



Kentucky Institute of Medicine™

Task Force Report

Comprehensive Statewide Physician Workforce Study

Funded by the Rural Kentucky Medical Scholarship Fund
as recommended by the Kentucky Medical Association
Physician Workforce Committee

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TABLE OF CONTENTS

KENTUCKY INSTITUTE OF MEDICINE TASK FORCE MEMBERS	2
EXECUTIVE SUMMARY	6
INTRODUCTION.....	8
BACKGROUND	10
CURRENT PHYSICIAN WORKFORCE	11
CHARACTERISTICS OF KENTUCKY PHYSICIAN WORKFORCE	
COMPARISON TO NATIONAL WORKFORCE	
RURAL/URBAN DISTRIBUTION OF PHYSICIANS	
INTERNATIONAL MEDICAL GRADUATES	
CURRENT DEMOGRAPHY OF KENTUCKY.....	17
TRENDS IN SPECIALTY SELECTION AND PRACTICE LOCATION	18
SPECIALTIES SELECTED BY MEDICAL STUDENTS	
FACTORS INFLUENCING SPECIALTY SELECTION	
STUDENT DEBT	
OTHER FACTORS	
GRADUATE MEDICAL EDUCATION IN KENTUCKY	19
FACTORS INFLUENCING THE FUTURE SUPPLY OF PHYSICIANS	20
GENDER	
CHANGES IN WORK ETHIC, LIFESTYLE	
RETIREMENT TRENDS	
FACTORS INFLUENCING THE FUTURE DEMAND FOR PHYSICIANS	21
INCREASE IN AGING POPULATION	
INCREASE IN CHRONIC DISEASES	
LEVEL OF EDUCATION AND SOCIOECONOMIC STATUS	
METHODOLOGY	23
ESTIMATION OF CURRENT AND PROJECTED PHYSICIAN SUPPLY	
ESTIMATION OF FUTURE NEED	
ESTIMATION OF FUTURE DEMAND	
PROJECTED 2020 PHYSICIAN WORKFORCE FOR KENTUCKY	26
TOTAL PHYSICIAN SUPPLY, NEED, AND DEMAND	
PROJECTED NEED FOR SELECTED SPECIALTIES	
IMPROVING THE PHYSICIAN SUPPLY.....	28
RECOMMENDATIONS	30
REFERENCES	34
APPENDIX	36
ACTIVE KENTUCKY PHYSICIANS BY SPECIALIZATION, 2007	

LIST OF TABLES

TABLE 1 – KENTUCKY PHYSICIANS ESTIMATION AND PROJECTIONS	7
TABLE 2 – KENTUCKY PHYSICIANS, 2007 CHARACTERISTICS BY RURAL AND URBAN PRACTICES.....	12
TABLE 3 – KENTUCKY PHYSICIANS, 2007 BY AREA DEVELOPMENT DISTRICTS AND PER 100,000 POPULATION.....	13
TABLE 4 – KENTUCKY PHYSICIANS, 2007 BY MAJOR ACTIVITY	16
TABLE 5 – KENTUCKY POPULATION CHANGE BY AREA DEVELOPMENT DISTRICT	17
TABLE 6 – KENTUCKY PHYSICIANS, 2007 ESTIMATED SUPPLY AND PROJECTED SUPPLY, NEED, AND DEMAND.....	27
TABLE 7 – ACTIVE KENTUCKY PHYSICIANS BY SPECIALIZATION, 2007..... APPENDIX...	36

LIST OF FIGURES

FIGURE 1 – KENTUCKY PHYSICIANS, 2007 RACE/ETHNICITY.....	11
FIGURE 2 – KENTUCKY BY AREA DEVELOPMENT DISTRICT	13
FIGURE 3 – KENTUCKY PHYSICIANS, 2007 PHYSICIAN TO POPULATION RATIO BY ADD	14
FIGURE 4 – KENTUCKY PHYSICIANS, 2007 BY AGE AND RURAL OR URBAN PRACTICE	15
FIGURE 5 – KENTUCKY ADD POPULATION CHANGE 2005-2020.....	18

EXECUTIVE SUMMARY

Access to healthcare services is vital to the health of all Kentuckians and the economic well-being of the Commonwealth. An adequate number of physicians, including an appropriate distribution of specialists by discipline and geography, is critical to ensuring that care is available.

National projections of physician supply have varied, from an oversupply just 10 years ago, to what analysis now confirms, the likelihood of a significant shortage of doctors in the near future (4-7, 13, 20). This is due to several factors, such as physicians retiring earlier, lifestyle changes among younger practitioners, more doctors entering administrative medicine, the aging of the population and the subsequent management of chronic diseases, concerns about litigation, managed care, and the ability of Americans to afford more care. The Centers for Disease Control reports that hospital and doctor visits have surged by 20% over the past five years (3).

For decades Kentucky has suffered a chronic shortage of physicians, particularly in rural portions of the State, creating a situation that, along with residents' poor lifestyle choices, has resulted in unfavorable health status (3, 23). Unfortunately, there is not a quick fix for this physician shortage. Even if all the barriers that have prevented a sufficient and well-dispersed supply of physicians were suddenly to disappear, the task of recruiting and educating an ample cohort of doctors would take years to accomplish.

Now is a prudent time to begin assessing physician requirements and medical education needs for the year 2020 and beyond (5, 13, 20). This is especially true considering that ongoing population shifts could soon necessitate physicians spending more than one-third of their time treating elderly patients. The healthcare workforce is also aging, with many physicians expected to retire at a time when demand for services is on the rise (14).

At the recommendation of the Kentucky Medical Association Physician Workforce Committee, the Rural Kentucky Medical Scholarship Fund asked the Kentucky Institute of Medicine (KIOM) to conduct an in-depth study of the State's need and demand for physicians in the coming years. KIOM examined trends in Kentucky's population and changing physician characteristics to determine how these forces are likely to influence the State's number of active physicians by specialty by the year 2020.

With Kentucky's more than four million population and 8,981 active physicians, it has a ratio of 213.5 active physicians per 100,000 population compared to that of 267.9 for the US (1, 3, 11, 17). Kentucky's current ratio ranks as the 32nd lowest among the 50 states. Kentucky now needs 2,298 more active physicians to bring it to the 2007 US ratio, assuming the US ratio constitutes an adequate supply of physicians. The results of this workforce study first assumed an increase in the number of Kentucky physicians to the level of physicians nationally. After making this adjustment, projections were made to 2020 of the likely supply of physicians and numbers required to meet need and demand if current population and economic trends continue (16).

It is projected that the supply of Kentucky active physicians will be 12,846 by 2020 (see Table 1) if recruitment and retention of physicians improves, the trend toward fewer hours worked and earlier retirement lessens, and output from State medical schools increases so as to bring Kentucky close to the US physician-to-population ratio in the next 3-5 years.

Using the Physicians Requirement Model (PRM) with the US ratio, by 2020 13,422 Kentucky active physicians are required to meet the projected need to guarantee access to healthcare based on existing standards of need.

Year	2007	Total 2020	Change 2007-2020
Supply Trends	8,981	12,846	43.0%
Need	8,981	13,422	49.4%
Demand	8,981	14,989	66.9%

This number increases to 14,989 active physicians required for the State to accommodate both need and optional services that might be demanded by a better educated, more prosperous, and somewhat older population on average with the *baby boom generation* making up a sizable segment of the total population (14-17).

For the past 10 years the average annual growth in active physicians for Kentucky is 2.4%. If Kentucky continues to attract active physicians at a rate of 2.4% per year, this would add 3,243 physicians by 2020, but the Commonwealth would still need 622 more active physicians to reach the projected supply requirement, 1,198 to meet need, and 2,765 to meet demand, or an increase ranging from 7-30%.

To address the shortage of Kentucky’s physician workforce, this report proposes strategies to increase the State’s supply of physicians, improve the diversity of its physician workforce, address the uneven distribution of physicians, increase physician productivity, and facilitate more effective workforce planning (13, 19, 20).

INTRODUCTION

The Kentucky Institute of Medicine (KIOM) was commissioned by the Rural Kentucky Medical Scholarship Fund to produce a *Comprehensive Statewide Physician Workforce Study*. This report reviews the literature and available data on a variety of factors influencing the supply of physicians within the State. These factors include demographic patterns in Kentucky, health insurance coverage and access, changing patterns of physician practice, the impact of other health professions and services, the role of the State's physician pipeline, trends in specialty selection and practice location by medical students, and other influences.

The KIOM brings together physicians, healthcare and hospital administrators, government officials and others unrelated to the healthcare field. KIOM members and taskforce members are chosen for their knowledge and commitment to improving the quality of healthcare for all the people of Kentucky.

The mission of the Kentucky Institute of Medicine is to improve the health of Kentuckians by providing objective, evidence-based advice concerning health and healthcare to policy makers, professionals, leaders of society, and the public. Since an essential component of a healthy society is access to healthcare services, it is incumbent upon KIOM to make recommendations relating to current and future shortages or surpluses of physicians within the Commonwealth.

The KIOM is indebted to the Kentucky Board of Medical Licensure for providing much of the data related to Kentucky's workforce covering the period from 2005-2007. KIOM analyzed key characteristics of Kentucky physicians including age, gender, race/ethnicity, practice sites (rural-urban), medical school, work hours, and other factors predictive of physician supply. Other physician data on supply and physician characteristics were assembled from the Area Resource File (releases 2006-1997). These data were used in adaptations of the Physician Supply Model (PSM) and the Physicians Requirements Model (PRM) to make projections of the supply, need, and demand for Kentucky physicians by 2020 (15). The PSM and the PRM models were developed by the US Health Resources and Services Administration (HRSA). Population and demographic data were assembled from the online resources of the Kentucky State Data Center (1). Physician-to-population ratios and many other measures were derived from sources such as the AAMC data book and AMA's reports of Physician Characteristics and Distribution in the US.

As the *baby boomers* near retirement age, and amid expectations that population increases will exceed the rate of growth of the physician supply in coming years, this study was undertaken to determine appropriate measures for ensuring an adequate quantity of physicians in Kentucky by the year 2020.

Estimates and projections are based on three general models briefly described below:

Supply, or the State's projected number of physicians based on those currently in practice using today's pathways, as well as existing entry levels and retirement rates;

Need, or the number of physicians that will be required in order to address the projected preventive, acute and chronic care conditions of patients; and

Demand, or the number of physicians that will be required in order to provide all the healthcare services patients might want or can afford in the future.

This study, in its comprehensiveness, not only examined whether Kentucky will have an adequate *supply* of primary care physicians (family medicine, pediatrics, internal medicine), but also whether there will be enough specialists such as oncologists to meet the *need* presented by an aging population (18) and a sufficient number of specialists such as plastic surgeons to handle the *demand* for elective medical procedures.

The State's physician workforce is critical to the delivery of healthcare to all Kentuckians, rural and urban alike. Regular tracking of workforce indicators, along with comprehensive assessments such as this one, contribute to a stable healthcare system by guiding the decisions of policy makers, medical schools, and current and prospective physicians. It is KIOM's hope that this report serves as a useful tool in reaching these goals.

BACKGROUND

Kentucky, with an estimated 4,206,074 residents, is the 26th most populous state (1). It is the nation's 6th most rural state, with only 35 of its 120 counties classified as urban, according to the US Department of Agriculture's Rural/Urban Continuum Codes (2). As with many predominantly rural regions, Kentucky historically has had difficulty producing, recruiting and retaining physicians (5, 8, 10, 20). The State's rural counties have a high proportion of chronic illness, which places significant stress on physician practices and medical resources. Kentucky has the highest cancer and heart disease mortality rates in the US. While these high disease burdens are spread throughout the entire State, the most severe rates usually occur in Kentucky's 85 rural counties (3).

Kentucky's physician shortage is not a new problem. Programs such as the Frontier Nursing Service, established in 1925 in the eastern Kentucky community of Hyden, were predicated on the assumption that rural Kentucky would never be able to attract and retain doctors. In fact, Mary Breckinridge, founder of the Frontier Nursing Service, said one of the reasons she chose the eastern Kentucky mountains for her nursing demonstration was that Leslie County was "in the heart of a thousand-square-mile area covering parts of several counties, where some 15,000 people lived without benefit of one resident state-licensed physician" (5).

Things are not nearly so bad today, though they are far from ideal. Nearly half of Kentucky's counties – 55 out of 120, and most of them rural – are officially designated Health Professional Shortage Areas (HPSA) for primary care by the Health Resources and Services Administration's Bureau of Primary Health Care. A criterion for this designation is a ratio of at least one full-time-equivalent primary care physician per 3,500 population. Due in part to that restriction, several Kentucky counties have lost their HPSA designation in recent years; since more than 30 federal programs depend on this designation to determine eligibility or as a funding preference, loss of HPSA status can have a negative impact. As recently as 2003, 81 Kentucky counties were classified as physician shortage areas. Proponents of re-designating those counties as shortage areas contend that Kentucky's above-average prevalence of chronic disease, and the requisite time it takes physicians to treat those conditions, makes a ratio of 1,500:1 more realistic and better facilitates incorporation of preventive care into treatment plans. To address the issue, shortage designation types, including the *Governor's Certified Medically Underserved Shortage Area (MUA)*, are being proposed within the State. MUA designation enables communities to develop and submit applications for funding the establishment of a 330 Federally Qualified Health Center (FQHC).

Kentucky is not alone in suffering a shortage of physicians. In order to offset a predicted national shortfall by 2020, the national Council on Graduate Medical Education (4) has recommended that the number of physicians entering residency training each year be increased from approximately 24,000 in 2002 to 27,000 in 2015. This action would lead to an increase in the nation's physician workforce by about 3% (30,000 physicians) by 2020, which officials acknowledge is insufficient to meet future needs. The Association of American Medical Colleges (7) has endorsed a 30% increase in medical school enrollment, which it says should be accomplished by increased enrollment in existing schools as well as

establishing new medical schools. Compared to some 16,000 first-year students today, the AAMC’s plan would require 21,434 matriculates in allopathic medical schools by 2015. The AAMC plan will potentially help the physician workforce in all states, but it could create concerns for rural Kentucky. A sizable increase in US medical school graduates has the potential to squeeze the number of residency slots currently filled by international medical graduates (IMGs), who historically have shown a greater willingness to practice in rural areas.

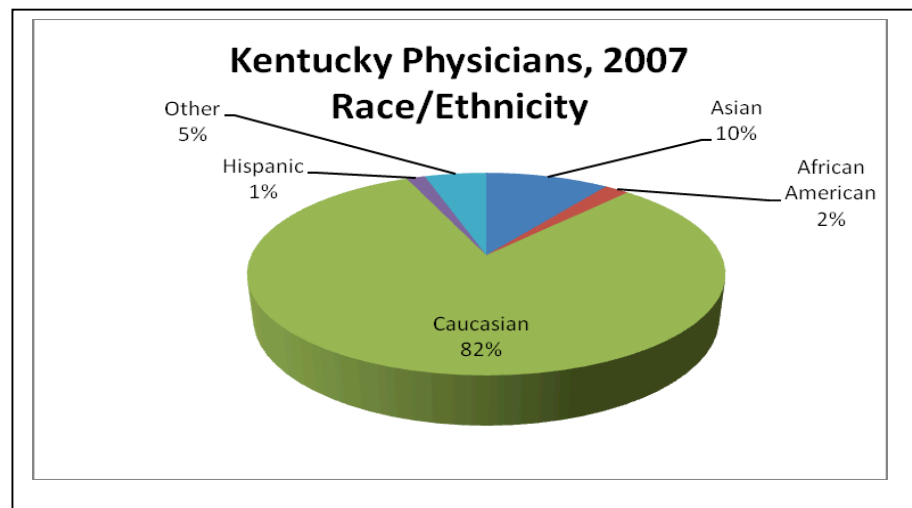
To further complicate matters within rural parts of the Commonwealth, approximately 400 of Kentucky’s family physicians are age 60 or above and are likely curtailing their practice or nearing retirement. At the same time, the State’s rural family medicine residency programs, as they now exist, can realistically produce only 16 to 18 new family physicians per year.

There is more bad news. Student interest in family medicine at Kentucky’s medical schools and many others across the country has waned in recent years, as has the number of residency positions. It stands to reason that as medical education costs increase, so does student debt, a factor that is cited in many students’ decisions to select specialties more lucrative than family practice (12, 21). Further, it is unlikely that other primary care specialties will significantly impact rural primary care physician shortages, since relatively few general pediatricians, general internists, and obstetrician-gynecologists enter practice in rural areas.

CURRENT PHYSICIAN WORKFORCE

There are 13,618 physicians licensed to practice medicine in Kentucky, among whom 8,981 are actively practicing in the State. This group has several interesting characteristics. The State’s physician workforce continues to be male-dominated (76%), but the career pipeline for women is growing. The median age for Kentucky’s male physicians is 51, compared to 44 for females. The vast majority (81.6%) of Kentucky’s physicians list their race/ethnicity as Caucasian, followed by Asian, African-American and Hispanic (see Figure 1).

Figure 1:



The State’s physicians are still overwhelmingly MDs (96.1%). Graduates of the Pikeville School of Osteopathic Medicine are just beginning to enter the physician workforce. In addition to the primary county cited for practice, 17% of physicians practice at least 4 hours in a second county, and 4% practice in three counties.

Kentucky ranks 32nd nationally in physician-to-population ratio, with only 213.5 doctors per every 100,000 residents (3, 6, 11, 16). This ratio is significantly lower than the national rate of 267.9, and it trails most states bordering Kentucky (Tennessee, 253; Missouri, 235; West Virginia, 222, e.g.). During the 10-year period ending in 2005, Kentucky’s physician workforce grew by an average of 2.4% per year, a promising trend, but not enough to relieve the State’s historical undersupply. If Kentucky continues to attract active physicians at a rate of 2.4% per year, this would add 3,243 physicians by 2020, but the Commonwealth would still need 622 active physicians to reach the projected supply requirement of 12,846, or 7% more from the 2007 baseline of 8,981.

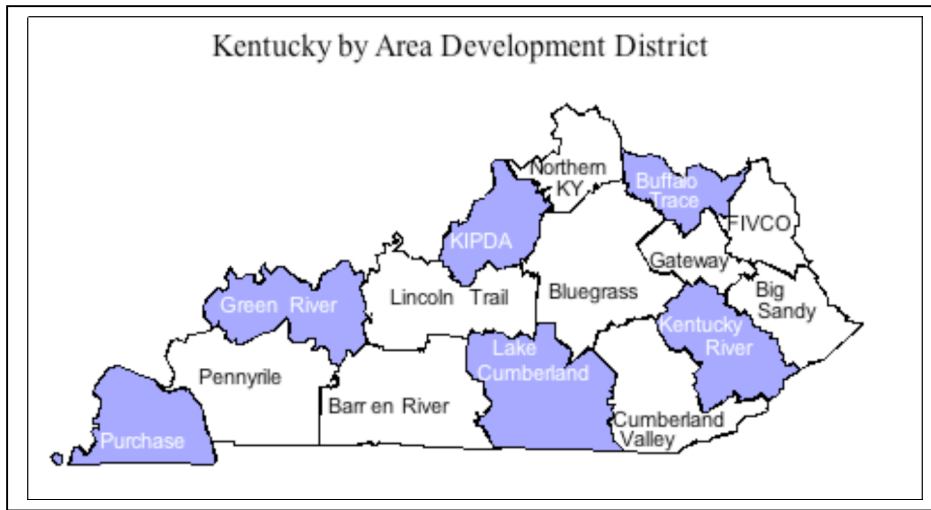
To compound Kentucky’s shortage, its physicians are not well distributed. This uneven distribution is evidenced by the fact that more than 43% of the State’s 4.2 million residents live in rural areas, but only 28% of its physicians do. Jefferson County alone has nearly 2,600 physicians – 29% of the State’s total – while one rural county, Robertson, is lacking a physician, and 26 other counties are home to fewer than five active physicians.

	Rural	Urban
Number (%) of MDs and DOs		
MDs	2525 (28%)	6456 (72%)
DOs	155 (44%)	198 (56%)
International Medical Graduates (IMGs)	713 (36%)	1,235 (64%)
Average hours worked and FTE		
Per population ratio hours	48	46
FTE per 100,000 population	164	306
Average hours worked by gender		
Female	47.4	42.8
Male	48.3	47.0

Table 2 shows interesting differences between Kentucky’s rural and urban physician populations. A larger percentage of osteopathic physicians practice in rural areas compared to allopathic physicians. A majority of IMGs practice in urban areas, although a higher proportion of IMGs practice in rural communities (36%) than the State’s US graduates (28%). Rural physicians, who are under-represented in rural areas (FTE per 100,000

population 164 vs. 306 urban), worked longer hours (48) than urban physicians (46). Men in rural and urban areas, as well as women in urban areas, work comparable hours per week, but women in urban areas work considerably fewer hours.

Figure 2:

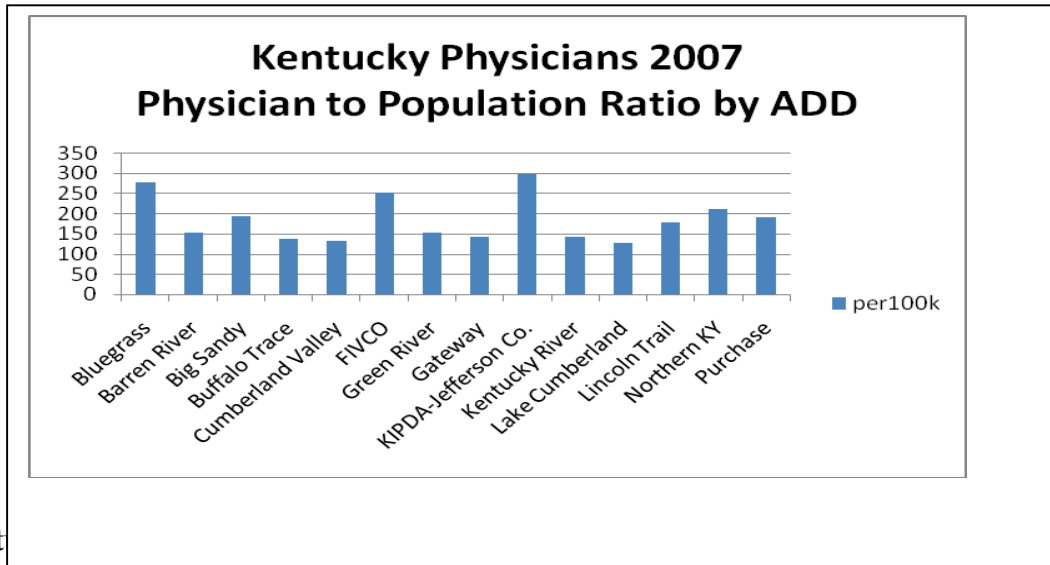


Examination of Kentucky physicians by Area Development District (ADD) also reveals a significant maldistribution. Two Kentucky ADDs, Lake Cumberland (126.2) and Cumberland Valley (131.7), have a physician-to-population ratio of less than half that of the US ratio of 267.9, and Buffalo Trace (137.9) is just slightly better off in terms of the ratio of active physicians to the total ADD population. Three additional Area Development Districts have physician-to-population ratios significantly below the national average: Gateway (141.3), Pennyrile (141.9), and Kentucky River (142.9). Of Kentucky's 15 ADDs, only the Bluegrass (276.2) and KIPDA-Jefferson County (296.8) are at or above the US ratio.

ADD	MDs/ODs	Pop	per100k
Bluegrass	1,995	722,243	276.2
Barren River	407	267,549	152.1
Big Sandy	305	158,828	192.0
Buffalo Trace	78	56,571	137.9
Cumberland Valley	319	242,191	131.7
FIVCO	345	137,152	251.5
Green River	323	210,601	153.4
Gateway	112	79,251	141.3
KIPDA-Jefferson Co.	2,673	900,616	296.8
Kentucky River	170	118,923	142.9
Lake Cumberland	252	199,716	126.2
Lincoln Trail	454	255,001	178.0
Northern KY	875	416,885	209.9
Purchase	370	194,310	190.4
Pennyrile	303	213,568	141.9
Total	8,981	4,173,405	213.5

Family medicine remains the specialty of choice among Kentucky physicians (1,435), followed by two other primary care fields, internal medicine (1,108) and general pediatrics (585). The percentage of Kentucky’s family physicians who live in rural counties (56.5%) is 13.3 points higher than the percentage of Kentuckians who live there. It might appear, then, that rural Kentuckians have adequate access to primary care, which research indicates contributes to better health outcomes, lower rates for all causes of mortality, and a decline in emergency room utilization rates. However, Kentucky’s high level of rurality, along with some of the nation’s highest rates of poverty and chronic disease, suggest an even greater need for family physicians in rural areas (2, 8).

Figure 3:



Rural Kent

This maldistribution severely impedes rural residents’ ability to access specialty services, as many either are unable or unwilling to travel great distances to receive care.

Seventy-eight percent (7,033) of Kentucky’s current physicians received their education at US medical and osteopathic schools, and 22% (1,948) of the State’s licensed physicians are international medical graduates (IMGs). However, only 14 of Kentucky’s registered graduates of international medicals schools were Kentucky citizens. The use of foreign-trained doctors within Kentucky has been necessary in order to fill shortage areas, particularly those in rural areas. When rural Kentucky has been unable to produce primary care physicians from within its own ranks or lure those from other parts of the country to locate within the Commonwealth through loan repayment incentives or other inducements, it has joined the rest of rural America in turning to IMGs. Foreign-trained doctors often agree to practice in the United States’ rural areas in exchange for the opportunity to stay in the country. Nationally, IMGs make up approximately 23% of the US physician population and 22% in Kentucky.

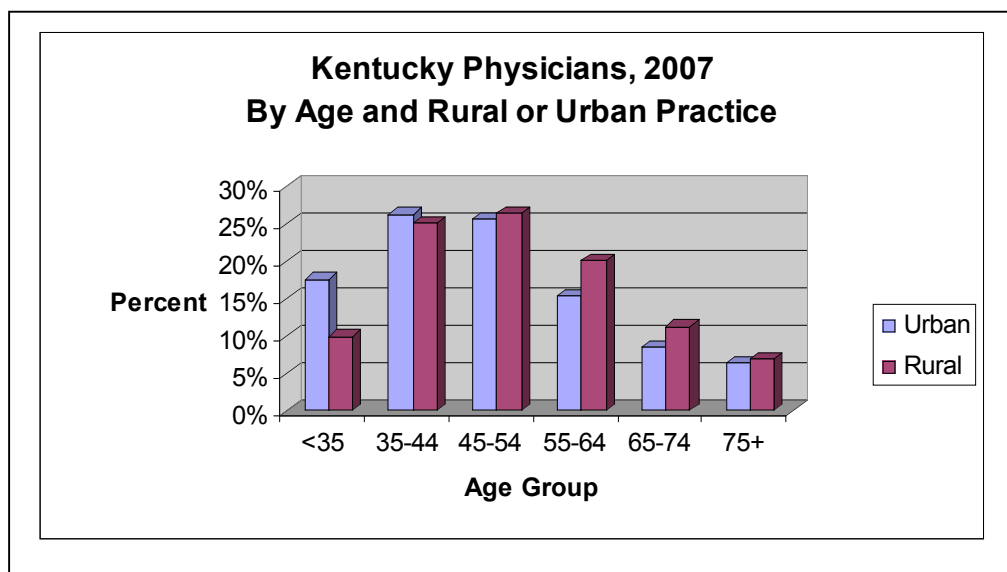
Many IMGs come to the United States to train on J-1 exchange visitor visas, which allow holders to remain in the country until their studies are completed. Nationally, more than 1,000 IMGs are sponsored for J-1 visa waivers each year. The J-1 program allows physicians to remain in the US if they agree to provide primary care or psychiatry services

in federally designated Health Professional Shortage Areas for a minimum of three years after completing their residency.

A study by University of Kentucky Center for Excellence in Rural Health found that 147 IMGs had been placed in Kentucky's 51 Appalachian counties through the Appalachian Regional Commission (ARC) and Conrad-30 programs (10). These physicians were specializing in family practice, internal medicine, obstetrics/gynecology, pediatrics and psychiatry. Together, these specialties comprised 99% of the 147 placements. Internal medicine was the largest category, comprising 63%. The results of this study indicated that IMGs are not transient. Eighty-two percent of the 147 J-1 visa physicians were practicing in the county in which they originally were placed, and 91% were in original placement counties or counties within the Kentucky ARC region. Of physicians who were placed in rural communities, only one moved from a rural county to an urban one, nine were in medical practice outside of Kentucky, and three were not licensed in Kentucky at the time, according to medical licensure information. However, restrictions on the program have intensified in the years since 9/11 due to the war on terror and the ongoing immigration debate. Consequently, federal and state requests for J-1s have declined in recent years and the number of physicians in training with J-1 visa waivers has decreased by almost half over the past decade.

A higher percentage of Kentucky's male licensed physicians were inactive during the 10-year period ending in 2005 than were females. But regardless of gender, those living in rural areas were less likely to be actively practicing medicine than were their urban counterparts. The disparity was not statistically significant, 10.7% of rural physicians were inactive, compared to 10.4% of their urban counterparts. As for women, 6.4% of rural license holders were inactive compared to 4.1% of those in urban areas. Inactive and retired physicians represent a pool of doctors some of whom may be encouraged to practice on a limited basis.

Figure 4:



Statistics indicate a higher percentage of rural physicians practice into advanced age (11, Figure 4). While the State's physician workforce is comprised of a higher percentage of

urban doctors under age 35 and in the 35-44 age bracket, rural Kentucky physicians make up the bulk of every other age category 45-54, 55-64, 65-74 and over age 75, (see Figure 4).

Table 4 Kentucky Physicians, 2007 By Major Activity		
Status	Number	Percent
Administration	86	1.0%
Faculty	583	6.5%
Hospital Based	2,464	27.4%
Locum Tenens	122	1.4%
Military	19	0.2%
Private Practice	5,414	60.3%
Public Health/Gov	264	2.9%
Research	13	0.1%
Other	16	0.2%
Total	8,981	100

Kentucky-licensed physicians are engaged in many activities (Table 4) and some are not actively involved in patient care. As many as 12.3% of active physicians who identify themselves as administrators, public health or government officials, etc. are not involved in patient care or are not involved full time.

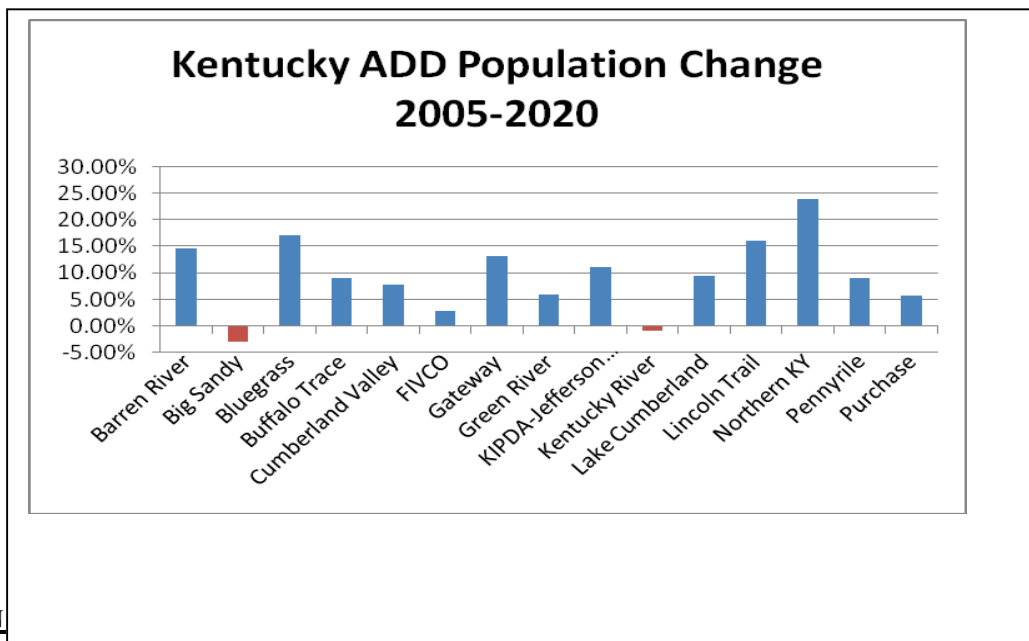
CURRENT DEMOGRAPHY OF KENTUCKY

Kentucky has 4.2 million people, with 2.4 million (57%) residing in urban areas and 1.8 million (43%) living in rural communities (1-2). As shown in Table 5, the population in Northern Kentucky is projected to grow the most by 2020 (23.8%), but several other ADDs will increase significantly as well (Bluegrass 17.1%, Lincoln Trail 16.1%, Barren River 14.5%, Gateway 13.1%, and KIPDA-Jefferson County 11.1%). Two ADDs are expected to actually decline in population during this timeframe (Big Sandy and Kentucky River).

	2005	2010	2015	2020	2005- 2020
Barren River	265,016	277,729	291,306	303,389	14.5%
Big Sandy	160,774	159,150	157,803	156,170	-2.9%
Bluegrass	719,276	760,597	803,692	842,327	17.1%
Buffalo Trace	56,231	57,663	59,666	61,362	9.1%
Cumberland Valley	243,599	249,839	256,768	262,429	7.7%
FIVCO	137,448	138,308	140,063	141,439	2.9%
Gateway	78,937	82,721	86,256	89,280	13.1%
Green River	209,357	212,864	217,769	221,895	6.0%
KIPDA-Jefferson County	895,928	928,809	963,119	995,316	11.1%
Kentucky River	120,452	119,344	119,524	119,333	-0.9%
Lake Cumberland	199,525	205,790	212,545	218,267	9.4%
Lincoln Trail	255,229	269,434	283,731	296,355	16.1%
Northern KY	411,952	444,102	478,285	510,065	23.8%
Pennyryle	218,901	224,891	231,950	238,761	9.1%
Purchase	193,189	195,249	200,118	204,315	5.8%
Total	4,165,814	4,326,490	4,502,595	4,660,703	11.9%

Two segments of the Kentucky population deserve special healthcare considerations. The African American population represents 8% of the total, and the Hispanic population (2%) is growing significantly. They are expected to increase to 9% and 3%, respectively, by 2020. If these populations are to receive appropriate access to care, there should be an adequate number of physicians in these ethnic groups, and as shown in Figure 1, the size of these physician groups is markedly under-represented. It is worth noting that in Kentucky the African American population is predominantly concentrated in the major metropolitan regions, especially Louisville-Jefferson County, Lexington-Fayette County, and Boone-Kenton counties. Fulton County is exceptional as a rural county with a substantial African American population (23%). An important consideration regarding Kentucky’s growing Hispanic population is that it tends to concentrate in significant groups around certain industries, such as meat packing, horse racing, construction, and areas requiring substantial day-labor. This tendency heightens the need for physicians with appropriate language skills and cultural sensitivity to serve the health needs of this population group.

Figure 5:



TRENDS IN

A review of the disciplines selected by medical students in Kentucky in 2006 revealed a pattern characteristic for most medical schools. Forty-eight percent selected primary care specialties of family medicine, internal medicine and pediatrics; 66% of the osteopathic medical students selected primary care specialties compared to 43% for allopathic medical students. However, only 19% of allopathic medical students plan to practice in a rural location compared to 60% of osteopathic medical students.

Since the peak of managed care in 1995, the trend among medical students has been to select specialties other than primary care (4, 15). Part of the reason for this shift is education indebtedness. Nationally, during the 20-year period ending in 2004, average tuition and fees increased by 165% in private medical schools and by 312% in public medical schools, growing far more rapidly than the consumer price index (12). Within Kentucky, annual in-state tuition at the UK College of Medicine nearly tripled – from \$7,420 to \$20,410 – between 1995 and 2006. These increases have created serious concerns among affected medical students and prospective students. They also have contributed to significantly higher debt levels for young physicians. The 2005 national average for student loan debt at public medical schools was \$110,460; by the following year, it had increased to \$119,131. Average indebtedness is not quite so substantial at Kentucky’s medical schools, but it is significant nonetheless. For instance, the average debt for a 2006 graduate of the Pikeville School of Osteopathic Medicine is \$104,000; for the UofL School of Medicine \$112,000, and the UK College of Medicine \$107,000. Perhaps as a result, 82.8% of the UK graduates said medicine will not be as financially rewarding in the future as in the past. It appears the problem is only worsening; preliminary projections at UK indicate an average debt for its 2007 graduates of \$121,763. Absent scholarship assistance, the prospect of mounting six-figure debt seems most likely to deter applicants from rural, minority, and otherwise under-represented populations. In response, the UK College of Medicine recently formed a tuition policy which keeps a student’s tuition the same for all four years of medical school.

The debt load might contribute to some students gravitating toward specialties that promise more lucrative incomes (15). The facts are clear, fewer US medical school graduates are going into family medicine (8, 19-20). Despite the decrease in family medicine residency positions, only 41% of US graduates entered family medicine residency programs in 2006 and the number has decreased annually for the past ten years ending in 2006. Part of the reason could be that family medicine is among the three lowest-paid medical specialties (15).

Another set of factors possibly influencing specialty selection comes from the knowledge of graduating medical students of recent trends in the medical market place. In the mid-to-late 1990s and early 2000s the demand for primary care physicians greatly exceeded supply, as hospitals, physician practice management groups, health maintenance organizations, and other entities sought the primary care gatekeepers needed to secure managed care contracts. In 1996, 76% of the nationwide physician search assignments conducted by Merritt, Hawkins and Associates (15), a major physician placement firm, were for primary care physicians. The competition for primary care physicians – particularly family physicians – was intense. In the last five to six years market conditions altered again. The gatekeeper system for which these physicians were being recruited largely vanished from our health care system. Patient preferences, demographic changes, and technological innovation have greatly increased demand for physician specialists, especially surgical and diagnostic specialists, which by 2005 was nearly a complete reversal from the earlier decade.

There is a complex web of variables that influence the choice of specialization by physicians. These include strong personal commitment to particular specialties formed early in a medical career, expectations about lifetime earnings, and the understanding that most physicians can find a way to manage their debt through buyouts by hospitals and other providers because of sufficient demand for their services.

The concerns regarding student debts make it all the more important to continue studying the manner in which loan forgiveness and scholarships for practicing in underserved areas are administered.

GRADUATE MEDICAL EDUCATION IN KENTUCKY

The continuum of medical education starts with undergraduate medical education and continues with graduate medical education or residencies. Another way to increase the physician workforce would be to increase the number of residency positions in Kentucky. Ideally the number of first-year residency positions should be comparable to the number of medical school graduates, although historically only about 40-50% of medical school graduates stay in Kentucky for residency (12, 20). Nationally, more physicians tend to stay in the state where they did their residencies (65%) than where they went to medical school (45%).

Kentucky currently has 269 first year allopathic residency positions and 18 osteopathic residency positions. The positions are distributed among all specialties. If the number of allopathic medical school and osteopathic medical school graduates increases, the number of

first year residency positions should increase as well to accommodate at least 50% of the increase in graduates.

The main sources of funding for graduate medical education are from Medicare, the Veterans Administration, and private funding of programs and positions. Since the Balanced Budget Act of 1997, Medicare has capped the number of residency positions funded. Only those hospitals that have not previously had residency programs are eligible for new positions funded by Medicare. Additional positions in existing programs must be funded by hospital, clinic or physician revenues. There are efforts in Congress to expand the number of residency positions funded by Medicare, particularly in states that now have a smaller number of positions. Kentucky is one of those states, and if the legislation is approved, Kentucky should be in a position to gain additional funded positions. Consideration should be given to the location and disciplines of these positions. For example, since Kentucky needs more specialties in rural/underserved areas, some of the new positions should be targeted for those specialties and areas.

The timing of the creation of new residency positions should be well planned. Any newly created residency positions should begin when the proposed increases in allopathic and osteopathic medical school graduates occur so that the positions are available to the Kentucky graduates.

FACTORS INFLUENCING THE FUTURE SUPPLY OF PHYSICIANS

A number of factors influencing the supply of physician work hours or FTE include age of physicians, retirement rates, gender, work ethic and type of practice (4, 17).

Nearly half of medical school students nationwide are now women. Increasingly women are assuming a larger role within Kentucky's physician workforce. During the 10-year period ending in 2004, the number of female physicians practicing in the Commonwealth grew from fewer than 1,500 to nearly 2,500. However, most of the growth within the State's female physician workforce occurred in urban areas. During the same 10-year period, the number of women practicing medicine in urban Kentucky locations increased from 1,200 to approximately 2,000, while rural areas added about 200 female physicians. As of 2004, female physicians represented 34% of all licensed physicians in urban Kentucky but only 18.5% of the total in rural areas. While an uneven distribution of physicians is true for male practitioners as well, one suggestion for a higher percentage of women choosing urban practice is that their spouses generally are professionals for whom there are fewer job opportunities in rural areas. Women physicians are also more likely to serve minority, urban and poor populations and are twice as likely to go into primary care, which further jeopardizes the growth of primary care physicians in rural Kentucky communities. Female doctors in training now outnumber men in family medicine, pediatrics, obstetrics and gynecology, psychiatry, and dermatology.

In review of trends in physician productivity, the Health Resources and Services Administration report, *Physician Supply and Demand: Projections to 2020* (16), found that female physicians tend to work approximately 15% less time in patient care than do their

male counterparts after controlling for age, specialty and IMG status (these data differ somewhat from the Kentucky data, see Table 2). Physicians over age 65 and under age 36 work fewer hours per year than their middle-aged colleagues, and over time average hours in direct patient care for these two groups has been declining. HRSA also concluded that part of the decline for the younger group reflects the growing proportion of women in the workforce.

A recent survey examining current physician attitudes and preferences found that younger physicians and women are less willing to work the traditional large number of hours that older women and male physicians are. The survey found that an increasing proportion of physicians today, regardless of age and gender, seek quality of life and organizational support (4). This has translated to working fewer hours and seeing fewer patients. The focus on lifestyle has also influenced choice of specialty. Some specialties such as radiology and dermatology are considered to be *lifestyle friendly* when compared to *lifestyle killers* such as general surgery and OB/GYN.

Increasingly more physicians are choosing early retirement (14). According to the American Medical Association's statistics, nearly half of doctors age 50 or older plan to leave medicine within the next three years. Of these 38% plan to retire and 12% plan to seek jobs in non-medical settings. The primary reason for early retirement is frustration due to managed-care regulations; 56% of physicians cite managed care as first on their list of professional frustrations and a "significant factor" in their decision to change their style of practice. Some physicians (15%) also report Medicare and Medicaid regulations as serious frustrations. The research literature does not substantiate that malpractice fears motivate early retirement, although it is believed to be an important factor. Texas has experienced a major influx of physicians since 2003 when the legislature limited awards on non-economic damages in malpractice cases to \$250,000. The benefits that have accrued to Texas (2003) and Mississippi (2004) since passing their tort reform legislation should be reviewed and the impact of similar action for Kentucky considered. Other potential reforms; pretrial screening of cases, central databases for analysis of adverse medical events, statute of limitations of claims for minors and birth injuries, medical claims conciliation panels, and a medical malpractice insurance commission should also be considered.

www.ncsl.org/standcomm/sclaw/medmaloverview.htm

www.ncsl.org/standcomm/sclaw/medmalreform07.htm

FACTORS INFLUENCING THE FUTURE DEMAND FOR PHYSICIANS

The demand for physicians is expected to increase in Kentucky and the United States over the next decade. Nationally, projections suggest that by 2020 the requirements for physicians involved primarily in direct patient care will increase by 22% over their 2005 level, from approximately 713,800 to 921,500. Assuming that requirements for physicians who primarily perform non-patient care functions, such as administration, teaching and research, remain unchanged (or about 6% of total physicians), then overall requirements for physicians in the US will increase from approximately 756,100 to 976,000 during this period.

Among the determinants fueling these physician requirement projections, especially the non-primary care physicians, is the increasing demand for physicians as a result of a rapidly growing elderly population. Attributable to increased longevity and aging of the *baby boom generation*, the size of the population segment aged 65 and older is expected to increase in all states and the District of Columbia through 2025. Kentucky already is one of the nation's *grayer* states – 12.5% of its population was age 65 or older, according to the 2000 Census – and is projected to have the 14th highest proportion of elderly residents by 2025 (1). At that time, it is predicted that those who are 65 and older will comprise 21.3% of the State's population. Further exacerbating the issue is the prediction that some regions of the State, presumably rural, are likely to have even higher concentrations of elderly residents.

Because the elderly have different, and generally greater healthcare needs than younger generations, such acceleration in the size of the 65 and older population could substantially increase overall demand for healthcare services and consequently the demand for health workers, including physicians. The National Center for Health Workforce Analysis cites other major implications of an aging population on healthcare personnel. For instance, the overall incidence of cancer will increase through 2025, according to the US Centers for Disease Control and Prevention. Cancer is predominantly a disease of older people, with 60% of diagnoses occurring in individuals over age 65. Additionally, improved cancer survival rates are likely to lead to a significant rise in individuals who need continuing care. Furthermore, the healthcare workforce is aging along with the general population, and there is concern that the future supply of health professionals will be inadequate to meet demand.

An issue that also deserves consideration in estimating the future number of physicians is the poor health status of many children and teenagers. Currently the patterns of unhealthy behaviors among its adults are beginning to show up in subgroups of Kentucky's youth, especially obesity, physical inactivity, and poor nutrition in minority urban and high-poverty rural groups.

Other factors influencing physician requirements for Kentucky residents are the high rates of chronic diseases. The Commonwealth has many health and health-related problems at far greater rates than national averages, which, if not corrected, might necessitate additional physicians beyond those that will be required in order to serve a growing and aging populace. Currently, Kentucky is tied at 49th for the percentage of persons who smoke, 45th in the percent of adults who are obese, 49th in poor mental health days in the past month, 48th in poor physical health, 46th in cardiovascular deaths, 50th in cancer deaths, 42nd in premature deaths, and 50th in total mortality (3). All of these factors are interrelated. The State's unfavorable rankings for premature death and total mortality, for instance, are largely a result of equally unfavorable rates of chronic diseases. Those chronic diseases, in turn, often are the result of health-damaging behaviors, particularly tobacco use, physical inactivity and poor nutrition. Therefore, chronic diseases, which account for 70% of Kentucky's total mortality and are among the most prevalent and costly of all health problems, are highly preventable through improvements in personal behaviors and regular primary healthcare.

It is important to note that education and health go hand-in-hand, improvement in one is likely to upgrade the other, and good standing in both is needed to improve the quality of life for all Kentuckians. Healthier children are better learners, which is important considering the widespread personal and societal benefits associated with education. Educated people are more likely to understand the life risks involved with poor health and, therefore, to make better lifestyle choices. Kentuckians' low educational attainment levels and poor health literacy rates, particularly in rural areas, make it likely that a higher ratio of physicians to population, which means a substantially larger number, will be required in the coming years. According to the 2000 Census, 74.1% of Kentuckians age 25 and older had graduated from high school (compared to the national rate of 84.6), and only 17.1% of the State's residents had earned a bachelor's degree or higher (the national rate was 27.2). Additionally, as much as 44% of the Commonwealth's adult population had quite modest, minimal or no functional literacy skills, according to a 1997 report on the Kentucky Adult Literacy Survey prepared by the University of Kentucky's Martin School of Public Policy and Administration. The poorest literacy rates, which can inhibit residents' abilities to understand health information, were found in rural areas (22).

Kentucky's high poverty rates could affect its future need for physicians. The State's poverty rate was 16.3% in 2004, according to a 2006 Census report, compared to the national rate of 12.7%. Forty-three Kentucky counties had poverty rates that exceeded 20% (all of them rural) and 16 counties had rates over 30%. In much of Kentucky, poverty has been intractable. Out of 386 *persistent poverty counties* in the US, those with poverty rates of 20% or higher for the previous four years, 43 are in Kentucky, and all are rural (11). All of the social and economic forces represented by these factors contribute to the State's high number of uninsured residents – 600,600 as of 2006. Poverty-stricken and uninsured residents tend to be less healthy, thus requiring more medical attention.

METHODS FOR ESTIMATING AND PROJECTING THE KENTUCKY PHYSICIAN SUPPLY, NEED, AND DEMAND TO 2020

This analysis began with a careful examination of the health status for Kentucky and an estimation of the size and characteristics of the current physician workforce. Data describing key physician demographics were supplied by the Kentucky Board of Medical Licensure (KBML) covering three years (2005-2007) and assembled for 10 years from the Area Resource File (releases 1997-2006). Age, gender, race/ethnicity, hours worked per week, medical school, birth place, medical specialty, and other descriptors were available. Several other data sources were used. These data were used to estimate the current physician supply, examine historical patterns and to make projections to 2020.

The Physician Supply Model (PSM) and Physician Requirements Model (PRM) developed by HRSA were chosen to make estimates of supply and need and demand requirements for Kentucky (16). These models are well documented and widely used in physician workforce planning. They are baseline projection models constructed using assumptions about trends in physician practice characteristics, utilization of physician services by particular age and socio-economic population groups, impact of rising income and changing expectations by health consumers on demand, and the likely state of the economy. These models include

growth factors (plus or minus) for 18 medical specialties. The basic PSM and PRM make projections from a base year of 2005 to 2020. KIOM, however, having data for 2007, adjusted the model using interpolation so as to make projections from 2007 to 2020. The more current KIOM data are likely to produce more accurate results. The PSM and PRM growth factors were consistent with KIOM's decision to recognize the current undersupply of physicians in Kentucky, and therefore provide projections based on the US ratio of 267.9 physicians to 100,000 population, rather than Kentucky's quite low rate of 213.5.

The PSM and PRM are constructed to acknowledge the impact of variables such as age and the increasing number of women physicians on the estimates and projection of physician numbers. For example, age is correlated with retirement probability and annual hours worked; this creates a concern that must be addressed because a growing proportion of physicians are nearing historical retirement age as illustrated by the shifting physician age distribution. Another issue is that during the past three decades the proportion of new medical graduates who are female has risen from 10% to close to 50%. Second, the growth in female representation is a relatively recent phenomenon, and it is predominantly male physicians who are nearing retirement age. In some studies it is estimated that female physicians work less time than male physicians. At least for the time period covered by our data, Kentucky female physicians work about the same hours as male physicians. This is one of many issues that needs to be tracked over time for improved physician workforce planning.

The baseline projections made using the PSM and PRM assume that current patterns of new graduates, specialty choice, and practice behavior continue.

After detailing the characteristics of Kentucky physicians and the number in active practice by specialty, an estimate was made of what the number of Kentucky physicians would be by specialty if the State were at the minimal US ratio of 267.9 physicians per 100,000 population, rather than its actual rate of 213.5. These new baseline numbers were included in the HRSA Physician Supply Model (PSM) and projected for 18 medical specialties from 2007 to 2020. The difference between the current supply, as derived from data from the KBML, and the projected rates were used to determine both current and future shortages of Kentucky physicians by specialty. These were ranked to indicate the top specialties in which shortages were most likely. These estimated shortages were compared with forecasts of shortages from the literature for such specialties as family physicians, adult psychiatrists, medical oncologists, e.g., and the Kentucky results correlated very highly with the results from other research. As an illustration, our projection to 2020 for family medicine shows a physician to population ratio of 43/100,000 compared with the recommended ratio of 42/100,000 population by the 2006 Congress of Delegates for Family Physician Workforce Reform.

The baseline estimates of physician supply for Kentucky physicians derived using the PSM were entered into the PRM model to make projections of the number of physicians to meet healthcare need and demand by 2020. These data were then sorted by specialty by rural-urban counties in the aggregate by Kentucky's fifteen Area Development Districts (ADDs)

so that comparisons can be made of current and likely future distribution of Kentucky's physicians according to information about regional needs.

Estimation Steps and Data Sources:

1. Specify statewide population, demographic, and economic characteristics and trends.
2. Specify health behaviors, health status, and illness and mortality rates and patterns.
3. Specify characteristics of Kentucky physicians in 2007 and previous years by status (retired, active, locum tenens), specialty, geographic location of practice by hours worked in up to three counties and by rural-urban classification, age, gender, race/ethnicity, birthplace, medical school, and area of activity (administration, hospital based, private practice, research, etc.).
4. Compare Kentucky and US physician distributions by specialty and ratio of physicians to 100,000 population.
5. Apply the HRSA Physician Supply Model (PSM) to determine what Kentucky's current shortage would be vis-à-vis the 2007 supply of 8,981 active physicians, if the State were at the US physician to population ratio of 267.9 to 100,000 population, rather than the Kentucky rate of 213.4.
6. Apply the HRSA Physician Requirements Model (PRM) to project the likely physician supply in 2020 from the adjusted Kentucky ratio to the US ratio and to project the number of physicians required to meet health care need and demand in the year 2020.
7. Specify data sources for the analysis. Data for descriptions and forecasts came from the Kentucky Board of Medical Licensure (KBML), Area Resource File (releases 2006-1997), Kentucky State Data Center online resources, The Health of Kentucky, 2007 (unreleased KIOM report), US Centers for Medicare and Medicaid (AdminaStar Federal), US Department of Agriculture (Economic Research Service), Workforce Kentucky online data sources (Kentucky Cabinet for Workforce Development and Unemployment Services), and the US Department of Health and Human Services, Health Resources Services Administration, National Center for Health Workforce Analysis.
8. Specify data sources for the analysis. Data pertaining to medical student attitudes and experiences, medical school applicants, and graduation and in-state retention rates were provided by the University of Louisville School of Medicine, Pikeville School of Osteopathic Medicine, and the University of Kentucky College of Medicine.

Although much effort has been devoted to locating, compiling, organizing and displaying the data presented in this report, it is inevitable that there are a number of

limitations. Some are related to the accuracy of the data in the original sources, some are related to the timeliness of the data, and others are related to the lack of consistency of definitions over time. The Physician Supply Model and Physician Requirements Model used to make estimations and projections are well tested physician workforce models. These models were used to make projections to the year 2020 of the number of physicians necessary to meet the need and demand of Kentuckians for physician services.

PROJECTED 2020 PHYSICIAN WORKFORCE FOR KENTUCKY

In order to determine the adequacy of the current physician supply appropriate for Kentucky, the data for Kentucky's workforce supply was compared to national statistics and adjusted. Then these Kentucky workforce data were used to project the supply, need, and demand for physicians in 2020. These data are presented in Table 6.

Kentucky currently has 8,981 active physicians or 213.5 physicians per 100,000 population, which is markedly below the national physician workforce ratio of 267.9. In order for Kentucky to have a comparable physician-to-population ratio, Kentucky would require an additional 2,298 physicians or a 25.6% increase over current numbers. Most of this increment would be in the primary care specialties (especially general internal medicine 45.9%, pediatrics 27.2%, family medicine 26.7%), but other specialties are in great undersupply as well (e.g. general surgery 66.6%, psychiatry 48.6% and obstetrics and gynecology 37.4%). In fact, Kentucky has an undersupply of all specialties except for possibly cardiology and emergency medicine. The change in the number of cardiologists could be a sign of an aging population, and the number of emergency medicine physicians reflects excessive emergency room utilization.

Using the number of physicians adjusted to the national physician-to-population ratios, the supply, need and demand for physicians in Kentucky projected for 2020 would require 12,846, 13,422 and 14,989 physicians or an increase of 43.0%, 49.4% and 66.9% over current numbers. Again, much of the projected increase should be in the primary care specialties (49.7-59.6%). The specialties projected to be most in undersupply, need or demand in 2020 would be general surgery (62.2-231.5%) and psychiatry (62.8-208.0%), although all specialties require an increase in workforce. Emergency medicine appears to require the fewest number of physicians by 2020, but a lot depends on whether emergency rooms will continue to be used as an access point to care.

For the past 10 years the average annual growth in active physicians for Kentucky is 2.4%. If Kentucky continues to attract active physicians at a rate of 2.4% per year, this would add 3,243 physicians by 2020, but the Commonwealth would still need 622 more active physicians to reach the projected supply requirement, 1,198 to meet need, and 2,765 to meet demand, or an increase ranging from 7-30%.

**Table 6: Kentucky Physicians, 2007
Estimated Supply and Projected Supply, Need, and Demand**

Specialty	US 2007	Kentucky 2007				Kentucky 2020		
	Current Ratio	Current Ratio	Current Number	Needed to Meet US Ratio	Total Projected Need Using Current US Ratio	Total Projected Supply	Total Projected Need Using Current US Ratio	Total Projected Demand Using Current US Ratio
Total	267.9	213.5	8,981	2,298	11,279 (25.6%)	12,846 (43%)	13,422 (49.4%)	14,989 (66.9%)
Primary Care	94.1	74.4	3,128	835	3,963 (26.7%)	4,684 (49.7%)	4,636 (48.2%)	4,993 (59.6%)
General Family Practice	38.0	34.1	1,435	167	1,602 (11.6%)	1,893 (31.9%)	1,858 (29.5%)	2,018 (40.6%)
General Internal Medicine	38.4	26.3	1,108	509	1,617 (45.9%)	1,911 (72.5%)	1,973 (78.1%)	2,122 (91.5%)
General Pediatrics	17.7	13.9	585	159	744 (27.2%)	886 (51.4%)	803 (37.3%)	867 (48.1%)
Cardiology	7.4	8.2	346	-34	312 (-9.8%)	342 (-1.2%)	403 (16.4%)	472 (36.3%)
General Surgery	13.9	8.4	352	234	586 (66.6%)	571 (62.2%)	715 (103.2%)	815 (131.5%)
Obstetrics/ Gynecology	14.4	10.5	441	165	606 (37.4%)	701 (58.9%)	661 (49.8%)	706 (60.1%)
Ophthalmology	6.6	5.5	233	44	277 (18.9%)	282 (20.9%)	343 (47.4%)	421 (80.7%)
Orthopedic Surgery	8.6	6.8	284	76	360 (26.8%)	369 (30.0%)	432 (52.1%)	528 (86.1%)
Otolaryngology	3.4	3.0	128	17	145 (13.2%)	149 (16.1%)	169 (32.4%)	208 (62.1%)
Urology	3.7	3.3	137	19	156 (13.9%)	147 (7.0%)	197 (43.6%)	217 (58.4%)
Anesthesiology	13.4	10.8	454	111	565 (24.5%)	678 (49.3%)	690 (51.9%)	800 (76.3%)
Emergency Medicine	9.2	10.7	449	-61	388 (-13.6%)	486 (8.1%)	439 (-2.3%)	472 (5.2%)
Pathology	6.1	5.0	212	47	259 (22.0%)	272 (28.4%)	310 (46.5%)	371 (74.9%)
Psychiatry	13.6	9.2	385	187	572 (48.6%)	627 (62.8%)	652 (69.5%)	801 (108%)
Radiology	11.0	8.0	337	126	463 (37.3%)	467 (38.5%)	564 (67.5%)	643 (90.8%)

IMPROVING THE PHYSICIAN SUPPLY

Kentucky needs more physicians, and there is no disputing that rural communities in Kentucky are in greatest need (5, 13, 20). There seem to be two primary methods to get them there: recruiting doctors from outside the State into the Commonwealth's rural areas or, preferably, increasing the number of students from rural Kentucky who enroll in medical schools.

Part of the reason for rural Kentucky's inability to produce its own physicians has been that not enough of its students pursue health professions education. There are initiatives under way at the Area Health Education Centers (AHECs) based at the Universities of Kentucky and Louisville to address that issue. There are similar Health Careers Opportunity Programs at UK, UofL and Pikeville that seek to increase the number of disadvantaged and under-represented students pursuing careers in the health professions. These programs include development of activities to build diversity in health professions, address identified risk factors for school failure, and explore ways to narrow achievement gaps and assure students in the programs remain in the educational pipeline. Another program is the M-1 Trover Rural Pathways Program which is designed to maintain interest in rural practice among rural students.

The addition of an osteopathic medical school in Pikeville in 1997 creates a better chance of attracting rural doctors, at least those who plan to pursue primary care fields such as family practice. Prior to the establishment of the Pikeville School of Osteopathic Medicine, Kentucky's only medical schools were allopathic and located in urban settings at the University of Kentucky in Lexington and the University of Louisville. Osteopathic medical schools have a long tradition of serving rural communities, and physicians who are trained in osteopathic medicine have proven to be more likely to select family practice as a specialty than those trained in allopathic medicine (46% vs. 11%) and to practice in rural areas (18.1% vs. 11.5%).

Prior failures to target young students and successfully funnel them through the rural physician training pipeline has caused it to be described as *leaky*, with many opportunities along the way for rural students to become attracted to urban life during their education. Part of the solution for this could be regional rural campuses that provide an opportunity for students to spend the last two years of clinical medical school training in smaller towns. Studies repeatedly have found that physicians tend to practice in communities similar to those in which they train.

Kentucky's medical schools could also emulate the nationally recognized Physician Shortage Area Program at Thomas Jefferson University's Jefferson Medical College. Although based in Philadelphia, this admissions and educational program was created in 1974 to address Pennsylvania's longstanding rural primary care physician shortage. Thirty-three years later, it has some of the most successful outcomes in the nation, including a multifold increase in recruitment of rural physicians and rates of lengthy retention.

Other options for increasing the number of physicians throughout the State are the creation of new medical schools and the expansion of existing class sizes. Despite an increase in population and related illnesses, the number of allopathic medical school graduates has remained relatively stable over the past 30 years, and there has been only one new allopathic medical school opened during that time. Nationally, some 20 new medical schools are now under consideration; however, none of those is planned for Kentucky. Each of the State's medical schools has increased annual admissions in recent years – from 60 to 75 at Pikeville College, from 95 to 103 at UK, and from 141 to 149 at U of L. The University of Kentucky is considering rural clinical campuses similar to the University of Louisville's clinical campus in Madisonville. Currently these schools have no other plans to increase graduation rates.

Due to the cap on Medicare funding of positions in graduate medical education, the number of residency positions in Kentucky has been relatively stable for several years. One way to increase the physician supply would be to increase the number of residency positions. If the numbers of allopathic medical and osteopathic medical graduates increase, it follows that additional residency positions will be needed. Therefore, Kentuckians should support recently introduced federal legislation (S. 588) that would increase the number of residency positions for which Medicare payments will be made to teaching hospitals in Kentucky and 23 other states with a shortage of resident physicians.

Kentucky could also provide better incentives for rural practice and retention. An example is the National Health Service Corps and the State Loan Repayment Program. Under this federal initiative, grants are awarded to states to assist in uniting communities in need with primary care professionals. This is a matching program that provides loan repayment for qualified educational loans incurred by these professionals. In return, the professionals make a two-year commitment to work full-time for a sponsoring organization in a federally designated health professional shortage area. In Kentucky, health professionals must seek their own sponsors for loan repayment; the award amount is negotiated between the health professional and the sponsoring organization. The award can be no more than \$35,000 per year (\$17,500 federal funds, \$17,500 matching) for a total of \$70,000 for a two-year obligation.

This loan repayment program has always generated intense interest from health professionals and interested organizations. Despite the interest and the need for the program, difficulties are encountered in trying to find healthcare organizations willing and/or eligible to participate in the program mainly due to a lack of funding availability. State government has failed to establish incentives or set aside funds for the matching component, rendering the program only modestly successful in Kentucky. A previous report proposed the use of coal-severance tax funds for rural health care organizations' matching portion. Tobacco-settlement monies are another avenue of potential support for the program.

The administration of current loan repayment programs should be reconsidered to prevent physicians and their employers from buying out the physicians' contracts.

RECOMMENDATIONS

This report demonstrates that Kentucky is likely to face a shortage of physicians of 25.6% by 2020. Rural areas are more likely to experience serious deficiencies than other areas. To address the projected shortage and maldistribution of Kentucky physicians, the following strategies should be considered:

1. Strategies to increase the supply of physicians in Kentucky
 - a. Increase the applicant pool. Kentucky has a relatively low number of applications for its medical school classes, especially applicants from underserved areas in the State.
 - b. Increase medical school class size. The University of Kentucky, University of Louisville, and the Pikeville School of Osteopathic Medicine medical schools can only increase class size to a minimal degree without additional capital construction.
 - c. Develop regional clinical medical school campuses. The University of Louisville currently has a clinical campus in Madisonville. Additional clinical campuses could be developed as long as more students can be taught the basic science years of medical education at the three existing medical schools, and the resources are available at the regional sites for teaching during the clinical years.
 - d. Increase residency programs. Additional residency programs in family medicine and other specialties should be considered. In view of the current cap on Medicare-funded programs, new federal legislation should be encouraged to support these additional programs financially. The programs should be in disciplines that are in need, and most of them should be located in rural areas to encourage the location of physicians in those areas. The timing of new program development should coincide with the expansion of the three existing medical schools to provide graduates for these residencies.
 - e. Provide incentives to encourage physicians to practice in Kentucky, especially in underserved areas. Debt relief and other incentives can be offered to recruit and retain physicians to practice in Kentucky.
 - f. Support the expansion of the National Health Service Corps. The federal government funds physicians who agree to practice for two years in a designated physician shortage area. This program should be expanded and Congressional representatives should be encouraged to support it.
 - g. Improve the medical liability environment in Kentucky. Despite having a strong Kentucky Board of Medical Licensure with a history of overseeing the quality of physician care of patients, the litigious atmosphere in the State might prevent immigration of physicians and may encourage Kentucky physicians to relocate in

other states. The Kentucky legislature should review the actions of other states in addressing this issue and consider possible action for Kentucky.

- h. Make part time or retired physicians more aware of malpractice coverage available under the Federal Tort Claims Act through the Bureau of Primary Health Care (<http://www.bphc.hrsa.gov/freeclinicsftca/appliation.htm>) to encourage them to participate more in voluntary or indigent clinics without the fear of medical liability or the cost of malpractice insurance. Efforts to address physician concerns about malpractice and part time patient care could increase the supply of physicians.

2. Strategies to increase the diversity of the physician workforce.

- a. Encourage the allopathic medical schools and osteopathic medical school to increase the number of under-represented minority students and faculty members in their institutions. In order to provide the types of physicians that are most likely to provide care for all segments of the population, medical school classes should reflect the current and projected changes in the demography of Kentucky.
- b. Increase minority applicant pool. The projected growth in Kentucky's African-American and Hispanic populations require additional minority physicians. Qualified minorities should be identified early and encouraged to pursue health careers.
- c. Develop a career pipeline for under-represented minority students in medicine. Programs should be developed to encourage students in minority populations to seek careers in medicine.

3. Strategies to address the maldistribution of physicians in Kentucky.

- a. Select more allopathic medical school and osteopathic medical school applicants from rural and underserved areas. Physicians are more likely to practice in rural areas/underserved areas if they are from those areas.
- b. Educate more students in rural and other underserved area training sites. Students trained in rural areas are more likely to remain and practice in rural areas. This has been shown for both medical students and residents trained in rural environments. Regional clinical campuses and rural residency programs provide this experience.
- c. Identify physician shortage areas annually. Data should be provided to physicians and employers that may be seeking funding for locating in federally designated physician shortage areas (HPSA). These data may be used to seek increased Medicare/Medicaid or other cost-based reimbursement available to federally assisted health provider organizations (e.g. Federally Qualified Health

centers, Rural Clinics) and to identify locations for the physicians in the National Health Service Corps.

- d. Utilize the state physician placement programs. As part of the 1990 Health Omnibus Bill, the University of Kentucky (866-770-6843) and the University of Louisville (800-821-1088) established health professional placement services. These services are available to both physicians looking to locate in particular areas and to employers seeking a physician. Fees for physician placement in rural medically underserved areas should be paid for by the State of Kentucky.
 - e. Provide debt relief to physicians practicing in underserved areas. The Rural Kentucky Medical Scholarship Fund and the State Office of Rural Health offer debt relief to physicians going into underserved areas. However, in many cases, physicians opt out of the agreement by paying the loan or employers reimburse the funds in order to hire the physician. The criteria and conditions for obtaining these funds should be reconsidered so that this form of debt relief is seen as incentive rather than punitive.
 - f. Allopathic Medical and Osteopathic Medical Schools should establish rural training tracks that encourage a commitment to rural care. Longitudinal educational tracks like the Jefferson Medical University Physician Shortage Area Program have been successful in identifying and encouraging students to enter under-represented specialties and practice in underserved areas.
 - g. Develop more Federally Qualified Community Health Centers. The federal government has had a major effort to establish more cost-based community health centers to provide care to the underserved without regard to the ability to pay.
 - h. Promote higher reimbursement in shortage areas. Kentucky Medicaid and private insurance should be encouraged to increase reimbursement to physicians practicing in designated rural/underserved areas, similar to the increased Medicare reimbursement in health professional shortage areas.
4. Strategies to increase physician productivity.
- a. Develop better healthcare systems. Physicians should be trained with inter-professional teams to establish better systems of care that provide comprehensive preventive, acute, chronic and end-of-life care to patients. Other professional members of the team should include nurses, pharmacists, nutritionists and other health professionals. A study or commission of national experts to develop better systems of care, considering how midlevel practitioners can best function in those systems and the role of physicians in the future should be considered.
 - b. Enhance telecommunications for the care of all patients. Kentucky has an extensive telecommunications network in the Kentucky TeleHealth Network.

Physicians are currently reimbursed by Medicaid for specialty care only and primary care should also be reimbursed appropriately.

5. Strategies for more effective workforce planning.
 - a. Establish a system for ongoing workforce data collection and planning. The significant need for more physicians in Kentucky in the future will require continued monitoring of the physician workforce. The Commonwealth of Kentucky should consider funding ongoing physician workforce research and planning. An update of physician workforce estimates and projections should be conducted at least every three years to capture trends in physician practices, patient preferences, economic and market changes, and changes in healthcare organization and technology. Many federal health grant program applications require physician workforce data that are current as of three years.

REFERENCES

1. Kentucky State Data Center. (August 2007). Online data services. Accessed at: <http://ksdc.louisville.edu/>
2. US Department of Agriculture, Economic Research Service. (August 2007). Online data services. (August 2007). Accessed at: <http://www.ers.usda.gov/Data/>
3. CDC Wonder. US Centers for Disease Control. (August 2007). Online data services. Accessed at: <http://wonder.cdc.gov/>
4. Council on Graduate Medical Education (COGME) 16th report: Physician workforce policy guidelines, 2000-2020. (January 2005). Available at: <http://www.cogme.gov/16.pdf>
5. Jones, J. (2002). Rural Kentucky addresses doctor shortage. Rural Health Update. Spring 2002: 1-3.
6. US Department of Health and Human Services, Council on Graduate Medical Education. (2005, January) Physician workforce policy Guidelines for the United States, 2000-2020. 16th report.
7. Association of American Medical Colleges. (2006, June). AAMC Statement on the physician workforce. Retrieved July 23, 2007, from <http://www.aamc.org/workforce/workforceposition.pdf>
8. Pearce, KA, Matheny, SC, and Casey, BR. (2002, February). Training family physicians for rural Kentucky: Physician shortage likely to worsen without better funding. Kentucky Academy of Family Practice Journal.
9. American Medical Association. (2006). IMGs in the United States. Retrieved July 13, 2007, from <http://www.ama-assn.org/ama/pub/category/print/211.htm>
10. Jones, J., and Whitler, ET. (2002). Changes in J-1 visa waivers: Implications for rural Kentucky. Rural Health Update. Summer 2002: 6-7.
11. Area Resource File (Releases from 2006-1997). National Center for Workforce Analysis, Bureau of Health Professionals, Health Resources and Services Administration, US Department of Health and Human Services.
12. Jolly, P. (2004). Medical school tuition and young physician indebtedness. Association of American Medical Colleges. Retrieved July 17, 2007, from <http://www.aamc.org/studentdebt/>
13. Rankin, M.D. (2006, October). Time to recruit more physicians for Kentucky! PowerPoint presentation. University of Kentucky Center for Excellence in Rural Health, Hazard, Ky.
14. American Medical Association, Physicians enticed into early retirement. Retrieved September 11, 2003, from http://www.ama-assn.org/sci-pubs/amnews/pick_00/prl20724.htm

15. Merritt, Hawkins & Associates. (August 2007). Year 2000 Survey of Physicians 50 Years Old and Older. Online data services. Accessed at: <http://www.merritthawkins.com/>
16. Physician supply and demand: Projections to 2020. National Center for Workforce Analysis, Bureau of Health Professionals, Health Resources and Services Administration, U.S. Department of Health and Human Services.
17. Changing demographics: Implications for physicians, nurses, and other health workers. National Center for Workforce Analysis, Bureau of Health Professionals, Health Resources and Services Administration, U.S. Department of Health and Human Services.
18. Sherrod, R., and Heumann, J. (2005, April 20). Two national medical groups will assess the supply and demand of clinical oncologists for the next 20 years. Association of American Medical Colleges and American Society of Clinical Oncology joint press release. Retrieved July 23, 2007, from <http://www.aamc.org/newsroom/pressrel/2005/050420.htm>
19. American Academy of Family Physicians. (2002). Keeping physicians in rural practice. Position paper. Retrieved July 24, 2007 from <http://www.aafp.org/online/en/home/policy/policies/r/ruralpracticekeep.html>
20. Casey, BR, Jones, J, Gross, DA, and Dixon, L. (2005, October). Rural Kentucky's physician shortage: Strategies for producing, recruiting and retaining primary care providers within a medically underserved area. Journal of the Kentucky Medical Association. October 2005: 505-513.
21. 2006 University of Kentucky and University of Louisville Medical School Graduation Questionnaire.
22. Jennings, ET and Whitler, ET. Adult Literacy in Kentucky: A Report on the Kentucky Adult Literacy Survey, (Kentucky Department for Adult Education and Literacy, 1997) Available from: Cabinet for Workforce Development, Department of Adult Education and Literacy, Capital Plaza Tower, 500 Mero Street, Frankfort, KY 40601 (502) 564-5114
23. Kentucky Institute of Medicine (KIOM). Taskforce Report. The Health of Kentucky: A County Assessment. May 2007. Lexington, KY.

Appendix – Table 7

Active Kentucky Physicians by Specialization, 2007
Comparison Per 100,000 Population

Specialty	#	KY	US	Specialty	#	KY	US	Specialty	#	KY	US
Addiction Psychiatry	2	0.05		Internal Medicine	1108	26.34	36.3	Pediatric Nephrology	8	0.19	
Aerospace Medicine	2	0.05	0.2	Interventional Cardiology	26	0.62		Pediatric Otolaryngology	3	0.07	
Allergy & Immunology	67	1.59	1.4	Interventional Pain Management	8	0.19		Pediatric Pulmonology	4	0.10	
Anesthesiology	454	10.79	12.8	Maternal-Fetal Medicine	23	0.55		Pediatric Radiology	19	0.45	
Blood Banking/Transfusion Med	2	0.05		Medical Genetics	2	0.05	0.4	Pediatric Surgery	9	0.21	
Cardiovascular Disease	346	8.23	7.5	Medical Oncology	41	0.97		Pediatrics	585	13.91	18.3
Child & Adolescent Psychiatry	59	1.40	2.2	Neonatal-Perinatal Medicine	55	1.31		Physical Medicine & Rehabilitation	69	1.64	2.3
Clinical Cardiac Electrophysiology	85	0.12		Nephrology	97	2.31		Plastic Surgery	83	1.97	2.2
Clinical Genetics	1	0.02		Neurological Surgery	57	1.36	1.8	Plastic Surgery of the Hand	3	0.07	
Colon & Rectal Surgery	11	0.26	0.4	Neurology	150	3.57	4.4	Plastic Surgery within Head & Neck	14	0.33	
Critical Care Medicine	4	0.10		Neuropathology	4	0.10		Preventive Medicine	26	0.62	0.6
Cytopathology	1	0.02		Neuroradiology	10	0.24		Psychiatry	383	9.11	14.1
Dermatology	117	2.78	3.5	Nuclear Medicine	4	0.10	0.5	Pulmonary Disease	145	3.45	3.1
Dermatopathology	3	0.07		Obstetrics/Gynecology	432	10.27	14.4	Radiation Oncology	62	1.47	1.4
Developmental-Behavioral Pediatrics	3	0.07		Occupational Medicine	19	0.45	1.1	Radiology	329	7.82	3.1
Diagnostic Radiology	155	3.69	7.5	Ophthalmology	233	5.54	6.5	Rheumatology	39	0.93	
Emergency Medicine	449	10.68	8.2	Orthopedic Surgery	284	6.75	8.0	Sleep Medicine	5	0.12	
Endocrinology Diabetes & Metabolism	54	1.28		Otolaryngology	128	3.04	3.4	Sports Medicine	6	0.14	
Family Practice/General Medicine	1435*	34.1	30.9	Pain Medicine	49	1.16		Pediatric Nephrology	8	0.19	
Forensic Psychiatry	1	0.02		Pathology/Forensic Pathology	212	5.04	6.7	Surgery	352	8.37	
Gastroenterology	146	3.47	3.8	Pediatric Cardiology	23	0.55	0.5	Surgical Critical Care	2	0.05	
Geriatric Medicine	15	0.36		Pediatric Critical Care Medicine	11	0.26		Thoracic Surgery	84	2.00	1.8
Gynecologic Oncology	19	0.45		Pediatric Emergency Medicine	6	0.14		Undersea & Hyperbaric Medicine	2	0.05	
Hand Surgery	29	0.69		Pediatric Endocrinology	8	0.19		Urology	137	3.26	3.7
Hematology	6	0.14		Pediatric Gastroenterology	10	0.24		Vascular & Interventional Radiology	8	0.19	
Hematology/Oncology	93	2.21		Pediatric Hematology-Oncology	8	0.19		Vascular Surgery	43	1.02	
Infectious Disease	48	1.14		Pediatric Infectious Diseases	8	0.19		Total	8981	213.52	258.2

Source: Kentucky Institute of Medicine. Data supplied by the Kentucky Board of Medical Licensure. US rates by specialty per 100,000 population: American Medical Association. Physician Characteristics and Distribution in the US, 2002-2003 Edition, Chicago, 2002. FP = 1317 and GP = 118.