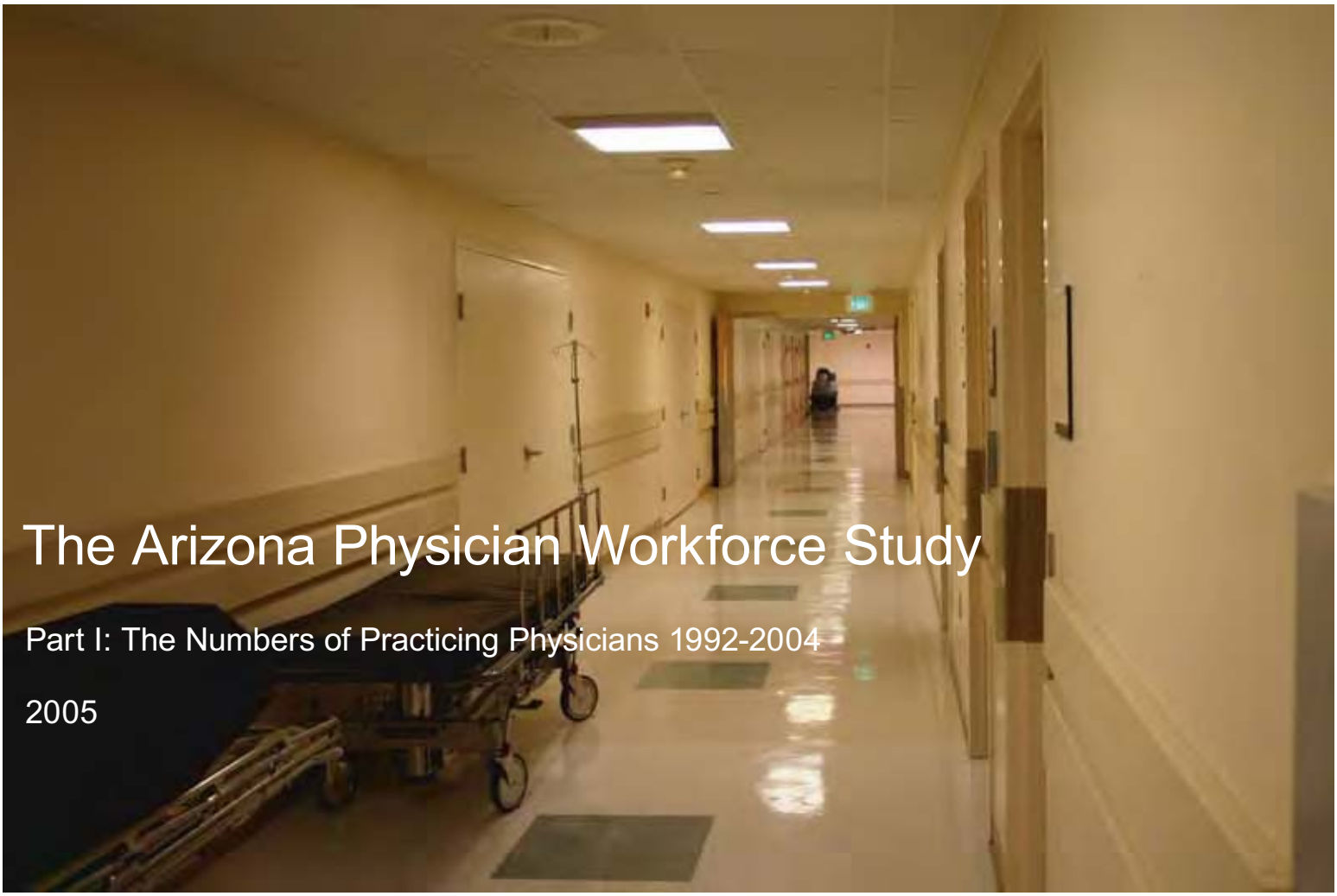

The Arizona Physician Workforce Study

Part I: The Numbers of Practicing Physicians 1992-2004

2005

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Executive Summary

The health of Arizona's citizens depends on an adequate supply of physician services to meet their health care needs. The supply of physician services is determined by the number of practicing physicians, the mix of physician specialties, and by the productivity of physicians. This is the first of two reports on the supply of physician services in Arizona. This report describes the results of a comprehensive review of the current physician workforce in Arizona and of the trends in the number, specialty composition, and geographic distribution of the physicians. A subsequent report (Part II) combines the numbers of physicians with measures of productivity to estimate the supply of physician services.

The Arizona physician workforce increased by 50% from 8,026 physicians in active practice in 1994 to 12,024 in December 2004 (Table 1). The increase in the physician workforce outpaced the increase in the Arizona population during the same decade resulting in an increase in the physician to population ratio from 190/100,000 to 207/100,000. However, the physician to population ratio in Arizona is still far below the national average of 283/100,000 (Figure 6).

From 1992 to 2004, the physician workforce increased in every Arizona county. The rise in population exceeded population increases in 13 of the 15 counties. The rate of growth in physician to population ratios in some rural counties exceeded growth in urban counties but large geographic disparities in the distribution of physicians remain (Figure 7, 8). In 2004, approximately 86% of Arizona physicians practice in either Maricopa or Pima County, and the physician to population ratios range from a high of 276/100,000 in Pima County to a low of 48/100,000 in Apache County (Figure 7, 8).

Approximately 75% of Arizona physicians are in private practice and 41% are in primary care specialties (Table 3, 4). This percentage is higher than the national average of 38%. Since 1992 the number of primary care physicians, hospital-based physicians, and surgeons has increased. However, the number of physicians practicing in allergy, cardiovascular diseases, endocrinology, gastroenterology, hematology, and infectious disease has decreased.

Approximately 90% of Arizona's allopathic physicians graduated from medical schools outside the state (Figure 12). The addition of the Midwestern University Arizona College of Osteopathic Medicine (AZCOM) in 1995 and the planned expansion of the University of Arizona (UA)

College of Medicine will increase the numbers of physicians who are trained in-state.[1] If historical patterns continue, approximately 50% of these students can be expected to enter practice in Arizona. Even if retention rates increased, in-state graduates will remain a relatively small part of the workforce.

The effect of enrollment increases in medical schools on the supply of practicing physicians is also subject to a considerable time lag. In 2006 enrollment growth, for example, will not increase the supply of practicing physicians until these students complete their residency training five to 13 years later in 2011-2019 (Figure 12). The lag between medical school matriculation and completion of medical training is an especially important consideration for Arizona because of the state's rapid rate of population growth. Unless population growth slows, increases in medical school graduates from Arizona will always lag population increases.

The site of residency training is also a major influence on physicians' choice of a location for their practice. The duration of residency training ranges from three to eight years. During this time, residents have the opportunity to establish ties to the community and develop professional relationships, both of which are factors cited by newly licensed physicians as reasons why they chose to practice in Arizona.

Approximately 39% of the physicians who entered practice in Arizona in 2004 completed residency training in the state and approximately 30% of all physicians currently practicing in Arizona completed residency training in Arizona. The number of physicians in residency training in Arizona has only modestly increased from 1,010 in 1992 to 1,076 in 2004 (Table 6). Some of the programs that have closed include osteopathic and allopathic family medicine training programs, the Maricopa Anesthesia Program, and other small fellowship programs. However, these closures have been offset by the development of new programs, especially at Mayo Clinic Scottsdale, which has increased its residency training from two programs with eight residents in 1996 to 30 residency programs with 110 residents in 2004.

Residency training programs are expensive to maintain and some hospitals have been forced to close their residency training programs because of financial costs and/or failure to maintain

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[1] It was recently reported (June 3) that the A.T. Still University, a private osteopathic school based in Missouri, will open a four-year medical school in Mesa, AZ beginning fall 2007 (Snyder, 2005).

accreditation. Closure of these programs can have an adverse effect on the supply of physicians in the state.

The relatively small enrollments in the two medical schools in Arizona combined with the lack of growth in the number of residency slots in Arizona limits the number of practicing physicians that can be obtained from these two sources. In consequence, Arizona will continue its historical dependency on attracting practicing physicians and recent graduates of residency programs from other states and other countries. The current projections of nationwide shortages in physicians will, presumably, increase competition among the states for the pool of physicians. Arizona faces a more difficult problem than other states because its population is increasing more rapidly than nearly any other state in the U.S.

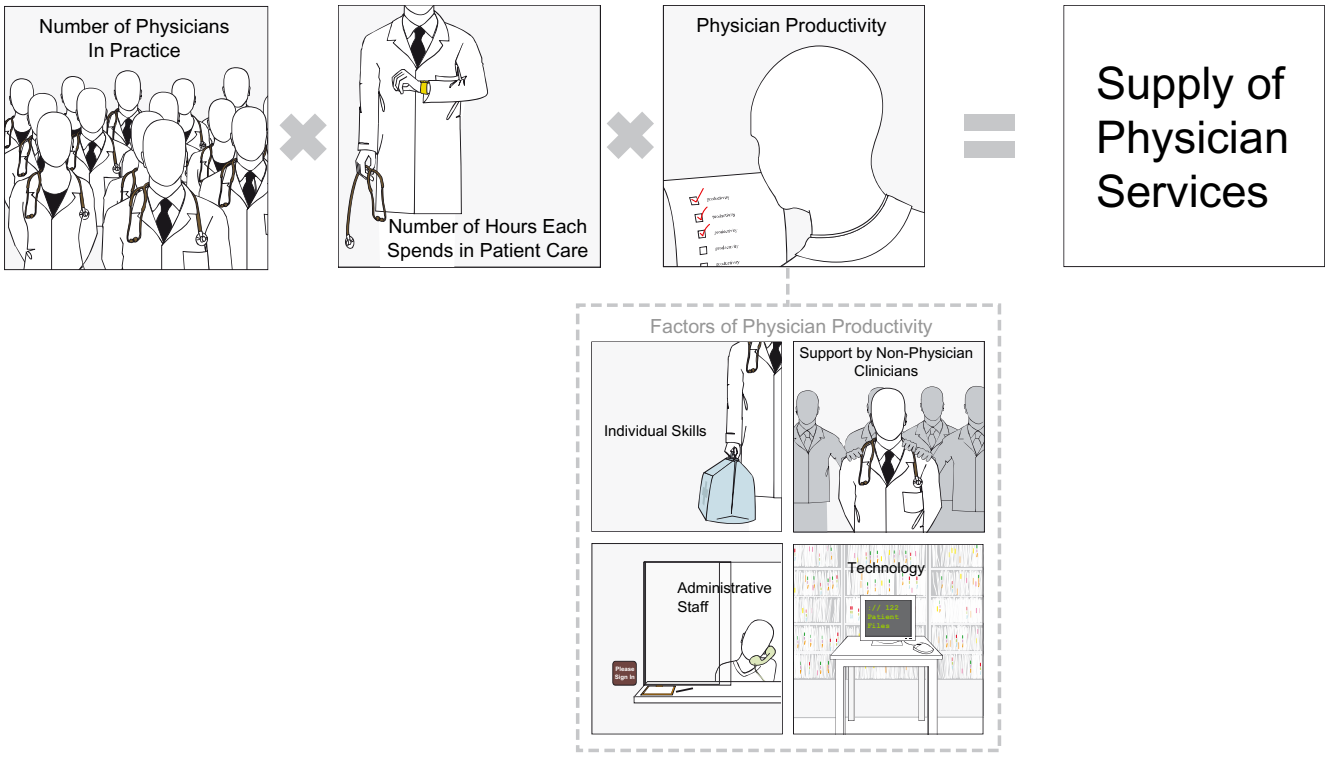
This report puts the question of the Arizona physician workforce in perspective by describing historical trends and discussing the influences that either attract or discourage physicians from practicing in Arizona.

Introduction

Arizona citizens depend on an adequate supply of physician services to meet their health care needs. This report describes the current physician workforce and the trends in the number, specialty composition, and geographic distribution of physicians in Arizona. A subsequent report (Part II) combines the numbers of physicians with measures of productivity to estimate the supply of physician services.

The supply of physician services is the product of the number of physicians in practice, the number of hours each spends in patient care, and their productivity. The productivity of a physician is determined by individual skills, technology, and the level of support from non-physician clinicians, such as nurse practitioners and physician assistants, as well as administrative staff. The number of physicians in practice is only the first of several influences on the supply of physician services (Figure 1).

Figure 1. Influences on Supply of Physician Services



Ideally, the adequacy of the physician workforce should be measured by the quantity and type of physician services that are available to meet the health care needs of a population and by the effect of physician care on the health of the community. The difficulty of assessing the health

care needs, outcomes of physician care, and health status of communities have lead studies of the physician workforce to measure adequacy by comparing the ratio of number of physicians per 100,000 people in a locale to national averages (Feillet *et al.*, 1993; Schwartz *et al*., 1980; Seifer *et al.*, 1995; A. M. Singer, 1989; Whitcomb, 1995).

National mean physician to population ratios do not account for differences among states in the mix of physician specialties, the quality and productivity of their physicians, or population characteristics, such as age and ethnicity that affect the population's health care needs. In Arizona, for example, racial/ethnic minorities represent a higher percentage of the population than the total U.S. population (e.g., 37.3% of the Arizona population versus only 30.9% of the U.S. population in 2002). In addition, a higher proportion of the minority populations in Arizona are Hispanic or Native American and a lower proportion are African-American than in the U.S.

Physician to population ratios are, however, useful as measures of changes in the supply of physicians relative to changes in the size of a population. The relationship between changes in supply and changes in population is especially important in Arizona because of its unusually high rate of population growth. Physician to population ratios are also useful to compare previous reports on physician supply in Arizona. This report, recognizing the limitations of physician to population ratios, describes the number of physicians practicing medicine and the physician to population ratios in Arizona in 2004. These ratios are compared with previous studies on physician workforce conducted from 1992-1997. The descriptive results on physician supply are supplemented by data on the (1) mix of primary care and specialty practices; (2) information on the process by which physicians enter practice in Arizona; (3) changes over time in practice patterns; (4) some data on compensation and medical liability premiums; and (5) results of a survey of physicians entering practice in Arizona.

Our results on physician workforce are based on current and past licensing data from the Arizona Medical Board (AMB) and the Arizona Osteopathic Board (AOB) and survey questions that we include as part of the licensing applications submitted by physicians. Historical trends are obtained from past studies which also were based on the AMB and the AOB licensing data and surveys conducted under the auspices of the Flinn Foundation by the predecessor of the Health and Disability Research Group (HDRG) from 1992-1997 (W. G. Johnson, 1997; W. G. Johnson et al., 1992). Data on physician compensation are obtained from the Medical Group Management Association (MGMA), a nationally known organization whose members comprise

of large medical group practices as well as most medium and small practices; and, the Mutual Insurance Company of Arizona (MICA), a medical malpractice carrier for Arizona, Colorado, and Utah, provided data on medical liability (malpractice) insurance premiums in Arizona. Information on medical liability insurance premiums in other states was obtained from a variety of sources.

The current surveys, described in detail later in this report, are the Practicing Physicians Survey (PPS), which monitors the number of physicians renewing their licenses; the New Physicians Survey (NPS) which tracks the number of physicians applying for an Arizona license for the first time; and the Graduating Residency Survey (GRS) which surveys the resident physicians who complete their residency training in 2005.

The survey questions for renewal licenses (PPS) collect information that is needed to measure physician productivity (e.g., clinical work hours, patient panel) and practice patterns (e.g., time spent in non-clinical care). The NPS provides information on motivations for practicing in Arizona; and, the GRS provides information on factors influencing graduating residents' choice of practice location.

The Physician Workforce in the United States: Surplus or Shortage?

In 1980, the Graduate Medical Education National Advisory Committee (GMENAC) estimated that the U.S. would have a surplus of 145,000 physicians by the year 2000. The GMENAC report recommended limiting U.S. medical school enrollments and the immigration of international medical school graduates (Graduate Medical Education National Advisory Committee, 1980). The U.S. Congress responded to the GMENAC report by discontinuing federal subsidies for students in U.S medical schools. The 1983 Medicare hospital-reimbursement reform inadvertently provided a strong incentive for teaching hospitals to increase the numbers of foreign medical school graduates in the U.S. by increasing funding for teaching hospitals. Because the number of U.S. medical school graduates was limited due to decreased funding, teaching hospitals that wished to take advantage of this increased Medicare funding recruited graduates of foreign medical schools to fill their expanded number of residency positions.

While the U.S. population increased by 24%, the number of graduates from U.S. medical schools increased by only 11% from 1980 to 2000. There were 16,172 graduates in 1980

compared to 17,953 in 2000. Thus, the number of U.S. medical school graduates per 100,000 people decreased from 7.1 in 1980 to 6.4 in 2000. An increasing proportion of the physician workforce in the U.S. is composed of foreign medical school graduates. The number of foreign medical school graduates practicing in the U.S. increased from 94,995 in 1980 to 178,048 in 2000. Most of the foreign medical graduates trained in U.S. teaching hospitals (Blumenthal, 2004).

In 1986, the U.S. Congress created the Council on Graduate Medical Education (COGME) to advise the federal government on workforce issues. The COGME is mandated with the responsibility of assessing trends, medical training, and financing policies as well as advising and making policy recommendations to federal agencies and the private sector about physician workforce developments and needs. The COGME predicted a surplus of 80,000 physicians by the year 2000. The COGME also predicted that this surplus would be in specialty physicians whereas the number of primary care physicians would be adequate to meet the needs of the U.S. population (Blumenthal, 2004).

In 1994, Weiner predicted a surplus of 165,000 physicians by 2000 based on a belief that increased use of managed care would decrease the need for physicians (Weiner, 1994). These projections were, however, based on the assumption that physician staffing patterns used by managed care groups at the time of Weiner's study would become the norm for all U.S. health care. The assumption proved to be incorrect.

From 1991 to 2001, the physician workforce in the U.S. grew by 26% (from 541,000 to about 681,000 physicians) or approximately twice the rate of total population growth. The physician to population ratio in the U.S. increased to 283/100,000 by 2004 with physician to population ratios higher in metropolitan areas (Health Resources and Services Administration, 2005). In 1991, there were 242 physicians per 100,000 people in metropolitan areas compared to 99/100,000 in non-metropolitan areas. By 2001, the physician to population ratio in the U.S. had increased to 267 in metropolitan areas and 122 in non-metropolitan areas (US General Accounting Office, 2003).

Despite the growth in the physician workforce, the projected surpluses have not materialized, and the majority of experts predict that there will be a shortage of physicians over the next 15 years. Cooper, for example, predicts a 200,000 shortfall in the number of physicians by 2020

because of economic expansion. He argues that economic expansion (e.g., increase in per capita income and gross domestic product) leads to increases in health care spending which then lead to increases in the health care labor force, including the supply of physicians. Cooper's estimate has been criticized because it does not provide a criterion for the number of doctors needed to optimize the health and well-being of the U.S. population.

Cooper suggests that increases in health care expenditures are an outcome of income increases that are associated with economic expansion. The model adopts the principle of economic models of consumption in which increases in income, all else equal, increase the demand for most goods and services. His predictions assume that the U.S. economy will grow at an average annual real (inflation adjusted) rate of two percent, which is the historical average rate of growth in the U.S. (Cooper, 2004).

The 16th Health Resources and Services Administration (HRSA)/COGME report on the state of the nation's physician workforce was released in January 2005. The COGME now predicts that the nation will face a shortage if the population uses medical services in the future as it has in the past, and if physicians practice in the future as they have in the past (Health Resources and Services Administration, 2005). In their 2005 report, COGME predicts that the physician per 100,000 people ratio will increase from 283 in 2000 to 301 in 2015, but this increase will not be sufficient to meet the demand for services. They predict that the demand for physician services will increase due to population growth, aging of the population, and changes in the "age-specific" per capita physician utilization rates with those over 45 years using more services and the population under 45 years using fewer services. The report predicts a shortage of physicians in the U.S. by the year 2020. Two estimates were given concerning the size of the 2020 physician shortfall: (1) a demand based estimate suggested a physician shortage of about 85,000 full-time equivalent (FTE) physicians, and (2) a medical needs based estimate predicted that supply will be short by about 96,000 FTE physicians.

In summary, there has been continued debate about the physician workforce over the past 25 years. Predictions of a surplus of physicians by the year 2000 were incorrect and experts now predict that there is a shortage of physicians in the U.S. Our analysis focuses on Arizona, but the analysis requires the same types of models and methods that one would use to make national projections. The next section describes the conceptual model that serves as the foundation for our empirical analysis.

A Model of the Supply of Physicians

In addition to the absolute numbers of physicians, assessing the supply of physician services also requires an assessment of physician productivity. Physician productivity, all else equal, is increased by the number of other professionals with whom a physician works, such as non-practicing clinicians. Physician productivity in terms of services to patients is also reduced by the amount of time a physician spends performing administrative work.

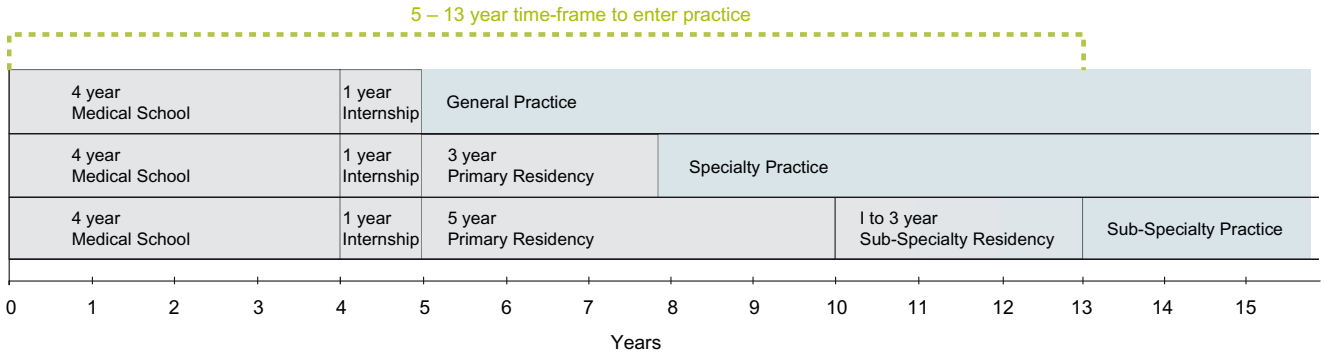
The analysis of the characteristics that affect physician productivity is reserved for a subsequent report. The analysis that is presented here begins with a simple model of the dynamics of the numbers of physicians practicing in a state in a year. The analysis is extended to consider the characteristics that influence physicians' decisions to practice in Arizona or alternatively to practice in other states.

In summary, the number of physicians practicing in a state is determined by the number of new entrants (residency program graduates) and those established physicians who chose to relocate from other states. Changes in medical school enrollment, number of medical schools, number of residency positions, and national immigration policy affect the national supply of physicians. These same factors will affect the supply of physicians in Arizona, but the Arizona supply will also be influenced by the number of Arizona residents who enter medical school, medical school enrollment in the state, residency positions in the state, and attractiveness of the state to established physicians who are considering relocation.

Entrants

The number of physicians in practice at any point in time is the outcome of a process that begins with medical school matriculation. However, because of the long duration of medical training, there is a five to 13 year lag time between the start of medical school training and entering practice (Figure 2). Someone who begins medical school in 2005 and chooses to become an obstetrician will, for example, begin clinical practice in 2013.

Figure 2. A Timeline of the Supply of Physicians



Approximately 93% of medical students will receive a medical degree four years after matriculation. However, there are only 123 allopathic and osteopathic medical schools in the U.S. These do not provide enough medical school positions for U.S. citizens who wish to become doctors. Approximately 1,400 U.S. citizens graduated from medical school outside of the U.S. and entered residency training in the U.S. in 2003.

After completion of medical school, graduates begin residency training in a medical specialty at a teaching hospital. The size of most residency training programs is limited by the Accreditation Council on Graduate Medical Education (ACGME) residency review committee for each specialty. Other factors that influence the number and types of residency programs include the state and federal funding available to support the programs, access to faculty, and the availability of patients which are the necessary “teaching material” for residents.

There are many factors influencing medical school graduates choice of specialty including the number, length, and rigor of the training programs work load (e.g., nights on call), as well as the educational quality of the available programs. Choice of specialty is also influenced by the future income potential and life style of practicing physicians (e.g., irregular work hours, night call) in each specialty. For example, the annual net income of practicing physicians in pediatrics, family medicine, and psychiatry is far less than the income of physicians practicing orthopedics, cardiology, or emergency medicine. Physicians who choose to practice pediatrics, obstetrics, surgery, and internal medicine also can expect to have irregular work schedules and night call responsibilities whereas physicians who choose to practice dermatology, emergency medicine, and pathology are more likely to work less hours per week and have limited night call. These factors will influence the graduating medical students’ choice of residency and thus the availability of specialists in different medical fields.

Currently, some residency programs in specialties with low potential income and heavy workloads, such as family medicine, have difficulty filling all available residency positions. In contrast, some specialties have many more applicants than they can accommodate because of the popularity of the specialty and/or the limited numbers of residency positions. For example, in 2005, there were only 39 neurosurgery and 28 dermatology positions available in the U.S.[2]

The ability to fill residency positions with U.S. medical graduates is a good indicator of the popularity of the specialty. For example, only 40% of the family practice positions were filled with U.S. graduates in 2005. This is the eighth consecutive year in which the number of U.S. seniors from allopathic medical schools entering family practice residencies has declined. In contrast, 74% of pediatric positions and 67% of obstetric positions were filled with U.S. graduates. The specialties in which over 80% of positions were filled with U.S. allopathic medical school graduates included emergency medicine, general surgery, and orthopedic surgery.

In addition to U.S. citizens who receive their medical training outside the U.S., other graduates of foreign medical schools who are not U.S. citizens also may come to the U.S. for residency training if they are able to obtain a visa. However, the number of foreign-born medical school graduates who can train in the U.S. is limited by U.S. immigration policy. They often are required to return to their home country after completing their training.

After completion of a residency, additional training is required if a physician wishes to practice in a medical or pediatric subspecialty such as cardiology, gastroenterology, pulmonary medicine, or in most surgical specialties (e.g., pediatric surgery) (Figure 3).

In summary, the number of entrants into practice in any year is determined by the capacity of U.S. medical schools from five to 13 years in the past, the number of positions available in residencies and fellowships, U.S. immigration policies towards foreign medical school graduates, and, for any given specialty, the ability to fill the residency slots in previous years. All these influences interact to make it extremely difficult to adjust the supply of new physicians to meet the expected challenges of physician shortages. The failure to adequately predict the

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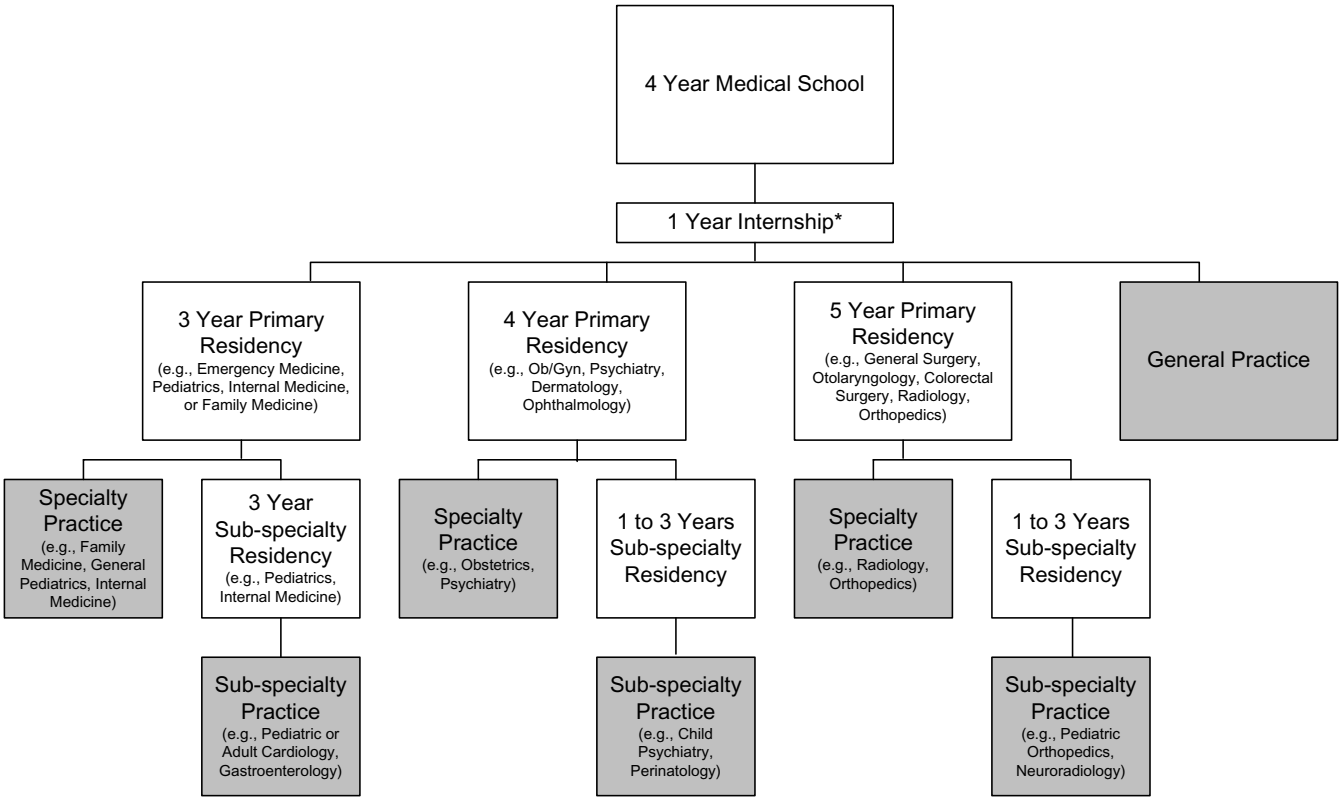
[2] To obtain detailed information regarding the current numbers of residents in training and specialty residency training programs please consult the National Residency Matching Program (NRMP) website at www.nrmp.org. The NRMP is a private not-for-profit organization that tries to match residents with appropriate training programs.

shortages has made the problem more difficult by delaying the attempts to expand the supply of physicians.

Figure 3. A Model of the Supply of New Physicians



*Internship may be done as part of primary residency

Departures

The number of physicians in the workforce is decreased by physician separation from practice due to death, retirement, or career change. Some studies report that retirement rates for physicians are similar across all specialties but others show that surgeons, internists, and family physicians are likely to retire sooner than other physicians (Reschovsky et al., 2005). Although data from the American Medical Association (AMA) Masterfile suggests that physicians are retiring earlier than their predecessors and other studies find that the retirement age of physicians has not changed (Konrad & Sheps, 2005).

A study of over 16,000 physicians conducted by the Center for Studying Health System Change, compared career satisfaction, professional autonomy, practice environment, and personal characteristics of physicians who retired during the study period (1996-1999) to those who did not retire. Factors associated with earlier retirement included age, working in large organizations

(e.g., health center), and having low career satisfaction. Physicians who owned their own practice had a lower income and had good relationships with office staff and were less likely to leave medicine than others (Reschovsky et al., 2005). Practice autonomy (e.g., ability to make your own clinical decisions, obtain services for your patients) and managed care penetration did not seem to influence retirement age. Higher income was associated with earlier retirement. In fact, physicians in the highest income quartile retired 4.4 years earlier than those in the lowest quartile (Reschovsky et al., 2005).

The Demand for Physician Services

The demand for health care is influenced by many factors, including public demand for the use of new technology, a public desire to have life-sustaining and life-enhancing care, and consumer responses to direct advertising of drugs and other remedies. The demand for health care is also affected by the economic status and insurance rates since patients must have sufficient income to pay for services. Thus, the demand for physician services will, all else equal, increase if more Americans have health insurance. Experts estimate that we would need to increase the physician workforce by 95% if the 45 million uninsured Americans had health insurance due to changes in national health policy (Health Resources and Services Administration, 2005). This assumes that the currently uninsured utilize health care in a similar manner as the currently insured U.S. population. Recent trends in health insurance coverage suggest that insurance coverage is decreasing rather than expanding, making it difficult to predict the future.

The rapid aging of the population is one of the most important influences on the demand for health care. Although subject to dispute, the effect of population growth on the demand of health care may be compounded by the increase of diseases related to life style, such as obesity.

A new approach to health and rehabilitation will be needed to deal with the effects of the aging population during the next 20 years. At each point in their life cycle, the baby boomers revolutionized the institutions that were part of their common experience: first in primary and secondary schools and then in colleges and universities. Although the impact was predictable, preparations were incomplete. Baby boomers will substantially increase the demand for health care and increase the number of persons with disabilities but efforts to deal with these situations are equally incomplete.

The incidence of illnesses increases in each subsequent year after people reach the age of 50. The baby boomers' journey through the life cycle will create one of the oldest work forces in contemporary history and a subsequent expansion of the retired population. The number of persons with disabilities will also increase to a historic high. The aging of the baby boomers will add approximately 535,000 persons per year to the population of disabled persons for the next 15 years. Nearly 27 million Americans age 50 through 69 will be disabled in 2020 or slightly less than twice the number in 1997 (W.G. Johnson *et al.*, 2004).

Much attention has been devoted to the effects of aging on the baby boomer generation as they enter the 65 years old or older age group. A recent report to the Social Security Administration finds that health care utilization will also increase substantially among members of the baby boomer generation under the age 65 (W. G. Johnson & Johnson, 2005). The report projects that the number of people with disabilities under age 65 will increase by 1.0% annually, for an overall increase of nearly 30% over 25 years (2000-2025). Total health care expenditures and Medicare expenditures for the under 65 age group will increase by 1.3% annually, for an overall increase of 37%. Seventy percent of persons with disabilities in 2025 will not qualify for Social Security Disability Insurance (SSDI) or Medicare benefits, and over 75% of the health care expenditures will be consumed by these persons.

The persons most at-risk for the lack of planning regarding the needs of the older baby boomers are persons with disabilities who are not eligible for SSDI or Medicare. The at-risk group is primarily composed of women with work histories either too short or too far in the past to allow them to qualify for SSDI but with assets that make them ineligible for Medicaid (W. G. Johnson & Johnson, 2005).

Predicting the effects of the aging on baby boomers on the demand for physician services in Arizona is complicated because a substantial number of older persons live in Arizona only during the winter. These numbers will presumably grow with the increase in the older population. Many winter residents are citizens of Canada who are not likely to be counted by U.S. population surveys. It is likely, therefore, that the seasonal residents are not reflected by the physician to population ratios that we report.

Our subsequent analysis (Part II) may include some estimates of the effects of baby boom generation residents and winter residents on the utilization of health care from the Arizona

HealthQuery (AZHQ) community health data system. The AZHQ is a patient level data base that records health care encounters for a large part of the state (described in detail in a subsequent section of this report).

In summary, the demand for physician services is affected by the economy, availability of affordable health insurance, new technology, and health status of a population. As Arizona's economy grows and increasing numbers of Arizonans can afford more health care, it is likely that the demand for physicians will increase. Even if economic growth were to slow the increased numbers of elderly residents as well as the annual in-migration of seasonal residents (snowbirds) will increase the demand for physicians. New technologies in health care can decrease health care utilization for the treatment of current conditions by increasing physician productivity, but the reductions may be offset by increasing demand for care as new technologies make it possible to diagnose and treat more diseases than in the past.

Some potential changes that could decrease the demand for physicians, all else equal, include increasing numbers of non-practicing clinicians, decreased utilization of ineffective health care services, and improved health status due to changes in personal lifestyles (e.g., diet, exercise).

An understanding of the probable future of the physician workforce and its relationship to health and health care requires an understanding of the current situation and the nature of the process by which it evolved. The next section describes the Arizona physician workforce in the year 2004 and the dynamic changes that lead to the current situation.

Studies of the Physician Workforce in Arizona

The reports of expected shortages of physicians in the U.S. are echoed for Arizona by a series of similar reports that have been published over the last 14 years. Next, we consider the problem in terms of the state of Arizona.

"Arizona Physicians Today and Tomorrow" (1989)

The first report on the supply of physicians in Arizona was published in 1989. The report, "Arizona Physicians Today and Tomorrow," estimated the number of physicians needed in Arizona by 2000 (Flinn Foundation, 1989). The estimates combined population projections from

the Arizona Department of Economic Security (DES)[3] with targeted physician to population ratios. Two alternative criteria were used to make the projections. The first criterion was the Bureau of Health Professions' (BHP) ratio of 231 physicians per 100,000 people. The second criterion was the recommendation of the GMENAC that 195 physicians are required for each 100,000 people.

The two ratios, applied to the DES estimate (1989) of an Arizona population of 4.7 million in 2000, projected needs for 10,800 (BHP) and 9,100 (GMENAC) physicians, respectively. The application of the BHP ratio (231) produced an estimate that 8,300 urban physicians would be needed in 2000. Using the GMENAC criterion (195) and an estimated urban population of 3.6 million, the report predicted that 7,000 physicians would be needed in the urban areas in 2000. If the trends between 1987-1992 had continued, approximately 9,700 physicians in Arizona would have been in practice in urban areas in 2000 and that number would have increased to 15,500 by 2010.

The report also applied the BHP and GMENAC ratios to the DES rural population projection, producing a projected need between 2,500 and 2,100 physicians in rural areas by the year 2000. However, if the 1987-1992 trends had continued an estimated 1,000 physicians would have practiced in rural Arizona in the year 2000 (Figure 4). Thus, although the projected number of physicians in practice in Arizona met or exceeded the projected total needs, the report predicted a shortage of between 1,200 and 1,600 physicians practicing in rural areas and a surplus of physicians practicing in urban areas.

Arizona State University/Arizona Council for Graduate Medical Education Reports (1992-1997)

A series of seven reports on physician supply and graduate medical education in Arizona was published between 1992 and 1997 (Lewis *et al.*, 1992). These reports were based on survey data and licensing data collected as part of the process of licensing physicians. The data were collected by the Arizona State University (ASU) School of Health Management and Policy (SHMP) under the auspices of the Arizona Council for Graduate Medical Education (AzCGME)

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[3] DES estimate from: *Arizona Business,* February 1992.

and sponsored by the Flinn Foundation. The studies showed that the growth in the number of Arizona physicians kept pace with population growth, but there were disparities in the distribution of physicians between rural and urban areas such that there would be a shortage of 1,400 physicians outside of Maricopa and Pima counties by 2000 relative to the levels suggested by GMENAC or BHP (W. G. Johnson et al., 1992). The 1996 report also predicted that the number of specialty physicians would decrease in future years (W. G. Johnson, 1997).

Goldwater Institute Report (2001)

In 2001, the Goldwater Institute published a report on the Arizona physician workforce. The report used 2000 data from the Arizona Board of Medical Examiners which licenses allopathic physicians. The authors made several adjustments to the data to distinguish physicians who provide direct care from physicians who were licensed but retired or employed in administrative positions. The adjusted physician to population ratios were then compared to the ratios that had been published in the 1990s by Johnson et al. (1992). The report concluded that the ratio of physicians to 100,000 people had declined from 198 in 1990 to 185 in 2000. Furthermore, they calculated that the actual number of practicing physicians in 2000 was even lower because 6% (513) of the physicians listed were retired and 1% (120) of the physicians were in administrative practice. They reported that the "adjusted" number of practicing physicians per 100,000 people ratio in 2000 was only 172. However, the Goldwater Institute report data do not include osteopathic physicians, and thus cannot be directly compared with the AzCGME reports which included both osteopathic and allopathic physicians.

The report concluded that "Arizona has a shortage of physicians, a situation that will worsen unless government policies and regulation that caused the shortage are revised or rescinded" (J. A. Singer & Cantoni, 2001). The relatively high penetration of managed care into the health care market in Arizona was cited as another reason for the shortage of physicians. However, no data were offered to show that the physician supply in states with relative low market penetration by managed care was higher than Arizona; nor was any financial data supplied to support the contention that the compensation of Arizona physicians is less than that of physicians in other states. The assertion that government regulation was one cause of the "shortage" was supported by claiming that the effect of EMTALA regulation lead physicians to abandon practice in Arizona.

Information on the compensation of Arizona physicians and premiums for medical liability is presented later in this report.

U.S. General Accounting Office Report (2001)

The U.S. General Accounting Office (GAO) reported that the number of physicians in the U.S. increased by 26% from 1991-2001, twice that of the national population during the same period. The physician to population ratio for Arizona metropolitan areas in 1991-2001 decreased from 214/100,000 in 1991 to 207/100,000 in 2001. Although the ratio in non-metropolitan areas of Arizona increased from 90 to 111, the 2001 ratio is higher than the expected ratio based on the Goldwater Institute report. The two reports agree, however, that the ratios in the early 2000s were lower than in the early 1990s in metropolitan areas of the state.

A decrease in the physician to population ratio in an area of population growth may be due to either a decrease in the physician workforce or an increase in the physician workforce that is less than the growth rate of the population. The GAO reported that 17 U.S. metropolitan areas experienced declines in the physician to population ratio from 1991-2001. Three of the communities were in Arizona (Phoenix-Mesa, Tucson, and Yuma). There were large population increases in all three communities from 1991-2001. The physician workforce increased in all these communities, but the rate of increase was less than the rate of population growth.

The GAO report was based on the AMA Physician Masterfile and the American Osteopathic Association (AOA) Physician Masterfile and included non-federal physicians, with known Arizona addresses, who stated they provided patient care services. These masterfiles are widely used in studies of physician supply (GAO). The AMA Physician Masterfile record is established when individuals enter medical schools accredited by the Liaison Committee on Medical Education (LCME) or, in the case of international medical graduates, upon entry into ACGME-accredited programs; and, the AMA data are likely to be less accurate than the ASU/AzCGME data because some of the AMA Physician Masterfile data are obtained from surveys rather than licensing data. Therefore, because these studies were suspended in 1997, there are no data available that can be directly compared with the 2001 GAO report.

Summary

In 1987, the first of a series of reports on the Arizona physician workforce was completed. At the time of the first report, 3.5 million people lived in Arizona and 6,400 physicians were in active practice for a physician to 100,000 people ratio of 187 (Table 1). Three years later, the population had grown to 3.7 million and the physician population had increased to 7,315, increasing the physician to population ratio to 197 (Table 1). From 1990 to 1996 the Arizona population increased dramatically and the number of physicians increased as well.

Unfortunately, the Arizona physician workforce studies were discontinued in 1997, and it is difficult to establish comparability between the workforce studies and studies of the physician workforce by HRSA and the Goldwater Institute. The HRSA reported in 1998 that the number of active physicians in Arizona was 8,301 and the physician to 100,000 people ratio was 176 (Table 1). In 2000, the Goldwater Institute reported that the physician to population ratio had further decreased to 172/100,000 (Table 1). In reviewing their methodology, however, their report failed to include osteopathic physicians which would lead to an underestimate in the number of practicing physicians in the state. If, as seems likely, there were approximately 1,000 DOs in active practice in 2000 and they had been included in the Goldwater Institute report, the physician to population ratio would have been 200/100,000.

Table 1 summarizes the available historical data on the Arizona physician workforce from 1987 to 2004. Unfortunately, data are not available for many of the years because this information was not retained by the licensing agencies (AMBs). From 1990 to 1997, data are available from the Survey of Arizona Physicians sponsored by the Flinn Foundation and from the licensing data acquired and retained by ASU as part of that study.

Table 1. Comparison between the Numbers of Arizona Physicians to Population 1987-2004

Year	*Active MD's*	*Active DO's*	*Active Physicians (000's)**	*Population (000,000's)*	*Physicians Per 100,000 People**
1987	--	--	6.4	3.4	187
1990	6,617	698	7.3	3.7	197
1992	6,923	758	7.7	3.9	197
1993	--	--	7.9	4.0	--
1994	7,193	833	8.0	4.2	190
1995	7,814	--	--	4.4	--
1996	8,047	--	--	4.6	--
1997	8,421	--	--	4.7	--
1998	8,301 (HRSA)	--	8.2 (HRSA)	4.9	176 (HRSA)
1999	8,428	--	--	5.0	--
2000	--	--	8.8 (GW)	5.1	172 (GW)
2001	--	--	--	5.3	--
2002	8,976	--	--	5.4	--
2003	9,228	--	--	5.6	--
2004	10,787	1,237	12.0	5.8	207

Sources: Population estimates acquired from the Arizona Department of Economic Security, US Census. Active Physicians estimates acquired from the 1990 Arizona's Physician Supply, 1992, 1995, 1996, 1997; MBD, 2004; Survey of Arizona Physicians (SAP); Health Resources Administration (HRSA), 2004; and the Goldwater Institute Report (GW), 2001.

Note: *For some of the years between 1997 to 2003, data have been obtained from other sources (HRSA, GW). The information presented in Table 1 is, therefore, subject to considerable uncertainty during that time period.

Data Sources

The results in this report are based on six different data sets. The data sets include the 2003 MGMA Survey; the statewide Medical Board Database (MBD); several statewide HDRG survey databases including the PPS, the NPS, the GRS, and the AZHQ database (Table 2).

The MGMA Survey provides information on the average compensation and productivity by medical specialty for states and regions in the U.S. The MGMA data are from a national survey that includes information on specialty income by state and region as well as workloads by region. The average salary data are particularly useful because they permit comparisons of physician compensation in Arizona relative to compensation for physician compensation in other states.

The MBD data include demographic data on all licensed Arizona physicians as well as their self-reported specialty and office location. The MBD was compiled from past and present files that the ASU HDRG obtained from the AMB and the AOB. The database contains demographic information on every physician licensed in Arizona as well as their medical specialty, board certification, office location, practice changes, retirement status, and hours of work. The practicing physician's medical school, date of graduation from medical school, and graduate training experiences are also collected.

The PPS is a survey sent to all Arizona physicians by the AMB and AOB at the time of relicensure. The survey instrument is nearly identical for both groups of physicians in a survey cycle except the osteopathic survey did not ask practicing physicians to provide a breakdown of their work distribution. Osteopathic physicians renew their licenses annually whereas allopathic physicians renew their license every two years on their birthday. All osteopathic physicians have completed the 2003-2004 survey, but because MDs renew their license every two years only approximately 50% of the MDs have completed the survey as of January 2005.

The NPS is a survey sent to all physicians at the time of their initial application for an Arizona medical license. The physicians are asked to identify the most important reasons for their decision to practice medicine in Arizona. This survey is ongoing and to date 453 surveys have been analyzed. The current PPS and NPS survey instruments are included in Appendices 1-4.

The GRS was distributed to graduating residents from 1993 to 1995 and is being distributed currently to the physicians completing residency training this academic year. The GRS identifies the reasons that residents decide to remain in Arizona or, alternatively, to practice in other states. The results of the 2005 GRS will be compared to the surveys of graduating residents that we conducted in 1993, 1994, and 1995.

Table 2. Data Sources

Data Source and Coverage	*Measures of Interest*	*Status*
MGMA Survey—National, 2003	1. Average specialty income by region. 2. Average specialty income by state. 3. Work loads by region.	Received.
MBD—Statewide, 1990-91; 1992-97, 2002-05	1. Office locations. 2. Medical specialties. 3. Demographic data.	Received.
PPS—Statewide, 1992-97, 2003-04	1. Productivity measures. 2. Characteristics of practice. 3. Effects of managed care. 4. Other changes over time.	DO: Completed. MD: Approximately ½ complete.
NPS—Statewide, 2004	1. Reasons for application for licensure in AZ. 2. Reasons for choosing to practice in AZ. 3. Region they left to come to AZ.	In the field.
GRS—Statewide, 1993-95, 2005	1. Intent to practice in AZ. 2. Reasons for leaving. 3. Reasons for staying.	1993-1995: Complete. 2005: In the field.
AZHQ Database—Yuma County, 1999-04; Maricopa County, 2001-04; AHCCCS – Statewide, 2000-04; Statewide Immunizations, 1999-04	1. Health encounter data. 2. Diagnoses. 3. Procedures. 4. Patient demographics. 5. Patient profiles over time.	Ongoing.

AZHQ is the Arizona HealthQuery, a community health data system that houses essential and comprehensive health information on Arizona residents. This data system is located at ASU and managed by the HDRG. It serves as a community resource for assessing the health status and health care needs of the state. The AZHQ data system is unique for its ability to provide vast amounts of continuously updated health care information and link patients across systems and over time. The data is voluntarily donated to AZHQ by health systems, physician groups, hospitals, and governmental agencies such as AHCCCS. Currently AZHQ contains information on over 5.2 million people who have obtained health care in Arizona. AZHQ helps the

community by putting actionable information from millions of health records at the fingertips of health care researchers and policy makers. We will utilize AZHQ for the second phase of this study to help us determine the health care needs and demands of Arizona residents.

Arizona Physician Workforce, 2004

There were 10,787 allopathic physicians and 1,237 osteopathic physicians practicing in Arizona in 2004 (Table 1, Appendix 5). In 2004, 72% of Arizona physicians were board certified; approximately 78% graduated from a U.S. medical school; 24% are women; and 44% are over 50 years old.[4]

The Nature of Physician Practices

One of the important links between the number of physicians in practice and the quantity of physician services to patients is the proportion of physicians who are either retired or engaged in activities that do not involve services to patients. The physician license renewal surveys asked physicians to describe the nature of their current practice. The distribution of physicians by the nature of their practice in 2004 is described in Table 3.

Allopathic physicians renew their licenses every two years on their birthdays. The data presented in Table 3 for the allopathic physicians represents approximately one-half of the allopathic physicians in the state, so surveys continue to be collected. Osteopathic physicians renew their licenses every two years *en bloc* so the data presented in Table 3 for the osteopathic physicians are complete.

[4] Estimates acquired from the MBD, 1994-2004.

Table 3. Practicing Physicians, 2004

Practice	*MD Sample*		*DO Census*		*Total*	
	Number of Respondents	*Percent (%)*	*Number of Respondents*	*Percent (%)*	*Number of Respondents*	*Percent (%)*
Academic/Teaching/Research	252	5%	24	2%	276	4%
Administrative Medicine	63	1%	14	1%	77	1%
Government	239	4%	44	3%	283	4%
Group Practice	2,776	50%	696	52%	3,472	51%
Hospitalist	420	8%	44	3%	464	7%
In training*	77	1%	43	3%	120	2%
Non-profit Community Health Center	89	2%	27	2%	116	2%
Retired/On leave	86	2%	105	8%	191	3%
Semi-retired/On leave	189	3%	1	0%	190	3%
Solo Practice	1,337	24%	341	25%	1,678	24%
Total	5,528	100%	1,339	100%	6,867	100%

Source: MBD Practicing Physician Surveys completed by osteopathic and allopathic physicians.

Note: Because osteopathic physicians are re-licensed annually and allopathic physicians are only re-licensed every two years, the Practicing Physician Surveys have been completed by all osteopathic physicians but are not yet completed by all allopathic physicians. Missing osteopathic respondents = 3.

The results in Table 3 show that approximately 75% of Arizona physicians work in a private practice organized as either group or solo practice. Only 4% work in an academic setting which might include medical research and/or teaching. The number of physicians in training is underestimated because most physicians in training have a training license which limits their medical practice to the hospitals in which they are training. Data from other sources (e.g., ACGME) indicate that there are approximately 1,076 physicians in training in Arizona. Physicians employed as hospitalists represent a small but increasing type of medical practice as an employee of the hospital.

Physician Specialty 2004

Table 4 describes the distribution of practicing physicians by primary specialty in 2004. The listed physician specialty is the specialty reported by physicians on their license renewal applications. The self report of specialty is not required to represent the specialty in which a physician received residency training and obtained board certification or the field of medicine in which they provide care. Appendix 6 provides a more detailed description of the specialties.

Approximately 41% of Arizona physicians were primary care specialists in 2004 (Table 4). (Primary care includes family/general practice, geriatrics, internal medicine, and pediatrics.) Approximately 18% of Arizona physicians work in hospital-based specialties, 20% are surgical specialists, 7% are medical specialists, and 1% are pediatric specialists (Table 4). Other specialties includes psychiatry, occupational medicine, physical medicine, and others (Appendix 6).

Table 4. Distribution of Practicing Physicians by Primary Specialty, 2004

Primary Specialty	*Total Physicians, 2004*	
	N	*%*
All Specialties	12,013*	100%
Primary Care†	4,962	41%
Surgical Specialties	2,457	20%
Hospital-Based Specialties	2,204	18%
Other Specialties‡	1,451	12%
Medical Specialties	829	7%
Pediatric Specialties	110	1%

Source: January 5, 2005 MBD.

Note: Primary specialty reported by physician at the time of licensure. Primary specialties were grouped into general categories as shown in Appendix 6.

*Missing = 11 cases. †Primary care includes family/general practice, geriatrics, internal medicine, and pediatrics. ‡Specialties with < 20 physicians.

The profile of Arizona practicing physicians in 2004 is the outcome of events that have occurred over the past quarter century. An understanding of the historical trends is the first step in beginning to understand and predict the future of the Arizona physician workforce.

Trends in the Numbers of Practicing Physicians

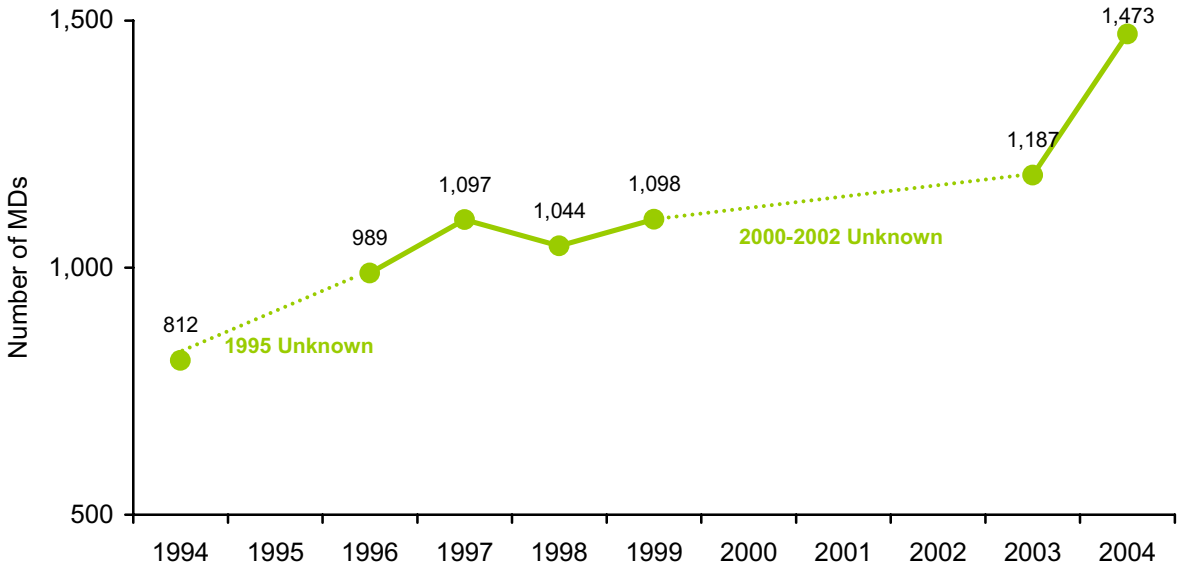
The 10,787 practicing Arizona allopathic physicians in 2004 reflect an increase of approximately 17% between 2003 and 2004 (Table 1). The increase in the number of practicing osteopathic physicians between the two years is not known, but osteopathic physicians are a slightly higher percentage of the physician workforce than in the 1990's. The Goldwater Institute report and the GAO report concluded that the increase in the supply of physicians had not kept pace with Arizona's rapid population growth. Our comparisons of the licensing data from the late 1990s to

the licensing and survey data for 2003-2004 show, instead, that increases in physician supply modestly exceeded population growth. The long term increase, however, is influenced by above average increases in supply between 2003 and 2004. This one year change in the number of practicing physicians is substantially more than the average annual increase from 1992 to 2003.

The uncertainty concerning trends in the data is in part due to the absence of annual data from the licensing agencies for many years. Although the practice is, we understand, being changed, it has been traditional for the licensing agencies to simply overwrite existing records when a renewal is received. Thus, no annual data were maintained for many years by the licensing boards. The historical information presented here on trends mainly is obtained from the previous ASU study in which annual licensing records were saved.

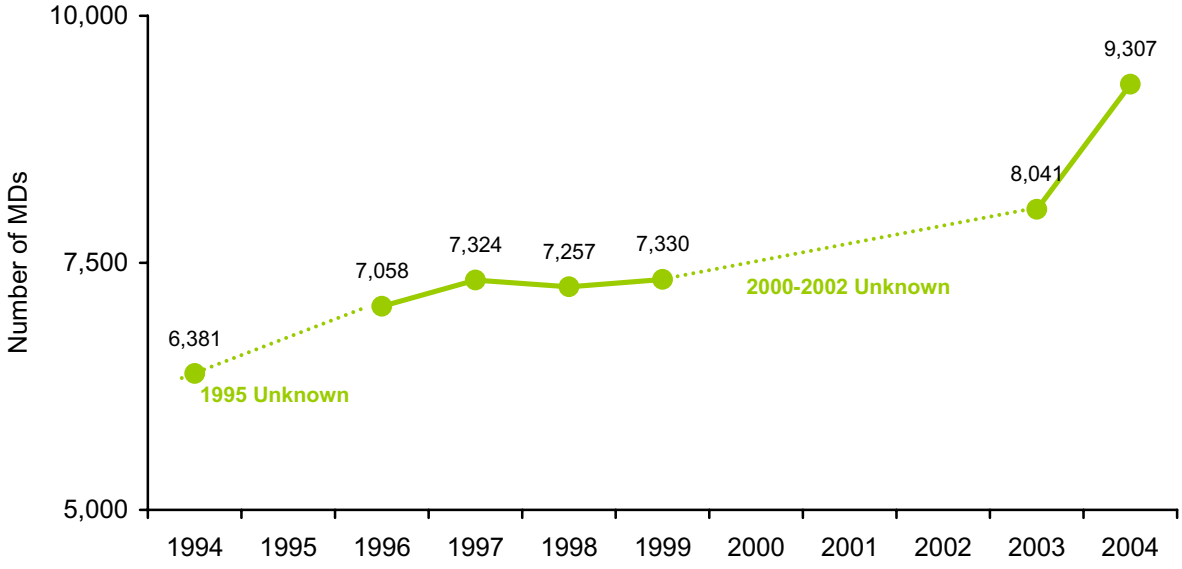
In 1990 an estimated 9% (698/7,315) of the physicians in active practice in Arizona were osteopaths. However, in 2004 the number of osteopathic physicians increased to 1,237 and now represents approximately 10% (1,237/12,024) of the physician workforce (W. G. Johnson et al., 1992) (Table 1). In 1992, we predicted that the supply of physicians in Arizona would keep pace with the growth in the population, but disparities would continue in the physician to population ratio in rural Arizona (Lewis et al., 1992). The 2004 data show that there are still large geographic disparities in the physician to population ratio between urban and rural counties (Figure 7, 8). In 2004, 86% of Arizona physicians practice medicine in Pima or Maricopa County, and the physician to population ratio ranges from a high of 276 in Pima County to a low of 48 in Apache County (Figure 7, 8).

Figure 4. MDs in Practice in Rural Areas of Arizona (1994-2004)



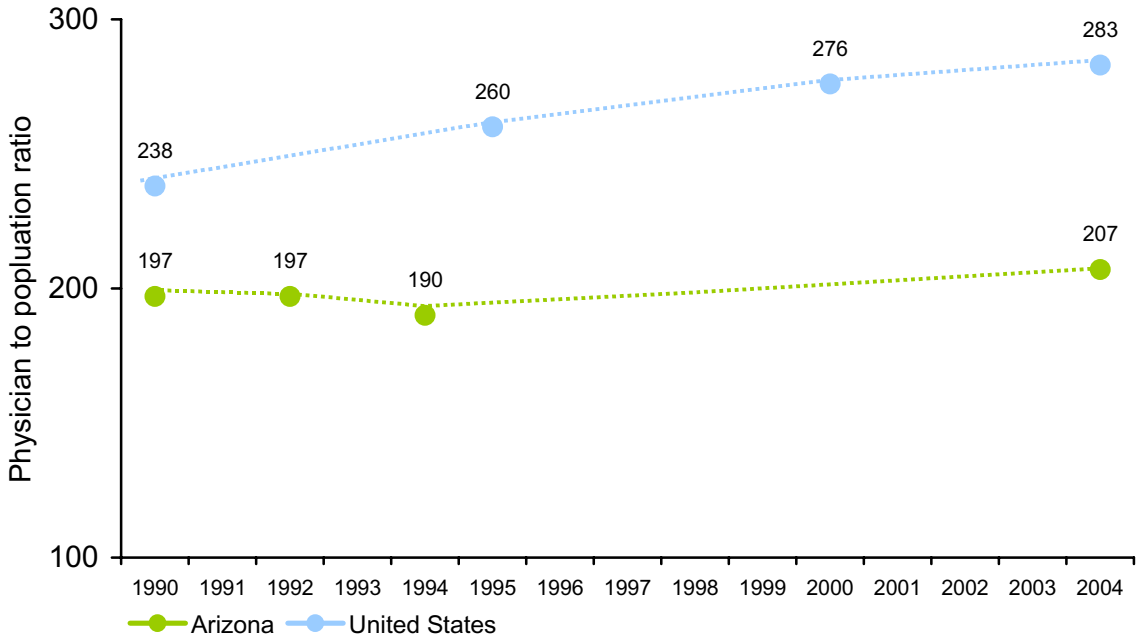
Source: MBD, 1994-2005

Figure 5. MDs in Practice in Urban Areas of Arizona (1994-2004)



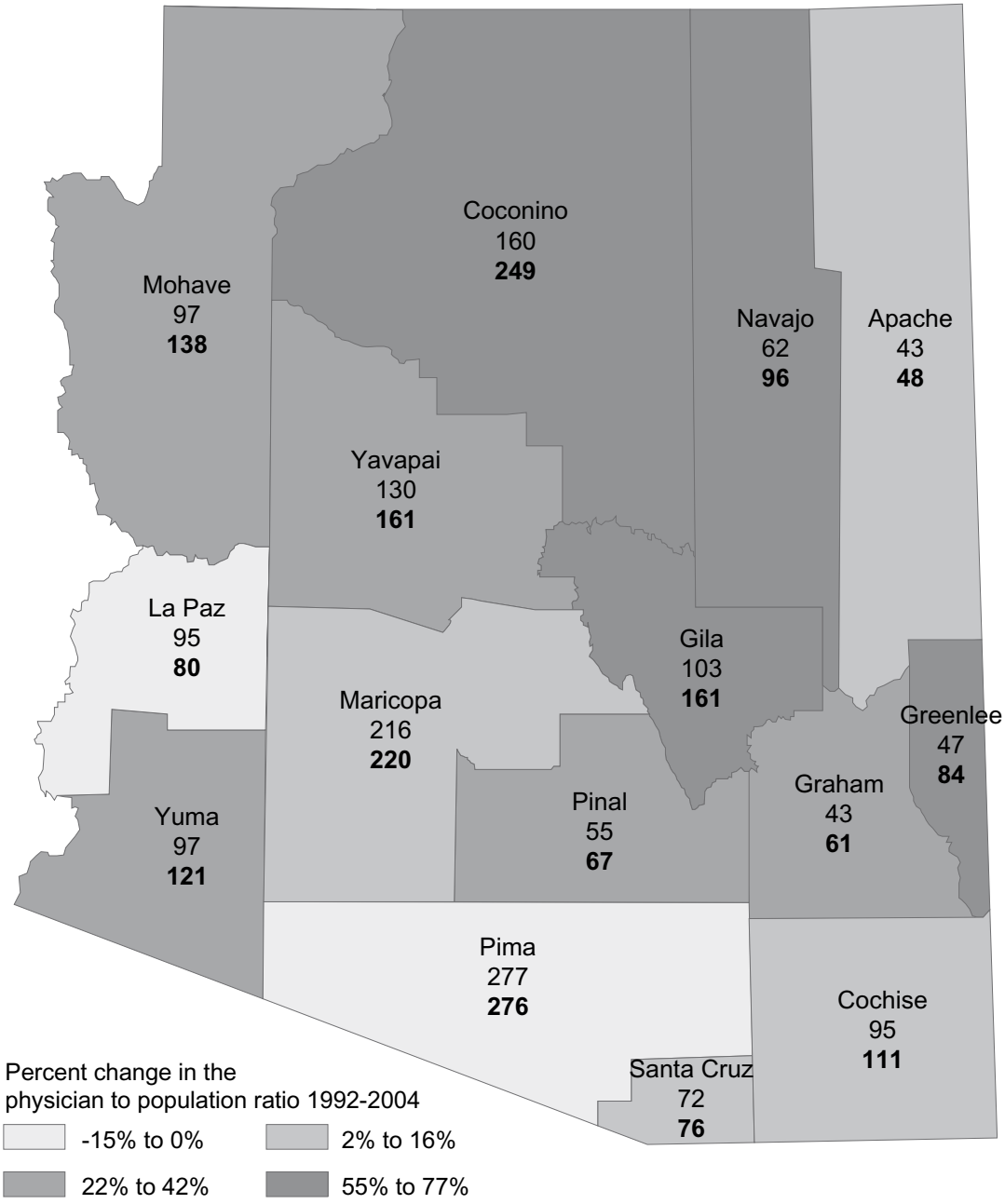
Source: MBD, 1994-2005

Figure 6. Physician to Population Ratio for Arizona and the U.S. (1990-2004)



Source: MBD, 2004; Census Data, 1990-2004

Figure 7. Physicians per 100,000 People, 1992 and 2004*

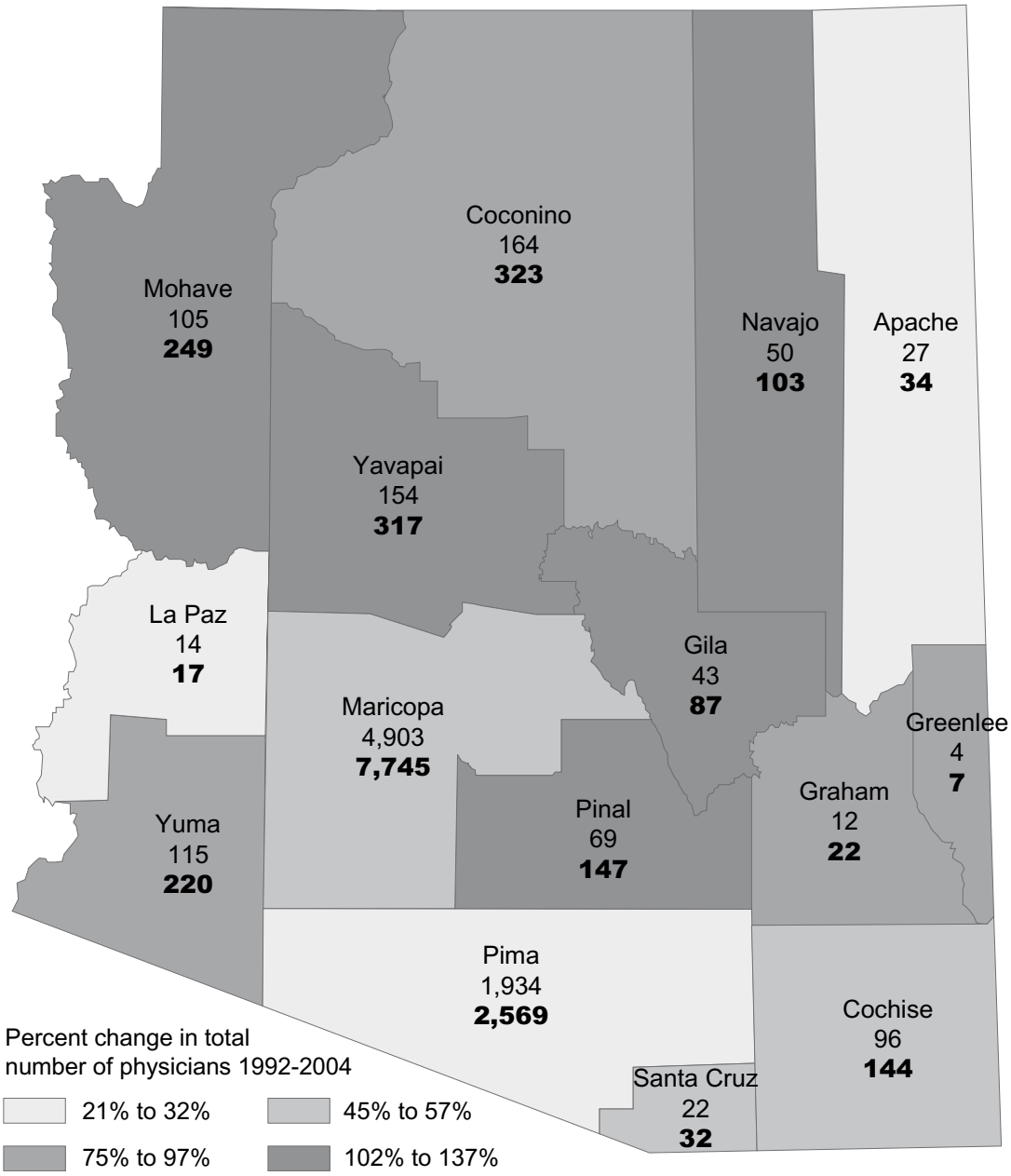


Source: MBD, January 5, 2005 and 1992; Arizona Department of Economic Security Population Projections, July 1, 2004; and Census Population Estimates, July 1, 1992. Data compiled by the ASU HDRG.

Note: Physician is defined as a MD or DO who practices medicine in Arizona, as of January 5, 2005. Map excludes retired physicians. Physicians practicing solely in a federal facility may be excluded because they are not required to have an Arizona license.

*Lightface numbers represent the number of physicians in 1992. Boldface numbers represent number of physicians in 2004.

Figure 8. Number of Physicians by County, 1992 and 2004*



Source: MBD, January 5, 2005 and 1992. Data compiled by the ASU HDRG.

Note: Physician is defined as a MD or DO practicing medicine in Arizona, January 5, 2005. Map excludes retired physicians; and physicians practicing solely in a federal facility may not be included because they are not required to have an Arizona license. Seven allopathic physicians and one osteopathic physician are missing county location. Consult Appendix 5 table for detailed information regarding the distribution of the allopathic and osteopathic physician population by county for Arizona in 2004.

*Lightface numbers represent the number of physicians in 1992. Boldface numbers represent number of physicians in 2004.

Trends in Physician to Population Ratios

The number of physicians per 100,000 people for Arizona increased from 197 in 1992 to 207 in 2004. The rate of increase in the number of physicians exceeded the rate of increase in the population in both rural and urban areas, but did not eliminate the existing rural to urban disparities in physician to population ratios (Table 5, Figure 7).

The past reports on Arizona's physician workforce differ in many respects, but agree that the statewide ratio of physicians to population has been below the national average. The reasons for the persistent shortage of physicians, at least by reference to the physician to population ratios, are less well known. Much of the difference may simply reflect the rather marked differences in population density between Arizona's urban and rural counties. Approximately 86% of the Arizona population lives in urban areas compared to 81% of the U.S. population. The physician to population ratios in one urban area of Arizona (Pima County) is historically much closer to the national averages than the ratios in the rural counties. Indeed, the data for 2004 show that the ratio in Pima County is similar to the national averages (Table 5, Figure 6).

One must be cautious in using national averages as a basis for comparison. Differences among the states in needs for care and the health care environment can, if not controlled, bias the conclusions drawn by comparing Arizona's physician to population ratios with the national averages. The bias could be in either direction, possibly understating or overstating the adequacy of the physician workforce in Arizona. We will address this question in Part II of this report, to be issued later this year.

Table 5. Arizona Physician to Population Ratios by County, 1992 and 2004

County	*1992*	*2004*
	Total Physicians Per 100,000 People	*Total Physicians Per 100,000 People*
All Physicians	*197*	*207*
Urban	*230*	*231*
Maricopa	216	220
Pima	277	276
Rural	*93*	*124*
Apache	43	48
Cochise	95	111
Coconino	160	249
Gila	103	161
Graham	43	61
Greenlee	47	84
La Paz	95	80
Mohave	97	138
Navajo	62	96
Pinal	55	67
Santa Cruz	72	76
Yavapai	130	161
Yuma	97	121

Source: January 5, 2005 and 1992 MBD; July 1, 2004 Arizona Department of Economic Security Population Projections; and July 1, 1992 Census Population Estimates.

Note: Consult Appendix 5 table for detailed information regarding the distribution of the allopathic and osteopathic physician population by county for Arizona in 2004.

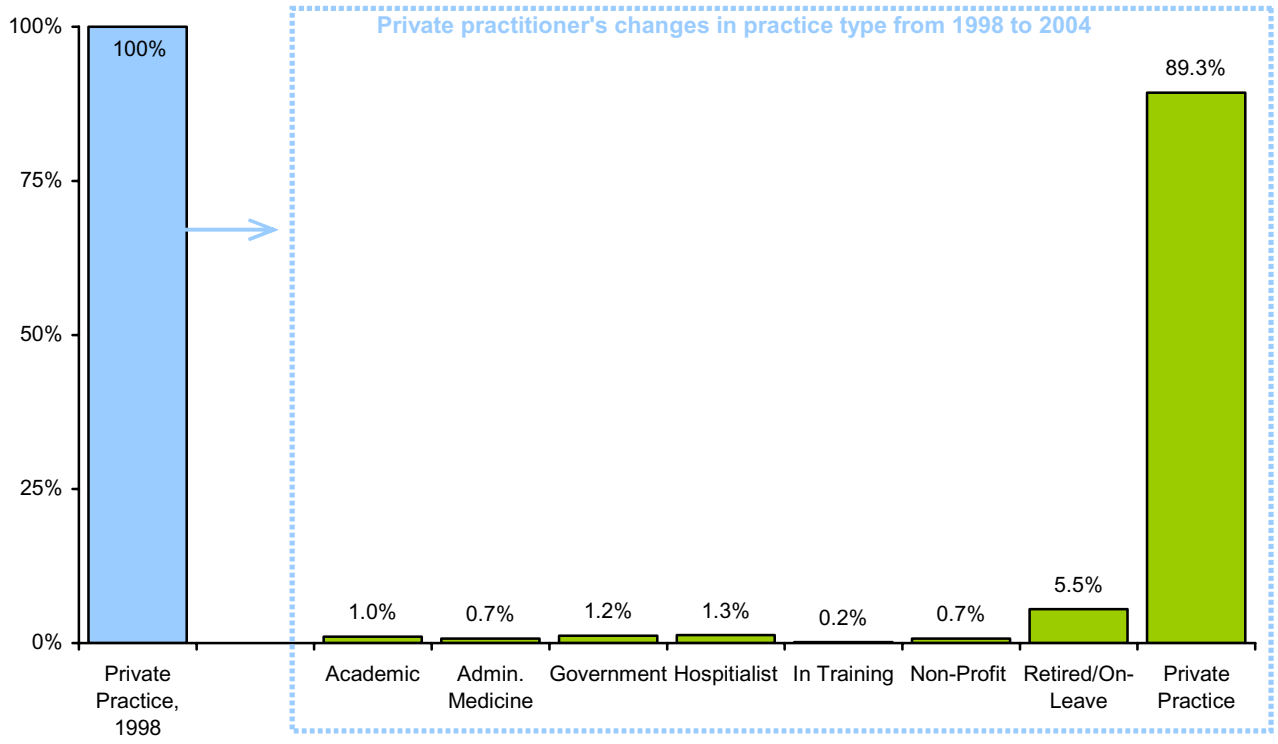
Trends in Types of Practice

Physicians who respond to the 2004 PPS are asked to compare the nature of their practices in 1998 with their practice at the time of survey. The question is an attempt to partially eliminate the gap in information on trends caused by the termination of the ASU/AzCGME project on the physician workforce in 1997. The recall period is long for a survey question, but the subject is of such fundamental importance to the respondents that recall error is not likely to be a significant problem.

Approximately 4,501 physicians responded to the question. There were 2,884 physicians surveyed who were in private group or solo practice in 1998. Six percent of the 2,884 physicians were retired/on-leave by 2004, and the remaining 5% had switched from private

practice to other types of practice (Figure 9). In other words 89% of the physicians who were in private practice in 1998 were in private practice in 2004.

Figure 9: Changes in Private Practice from 1998 to 2004 (n=2,884)



Source: PPS, 2004

Note: N=4,501 and includes academic, administrative medicine, government, group practice, hospitalist, in training, non-profit, retired/on-leave, and solo practice. 2,884 respondents were in private practice in 1998; private practice includes group practice and solo practice.

Trends in Arizona Physician Specialties

The primary specialties of Arizona physicians in 2004 are shown in Table 4. The number of primary care physicians, hospital-based physicians, surgeons, and other specialists increased between 1992 and 2004. However, the number of physicians with medical specialties declined from 911 in 1992 to 829 in 2004 (Table 4). Within the medical specialties, decreases occurred in the number of physicians specializing in allergy, cardiovascular diseases, endocrinology, gastroenterology, hematology, and infectious disease. The number of surgeons practicing in Arizona increased by 40% since 1992, but there has been a decrease in the number of surgeons who reported cardiovascular surgery, colorectal surgery, hand surgery, and thoracic surgery as their primary specialty since 1992. There has also been a decrease in the number of

child psychiatrists and gynecologists. The decrease in the number of medical specialists was predicted by our research group in 1996 when we noted decreasing numbers of medical school graduates entering specialty training.

Approximately 38% of all physicians in the U.S. are primary care specialists. In 1994, the COGME recommended that 50% of all U.S. physicians should be primary care specialists (family/general practice, geriatrics, internal medicine, and pediatrics). But their most recent report rescinded that recommendation. Currently, they recommend that the federal government conduct a study to determine the specialty-specific need, demand, and desired distribution of physicians at the regional level. Thus, they offer no guidance for determining the ideal specialty mix of physicians. There are, however, a growing number of reports suggesting national shortages in the number of specialty physicians including radiology, anesthesiology, cardiology, rheumatology, nephrology, pulmonary disease, child psychiatry, and pediatric subspecialties (Health Resources and Services Administration, 2005).

The Dynamics of Physician Supply in Arizona

Physician supply changes in Arizona have been described in the previous sections. The next step is to begin to understand the process of these changes.

Retirements/Departures

Physician retirements are another factor that influences the composition and size of the physician workforce. Many expect that the exit of the baby boom cohort of physicians from the labor market will substantially reduce the supply of physicians. Approximately 42% (5,285) of Arizona physicians are 50 years old or older in 2004 and can be expected to retire in the next 10 to 15 years. Approximately 49% of the medical and pediatric specialists are 50 years old or older. In contrast, only 39% of primary care specialists and 41% of hospital-based specialists are 50 years old or older.

Arizona Entrants

At the state level, the number of new entrants into practice is a function of the number of new graduates from internships, residencies, or fellowships who are attracted to the state as well as in-migration of established physicians who choose to relocate. The proportion of residents/fellows likely to choose to practice in a state is higher for those who complete

residencies/fellowships within the state or grew up there. Residency training programs in Arizona are sponsored by hospitals or medical schools. The programs are accredited by the ACGME to train physicians who have graduated from medical schools in clinical specialties, including primary care specialties and other specialties. Currently, approximately 59% of Arizona's physicians in residency training are trained in teaching hospitals in Phoenix. These programs are based in private community hospitals as well as the county's only public hospital, Maricopa Medical Center. Residency programs with their faculty and residents in training also provide the teaching faculty for the clinical training of medical students working towards their MD and DO degrees. These programs are expensive to maintain and some hospitals have closed selected residency training programs because of financial costs and/or the failure to maintain accreditation. Closure of these programs can have an adverse effect on the supply of physicians in the state, as well as the ability to support undergraduate medical education.

Changes in Residencies in Arizona, 1992-2004

There were 1,010 physicians in residency training in Arizona in 1992. Approximately 58% of the residents (581) received training at three Phoenix hospitals (Maricopa Medical Center, St. Joseph's Hospital, and Good Samaritan Regional Medical Center) and approximately 39% of the residents (392) received training at the UA College of Medicine. In 1992, 41% (412) of the residents in training were in primary care training (pediatrics, family medicine, internal medicine). Only 15% (147) of the residents were training in surgical specialties. There were 71 residents in obstetrics/gynecology, 64 in anesthesiology, 62 in psychiatry, and 44 in emergency medicine (Meenan *et al.*, 1995).

By 1996, there were 1,166 residents in training in Arizona in 96 programs. The number of residents at the UA College of Medicine decreased to 371 while the number of Mayo Clinic Scottsdale residents increased from eight residents in 1992 to 31 in 1996. Eight of the 96 training programs in 1996 were osteopathic programs (Arizona Council for Graduate Medical Education, 1998).

In 2004, there were 1,076 residents in 84 training programs in Arizona, a decrease from 1996 (Table 6). There were decreases in the number of programs in anesthesiology, family practice, internal medicine, and obstetrics while the number of programs in cardiology increased. However, because some of these decreases were due to program mergers, the total number of

residents in training only decreased in anesthesiology and family practice. By 2004, almost all of the osteopathic training programs closed. These programs largely trained family physicians or general practitioners although there had been one program in obstetrics/gynecology. In contrast, there has been a large increase in the number of residents and training programs at the Mayo Clinic Scottsdale which has helped offset the closure of other Arizona programs. In 1992, Mayo had only two training programs and eight residents; whereas in 2004 Mayo has 30 residency programs with 110 residents. The number of residents trained at the UA College of Medicine also increased to 437 in 2004. Table 6 shows the current number of residents in training by specialty.

Table 6. Arizona Residency Training Programs, 2004

Specialty	*Number of Programs*	*Number of Residents*
Anesthesiology	1	29
Emergency Medicine	2	63
Family Practice	6	132
Internal Medicine	5	229
Neurosurgery	2	13
Obstetrics	3	73
Orthopedics	2	27
Pathology	2	23
Pediatrics	3	103
Psychiatry	3	53
Radiology	2	38
General Surgery	4	109
Cardiovascular Disease	3	25
Gastroenterology	3	18
Neurology	3	19
Other	40	122
Total	84	1,076

Source: AzCGME, www.acgme.org, Sept. 14, 2004

The number of residency training program positions available for graduating medical students limits the number of physicians who can train in each specialty. For example, in internal medicine, there are 263 residency positions available in Arizona and over 22,000 positions available nationally, but there are only 20 residency positions in neurosurgery in Arizona and only 800 positions available nationally.

The number and type of residency program positions available in the U.S. affects the supply of practicing physicians. In addition, residents are more likely to practice in the state in which they completed their residency. In a 1992 survey of graduating Arizona residents, 52 of the 88 respondents (59%) chose to practice in Arizona after completing their training. In Part II of our study we will report on the location of practice for Arizona residents who graduate this year (2005).

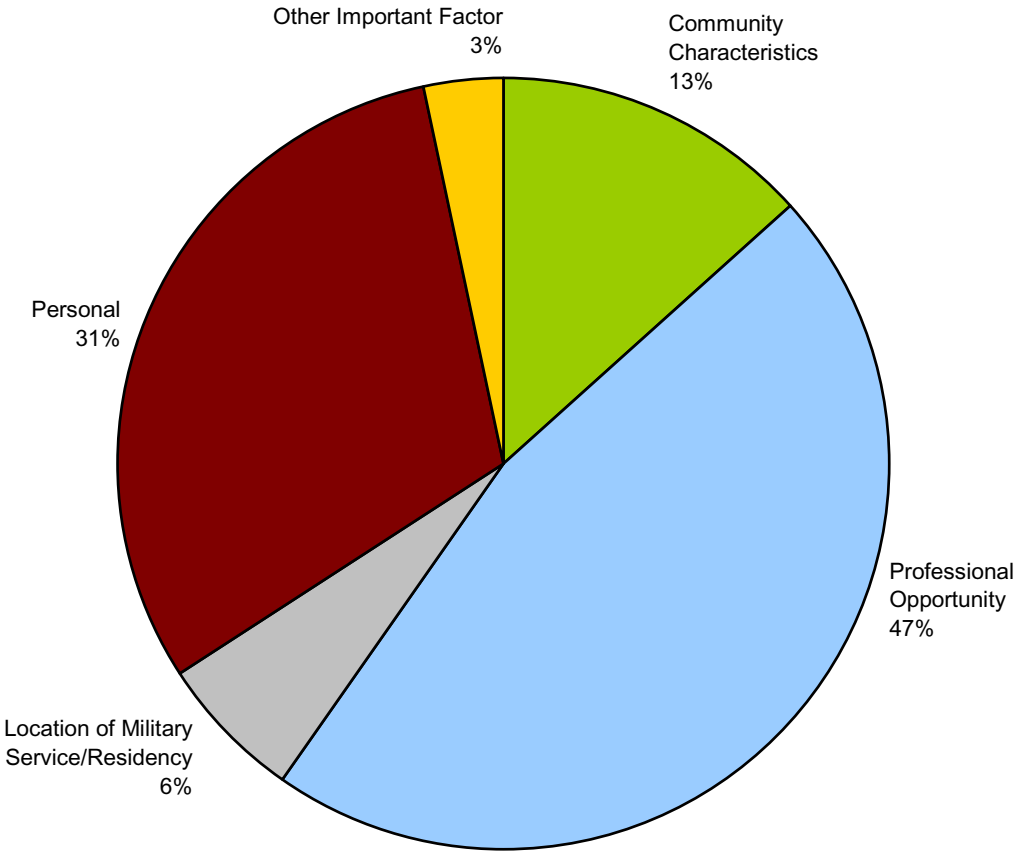
While training in Arizona is not synonymous with a decision to practice in Arizona upon completion of the training, there is an important link between the two. We next consider the reasons that lead graduating residents from Arizona and graduating residents and practicing physicians from other states to locate in Arizona.

Why Physicians Choose to Practice in Arizona

The factors that influence the supply of physicians include compensation, work environment, location of medical school and residency training, employment opportunities, and personal preferences. The living environment, including the quality of schools, cultural and recreational resources, and the climate are key factors as well. The growth in two career families means that the choice of jobs and location is increasingly a joint decision by spouses based on the best job opportunities and characteristics for both. Finally, since medical liability premiums vary from state to state, they also may play a role.

In cooperation with the AMB and the AOB, we developed the NPS of first time applicants for Arizona licenses (Appendix 1 and 2). The survey collects information on the reasons that lead physicians to practice in Arizona. We received 453 new applicant surveys. Approximately 39% of new applicants to date in 2005 were recent graduates of residencies or fellowships in Arizona. Applicants were asked about the most important reasons for choosing to practice in Arizona. The most frequently cited reasons included: “the characteristics of the community,” “the best professional opportunity available,” and “personal ties to the community.” Almost half (47%) cited “professional opportunity,” including factors such as earning potential, work hours, opportunity to serve a particular population, colleagues, and professional contacts as the reason they decided to practice in an Arizona community. Personal factors were cited by 31%, including factors such as “grew up in the community,” “influence of spouse,” and “personal ties to the community” (Figure 10).

Figure 10. Single Most Important Reason Influencing Physicians to Practice in Arizona (N=496)



Source: NPS, 2004.

Note: Number of non-respondents = 43; respondents include 366 MDs and 87 DOs. Professional opportunity includes earning potential, environment/hours of work, best professional opportunity available, recruited by colleagues, opportunity to serve a particular group of people, and professional contacts. Personal includes grew up in area, personal ties in the community, and influence of spouse.

The survey of new applicants provides valuable information on the physicians who choose to locate in Arizona but omits physicians who decide to locate in other states. The Goldwater Institute report concluded, without direct empirical support, that relatively low levels of compensation for physicians was a significant obstacle to attracting and retaining individuals to practice in Arizona. The next section addresses the question of physician compensation. The two most important elements of compensation are the potential gross earnings associated with a practice and the expenses associated with a practice, of which premium payments for medical liability are an important element.

Compensation

Differences in compensation can influence a physician's choice of practice location, but there are few differences in physician income across the U.S. Census divisions, and the income of physicians in the Mountain States is similar to the rest of the U.S. (Pasko & Smart, 2004). Table 7 compares median wages of four medical specialties among regions based upon MGMA surveys. While limited in scope, the data show that in three of the four specialties shown, Arizona physicians earned median wages comparable to the median wages earned at a national and regional level.

Although it has been argued that the disparities in physician to population ratios between urban and rural areas are due to decreased compensation for physicians in rural communities, the Center for Studying Health System Change recently reported that primary care physicians working in rural areas actually make 6% more than urban PCPs, and specialists working in rural areas make 3% less than urban specialists. Since the cost of living is often less in rural communities, these findings suggest that the disparities in physician distribution are not due to differences in compensation (Reschovsky & Staiti, 2005).

Table 7. Physician Median Income, Selected Specialties by Region, 2003

Specialty	*Arizona*		*U.S.*		*Alaska, California, Hawaii*		*Rocky Mountain*		*Midwest*	
	Providers	*Median Income ($)*	*Providers*	*Median Income ($)*	*Providers*	*Median Income ($)*	*Providers*	*Median Income ($)*	*Providers*	*Median Income ($)*
Cardiology: Invasive-Interventionalist	13	$562,800	731	$439,221	40	$372,210	65	$468,608	138	$532,251
Dermatology	11	$305,000	287	$280,121	49	$273,480	39	$277,460	37	$321,350
Family Practice (without OB)	33	$126,727	4,336	$152,478	266	$151,186	360	$149,363	684	$170,628
Internal Medicine: General	46	$160,722	4,216	$159,252	818	$163,421	295	$152,920	506	$160,959

Source: 2004 MGMA Physician Compensation and Production Survey.

Note: Number of providers refers to number responding to the survey. Physicians with less than one year in specialty are excluded.

Medical Liability (Malpractice) Insurance Costs

There is an ongoing national debate over the effects of increasing medical liability premiums on the physician workforce, including allegations that large numbers of physicians are abandoning medical practice or changing their method of practice to exclude high risk patient care. The AMA has designated 20 states—Arkansas, Connecticut, Florida, Georgia, Illinois, Kentucky, Massachusetts, Mississippi, Missouri, Nevada, New York, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, Texas, Washington, West Virginia, and Wyoming—as "crisis" states based on the size of medical liability insurance premium increases and the adverse effects of these increases on medical practice as reported by their medical society. Arizona and 23 other states are classified as "showing problem signs," and six states (California, Colorado, Indiana, Louisiana, New Mexico, and Wisconsin) are "currently okay."

Federal legislation has been proposed but not passed that would reduce medical liability. Twenty-seven states, not including Arizona, have laws which cap non-economic damages in malpractice cases. In Arizona, physician groups have sought legislation that includes a cap on payments and changes in the litigation process. Legislation was passed in Arizona in 2005 changing the qualifications of expert witnesses in medical liability litigation and limiting the admissibility of apologies made by a physician after a medical error has occurred.

Increases in insurance premiums, whether caused by tort awards, settlements or reduced rates of return on insurer's investments, pose a problem for physicians who usually are unable to increase their revenue to offset these increased costs. There is concern, therefore, that these increases in medical liability premiums may result in decreases in the Arizona physician workforce.

The GAO investigated the reductions in physician supply in the "crisis" states that propose medical societies attributed to the effects of increasing medical liability insurance premiums. They found that since 1990 the increases in medical liability premium rates have varied greatly by state and by specialty. Additionally, falling investment income and rising reinsurance rates have contributed to recent rate increases in addition to losses on medical liability claims. The GAO also found that other factors, including high investment income or lower-than-expected losses, can exacerbate the market cycles by encouraging insurers to price insurance below the expected cost of paying claims which can lead to large premium rate hikes when increasing

losses ultimately are recognized (US General Accounting Office, 2003). While the GAO findings did not support the claim that out-of-control jury awards causes premiums to skyrocket or that access to services was restricted because of rising medical liability premium rates, evidence suggests that premium increases are one of several influences affecting physician supply.

In a recent study Encinosa analyzed the effect of state caps on non-economic damage awards between 1985 and 2000. He determined these were associated with a 2% increase in the number of physicians practicing in these states, but that these increases occurred three or more years after the cap was instituted. The effect of caps was greater in rural counties than urban areas and seemed to affect the supply of surgeons and obstetricians more than other categories of physicians. Interestingly, other medical liability reforms (e.g., caps on punitive damages) did not affect physician supply (Encinosa & Hellinger, 2005; Kessler *et al.*, 2005).

A medical liability crisis is characterized by both the decreasing availability and affordability of insurance coverage (Studdert et al., 2004). Medical liability premiums have increased in Arizona in recent years, but other states (e.g., Florida, Nevada, Pennsylvania, and Texas) have had even higher increases (US General Accounting Office, 2003). It is worth noting that the predictions regarding a severe reduction in physician supply due to medical liability premiums in Nevada have not been realized. An article just published (June 4-5) in a Nevada newspaper reports that “2004 saw the highest gain of licensed Nevada physicians since the board (the Nevada State Board of Medical Examiners) began keeping that statistic in 1987” (Kanigher, 2005). Although the data from Nevada do not prove that medical liability premiums had no effect on physician supply, they are a reminder that the premiums are but one of many influences on the supply of physicians in a state.

The major medical liability insurance carrier in Arizona is the MICA. In 2005, MICA’s annual premiums for physicians range from approximately $11,000 (psychiatrists) to over $124,000 (neurosurgeons). Primary care physician premiums range from approximately $18,000 to $28,000 (Figure 11). Since Arizona must rely on other states to train the majority of our physicians, maintaining availability and affordability of medical liability insurance may be an important factor in attracting physicians to our state. Arizona rates were increased by MICA by only 6% in most specialties between 2004-2005. Rates increased by approximately 16% in the previous year (Dr. Carland, MICA, personal communication, June 14, 2005).

In 2002, Arizona's medical liability rates were moderately high (e.g., top 25%) compared to other states for internists, surgeons, and obstetricians but equal to or lower than other states for some specialties. In addition, MICA medical liability rates for Arizona physicians were higher for some specialties and lower for others in other states served by MICA including Colorado and Utah (Figure 11). In 2005, the survey of first time applicants for Arizona licenses included a question regarding high medical liability rates in other states as one of the possible reasons that physicians chose to locate in Arizona. Twelve percent (60/496) of the new applicants for an Arizona license listed high medical liability insurance rates as one of, but not the most important, reason for coming to Arizona. Interestingly, 72% (43/60) of the physicians who cited medical liability costs as an influence had relocated to Arizona from states that were considered "in crisis" in terms of medical liability by the AMA.[5]

The results suggest that medical liability premiums relative to higher premium states play a minor but positive role in the decisions of physicians to practice in Arizona. That conclusion is, however, constrained by the fact that we do not, as yet, have data that identify physicians who decided not to enter practice in Arizona or of physicians who moved to other states or retired.

Part of the gap in information on the effect of medical liability premiums will be filled from the results of the ongoing survey of residents in Arizona who are graduating. The data will be available for those who continue to practice in Arizona as well as those who go to other states. Results from the survey of residents graduating in 2005 from Arizona residencies will be available for Part II of this report. Information on practicing physicians who leave the state would require a survey that is outside the scope of the current project.

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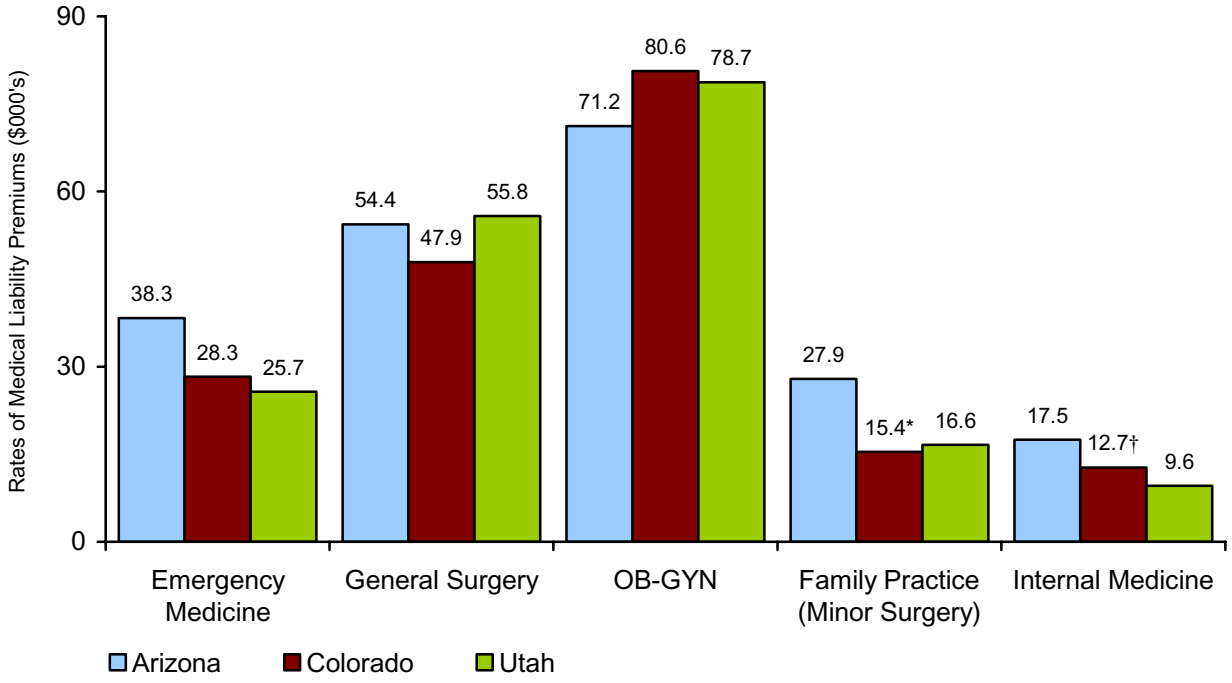
[5] The AMA classification scheme for determining whether a state is "in crisis," "showing problem signs," or is "currently okay" in terms of medical liability is based on the rating of three general criteria including: the loss of patient's access to health care; a state's legislative, legal, and judicial climates; and affordability and availability of professional liability insurance. For more information on these criteria Daniel Blaney-Koen of the AMA can be contacted at daniel_blaney-koen@amam-assn.org. The crisis map can be seen at the following website: www.ama-assn.org/ama/noindex/category/11871.html.

Figure 11. Medical Liability Premiums by Practice for Three Western States, 2005.



Source: MICA, April 3, 2005 and May 3, 2005. Compiled by the ASU HDRG.
Note: Comparisons are 2005 MICA; premiums for a 1,000,000/3,000,000 claims made mature policy.
*Non-ER, minor surgery; †includes minor surgery

Location of Medical Schools and Residencies

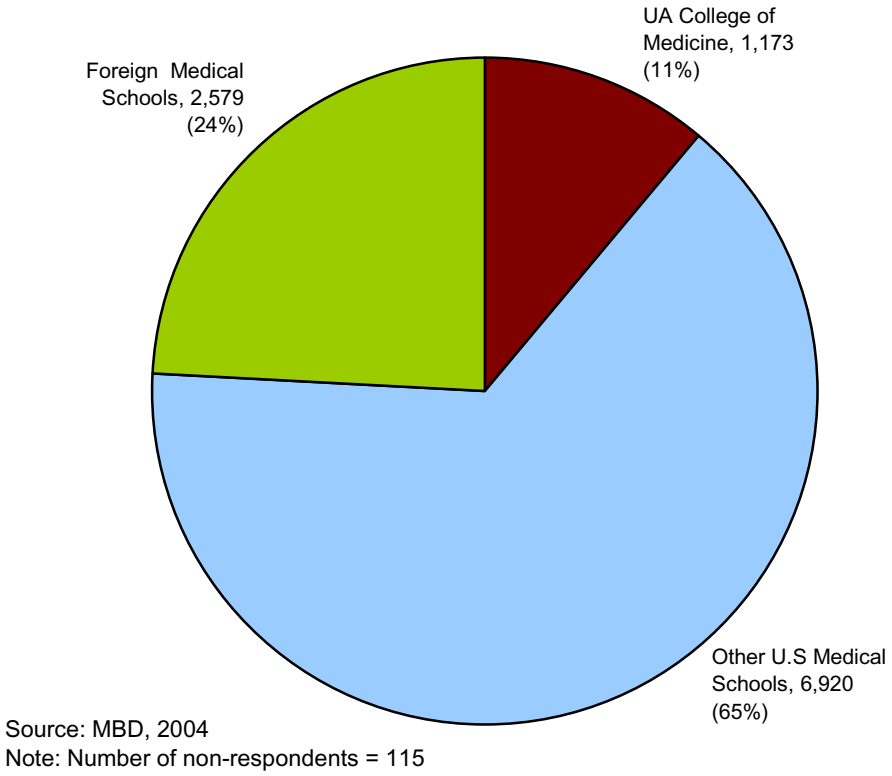
The relationship between attending a medical school and subsequent practice in the same state as the school is rather ambiguous. Arizona has, for many years, been an importer of physicians, the majority of whom attended medical schools in other states or other countries. On the other hand, it is true that increasing the size of a medical school or adding a new school to a state is likely to increase the number of graduates who eventually practice in the state. It is, however, difficult to predict the proportion of students who will remain in the state to practice.

There are two medical schools in Arizona: the UA College of Medicine, a public allopathic school, and Midwestern University AZCOM, a private osteopathic school. These two schools graduated 196 new physicians in 2000 or 3.9/100,000 population. The national average is 6.4/100,000, and Arizona ranked 38th among the 48 states with medical schools in medical school graduates per capita in 2000 (Health Resources and Services Administration, 2005). The total enrollment of the two schools was 895 students in 2000-2001 or 16.9/100,000 population. This is an increase from 628 students (11.8/100,000 population) in 1998 (US General Accounting Office, 2003).

As discussed previously, there are 84 residency training programs in Arizona and 1,076 residents in training or 20/100,000 population (Table 6). Approximately one-third of all physicians who are now practicing in Arizona received their most recent residency training in Arizona (US General Accounting Office, 2003).

In 1990, 607 or 9% of the allopathic physicians practicing medicine in Arizona had graduated from the UA College of Medicine. In 2004, 1,173 physicians in active practice in Arizona are UA College of Medicine graduates. This is approximately 11% of the physicians practicing in Arizona. The majority of Arizona physicians (6,920) graduated from other U.S. medical schools. However, 2,579 of Arizona physicians graduated from foreign medical schools (Figure 12).

Figure 12. Site of Medical School Training for Arizona MDs, 2004 (N=10,672)



Source: MBD, 2004
Note: Number of non-respondents = 115

In 2004, 126 students graduated from Midwestern University AZCOM. The majority of the Midwestern University AZCOM graduates (73/126) are entering primary care residencies in family medicine, internal medicine, or pediatrics. Approximately 32 of the 126 graduates entered residencies in Arizona.

In 2004, an estimated 58% (723/1,237) of osteopathic physicians were practicing primary care compared to 39% (4,239/10,787) of allopathic physicians. The majority (530/723 or 73%) of osteopathic primary care physicians are family physicians or general practitioners, whereas only 28% (1,208/4,239) of allopathic primary care physicians are family physicians.

Summary

The ratio of practicing Arizona physicians per 100,000 people increased from 197 in 1992 to 207 in 2004, but the physician to population ratio in Arizona remains far below the national average of 283 (Table 1, Figure 6). The physician workforce in Arizona continues to increase, largely by in-migration. Only 10% of the physicians practicing in Arizona attended medical school in Arizona and only one-third of practicing Arizona physicians completed residency training in the state.

The large geographic disparities in the Arizona physician workforce which were noted in 1992 continue in 2004, although the physician to population ratio of rural counties has improved especially in the rural counties which have become more urbanized.

Approximately 41% of Arizona physicians were primary care specialists in 2004. Currently about 38% of all physicians in the U.S. are primary care specialists, so the percentage of primary care specialists in our state is greater than the national average. However, with the decreasing popularity of family medicine and decreased number of family medicine residency positions in the state, it is likely that the number of family physicians practicing in Arizona will decline in the future. It is also likely that osteopaths will comprise a higher percentage of family physicians practicing in Arizona since the number of osteopathic physicians in Arizona is increasing, and, historically, most osteopaths choose careers in family medicine. In general, the number of Arizona physicians practicing in non-primary care fields has increased except for subspecialties of internal medicine. The decrease in the number of residents in training programs in anesthesiology may impact the supply of physicians in this specialty in the future.

The gender and age distribution of the Arizona physician workforce has changed dramatically since 1992. Only 15% of Arizona physicians were women in 1992 compared to approximately 24% of Arizona's practicing physicians in 2004. In 1992, only 31.5% of Arizona physicians were over 50 years old; whereas in 2004, 42% of the physicians are over 50 years old. This has important implications for the Arizona physician workforce over the next 15 years.

Because of the five to 13 year lag between medical school matriculation and completing medical training, expanding the number of medical students in the state cannot have an immediate effect on the physician workforce even if a majority of these students choose to practice in Arizona. This is an especially important consideration for states, like Arizona, where population growth is much higher than the average in nearly all the other states and our current physician to population ratio is much less than the national ratio. It is unlikely that medical education in Arizona can expand to a level where even one-half of the practicing physicians will have attended medical school in Arizona. Therefore, Arizona will continue to rely on the in-migration of physicians to maintain its physician workforce.

We must continue to study the factors associated with physician in-migration since Arizona relies on continued in-migration of physicians trained in other states (and other nations) for the overwhelming majority of its physician workforce. Surveys of newly licensed physicians are one way we can monitor the reasons for in-migration. It would also be helpful to begin surveying physicians who leave Arizona to practice in other states. Finally, we must also examine the factors associated with physician retirement because the continued practice of medicine by physicians over 50 also can help us maintain and potentially increase the total physician workforce in our state.

This is the first of two reports on the supply of physician services in Arizona. A subsequent report (Part II), using the AZHQ, will combine the numbers of physicians in the workforce with measures of productivity and estimates of the population's health care needs. Using these techniques, we hope to estimate the current and future physician workforce needs in our state.

The data on the trends in physician supply include a number of years in which data are missing. The omissions result from the historical practice of state licensing agencies simply overwriting physician records at each renewal without saving backup copies of the data at the end of each year. Backup data for some years was obtained. The practice is consistent with the agency's primary function of maintaining current licensing records but creates problems with attempts to measure changes over time. It is our understanding that at least one of the agencies is changing this practice.

The data on past years were obtained from records available from the licensing agencies if backups existed and from annual records provided to ASU by the licensing agencies during the

previous study. The data were not, however, obtained at the same date in each year and do not refer, therefore, to the number of physicians at the same point in time in different years. The trend data should, therefore, be interpreted as being subject to some uncertainty.

The survey data from the practicing physicians survey on allopathic physicians represents approximately one-half of the allopathic physicians in Arizona. Allopathic physicians renew their licenses every two years on their birthdays. The current cycle is not yet complete, and the survey is continuing. The results from the current survey may, therefore, differ from the results when all surveys have been administered. The large percentage of physicians who have completed surveys and the selection by birthdays makes it extremely unlikely that the results are not representative of all allopathic physicians but that expectation cannot be confirmed until the survey process is complete. Osteopathic physicians renew as a group every two years so the survey results for the osteopathic physicians are complete.

Limitations of the Study

We have, hopefully, made it clear that the supply of physician services, rather than the number of physicians, is the best measure of the adequacy of the physician workforce. Part II of this study will be devoted to converting the numbers of physicians to physician services. One important element of the conversion that will be omitted is the number and placements of non-physician clinicians. The information is important as an influence on the productivity of physicians and, thereby, on the supply of physician services. Anecdotal information suggests that Arizona has an unusually large number of non-physician clinicians. It would, in our opinion, be both possible and useful to obtain information on the non-physician clinicians through the licensing agencies; however, that activity is outside the scope of the current project.

Another limitation of the study is the absence of data on physicians who have left the state. The licensing agency data include all physicians who maintain an Arizona license even if they do not practice within the state. If the current project is continued, it may be possible to survey physicians with recent changes from in-state to out-of-state addresses to obtain the reasons for their departures. Again, however, that is not within the scope of the current project.

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Appendix 1. New Physician Survey for Allopathic Physicians

Please complete the survey below and return with your application for licensure.

Applicant Name _____,

1. I'm applying for an Arizona license because: (select the three most important reasons from the "Reason for Applying for an AZ License": see box)

_____ _____ _____
Reason #1 Reason #2 Reason #3

REASON FOR APPLYING FOR AN AZ LICENSE
1. Completed a residency.
2. Considering retirement.
3. Bought into practice/became partner.
4. Opportunity to serve an underserved group.
5. Malpractice expenses too high in current practice state.
6. Position ended.
7. Too much paperwork.
8. To change the scope of practice.

2. Please indicate which of the following was important in influencing you to practice in Arizona. Circle **one** code number after each factor.

Factor	Important	Not Important	Does Not Apply
1. Grew up in the area	1	2	3
2. Personal ties in the community	1	2	3
3. Professional contacts	1	2	3
4. Characteristic of the community	1	2	3
5. Financial advantages	1	2	3
6. The opportunity to serve a particular group of people	1	2	3
7. Best professional opportunity available	1	2	3
8. Recruited by colleagues	1	2	3
9. Availability of adequate hospital facilities	1	2	3
10. Influence of Spouse	1	2	3
11. Location of military service	1	2	3
12. Location of residency	1	2	3
13. Earnings potential	1	2	3
14. Work environment/hours of work	1	2	3

15. If other important factor, specify_____

_____

3. Please list the code number from the list above which represents the SINGLE most important reason that influenced you to practice in Arizona.____

4. I am moving to (city/town)_____, Arizona from (city/town)_____ (state/country)_____.

Appendix 2. New Physician Survey for Osteopathic Physicians

Doctor's Name_____ AZ License Number: _____

5. COMPLIANCE WITH CME REQUIREMENT: Check how you complied and ATTACH the documentation:

____ I completed 20 hours of AOA approved category 1-A CME required during the calendar year 2004 or during an approved extension period; transcripts or certificates are attached

____ I completed or participated in an internship or residency program during 2004; a copy of a certificate of completion or a letter from the Dean of Medicine stating dates I was in residency is attached.

_____ I received a waiver of the CME requirement from the Board at their meeting on _____.

6. WORKFORCE SURVEY OF OSTEOPATHIC PHYSICIANS

A. I usually work _____ days per week (Mon- Fri) and _____ days per weekend (Sat-Sun).

B. I usually work _____ hours per day during the week (Mon-Fri) and _____ per day on the weekend (Sat-Sun).

C. I usually work _____ weeks per year, and _____ weekends per year.

D. I usually treat _____ patients in a typical week and _____ patients on a typical weekend.

E. My primary compensation is BEST described as (check only one);

	Base Salary/ Straight salary		Salary plus incentive		Production based

F. I can provide adequate care, without using a translator, to patients who speak the following languages: (check all that apply):

	English		French		Chinese		Hindi
	Spanish		Vietnamese		Arabic		Tagalog

G. What were the three most important reasons you did applied for an AZ license at the time you did so?

	Completed internship or PGY1 of residency		Bought practice / became partner		Changed specialty or scope of practice		Considering retiring / semi-retiring
	Completed full residency program		Employment opportunity		Malpractice rates more favorable		Other: please specify

H (a) How important were the following factors in your decision to practice in AZ? CIRCLE a number after each factor to answer.

FACTORS	**Important**	**Not Important**	**Not Applicable**
1. Grew up in the area	1	2	3
2. Personal ties in the community	1	2	3
3. Professional contacts	1	2	3
4. Characteristic of the community	1	2	3
5. Financial advantages	1	2	3
6. Opportunity to serve particular group of people	1	2	3
7. Best professional opportunity available	1	2	3
8. Recruited by colleagues	1	2	3
9. Availability of adequate hospital facilities	1	2	3
10. Influence of Spouse	1	2	3
11. Location of military service	1	2	3
12. Location of internship / residency	1	2	3
13. Earnings potential	1	2	3
14. Work environment/hours of work	1	2	3

15. If other important factor, specify_____

H. (b) Which was the SINGLE most important factor in your decision to practice in AZ? Factor #: _____

I. What city / town_____ and state _____did you move from, to practice in AZ?

7. SIGN AND DATE THIS FORM I, the undersigned, do hereby attest that the information I have provided the Board on this application and in the supporting documentation is true, complete, and accurate.

Signature _____ Date signed _____

License holder must sign the form; signature stamps are not accepted.

8. Mail to: AZ Board of Osteopathic Examiners, 9535 E Doubletree Ranch Road, Scottsdale AZ 85258.

Appendix 3. Practicing Physician Survey for Allopathic Physicians

Arizona License Number: _____ Name _____

A. My practice in 1998 and my current practice can be **BEST** described as (**check no more than two in each column**):

	In 1998		**Current**
	Not in Active Practice: Fully Retired		Not in Active Practice: Fully Retired
	Semi-Retired / On Leave		Semi- Retired / On Leave
	Group Practice		Group Practice
	Solo Practice		Solo Practice
	Hospitalist		Hospitalist
	Non-Profit Community Health Center		Non-Profit Community Health Center
	Government (VA, IHS, Public Health)		Government (VA, IHS, Public Health)
	Administrative Medicine		Administrative Medicine
	Academic/Teaching/Research		Academic/Teaching/Research
	In training (med school, intern, resident, fellow)		In training (med school, intern, resident, fellow)

B. My employment in 1998 and current can best be described as

	In 1998		**Current**
	Self-employed		Self-Employed
	Employee		Employee

C. My primary compensation is **BEST described as (check only one in each column)**

	In 1998		**Current**
	Base Salary/Straight Salary		Base Salary/Straight Salary
	Salary plus incentive		Salary plus incentive
	Production based		Production based

If **completely retired**, date of retirement _____ if **completely retired** this is the end of the survey, otherwise, please continue:

D. I usually work _____ days per week (Mon- Fri) and _____ days per weekend (Sat-Sun)

E. I usually work _____ hours per day during the week (Mon-Fri) and _____ per day on the weekend (Sat-Sun)

F. I usually work _____ weeks per year and _____ weekends per year

G. I usually treat _____ patients in a typical week and _____ patients on a typical weekend.

H. I can provide adequate care, without using a translator, to patients who speak the following languages: (check all that apply):

	English		French		Chinese		Hindi
	Spanish		Vietnamese		Arabic		Tagalog

I. What percent of your work time in a typical week is spent on each of the following?(Insert 0 if none)

1) Providing primary care to non-specialty patients _____ %
2) Providing primary care to continuing specialty patients _____ %
3) Providing specialty care only _____ %
4) Management of practice _____ %
5) Other _____ %

100%

Appendix 4. Practicing Physician Survey for Osteopathic Physicians

5. **COMPLIANCE WITH CONTINUING MEDICAL EDUCATION REQUIREMENT**
Initial the statement that describes how you complied with the requirement:

_____ I have completed at least 40 hours of category 1-A CME during the calendar years 2002 and 2003. I

_____ I have an approved extension, and have completed at least 40 hours of category 1-A CME between January 1, 2002 and May 30, 2004. I have attached transcripts or certificates showing my hours.

_____ I received a waiver from the Board at their meeting on _____.

6. WORKFORCE SURVEY OF OSTEOPATHIC PHYSICIANS
the Board is conducting a survey to assess the impact of the profession on the provision of health care in AZ. Please answer all questions.

A. I usually work _____days per week (Mon-Fri) and _____days per weekend (Sat-Sun).

B. I usually work _____hours per day during the week (Mon-Fri) and ___ hours per day on the weekends (Sat-Sun).

C. I usually work _____weeks per year, and _____ weekends per year.

D. I usually treat _____ patients in a typical week and ____ patients on a typical weekend.

E. My practice in 1998 and my current practice can be best described as (check only one in each column):

	In 1998		Current
	Group Practice		Group Practice
	Solo Practice		Solo Practice
	Hospitalist		Hospitalist
	Government (VA, IHS, Public Health)		Government (VA, IHS, Public Health)
	Administrative Medicine		Administrative Medicine
	Academic/Teaching/Research		Academic/Teaching/Research
	In training (med school, intern, resident, fellow)		In training (med school, intern, resident, fellow)
	Retired / On Leave		Retired / On Leave

F. My primary compensation is best described as (check only one in each column)

	In 1998		Current
	Self-employed		Self-employed
	Salaried		Salaried

G. I can provide adequate care, without using a translator, to patients who speak the following languages:
(check all that apply):

	Spanish		French		Chinese		Hindi
	Tagalog		Vietnamese		Arabic		English

&. SIGN AND DATE THIS FORM

I, the undersigned, do hereby attest that the information I have provided the Board on this application and in the supporting documentation is true, complete, and accurate.

Signature _____ Date signed _____

License holder must sign the form; signature stamps are not accepted.

8. MAIL FORM AND PAYMENT TO: AZ Board of Osteopathic Examiners
9535 E. Doubletree Ranch Road, Scottsdale AZ 85258

Appendix 5. Distribution of Practicing Physicians by County of Practice

County	2004						
	Allopathic Physicians		Osteopathic Physicians		Total Physicians		Physicians per 100,000 People
	N	%	N	%	N	%	N
All Physicians	*10,787**	*100%*	*1,237**	*100%*	*12,024**	*100%*	*207*
Urban	*9,307*	*86%*	*1,007*	*81%*	*10,314*	*86%*	*231*
Maricopa	6,906	64%	839	68%	7,745	64%	220
Pima	2,401	22%	168	14%	2,569	21%	276
Rural	*1,473*	*14%*	*229*	*19%*	*1,702*	*14%*	*124*
Apache	28	<1%	6	<1%	34	<1%	48
Cochise	118	1%	26	2%	144	1%	111
Coconino	306	3%	17	1%	323	3%	249
Gila	68	1%	19	2%	87	1%	161
Graham	21	<1%	1	<1%	22	<1%	61
Greenlee	7	<1%	-	-	7	<1%	84
La Paz	12	<1%	5	<1%	17	<1%	80
Mohave	195	2%	54	4%	249	2%	138
Navajo	88	1%	15	1%	103	1%	96
Pinal	124	1%	23	2%	147	1%	67
Santa Cruz	29	<1%	3	<1%	32	<1%	76
Yavapai	274	3%	43	3%	317	3%	161
Yuma	203	2%	17	1%	220	2%	121

Source: January 5, 2005 and 1992 MBD; July 1, 2004 Arizona Department of Economic Security Population Projections; and July 1, 1992 Census Population Estimates. Percentages may not add to 100% because of rounding. Compiled by the ASU HDRG.

Note: Includes MDs and DOs who practice medicine in Arizona. Excludes retired physicians; and physicians practicing solely in a federal facility may not be included because they are not required to have an Arizona medical license.

*Seven allopathic physicians and one osteopathic physician missing county location.

Appendix 6. Algorithm Used to Group Physician Specialties

Abbreviation	*Specialty Name*	*Osteopathic Specialty Abbreviation, 2004*	*Allopathic Specialty Abbreviation, 2004*	*General Medical Category*
ACU	Acupuncture		ACU	Other Specialty
ADM	Administrative medicine		ADM,MIN,MDM	Other Specialty
ADL	Adolescent		ADL,AMI	Other Specialty
AM	Aerospace medicine	AM/FP, AM/IM,AM/OE, AM/OM, AM/ONM, AM/PVM, AM/PM	AM	Other Specialty
A	Allergy	AI, AI/PUL	A,AI, IG	Medical
AN	Anesthesiology	AN, AN/FP, AN/GER, AN/GP, AN/IM	AN,APM	Hospital Specialty
CD	Cardiovascular Disease	C, C/IM, C/IM/NM, CD, CVD, CVD/IM	CD,IC,ICE	Medical Specialty
CCM	Critical care medicine		CCM,CCA,CCS,PCC	Hospital
D	Dermatology	D,D/AM,D/FP	D,DS	Medical
EM	Emergency Medicine	EM, EM/FP, EM/GP, EM/GP, EM/IM, EM/PVM	EM,PE, PEM	Hospital Specialty
END	Endocrinology		END,DIA	Medical
FP	Family Practice	FM, FP, FP/ADD, FP/AI, FP/AM,FP/BAR/OMM, FP/D, FP/EM,/FP/ER, FP/GE, FP/GER, FP/IM, FP/OBS, FP/OE,FP/OM, FP/OMM, FP/OMT, FP/OOM, FP/OOP, FP/OPH, FP/OS, FP/P, FP/PD, FP/PHP, FP/PVM, FP/S, FP/SM, GP, GP/ADD, GP/AN, GP/EM, GP/FP, GP/GER, GP/IM, GP/OBG, GP/OBS, GP/OM, GP/OMM, GP/OMT, GP/OMT/OE, GP/P,	FP,GP	Primary Care Specialty
GE	Gastroenterology	GE,GE/IM,	GE	Medical
GEN	Genetics		GEN,CBG,CG,	Other Specialty
GER	Geriatrics	GER	GER,FPG, IMG	Primary Care
GYN	Gynecology	GYN, GGYN/S, GYN/S, GO	GYN,GO	Other Specialty
HEM	Hematology	HEM/ON, HEO/IM,	HEM,HO	Medical
ID	Infectious Disease	ID/IM	ID	Medical

Abbreviation	*Specialty Name*	*Osteopathic Specialty Abbreviation, 2004*	*Allopathic Specialty Abbreviation, 2004*	*General Medical Category*
IM	Internal Medicine	IM, IM/AN, IM/C, IM/EM, IM/END, IM/FP, IM/GE, IM/GER, IM/GP, IM/HEO, IM/MDC, IM/N, IM/NEP, IM/NM/ENDO,IM/ON, IM/PD, IM/PDR, IM/PLM, IM/PUL, IM/RHU,IM/SM,	IM	Primary care Specialty
LM	Legal Medicine		LM	Other Specialty
NEP	Nephrology	NEP, NEP/IM,	NEP	Medical Specialty
N	Neurology	N, N/FP/OM, N/RM, N/SM	N,CN	Medical Specialty
NPM	Neonatology	NE	NPM	Pediatric Specialty
NM	Nuclear Medicine	NM	NM	Other Specialty
OBS	Obstetrics	OB/GYN, OBG, OBG/FP, OBG/OGS, OBG/S, OBG-GYN, OBGYN, OB-GYN, OGS	OBS,OBG	Surgery Specialty
OM	Occupational Medicine	OE, OE/FP, OE/GP,OM, OM/FP, OM/GP, OM/PD, OM/PM	OM	Other Specialty
ON	Oncology	ND, ON, ON/HEM	ON,OMO	Medical Specialty
OPH	Ophthalmology	OPH, OPH/OTL	OPH	Surgery Specialty
OTO	Otolaryngology	OTL, OTL/OPL, OTO,OTR, OTR/OOP,OTR/OPL, ENT, EENT	OTO,OFS,OT, HNS,NO, BE	Surgery Specialty
PNC	Pain Control		PNC	Other Specialty
PTH	Pathology	PTH. PTH/FP,PTH/GP PTH/NM, AP/D, AP/LBM, APL, FOP	PTH,ATP,BLB,CMP,LP ,FOP,IP,MP,DLI,NA,BB KDDL, HMP,NP,PCH, PCP,PP,SP	Hospital Specialty
PD	Pediatrics	PD, PD/AFP, PD/EM, PD/GP	PD,PDA	Primary Care Specialty
PDC	Pediatric Cardiology		PDC	Pediatric
PDE	Pediatric Endocrinology		PDE	Pediatric
PDG	Pediatric Gastroenterology		PDG,PG	Pediatric
PHO	Pediatric Hematology		PHO	Pediatric
PNP	Pediatric Nephrology		PNP,PN	Pediatric
PDP	Pediatric Pulmonary Disease		PDP	Pediatric
PA	Pharmacology		PA	Other Specialty

Abbreviation	*Specialty Name*	*Osteopathic Specialty Abbreviation, 2004*	*Allopathic Specialty Abbreviation, 2004*	*General Medical Category*
PM	Physical Medicine and Rehabilitation	PMPM/R,PM/RM,PM/RM/SM, PMR, RM, RM/OE/FP,RM/PM, PVM/RM	PM,PMM,PMR, SCI	Other Specialty
P	Psychiatry	P,P/ADD,P/EM,P/N,PYA	P,PYA,PFP,PYG	Other Specialty
CHP	Child Psychiatry	P/CHP, CHP, CHP/P	CHP	Other Specialty
PH	Public Health	PHP/PVM	EP	Other Specialty
PUD	Pulmonary Disease	PUD,PUL,PUL/IM	PUD	Medical
R	Radiology	R,R/AM,R/FP,R/N, R/NM, R/ON RADIO,RT,RTD,RTD/GP, DR	R,DR, PR, TR, AR,NBN,RNR,VIR	Hospital Specialty
RO	Radiation Oncology	RO	RO	Hospital
REN	Reproductive Endocrinology		REN	Other Specialty
RHU	Rheumatology	RHU,RHU/IM	RHU	Medical Specialty
SM	Sports Medicine	SM,SM/FP, SM/FP/OM, SM/RM	SM,ESM, FSM,ISM,PSM	Other Specialty
GS	General Surgery	S,S/DR, S/EM, S/FP, S/GP	GS,TRS,AS	Surgery Specialty
CDS	Cardiovascular Surgery	S/TCV, TCV, TCV/S, CTS,CVS	CDS,CTS	Surgery Specialty
CRS	Colorectal Surgery		CRS,ABS	Surgery
HS	Hand Surgery	OR/HS,ORS/HS	HS	Surgery
MFS	Maxillofacial Surgery		MFS,CFS	Surgery
NS	Neurosurgery		NS	Surgery
ORS	Orthopedic Surgery	OR,OR/S,ORS,ORS/S	ORS,OSM,OSS, OTR	Surgery
PDS	Pediatric Surgery		PDS	Surgery
PS	Plastic Surgery	OOP, PLR	PS,FRS,PSH	Surgery
TS	Thoracic Surgery	TS	TS	Surgery
U	Urology	U,U/URS,UR, URS	U	Surgery
VS	Vascular Surgery	S/GVS, GVS,	VS	Surgery
CCP	Pediatric Critical Care		CCP	Hospital Specialty
DBP	Developmental/Behavioral		DBP,NDP	Pediatric
NSP	Pediatric Neurosurgery		NSP	Surgery
OP	Pediatric Orthopedics		OP	Surgery
PAN	Pediatric Anesthesiology		PAN	Hospital Specialty
PDI	Pediatric Infectious Disease		PDI	Pediatric
PDO	Pediatric Otolaryngology		PDO	Surgery
PO	Pediatric Ophthalmology		PO	Surgery
PRO	Proctology	PR, PR/FP,	PRO	Surgery
SO	Surgical Oncology		SO	Surgery
UM	Underseas Hyperbaric Medicine		UM	Other specialty

Abbreviation	*Specialty Name*	*Osteopathic Specialty Abbreviation, 2004*	*Allopathic Specialty Abbreviation, 2004*	*General Medical Category*
UP	Pediatric Urology		UP	Surgery
VM	Vascular Medicine		VM	Other Specialty
RES	Research		RES	Other Specialty
INT	Intern		INT	Unknown
NK	Unknown Specialty		NK	Unknown
TTS	Transplant Surgery		TTS	Surgery
CMD	Addiction Medicine	ADD, ADD/FP	CMD ,ADP	Other Specialty
HYP	Hypnosis		HYP	Other Specialty
OS	Other Specialty	SCL	OS,MED,HSP,SRG,PLM, PYM	Other Specialty
TOX	Medical Toxicology		TOX ,ETX, PHM, PDT,PTX	Other Specialty
HOS	Hospitalist		HOS	Hospital
HEP	Hepatologist		HEP	Other Specialty
PMD	Pain Control		PMD	Other Specialty
OMM	Osteopathic Manipulative Medicine	NMM, OMM/FP, OMMOMM/GP, OMT		Other Specialty
PHP	Preventive Medicine	PVM, PVM/FP, PVM/OE,		Other Specialty