Incentives and Physician Specialty Choice:
A Case Study of Florida's Program in Medical Sciences (PIMS)*

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ABSTRACT

The growing shortage of primary care physicians in medically underserved areas of the nation led medical schools and policymakers years ago to design and fund numerous innovative medical education programs to foster the development of a more balanced physician workforce. Florida's Program in Medical Sciences (PIMS) was an example of one such program that was established in the fall of 1971 at Florida State University (FSU). A precursor of the present-day FSU College of Medicine, this program was specifically created to address the growing need for primary care physicians in rural areas of Northwest Florida. The results of the empirical tests on the career choices of PIMS graduates in the first twenty years provide weak evidence that the program was more effective than the existing channels of medical education in producing additional primary care physicians to rural Florida counties.

Introduction

The persistent shortage of primary care physicians in medically underserved areas of the nation has become one of the most challenging health care policy issues facing medical educators and health care policymakers. Medically underserved areas are defined, among other characteristics, by a perceived shortage of physicians and other medical care providers. Most such areas are rural, but some are also found in parts of cities and urban districts. Both financial and personal incentives combine to create a modern-day physician workforce oversupplied with specialists and too concentrated in metropolitan and suburban markets (Schroeder 1985; Isaacs et al 1996). The other side of this skewed distribution of physician location and services is a real shortage of basic health care services for certain groups of the U.S. population, particularly in rural areas (COGME 1998; Goodman 2004).

Initially, medical schools accepted little responsibility for the growing "surplus of specialists." To be sure, there were a few innovative medical programs, such as the Rochester Medical School, that addressed the need for more generalists, but their impact was not enough to reverse the imbalances (Colwill 2004). More serious reforms were undertaken only after the shortage of primary care specialists was deemed critical in several key states. Faced with legislative mandates for change, medical schools began to experiment with curriculum design and admission policies to favor, preferentially, applicants with promise of commitment to primary care (Verby 1991). Grants from foundations such as the Robert Wood Johnson Foundation sought to enact major changes in programs at the Dartmouth Medical School and others (Brooks et al 1999). In some

instances, these policy-driven changes appeared to alleviate successfully some shortages of primary care physicians at the local level; in many others, they did little to solve a growing problem (Schroeder 1992). A recent volume shows very mixed policy results and suggests that the issues underlying the supply of primary care physicians are more complex than previously thought (Isaacs and Knickman 2004).

This paper examines the results achieved by the Program in Medical Sciences (PIMS), established in Florida in the early 1970's to address the physician manpower needs in medically underserved areas of the state. The discussion begins by addressing the trends in Florida of population demographics and physician manpower over the past thirty years and a description of PIMS. The sections that follow present an empirical analysis of twenty years of graduating cohorts and test whether the program in Florida has significantly affected these medical school graduates' choices of specialty or location. Results from our PIMS analysis are compared to three other similar community-based programs established in other states during to same time period. Finally, we conclude with a discussion of the possible economic and non-economic reasons for the disappointing results of this program.

Trends in Florida

Policy studies concerning physician workforce issues typically begin with an analysis of changes over time in physician supply and the corresponding population served (Salsberg and Forte 2002; Colwill and Cultice 2003). Aggregate changes in physicians per capita will reflect the impact of changes in other policies and demand (Weiner 2002). These changes in Florida, from 1975 to 2000, are summarized in Figure 1 and show that Florida has seen substantial increases in the number of licensed

physicians from 14,900 in 1975 to over 42,000 in 2002, a 190% change over a 27 year period. During the same period, however, rural counties experienced a 56% increase in the physician-population ratio (to an average of 63 physicians per 100,000 individuals) while urban counties fared much better with a 104.4% increase (to an average of 194 physicians per 100,000 individuals). The lack of improvement in physicians per capita is especially apparent in the Health Professions Shortage Areas (HPSAs) of Florida.[1]

Figure 1: Florida's Ratio of Physicians per 100,000 Population (1975-2001)

[Place Figure 1 here]

Source: Florida Statistical Abstract, 1975-2001 Editions.

Accompanying this growth in the physician-population ratio in Florida and nationwide has been a gradual decline in the number of licensed physicians choosing one of the "generalist" specialties, namely, family practice, internal medicine, pediatrics, obstetrics-gynecology, or emergency medicine. While the number of generalists in Florida's urban counties has grown steadily over the years (to 40% of their total physician population), Florida's rural counties have seen a steady decline in the number of generalists choosing to practice there. In 1987, some 358 generalists practiced in rural counties (72% of their total physician population). By 1993, only 205 generalists practiced in these same rural counties, a 43% decrease in generalist providers over those six years alone. This trend is of particular relevance due to the critical role that specialty choices play in determining ultimate practice locations. While 48% of Florida's licensed physicians chose a generalist specialty in 1975, only 38% of physicians continued to do

so in 2002. (AHCA 1985-1993, Kaiser 2002). Figure 2 shows the growth in the number of licensed physicians statewide for both generalists and specialty physicians.

Figure 2: Number of Florida Primary Care Physicians per 100,000 Population for Selected Years

[Place Figure 2 here]

Source: Agency for Health Care Administration. Florida Health Care Atlas, 1985-1993 Editions and Kaiser Health Facts online[2]

Florida ranks 11th in physicians per capita (AMA 2001c) and currently grants some 494 medical degrees each calendar year from one of five state universities offering graduate medical education programs. Nearly 90% of Florida's newly licensed physicians are "imported" from other states and approximately 38% are international medical graduates (MGT 1999). On average, only 42% of Florida medical school graduates continue their residency within the state. In addition, only 12-24% of the physicians practicing in one of Florida's metropolitan areas obtained their degree from a Florida medical school. The same can be said of Florida's rural counties, where some 12-30% of the physicians practicing therein obtained their degree from a Florida medical school (National Conference of State Legislatures 2001).

A further development to consider is role of managed care. As shown in Table 1, HMO growth was largely concentrated in urban Florida. We use data on hospital admissions insured by commercial HMOs as a basis for comparison between rural and urban areas.[3] Managed care growth fueled a strong urban demand for generalist physicians, the traditional gatekeepers in HMOs. New generalists appear to have a preference for locales with a high HMO presence due to the increased demand for their services as well as to the amenities that these areas provide (Escarce 1998). For example,

the city of Tallahassee has a large base of government workers and 42% of its population enrolled in HMO's while the city of Naples, a retirement community, has only 0.2% (The Orlando Sentinel 1996). These developments highlight the difficulties of recruiting primary care physicians to rural areas where, as the Miami Herald (1994) succinctly put it, there are "poorly equipped hospitals, dried up economies, and nothing much to keep highly educated professionals amused or challenged."

Table 1: Net Change in HMO Hospital Admissions for Urban and Rural Florida Counties

Years	Urban Counties	Rural Counties
1989 – 1993	178,370	2109
1994 – 1998	270,975	3903
1999 – 2002	53,588	727

Of Florida's 67 counties, 34 are classified as urban markets for health care. These markets attract specialists due to complementarities in demands for adequate technology, referral practitioners, and an adequate population base for requisite patient volume. Generalist practices, especially family practice, are distinctive in that they require less complementary inputs and can in principle distribute themselves evenly throughout the population. Hence, many programs designed to address access to physician care in underserved areas focused on efforts to recruit, educate, and retain family practitioners (COGME 1998).

PIMS Program in Florida

The focus of the current study is on the Program in Medical Sciences (PIMS). Funded by the state from 1971 to 2000, PIMS had the sole mission of enhancing the provision of physician services in rural, underserved areas of Northwest Florida. PIMS was one of a handful of programs established amid mounting concerns over the growing

shortage of health care providers willing to relocate and practice in rural, underserved areas throughout the nation. This program utilized a community-based model for training medical providers. It was affiliated with the University of Florida's College of Medicine in Gainesville and designed to admit 30 students each calendar year.

The applicant pool of students consisted of individuals committed to rural or primary care medicine but who may have faced obstacles to admission to medical school through the normal channels. These students begin their medical education at the FSU campus in Tallahassee then transfer into the 2nd year class at the University of Florida, and go on to complete their medical studies and earn their medical degree. The students selected by the program were described as "*nontraditional, from financial and/or educationally disadvantaged backgrounds, or were a member of a minority group not currently well represented in the physician workforce*." The term "nontraditional' applied to those students over 25 years of age who would normally find admission to traditional medical schools difficult due to their age and the presence of established careers and/or families. Other special features of this program included a 12-month curriculum (in contrast to the 9 month 1st year program of traditional medical schools) as well as an early focus on clinical experiences in a community environment (i.e., physician's offices, rural health clinics, etc.).[4]

Data

For this study, the names of PIMS program graduates were obtained for the calendar years 1972-1992 from The Florida State University database provided by the FSU Foundation. Similarly, names of University of Florida medical school graduates were obtained for the calendar years 1975-1995 so that comparisons could be made

between the two respective groups: those who went through PIMS their first year (the treatment group) versus those who obtained their medical education solely at the University of Florida campus (the control group). The PIMS students, on average, represented approximately one-fourth of the total pool of graduates from UF for any given year.

Relevant information on physicians practicing instate was obtained primarily from public access databases such as the one run by the Florida Department of Health. The Department's website and database, via its physician profiling search form, provided key data concerning the specialty choices, post-graduate training, and practicing locations of currently licensed Florida physicians.[5] Although this data provided limited biographical data (i.e., sex of provider and date of birth), additional sources, such as the American Medical Association (AMA) website were used to fill in the gaps on the instate providers.[6]

Data on physicians who chose to practice out-of-state was obtained from several sources. Directories of physicians published by AMA (2001a and 2001b) were utilized in determining the current location of these Florida educated providers. Once their practice location was determined, *The Official ABMS Directory of Board Certified Medical Specialists 2001* and the AMA website provided relevant data concerning the date of birth, dates and locations of postgraduate education, and board certifications obtained by these out-of-state practicing physicians.

Originally, data for 2,314 individuals were obtained from the University of Florida foundation and identified as medical school graduates from the time period 1975-1995. Following the construction of the completed data set, 207 individuals were

excluded (30 from PIMS) for which no data could be found regarding their specialty, postgraduate training, or current practice locale. Thus, 2,107 graduates from the University of Florida's College of Medicine were evaluated—406 of these were in the PIMS program (the treatment group) and 1,701 completed their medical studies entirely at the UF campus (the control group).

Empirical Analysis

In this section, statistical analyses utilizing t-tests are presented to determine if any differences exist between UF graduates who were in PIMS and UF graduates who were not in PIMS (from the 1975 to 1995 graduating classes). These t-tests are based on the characteristics of the graduates themselves and on their ultimate specialty/practice location choices.

Construction of the t-tests begins by dividing the data into 21 test years and computing for each year the number of graduates from each program satisfying the particular criteria being tested. For each t-test the level of significance α was chosen to be 0.05 and the hypotheses to be tested were as follows:

$$H_o: \; X_{PIMS} - X_{UF} = 0$$

$$H_A: \; X_{PIMS} - X_{UF} \neq 0$$

One test criterion was the difference in the proportion of graduates that were classified as "nontraditional." For the specialty choices, three test criteria were chosen: those choosing generalist specialties, those choosing primary care specialties, and those choosing the penultimate generalist specialty, namely, family practice. Finally, for the practice locations, two test criteria were chosen: those choosing instate (vs. out-of-state)

and those choosing rural (vs. urban) areas. The results of these t-tests provide evidence on the effectiveness of the PIMS program over the period, relative to normal channels of medical education, in producing additional supply of generalist physicians and additional physician supply to rural Florida counties.

The PIMS program from its inception sought "nontraditional" students, primarily on the belief in their higher propensity to undertake primary care specialties in their medical training. This selective admissions policy of the PIMS program was supported by the work of Rosenblatt et al. (1992) who found that successful applicants to rural practice, primary care programs tend to be older, married, and have a family prior to matriculation into medical school. In this context, a "nontraditional" indicator was assigned to students who were at least 25 years of age prior to admission into medical school. Overall, 88 graduates from the PIMS program and 259 graduates from the UF program were given this "nontraditional" designation. Testing for differences in the proportions of "nontraditional" status graduates produced a t-statistic of 2.69 with a p-value of 0.0062 and we reject the null hypothesis (no difference in the means) at $\alpha = 0.05$. Hence, we can conclude that the mean proportion of non-traditional graduates is higher in the PIMS program than in the general pool of UF graduates.

Next we can examine the specialty choice decisions of graduates in the two groups. The first row in Table 2 reports the number of graduates from each program choosing one of the targeted "generalist" specialties.

Table 2: Graduates from PIMS and UF by Specialty Choice

	PIMS Graduates			UF Graduates			Test Results	
Specialty Choice	**No. Grads.**	**Mean PIMS**	**Variance PIMS**	**No. Grads.**	**Mean UF**	**Variance UF**	**T-stats**	**p-values**
Generalists	184	0.469	0.027	661	0.392	0.006	1.947	0.0172
Primary Care	129	0.317	0.028	484	0.287	0.003	0.789	0.2189
Family Practice	67	0.169	0.015	215	0.127	0.002	1.503	0.1034

Criteria for Test Calculations: ***n = 21 test periods; df =*** $n_{PIMS} + n_{UF} - 2 = 40$***; a = 0.05***

$$t = \frac{(X_{PIMS} - X_{UF})}{S^2{}_{PIMS}/n_{PIMS} + S^2{}_{UF}/n_{UF}}$$

The data summarized in Table 2 indicate that 184 generalists emerged from the PIMS program while, over the same time period, the UF program graduated 661. Testing for differences in the proportions of generalists produces a t-statistic of 1.947 with a p-value of 0.0172. Thus, sufficient evidence exists to reject the null hypothesis (no difference in the means) at $\alpha = 0.05$.

In contrast, testing for differences in the proportions of primary care and family practice specialties produced p values of 0.2189 and 0.1034, respectively, indicating no statistically significant differences between PIMS graduates and non-participant graduates of UF. Overall, the results generated by this section are mixed. PIMS did help to promote physician graduates who were nontraditional, as well as physicians selecting generalist specialties as a career choice. At the same time, the proportion of primary care and family practitioners produced in the PIMS program is no greater than the results achieved by non-participants in the comparison group.

A similar examination of the practice location choices of graduates focused on two test criteria: those choosing instate (vs. out-of-state) and those choosing rural (vs. urban) areas. These data are summarized in Table 3.

Table 3: Location Choice Decisions of PIMS & UF Graduates

	PIMS Graduates			UF Graduates			Test Results	
Location Criteria	**No. Grads**	**Mean PIMS**	**Variance PIMS**	**No. Grads**	**Mean UF**	**Variance UF**	**T-stats**	**p-values**
Instate	215	0.545	0.016	843	0.494	0.004	1.808	0.0565
Instate - Generalists	114	0.555	0.045	339	0.403	0.004	3.131	0.0026
Instate - Rural	10	0.038	0.003	20	0.025	0.00	1.006	0.1623

Criteria for Test Calculations: $n = 21$ *test periods;* $df = n_{PIMS} + n_{UF} - 2 = 40$; $a = 0.05$

$$t = \frac{(X_{PIMS} - X_{UF})}{S^2{}_{PIMS}/n_{PIMS} + S^2{}_{UF}/n_{UF}}$$

The data reveal a small numerical difference in the proportion that stays instate; that is, 53% (215 out of 406) of the PIMS graduates remained instate following graduation to practice while only 50% (843 out of 1701) of UF graduates chose to do so. The t-tests do not support a finding that this difference is significant. Focusing only on graduates who remain instate, we report a t-statistic of 1.808 and a p-value of 0.0565 suggesting that at the margin of $\alpha = 0.05$, there is (weakly) insufficient evidence to reject the null hypothesis (no difference in the means). However, if we test for differences in the proportions of instate graduates who become generalists, we get a t-statistic of 3.131, leading us to conclude that, again at $\alpha = 0.05$, there is a difference in the mean proportion of generalists who remain instate after graduation from each of these respective programs.

Turning to the question of how frequently those instate graduates choose rural counties in which to practice, we see that only 4.7% (10 out of 215) of the instate PIMS graduates and 2.4% (20 out 843) of the instate UF graduates choose a rural county as

their ultimate practice location. While that may appear to be statistically significant at first glance, the test statistics (t-value of 1.006, p-value of 0.162) tell otherwise.

At this point it seems relevant to ask the question, where did these graduates choose to practice instate if they were not going to rural counties? The answer becomes clear if one tabulates the largest counties, where 4% or more of the instate graduates of either program currently (as of 2000) reside and practice. These results are summarized in Table 4.

Table 4: Florida Counties Representing More Than 4% of Either PIMS/UF Instate Graduates

	PIMS Graduates		*UF Graduates*	
Florida Counties	**No. of Graduates**	**% Instate Grad.**	**No. of Graduates**	**% Instate Grad.**
Alachua	**21**	**9.8**	**133**	**15.7**
Brevard	**0**	**0**	**36**	**4.3**
Duval	**26**	**12.1**	**70**	**8.3**
Hillsborough	**10**	**4.7**	**45**	**5.3**
Leon	**28**	**13.0**	**35**	**4.1**
Miami-Dade	**0**	**0**	**41**	**4.9**
Okaloosa	**9**	**4.2**	**0**	**0**
Orange	**17**	**7.9**	**75**	**8.9**
Palm Beach	**0**	**0**	**41**	**4.9**
Pinellas	**0**	**0**	**43**	**5.1**
Volusia	**9**	**4.2**	**0**	**0**
GRAND TOTAL	**120**	**55.8**	**519**	**61.4**

It can be seen from Table 4 that 56% of the PIMS graduates who remain instate following graduation are now practicing in one of seven highly populated counties—namely, Leon, Duval, Alachua, Orange, Hillsborough, Okaloosa, and Volusia counties. Likewise, 61% of the graduates from the University of Florida program who chose to remain instate are practicing in nine, similarly populated counties—namely, Alachua, Orange, Duval, Hillsborough, Pinellas, Miami-Dade, Palm Beach, Brevard, and Leon

counties. In short, these patterns confirm that the most attractive urban areas of the state seem to be the favorite location choices of both groups.

Note that our results cannot address the counterfactual question of what would have happened to physician supply in rural counties of Florida in the absence of PIMS. The PIMS program might have increased physician supply in those areas just by increasing the total numbers of physicians in Florida without changing the distribution across rural/urban areas.[7] This explanation seems doubtful, however, considering that the state of Florida's 11th place ranking among all states in physicians per capita was unchanged from 1980 to 1999 (AMA 2001c). An ideal study might be to compare physician supply developments in other states that did not launch their own initiatives in medical education; but it is difficult to implement an empirical model to control for relevant supply shifters in practice.

Previous evidence on physician location and policy initiatives

Our results can be compared with numerous studies conducted over the past few years showing the undeniable effect of pecuniary and non-pecuniary factors on the specialty choice/location decisions made by medical residents. Rosenthal et al. (1994) determined that about 20% of residents in specialty programs surveyed would consider switching to primary care, some for an adjustment in income and others for more favorable workweek schedule. McKay (1991) found that the number of residents in a given specialty increased when its relative expected earnings increased, when the relative length of the postgraduate training period decreased and, in particularly, when the relative expected workweek hours decreased. Finally, Carpenter and Neun (1999) addressed

location preferences by noting that young primary care physicians prefer initial practice locations where the demand for their professional services is strong (i.e., a strong academic presence, a sufficient number of facilities to accommodate incoming patients, and a moderate to high population growth). This supply response was facilitated by factors such as low crime rates, low unemployment, low poverty rates, and a moderate cost of living.

The effects of adequate program design on specialty choice/location decisions were addressed by several researchers who independently evaluated three noteworthy community-based model programs to determine which factors were most relevant to their success. The Rabinowitz (2001) in-house evaluation of the Physician Shortage Area Program (PSAP) in Pennsylvania found that an applicant's rural roots, the incorporation of a mandatory family medicine clerkship, a required outpatient sub-internship program, and assigning a family practice mentor were all instrumental to the program's success.

Verby (1991) provided a similar assessment of the Rural Physicians Associate Program (RPAP) at the University of Minnesota. This program's success was remarkable: 81% of graduates chose to practice in primary care specialties and 63% in rural practice locations. The design characteristics that, according to Verby, contributed most were its selective admissions component and a core curriculum focused on the development of keen clinical skills in a rural setting.

Ramsey (2001) provided a similar assessment of the multi-state, community-based program which began at the University of Washington in 1970 and went on to serve five states: Washington, Wyoming, Alaska, Montana, and Idaho (hence, the acronym, WWAMI). The success of this program was reflected in the relatively high

number of family practice graduates it produced (57%) and in its success of bringing 74% of its graduates back to the program states to practice. Ramsey and other proponents of this program ascribe the results to an early focus on primary care and community-based training, a medical leadership committed to its underlying mission, and a strong and vocal rural constituency served by the program (Ramsey 2001).

Discussion

The results of our PIMS study suggest that the program was rather unsuccessful in its mission of making a discernible difference in the specialty choice and location decisions of its graduates. Why were the results of this program so much different from the other highly successful community-based model programs previously considered? Perhaps one of the answers lies in the multifaceted approach employed by these other programs in the admission, education, recruitment and retention of primary care physicians for their respective states.

As suggested by the advocates of the WWAMI program, features essential to the success of any community-based program include a favorable political economy for legislative support, fostered by a strong medical leadership committed to primary care and an active rural constituency served by the program. In addition to these factors, evidence from the PSAP and RPAP programs suggests that mandatory clerkships in primary care in the third and fourth years combined with a dedicated rural tract program following graduation are essential to success. While the PIMS program employed the selective admissions criteria and early exposure to clinical experiences in a community setting, it lacked other critical components that have proven instrumental to the success of these model programs.

The federal government has instituted a number of pecuniary-based programs to address this health manpower issue. One of these pecuniary-based programs, supported by the work of Rosenthal, involves a 10% Medicare bonus payment made to a practicing physician for the provision of primary care medical services in a rural setting. A second program, directed specifically at rural health care clinics, entails a cost-based reimbursement from both Medicare and Medicaid for all primary care services provided. Preliminary evidence from both programs suggests that these pecuniary-based economic incentives have been instrumental in alleviating the growing shortage of rural, primary care providers by allowing these physicians to run profitable practices in many rural and medically underserved areas of the country (COGME 1999).

In addition to these pecuniary-based incentive programs, the government has also sponsored numerous placement programs, the most notable of which are the Department of State's J-1 Visa program and the National Health Service Corps sponsored by the Department of Health and Human Services. Under the J-1 Visa program, participating doctors are granted a waiver which requires them to relocate and practice in a medically underserved area for a prescribed period of time. The National Health Services Corps complements the effects of the J-1 Visa program by offering scholarships and loan repayment plans to new physicians who are willing to relocate and provide medical care in these underserved areas, once again for a prescribed period of time.[8]

Further support for these various programs has been provided by Brooks, et al. (2003). Rural primary care physicians were more likely than their urban counterparts to have been (a) raised in a rural locale (26% vs. 13.4%), (b) foreign born with J-1 Visa waivers (48.8% vs. 35%), and (c) a National Health Service Corps member (12.6% vs.

3%). The study advises that rural health care can best be fostered by a careful selection of applicants committed to rural health care and by a medical school curriculum designed to engage practitioners in a rural setting. In addition, the J-1 Visa program and the NHSC have played a significant role in the provision of primary care in many rural and medically underserved areas of the state (Brooks 2003).

Conclusion

The growing shortage of primary care physicians in rural and medically underserved areas of the nation remains a critical issue in health care. The recent literature has helped to ascertain what factors are instrumental in producing the desired results, namely, an efficient provision of physician services and a more equitable distribution of physicians among specialties and locales. It is useful, in hindsight, to see how well medical education initiatives work to achieve these goals.

The PIMS program was implemented in 1971 to alleviate the shortage of primary health care providers practicing in rural counties of Northwest Florida. The results obtained here suggest that the program was rather unsuccessful in affecting the specialty choice and location decisions of its graduates. While the program employed selective admissions criteria and early exposure to clinical experiences in a community setting, it failed to incorporate some critical components of other, successful community-based model programs.

In Florida, economic incentives have proven instrumental in physician specialty and location preferences. The designers of PIMS may have failed to address the fundamental point that physicians will likely continue to locate and specialize where they can achieve their highest-valued employment, including non-pecuniary benefits. And not

every economist agrees that the government promotion is the best policy. Newhouse (1982) is highly critical of the government-based incentives due to the high cost, the arguable assumptions of market failure and the lack of consistent criteria for what constitutes medically underserved.

This paper illustrates clearly that addressing this issue by targeting the "right applicants" may be insufficient to produce effective change. Clearly, it will take coordinated action by health care policymakers and medical educators to insure that programs are effectively compatible with the incentives and career concerns of physicians.

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NOTES

1. To receive a primary care HPSA designation, an area must contain less than one primary care physician per 3500 individuals based on clearly recognizable boundaries such as census tracts or county lines. The lack of access, in this definition, pertains to the presence of physical or cultural barriers impeding easy access to basic health care needs. Currently, thirteen counties in Florida qualify as HPSAs according to the Florida Department of Health nine are in the Northwest what is called the "Big Bend" area of the state and two are in the southernmost portion of the state. (Sources: MGT 1999 and http://bhpr.hrsa.gov/shortage/hpsacrit.htm).

2. The number of generalist and specialty physicians for Florida for 2002 was obtained from the Kaiser Health Facts website at http://www.statehealthfacts.kff.org.

3. The most common source of data by county on HMO penetration is from Wholey et al. (1997). These authors caution that the algorithms used to construct year-to-year penetration rates are intended for MSA or HSA areas and may be unreliable at the county level. We report the number of hospital admissions insured by commercial HMOs from the Hospital Financial Reports submitted annually by hospitals in Florida for each of the years 1989-2002. The annual reports to AHCA have long been routine and are well audited. Our measure of hospital admissions is not perfect but should be a good proxy for HMO penetration growth for the purpose of a rural versus urban county comparison.

4. Florida State University was considered the ideal site for PIMS for two reasons: its large rural student population (in 1971, 40% of FSU students came from rural

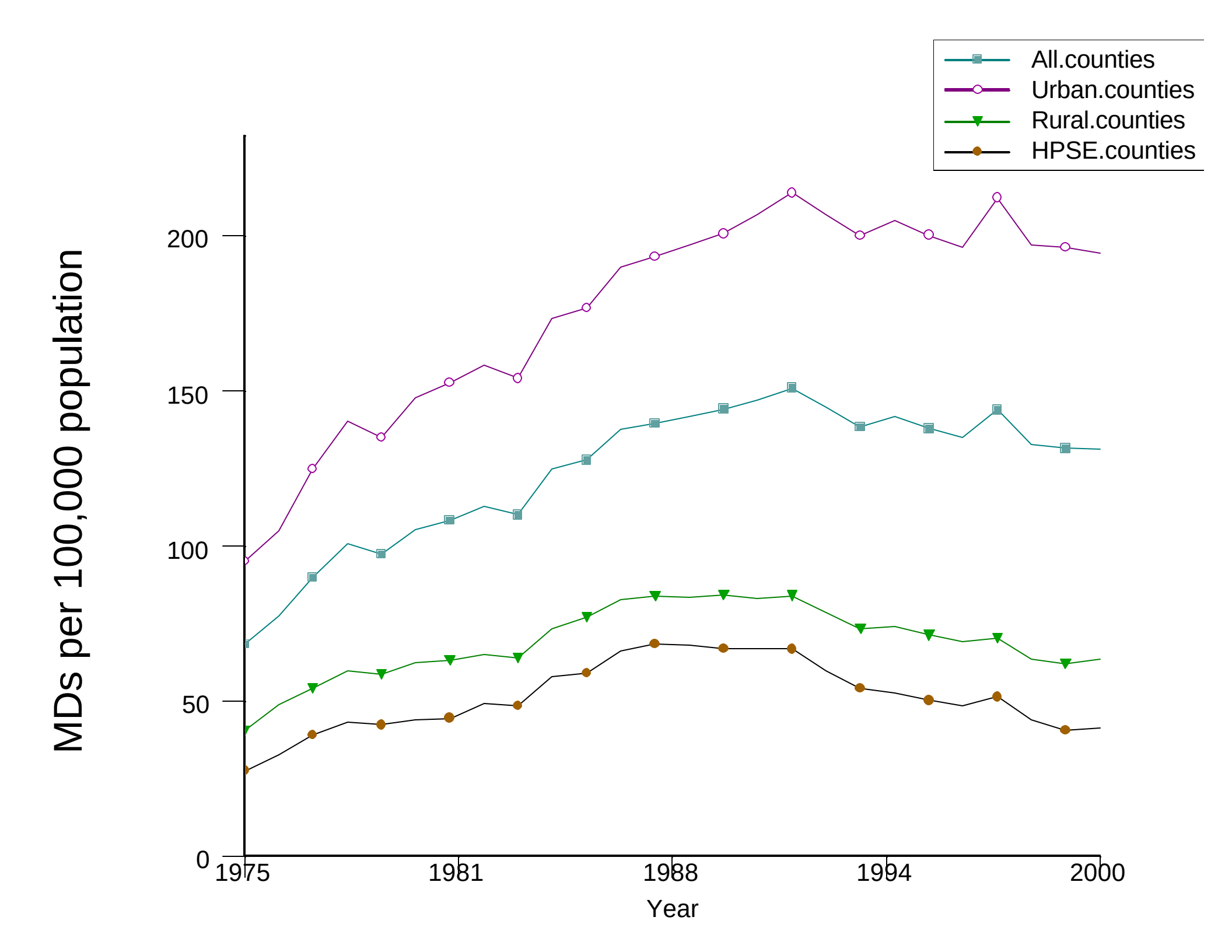
counties) and its central location to most of Florida's rural counties. From 1975 to 1992 the applicant pool was limited to graduates from Florida State University, the Universities of West Florida and Florida, and Florida A&M University. This policy was changed to the AMCAS application process in 1993 to allow a broader pool of prospective statewide applicants. More information on the early history of the Program in Medical Sciences (PIMS) can be found at The Florida State University School of Medicine website at http://www.med.fsu.edu .

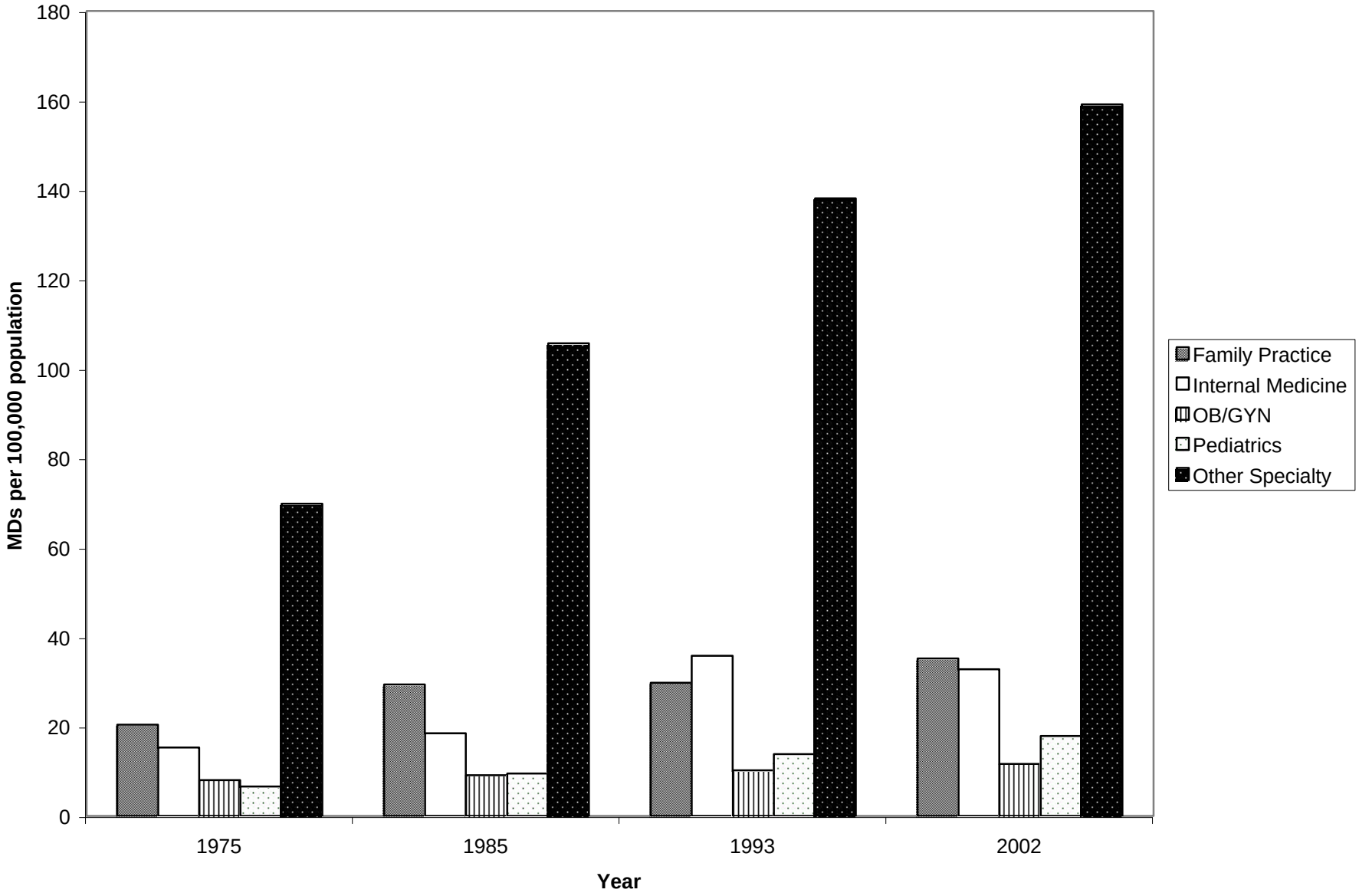
5. State of Florida Department of Health Web site, http://www.doh.state.fl.us , accessed from August-September 2002, was the source of this information.

6. The official American Medical Association (AMA) website located at http://www.ama-assn.org via its AMA membership index was a key source of data on physician providers used in this study.

7. This point was raised by an anonymous reviewer.

8. Further information on the Florida Department of State's J-1 Visa waiver program can be found at http://www.doh.state.fl.us. Likewise, the Department of Health and Human Services' National Health Service Corps (NHSC) can be found at http://www.hhs.gov.


All.counties
Urban.counties
Rural.counties
HPSE.counties
MDs per 100,000 population
200
150
100
50
0
1975
1981
1988
1994
2000
Year


180
160
140
120
100
80
60
40
20
0
MDs per 100,000 population
1975
1985
1993
2002
Year
Family Practice
Internal Medicine
OB/GYN
Pediatrics
Other Specialty