the Wisconsin Academy for Rural Medicine (WARM), aimed at addressing shortage of physicians in rural areas of the state. The program will have a rural emphasis from the admissions process through residency placement. It will differ from other rural focused programs by including other specialties beyond family medicine. Almost all student clinical experiences in years 3 and 4 will take place in rural training sites sponsored by the Marshfield Clinic, Gundersen Lutheran – LaCrosse and Aurora Bay Care – Green Bay. The program will increase the size of the medical school class by 25, beginning with five students in 2007, and increasing by five students per year over five years (University of Wisconsin Medical School, undated memo).

Rural Training Tracks and Residencies in Rural Areas

- As of 2000, 30 medical residencies in 15 states had rural training tracks (RTTs), where residents spend 1 year in an urban location followed by 2 years in a rural setting. In a national study, Rosenthal et al. (2000) found that 76% of RTT graduates practice in rural communities. However, the small size of these programs means their capacity for training residents is limited and some programs have a difficult time filling positions. Malaty and Pathman (2002) conducted a national study of National Resident Match Program (NRMP) match rates among family practice residencies with RTTs. The RTTs had lower mean match rates than other family practice residencies (50% vs. 76% in 2001). Geographic and community characteristics appeared to influence the match rate, whereas characteristics of programs and their faculty did not.
- Rosenblatt et al. (2006) examined the NRMP performance of 33 family medicine residency programs located in rural areas and a comparison group of urban-based programs in the same states in 2002-2004. Rural programs had lower match rates than their urban counterparts (a three year average of 60.1% vs. 72.5%).

Appendix C.

Physician Loan Repayment Programs in Minnesota and Other States

Minnesota currently has two loan repayment programs for which rural primary care physicians may qualify: 1) the Minnesota Rural Physician Loan Forgiveness Programs, which are two of several health professional education loan programs funded entirely by state dollars and 2) the Minnesota State Loan Repayment Program, which is jointly funded by the federal National Health Service Corps and the state.

To qualify for the Minnesota Rural Physician Loan Forgiveness Program, a physician must be practicing family practice, pediatrics, internal medicine, obstetrics/ gynecology or psychiatry in a designated rural area (outside Hennepin, Ramsey, Anoka, Carver, Dakota, Scott, Washington counties and the cities of Duluth, Mankato, Moorhead, Rochester, and St. Cloud). The Commissioner of Health distributes available funds annually from the health professional education loan fund proportionally among eligible professions (which include nurses, dentists, physician assistants, nurse practitioners, and pharmacists in addition to physicians) according to the vacancy rates for each profession.

Participants must practice at the approved site for a minimum of three years and up to a maximum of four years, and can receive annual disbursements equivalent to 15% of the average educational debt for indebted graduates in their profession, not to exceed the balance of their own qualifying educational loans. As of 2007, up to approximately \$17,000 per physician per year will be available. Four to seven physicians per year are usually funded. In FY 2004-2008, a total of 30 physicians qualified to receive loan repayment (along with 19 dentists, 37 faculty, 20 midlevel practitioners, 66 nurses, and 26 pharmacists) (Unpublished data from MDH, 2007).

To qualify for the Minnesota State Loan Repayment Program, a physician must practice in a federally designated Health Professional Shortage Area (HPSA). Up to \$20,000 per year is available for a 2 year commitment, with an option for extension. Since the start of the SLRP in FY 1994, a total of 26 physicians have participated, including 24 family physicians. Fifteen practice sites were rural and 11 urban. As of 2006, one physician still had a service obligation; three did not stay in their sites beyond their obligation; and the remaining 22 physicians had remained in their sites beyond their obligation. Since Fiscal Year 2003, seven of the eight physician participants have been at urban practice sites in the Twin Cities and Duluth (Unpublished data from MDH, 2007).

- The New York State Regents Physician Loan Forgiveness Program provides awards to physicians who agree to practice primary care in a state designated shortage area. Award recipients receive up to \$10,000 each year for two years, and may reapply for an additional two-year award. In 2007, New York State plans to award loan forgiveness to approximately 80 physicians.
- The North Carolina State Loan Repayment Program pays \$70,000 for a four year commitment (plus a stipend to help offset increased tax liability).

- The Ohio Physician State Loan Repayment Program pays up to \$20,000 per year for up to four years for family practice, internal medicine, pediatrics, OB/GYN physicians and psychiatrists who practice in designated Health Professional Shortage Areas in the state.
- The Oregon State Loan Repayment Program pays 20% of qualifying loan principal (up to five years) for physicians who practice at least 3 years in a medically underserved rural area in the state.
- The Montana Rural Physician Incentive Program provides physicians who serve in medically underserved areas of rural Montana repayment funds toward educational loans. It pays up to \$45,000 over a one to five year period of service in six month increments: 6 and 12 months/\$3,500; 18 and 24 months/\$4,000; 30 and 36 months/\$4,500; 42 and 48 months/\$5,000; 54 and 60 months/\$5,500.
- The Vermont Freeman Educational Loan Repayment for Physicians program pays up to \$20,000 per year for primary care and specialty physicians who practice in an underserved area; one year of service is required for each annual grant.
- The Osteopathic Physician Recruitment Program in Iowa pays up to \$50,000 from a state grant and arranges for up to \$50,000 from the employing agency for osteopathic physicians who work in a town in Iowa with a population of 10,000 or under.
- The South Dakota Physician Tuition Reimbursement Program provides an amount double the total amount of tuition charged students at the University of South Dakota medical school for the 4 most recently completed years (approximately \$80,000) for a family physician who practices at least three years in an eligible community with a population of 10,000 or under determined to need a family physician.