

Healthcare



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June 2012

GEORGETOWN UNIVERSITY



Center
on Education
and the Workforce

Healthcare

Acknowledgements

We would like to express our gratitude to the individuals and organization that have made this report possible. First, we thank Lumina Foundation and the Bill and Melinda Gates Foundation for their support of our research over the past few years. This report would not have been possible without the support of Jamie Merisotis, Holly Zanville, Elizabeth Gonzalez, Parminder Jassal as well as Hillary Pennington and Ann Person. We are honored to be partners in their mission to promote postsecondary access and completion for all Americans.

We undertook this report to help advance the discussion and understanding of many contentious issues surrounding the healthcare workforce. We reached out to experts with a diverse array of perspectives in the healthcare dialogue to review our analysis. Their responses contributed enormously to our understanding of the healthcare data and forced us to address many empirical questions much more clearly.

We especially want to thank the following experts for their in-depth review:

- Ed Salsberg Director, National Center for Health Workforce Analysis
Health Resources and Services Administration.
- Emory Morrison Director, Policy Research Studies, Research and Data Programs
Association of American Medical Colleges.
- Douglas Grbic Senior Research Analyst, Research and Data Programs
Association of American Medical Colleges.
- Catherine Dower Associate Director of Research, Center for Health Professions
University of California San Francisco
- Linda Burnes-Bolten Vice President and Chief Nursing Officer
Cedars-Sinai Medical Center
- Bernard Galla Chief Information Officer, Health Sciences
Howard University Hospital

Special thanks to our own experts at Georgetown University's Health Policy Institute for their input and critique throughout the process:

Doreen Cavanaugh Mila Kofman
Sabrina Corlette Laura Summer
Jack Hoadley

We also wish to thank Jeff Strohl, Megan Fasules and Ban Cheah for their strong data expertise and Tracy Thompson, who served as our editor. Finally, we wish to thank Ryan Clennan, Studio Grafik, for design, and Andrea Porter, Marilyn Downs and Andrew Hanson, who provided support to the project.

That said, all errors remain the responsibility of the authors.

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Chapter 1:
**Growing Demand
For Healthcare
Workers**

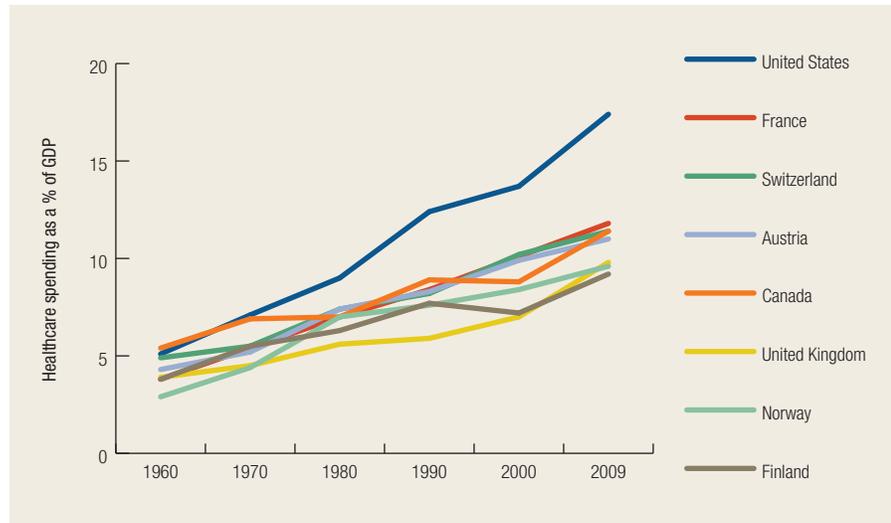


We spend twice as much as Europe

Americans like to think that we live in a country with the best health care system in the world—but is it? Only if “best” equals “most expensive.” The per capita cost of healthcare in the United States approached \$8,400 in 2010, almost 2½ times the cost in other developed countries. While the U.S. offers the best medical care in the world in certain highly specialized areas, it ranks below other developed nations by measures that encompass everyone, like infant mortality rates and average life expectancy.¹

Figure 1: We spend twice as much as Europe, even more so over the last decade.

Source: OECD Health Statistics, 2011



The reasons for this yawning disparity are a mix of free-market and systemic factors. Americans’ higher incomes tend to inflate the cost of health care. We also make more doctors’ office visits, opt for brand-name drugs over less-costly generics, use expensive emergency room visits for primary health care and consume more outpatient care—all in a system which requires higher insurance and administrative costs to operate than those in other developed countries.

The current state of affairs is the culmination of a 50-year period in which health care as a percentage of GDP rose steadily—from 5 percent, in 1960, to 10 percent in 1980, 12 percent in 1990 and 18 percent today. The Netherlands, France and Germany – the western countries most comparable to us—spend at least 6 percentage points less (as a percentage of GDP).

¹ Based on an analysis of data from the 34 members of the Organisation for Economic Co-operation and Development (OECD). Life expectancy for the U.S.: 78.49 in 2012. Other nations: U.K.- 80.17, E.U. – 79.76, Germany- 80.12, France- 81.46, the Netherlands -80.91. Infant mortality (death per 1,000 live births) for the U.S.: 5.98 in 2012. Other nations: U.K.- 4.56, E.U. – 4.49, Germany- 3.51, France- 3.37, the Netherlands -3.73.

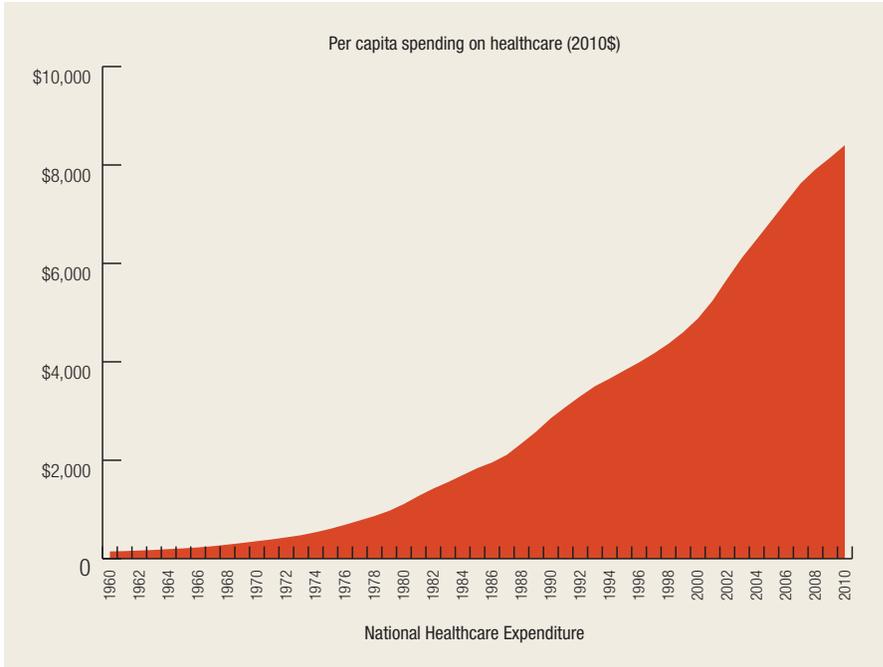


Figure 2: Per capita spending on healthcare continues to grow at a faster pace than anywhere else and shows no signs of slowing.

Source: Bureau of Economic Analysis; OECD Health statistics 2011

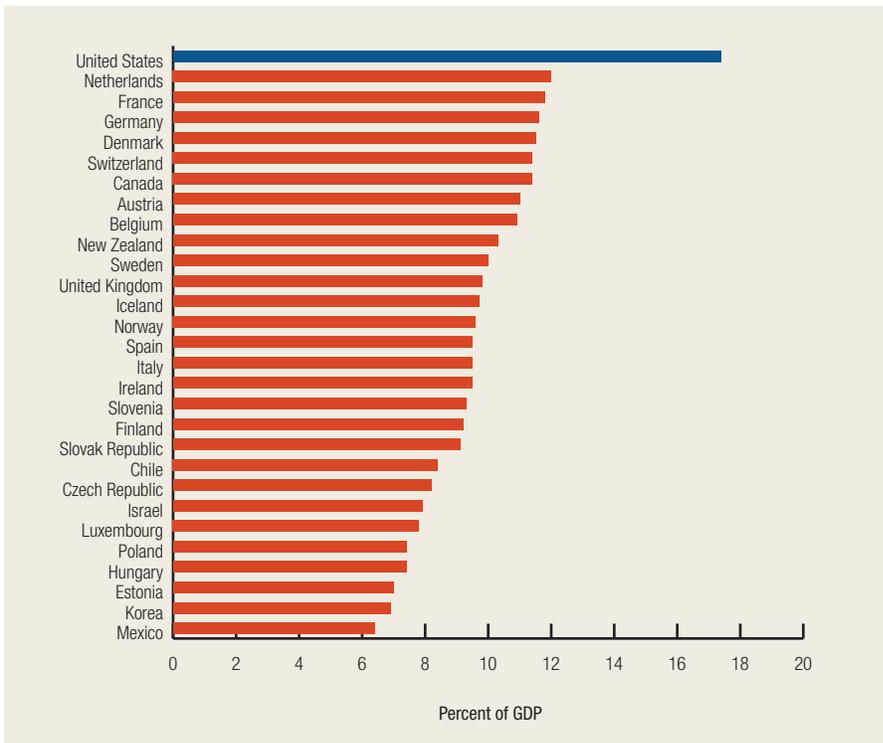


Figure 3: As a percentage of GDP, the Netherlands and France come closest to our expenditure, but we still spend more.

Source: Bureau of Economic Analysis; OECD Health statistics 2011

TIMELINE

1920s	Blue Cross and Blue Shield plans evolve from initiative of the Baylor University Hospital in Dallas Texas, 1929. These nonprofit health insurers help lower costs and provide a system of repayment for small service community areas. All patients are charged same premium irrespective of age, sex or pre-existing conditions.
1930s	Great Depression. Social Security Act is passed but does not include health insurance. Blue Cross expands, offering private coverage for hospital care in many states. Coverage expands to hospital networks instead of individual hospitals
1940s	<p>World War II. With young men overseas and war-time wage controls, there is stiff competition for remaining workers. Group healthcare begins. Private healthcare insurance is offered as an incentive, and the practice expands thanks to the strength of union bargaining. Government makes healthcare expenses tax deductible to employers but not to individuals.</p> <p>Truman proposes a national health program featuring a single-payer system for all of America. It is denounced by the American Medical Association, claiming Blue Cross can provide insurance. Single-payer proposal is called a Communist plot by a House subcommittee.</p>
1950s	Cost of care continues to rise, now 4.5% of GDP. Without health insurance, you pay cash or receive no care. Private healthcare insurers begin to differentiate by risk and do not insure risky customers. Blue Cross hospital initiatives do the same.
1960s	Health insurance is offered to low-risk customers across the nation by over 700 companies. Medicare and Medicaid introduced to help older Americans and the indigent, and are seen as a first step toward universal coverage.
1980s	<p>For-profit HMOs dominate market and deny coverage routinely in favor of bottom line.</p> <p>Healthcare costs continue to rise. In response, employer-provided programs change from pay-as-needed plans to managed care, whereby employers could set up fee structures to better manage costs.</p>
1990s	Healthcare costs rise at twice the rate of inflation. Managed care is most common insurance offered, to combat costs.
2000s	Managed care through PPOs is most popular. 16% of Americans still have no insurance (54 million in 2010, up from 40 million in 2000). Costs continue to rise.
2010s	Affordable Care Act promises reform. U.S. Supreme Court agrees to review requirement that all adults secure healthcare insurance.

Source: Cohn (2007),
<http://www.pbs.org/healthcarecrisis/history.htm>
http://yourhealthdollar.org/pdf/yourhealthdollar.org_blue-cross-history-compilation.pdf

Healthcare costs will continue to rise in spite of new legislation – reform is inevitable

And there is no clear end in sight to rising costs. Though they are expected to increase at a slightly slower pace over the next decade,² healthcare costs in this country are still expected to amount to 20 percent of GDP by 2020 (\$6 trillion). The biggest reason: the aging of the Baby Boom generation (Alliance for Health Reform, 2011). By 2030, some 78 million Baby Boomers will be over 65—a segment of the population which accounts for 26 percent of physician office visits, 38 percent of emergency medical service responses, 34 percent of prescriptions, and 90 percent of nursing home residents (Ricketts, 2011).

Moreover, more of those aging Boomers will survive into extreme old age. The average American over 85 consumes three times as much health care as those 65 to 74, and twice as much as those 75 to 84.³ Nursing home and short-stay hospital use also increase with age, especially for adults over 65.⁴ But an aging population in itself is not the only reason our healthcare costs are so much higher; Europeans are aging, too, and at a much faster rate than we are. (In Europe, 16.7 percent of the population is over 65, compared with 12.6 percent in the U.S.)⁵

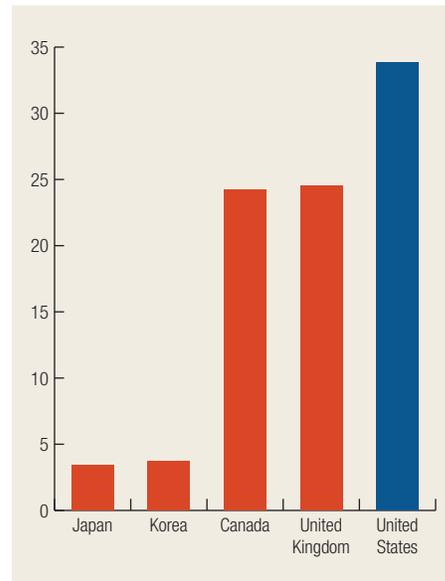


Figure 4: Obesity is certainly not the only factor contributing to rising costs, but the number of obese Americans and incidence of secondary illnesses are troubling.

Source: OECD Health Statistics, 2011

Which leads to the third factor in growing demand: the decline in Americans' health, mainly due to poor dietary habits and too little physical activity. The Centers for Disease Control (CDC) reports that 35.7 percent of adults in this country are now obese, and the number of obese children and adolescents has almost tripled since 1980, to 17 percent. Obesity increases the risk of a number of health conditions, including hypertension, adverse lipid concentrations, and type 2 diabetes. Because the U.S. tends to focus less on primary and preventative care, the bill for this comes due in the form of hospitalizations connected with one or more of those chronic illnesses.⁶

² This is due to a shift in workers towards relatively lower-cost plans and higher deductibles, which deter individuals from visiting doctors for marginal issues. High-deductible insurance plans also lead many to skimp on preventive services, which can drive up long-run costs.

³ Fuchs V. Cambridge, MA: National Bureau of Economic Research; 1998. "Provide, Provide: The Economics of Aging." NBER working paper no.6642.

⁴ (Probabilities and lifetime durations of short-stay hospital and nursing home use in the United States, 1985, Liang J, Liu X, Tu E, Whitelaw N., Institute of Gerontology, University of Michigan, Ann Arbor, MI 48109-2007). <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1361028/>

⁵ OECD, 2009

⁶ Europeans have had higher rates of smoking and alcohol use, which should theoretically contribute to worse health outcomes relative to Americans.

If the Patient Protection and Affordable Care Act (PPACA), passed by Congress in 2010—also known as Obamacare—is repealed and nothing else replaces it, the Medicare hospital fund is expected to be bankrupt by 2024. Emergency rooms will continue to serve as providers of last resort for the uninsured; those who do have insurance will feel locked in jobs tied to healthcare benefits, and insurance carriers will deny coverage to “bad bets” with preexisting conditions. Yet health care reform is no panacea. If the PPACA remains in its current form, it will result in insurance coverage for 32 million additional Americans, starting in 2014, and that increased demand will drive up healthcare costs (Alliance for Health Reform, 2011). Growth in healthcare spending is also expected to peak at 8.3 percent in 2014, but will average 5.8 percent per year between 2010 and 2020 (Keehan et. al. 2011).

How to pay for the growing demand for health care in an era of rising costs is a crucial concern in the debate over healthcare reform. But issues of choice, efficiency, value and quality are also important.

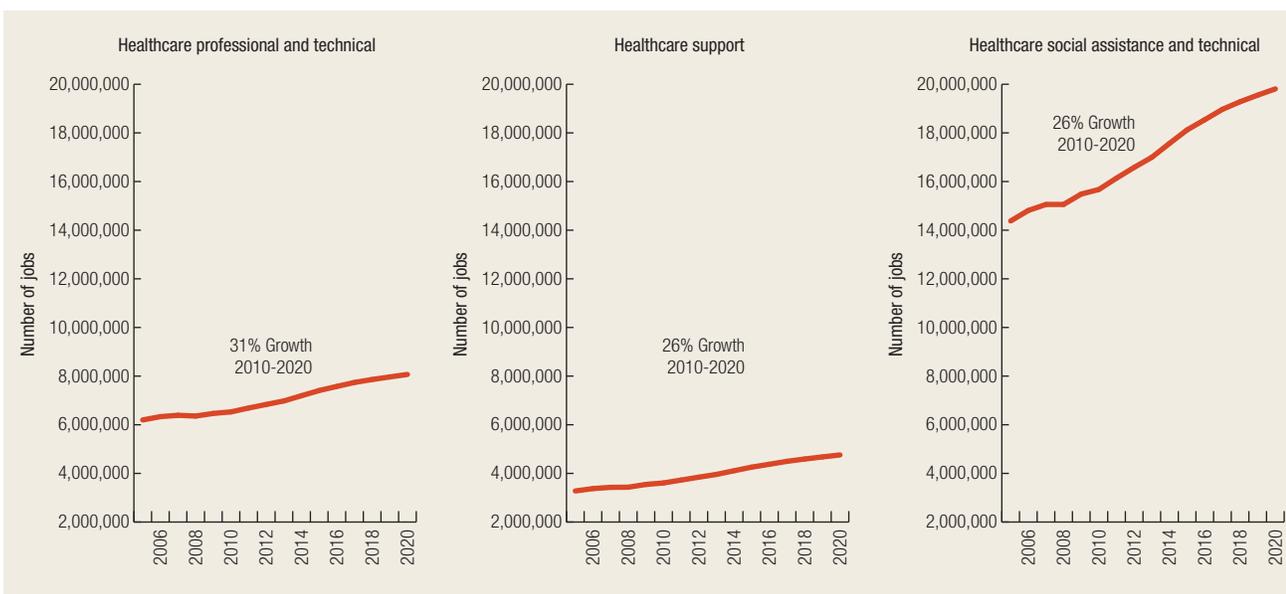
Healthcare jobs will grow faster than any other sector

To meet growing demand for care, the number of healthcare professionals will have to expand by almost 30 percent overall by 2020—the most dramatic growth of any sector in the U.S.

Jobs in this field fall into two broad categories: 1) professional and technical occupations and 2) support occupations. The education required for these positions and the rate of compensation cover a wide spectrum—but of the two, professional and technical occupations are forecast to grow the fastest: 31 percent.

Figures 5, 6, 7:
Healthcare occupations are a significant contributor to the nation’s stock of jobs. Healthcare’s industry share is even larger.

Georgetown University Center on Education and the Workforce forecasts of educational



As outlined in a previous report by the Center on Education and the Workforce, this is a segment of the industry that draws a substantial amount of talent from graduates in science, technology, engineering and mathematics (STEM).

Professional and technical workers include surgeons, psychiatrists, dentists, anesthesiologists, dietitians, pharmacists, and registered nurses, among others. While many in this category earn hundreds of thousands of dollars a year or even a million dollars, the income range runs as low as \$27,000, the average salary for a dietetic technician. We further subdivide healthcare professional and technical workers into four broad areas:

1. Doctors and physicians
2. Registered nurses
3. Licensed practical and technical vocational nurses
4. Allied healthcare

Between 2005 and 2010, the number of professional and technical jobs grew from 6.2 million to 6.5 million, or 5 percent. That figure is expected to increase by another 31 percent by 2020, to more than 8 million.

Jobs in the second major category, healthcare support, are forecast to grow by 26 percent over the next decade. Between 2005 and 2010, the number of these jobs rose from 3.3 million to 3.6 million, up by 9 percent. By 2020, that number is projected to reach 4.6 million. These jobs include veterinary assistant, massage therapist, pharmacy aide, athletic trainer, home health aide, and 24 other occupations. Their income ranges roughly from \$21,760 to \$51,300, averaging about \$26,920. (For more detail, see the chapter on wages.)

Broken down by specific occupation, the rate of job increase will vary widely. Registered nurses and home health aides will be in strongest demand: the number of those positions is projected to increase by more than 700,000. The least in demand will be podiatrists: the number of jobs in that specialty is expected to grow by at most 2,600 positions, and perhaps as few as 288.

For most health professions, the supply will grow too slowly to keep up with demand, resulting in shortages by the end of this decade. The expected shortages vary from the relatively modest one of 851 podiatrists (or 5.5% of podiatry workforce) to 808,416 registered nurses (or 29% of registered nurses). The United States has the world's largest nursing workforce and is a major importer of nurses (Aiken and Cheung, 2008).

Healthcare job openings will grow by 30% through 2020 – almost twice as fast as the national economy

Because of this rapid growth, the healthcare industry has the potential to provide millions of new high-quality, well-paying jobs over the next decade. Overall, there will be an estimated 5.6 million healthcare job vacancies between 2010 and 2020.

Healthcare accounts for about 7 percent of all occupations today, a number that will grow to 8 percent by 2020. Healthcare will provide 12.3 percent of all net new jobs over the next decade and 8.7 percent of all replacement jobs. The growth in jobs for healthcare professional and technical occupations (31 percent) and support positions (26 percent) is expected to exceed the projected average growth in the number of all jobs in the U.S. over the same period, which is 17 percent.

Table 1: Job openings in healthcare occupations will grow faster than in any other group of occupations through 2020

By occupation (in '000 of jobs)	2010 Jobs	2020 jobs	Difference (Net new jobs) a	Replacement jobs b	Job openings 2010-2020 a+b	Growth of jobs
Healthcare professional and technical	6,480	8,490	2,010	1,580	3,590	31%
Healthcare support	3,660	4,610	950	1,090	2,040	26%
All healthcare occupations	10,140	13,100	2,960	2,670	5,630	29%
All jobs in the economy	140,600	164,590	23,990	30,780	54,770	17%
Percentage	7.2%	8.0%	12.3%	8.7%	10.3%	

Source: Georgetown University Center on Education and the Workforce forecasts of educational demand through 2020

Table 2: Among industries, healthcare will experience the second fastest growth through 2020

By industry (in '000 of jobs)	2010 Jobs	2020 jobs	Difference (Net new jobs) a	Replacement jobs b	Job openings 2010-2020 a+b	Growth of jobs
Health Care and Social Assistance	15,670	19,810	4,140	2,450	6,590	26%
All jobs in the economy	140,600	164,590	23,990	30,780	54,770	17%
Percentage	11%	12%	17%	8%	12%	

Source: Georgetown University Center on Education and the Workforce forecasts of educational demand through 2020

Jobs in the industry are closer to 13 percent of all employment (if we include pharmaceuticals and medical equipment manufacturing)

People in the healthcare occupations are able to do their jobs only with the help of an even bigger cast of people in a host of related jobs: hospital accountants, information specialists, medical equipment manufacturers, pharmaceutical sales representatives, doctor's office secretaries and the like. If you include all of these behind-the-scenes players, the healthcare industry accounts for closer to 13 percent of all workers today, a figure that will grow to 14 percent by 2020.

In 2010, 11 percent of all jobs in the nation were in the healthcare industry as it is currently defined by the U.S. Department of Labor. Using that definition, that number will rise slightly to 12 percent in 2020.

Output in healthcare was \$1.8 trillion in 2010 and will rise to \$3.1 trillion in 2020.

Table 3: Output in healthcare will grow by 78% from 2010 to 2020

	2010		2020		Change 2010 - 2020		Ranking	
	Output in billion \$	Rank	Output in billion \$	Rank	Change in Total Output in billion \$	Rate of Growth: Percent Change in Output	Fastest rate of growth	Largest change in output
Health Care and Social Assistance	1,760	6	3,150	6	1,380	78%	6	6

Sources: Bureau of Labor Statistics; Bureau of Economic Analysis, 2012

Output in healthcare—defined as the total expenditure on health care services—was close to \$1.8 trillion in 2010. This is about one third the output of manufacturing, the largest sector of the nation's economy. Of the 13 industries in our forecasts, healthcare is sixth in size. The industry is projected to grow by 78 percent to \$3.1 trillion in 2020. Next to professional and business services and information, healthcare records the third-fastest rate of output growth through 2020.

Productivity in the healthcare industry is fourth in the nation compared to other industries, but slowest to grow over time

Table 4: The healthcare industry will continue its fast growth through 2020, but productivity will remain low

	2010			2020			Change 2010-2020		
	Total Employment (thousands)	Output in billion \$	Productivity (\$/employed)	Total Employment (thousands)	Output in billion \$	Productivity (\$/employed)	Change in employment (thousands)	Rate of Growth: Percent change in employment	Change in Productivity (\$/employed)
Health Care and Social Assistance	15,670	1,760	112,510	19,810	3,150	158,780	4,140	26	46,270

Sources: Bureau of Labor Statistics; Bureau of Economic Analysis, 2012

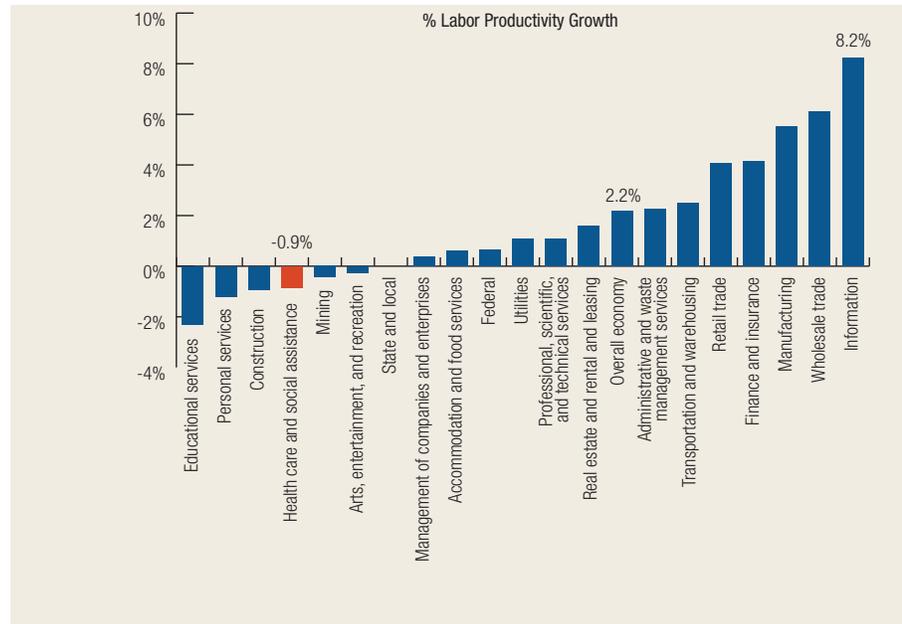
A simple measure of productivity is an estimate of the total output divided by the number of workers. Manufacturing and information services have the highest levels of productivity in our economy, while the health care sector comes in only fourth from the bottom, at \$112,510.⁷ Given the enormous growth in

⁷ Despite this poor productivity numbers, healthcare outcomes have improved over time.

health care spending in recent years, it might seem reasonable to expect higher productivity, but across time healthcare has experienced the smallest level of productivity growth of all industrial sectors (although gains in the quality of care are evident in OECD comparisons). To compound the problem, while the expected expansion of coverage to an additional 34 million people over the next 10 years will expand the healthcare workforce, the relative scarcity of those workers will drive up wages. In other words, spending on health care will go up at the same time the number of workers in the field will also increase, meaning that productivity—the ratio of spending to workers—is unlikely to change much.

Figure 8:
Between 1990 and 2011, labor productivity in healthcare fell. After education, personal services, and construction, healthcare showed the least growth over time

Source: Authors' analysis of data from the Bureau of Labor Statistics (BLS), and the Bureau of Economic Analysis (BEA), various years



We employ a basic formula to define industry growth. Percent real-sector growth (value added growth) = Percent labor productivity growth + percent employment growth (used in Kocher and Sahni, 2011).

Labor productivity refers to the extent to which workers improve the way they contribute to output. Labor productivity defined in this way could increase if either output increases with the same amount of workers, or output is the same with fewer workers, or both.

Since 1990, real gross domestic product (GDP) grew 1.52 percent annually on average, with 1.65 percent of that growth due to labor productivity and the -0.13 percent showing employment decline.⁸ The majority of industries in the economy had annual productivity growth between 1990 and 2011. (Information, wholesale and retail trade and manufacturing led the way with the highest annual productivity growth of 8.2, 6.1 and 5.5% respectively).

⁸ We've been doing more with fewer workers.

Manufacturing and information were able to increase their productivity by increasing output with fewer workers. Information services increased output at a much faster rate than the increase in workers.

Value added in the health care sector grew at an average of 2.9 percent, due to the combined effect of strong employment growth (3.8 percent annually over the period) and declining labor productivity (-0.9 percent annually).

Demand for postsecondary education in healthcare professional and technical occupations is third highest after science, technology, engineering and mathematics (STEM) and education.

All it takes to get a job as a home health care aide is a high school diploma, and sometimes not even that; an associate's degree provides access to another set of occupations, such as entry-level nurse, dental hygienist, and physical or occupational therapy assistant. Nursing is the largest healthcare occupation for individuals with a bachelor's degree. And a master's degree is usually needed for a job as an advanced practice registered nurse (APRN) or physician assistant (PA). At the far end of the spectrum physicians, podiatrists, dentists, and high-level medical researchers hold MD or PhD-level post-graduate degrees.

Table 5: In 2010, the majority of healthcare jobs (81%) required postsecondary education

2010 (in '000 of jobs)	High school dropouts	High school graduates	Some college	Associate's degree	Bachelor's degree	Master's degree	Professional degree	PhD	Total	Postsec total	Post- sec%
Healthcare professional and technical	40	400	910	1,500	1,840	640	890	260	6,480	6,040	93%
Healthcare support	360	1,140	1,180	610	290	40	30	10	3,660	2,160	59%
Total healthcare jobs	400	1,540	2,090	2,110	2,130	680	920	270	10,140	8,200	81%
% of healthcare jobs	4%	15%	21%	21%	21%	7%	9%	3%	100%		
Total jobs in the economy	14,810	42,060	26,220	13,560	28,930	10,800	2,650	1,590	140,600	83,750	
% of total jobs in the economy	11%	30%	19%	10%	21%	8%	2%	1%	100%		59%

Source: Georgetown University Center on Education and the Workforce forecasts of educational demand through 2020

Table 6: By 2020, 82% of healthcare jobs will require postsecondary education

2020 (in '000 of jobs)	High school dropouts	High school graduates	Some college	Associate's degree	Bachelor's degree	Master's degree	Professional degree	PhD	Total	Postsec total	Post- sec%
Healthcare professional and technical	60	450	880	2,450	2,640	810	980	220	8,490	7,990	94%
Healthcare support	530	1,380	1,360	800	440	60	30	10	4,610	2,700	58%
Total healthcare jobs	590	1,830	2,240	3,250	3,080	870	1,010	230	13,100	10,690	82%
% healthcare jobs	5%	14%	17%	25%	24%	7%	8%	2%			
Total jobs	19,170	38,790	29,460	19,480	40,200	13,310	2,840	1,340	164,590	106,630	
% of total jobs	12%	24%	18%	12%	24%	8%	2%	1%	100%		65%

Source: Georgetown University Center on Education and the Workforce forecasts of educational demand through 2020

By 2020, 82% of all healthcare jobs will demand postsecondary education and training

However, over the next ten years the percentage of jobs in health care that will require some amount of postsecondary education and training will edge upward. In 2010, it was 81 percent; by 2020, it will be 82 percent. A bachelor's degree will be required for 24 percent of all healthcare jobs, up from 21 percent in 2010.

By 2020, 29 percent of healthcare professional and technical occupations will require an associate's degree, and 55 percent will call for a bachelor's degree (BA) or above. Almost one third of all professional degrees are in healthcare fields.

For those in support occupations, less training is needed, and by 2020 this rapidly growing workforce is expected to have the third-lowest concentration of postsecondary attainment of all U.S. jobs: 58 percent. By 2020, it is projected that 30 percent of these workers will need to have high school diplomas; 30 percent, some college or postsecondary certificate; and 17 percent, an associate's degree. Support jobs often require no more than a high school diploma or a postsecondary vocational certificate.

Between 2010 and 2020 there will be 5.6 million job openings in healthcare occupations

The information most relevant to new college graduates and the unemployed is data on job openings: newly created positions and openings created by workers permanently leaving an occupation due to retirement or other reasons.

Table 7: 83% of job openings in healthcare occupations between 2010 and 2020 will require postsecondary education

(in '000 of jobs)	Less than High School	High School Graduates	Some College, No Degree	Associate's Degree	Bachelor's Degree	Master's Degree	Professional Degree	PhD	Total
Healthcare professional and technical	20	280	420	480	430	230	1130	600	3,590
% by education	1%	8%	12%	13%	12%	6%	31%	17%	100%
Healthcare support	230	640	630	370	150	20	0	0	2,040
% by education	11%	31%	31%	18%	7%	1%	0%	0%	100%
Total healthcare jobs	250	920	1050	850	580	250	1130	600	5,630
% by education	5%	14%	17%	25%	24%	7%	8%	2%	100%
Total jobs in the economy	6,370	12,910	9,810	6,500	13,390	4,430	960	420	54,770
% by education in the economy	12%	24%	18%	12%	24%	8%	2%	1%	100%

Source: Georgetown University Center on Education and the Workforce forecasts of educational demand through 2020

Table 8: Between 2010 and 2020, 79% of job openings in the healthcare industry will require postsecondary education

(in '000 of jobs)	High school dropouts	High school graduates	Some college	Associate's degree	Bachelor's degree	Master's degree	Professional degree	PhD	Total
Health Care and Social Assistance	290	1,030	950	1,010	1,800	1,080	260	170	6,590
% healthcare by education	4%	16%	14%	15%	27%	16%	4%	3%	
Total jobs in the economy	5,190	13,520	10,150	6,460	14,000	4,030	940	460	54,770
% total by education in the economy	9%	25%	19%	12%	26%	7%	2%	1%	

In 2020 healthcare professional and technical jobs will have the highest concentration of postsecondary attainment among all U.S. jobs (92%). In contrast, healthcare support occupations will have the third-lowest concentration of postsecondary attainment of all U.S. jobs (58%).

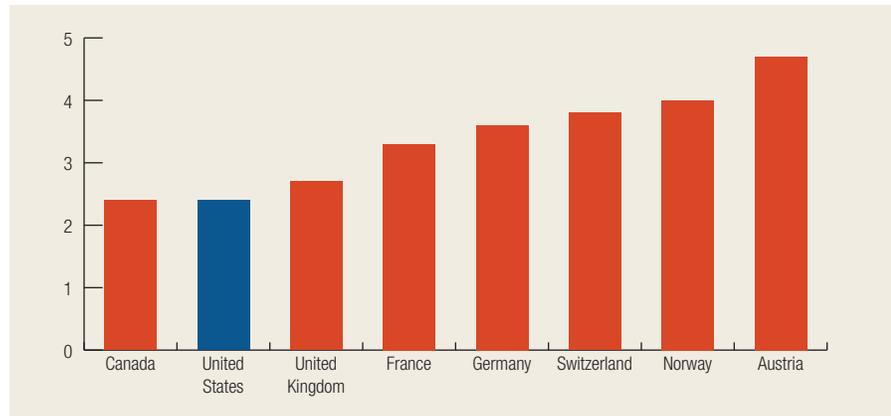
The healthcare workforce is aging and “shortage” areas are still difficult to fill

Meeting this demand will be particularly challenging when the healthcare workforce itself is aging. An estimated 40 percent of practicing physicians are over 55, as are roughly a third of today's nurses.⁹

⁹ (Alliance for Health Reform, 2011).

Figure 9:
Compared to other OECD
nations, we have fewer
physicians per capita today

OECD Health Statistics, 2011



Healthcare offers employment opportunities across the educational spectrum. Perhaps surprisingly, the U.S. is in the bottom ten of OECD countries in the number of practicing physicians and nursing graduates per 100,000 people. In terms of medical residents per 100,000, it's in the bottom five.¹⁰

Yet another challenge is the reluctance of doctors and other healthcare professionals to practice in rural areas. About 20 percent of Americans live in rural areas, but only 9 percent of physicians practice there, according to Dr. Howard Rabinowitz, a professor of family and community medicine at Thomas Jefferson University's Medical College, who has studied the issue for more than 30 years. He states that insufficient insurance payments, administrative hassles tied to insurance claims, and rising business and malpractice insurance expenses are among the reasons that doctors give for shunning rural opportunities.¹¹

The United States has about 60 million people living in areas, both rural and urban, that the government recognizes as places that are experiencing a shortage of primary care providers. Another 49 million people live in areas with a shortage of dental care providers, and about 92 million live in areas with a shortage of mental health professionals. The agency estimates that about 16,120 primary care practitioners, 9,697 dental health practitioners, and 6,011 mental health practitioners are needed to bridge this shortfall.¹²

Part of the solution lies in higher reimbursements for providers working in underserved areas. The federal government provides scholarships and loan repayments to healthcare practitioners who agree to practice in areas with limited access to care through the National Health Service Corps,¹³ yet these have not attracted enough providers to these areas. More creative strategies are needed, including development of multidisciplinary primary care teamwork with greater utilization of physician assistants (PAs) and advanced practice registered nurses (APRNs), increased coordination and collaboration across rural

¹⁰. (OECD, 2009).

¹¹. CNN Money, 3-28-10.

¹². Health Resources and Services Administration (HRSA), 2012

¹³. Health Resources and Services Administration (HRSA), National Health Service Corps (NHSC), <http://nhsc.hrsa.gov>.

regions and between rural and urban providers, greater adoption of health IT (information technology), expanded use of telemedicine, support for nonemergency medical transportation, and development of mobile care delivery mechanisms, such as physicians from neighboring urban areas traveling to rural areas on a given day to offer services to residents.¹⁴ In addition, analysts trying to make sense of the looming shortage of healthcare workers are handicapped by a lack of comprehensive, comparable, national healthcare workforce supply data, especially for mid-level providers, allied health professionals and direct care workers.¹⁵ This problem needs to be addressed if we are to have effective planning and policy making.

Physician and nursing shortages are still significant

Failure to prepare an adequately trained healthcare workforce will have serious consequences beyond the economy. At stake are access to care, quality of care and patient safety. The best current estimates project significant shortages of healthcare workers in the next 10 to 20 years:

- The supply of physicians will fall 130,600 short of demand by 2025, according to the Association of American Medical Colleges (AAMC).
- The AAMC also projects a shortage of roughly 65,800 primary care doctors.
- The American Physical Therapy Association (APTA) has projected a shortage of 25,295 physical therapists by 2020.
- The Health Resources and Services Administration (HRSA) has estimated that by 2030 there will be a shortage of 37,900 pharmacists.

Producing enough healthcare workers would be less difficult if it were not for the competition with other economic sectors bidding for graduates in science, technology, engineering and mathematics (STEM), as outlined in a previous report by the Georgetown University Center on Education and the Workforce.¹⁶ In addition, high turnover rates in the healthcare field are constantly creating vacancies in the front-line direct-care workforce, where low wages and low status make recruitment especially difficult (Stone and Wiener, 2001). The upside of this difficulty is that the wide range of education requirements in the healthcare field provides opportunities for career progression.

Other means of addressing this issue would require changes in medical education—changes that will necessarily differ from school to school, since demographic factors both drive the demand for healthcare service and create the pool of potential students in any given area. Given the deep spending cuts most

¹⁴. UnitedHealth, 2011

¹⁵. (Bipartisan Policy Center, 2011).

¹⁶. Carnevale et. al. 2011.

states have been forced to make in recent years, there is well-founded anxiety about whether state educational systems will be able to produce the number of trained healthcare workers needed to meet the projected demand in the coming decade.

Some systemic problems, however, are clear. The nursing field, for example, has plenty of qualified applicants to nursing schools, but existing academic programs don't have enough classrooms or faculty to move students through the educational pipeline quickly enough to meet the growing demand.¹⁷ Increasing tuitions also play a role: the cost of a medical education for a doctor who attends a public medical school now averages \$145,000; for private medical school graduates, it's \$180,000.¹⁸ Not surprisingly, considering these numbers, more and more medical students are choosing to go into more lucrative specialties, exacerbating the shortage of primary care physicians.

One recent study, however, shows that this last trend may be reversing. The number of American medical students entering primary care residencies jumped 20 percent between 2009 and 2011, according to the AAMC. Hoping to promote such decisions by med students, the Obama administration created the Primary Care Residency Expansion program at 82 hospitals in 2011. There were two strings attached: the programs must train residents dedicated to primary care, and the residents must work in underserved areas.¹⁹

Finally, another way to address the projected shortages in healthcare occupations would be to allow workers more flexibility in their duties. Professional licensure, regulation, accreditation and credentialing help promote better-qualified health professionals and ensure public safety, but they also reduce flexibility of the healthcare workforce and make it more difficult to address the changing health needs of the population.²⁰ In the healthcare field, credentialing plays a significant role in educating the workforce, especially at the middle-skills level. For example, 56.6 percent of massage therapists and 41.1 percent of emergency medical technicians (EMTs) and paramedics have postsecondary certificates. Certificates and test-based certifications that must be periodically updated are a prerequisite for functioning in this sector in most states.

Proper preparation is not solely a matter of curriculum. For example, there is evidence that medical residents and other health professionals trained in hospitals do not spend enough time at alternative settings outside the hospital.²¹ We also need more education models that are friendly to adult working students. This is critical if the nation is to train current health workers for more advanced positions, retrain dislocated workers from other industries, and provide continuing education for health professionals.²²

¹⁷. (Aiken and Cheung, 2008; Gerolamo and Roemer, 2011).

¹⁸. (Alliance for Health Reform, 2011).

¹⁹. (Washington Post, Feb. 10, 2012).

²⁰. (Finocchio LJ, Dower CM, Blick NT, Gragnola CM and the Taskforce on Health Care Workforce Regulation, 1998).

²¹. (IOM, 2008).

²². (Wilson, 2010).

Table 9: Massage therapists and dental assistants have the highest share of workers with postsecondary certificates

Healthcare professional and technical occupations	
	Postsecondary %
Surgical technologists	43.8%
Emergency medical technicians and paramedics	41.1
Opticians, dispensing	39.7
Respiratory therapy technicians	32.7
Pharmacy technicians	32.6
Licensed practical and licensed vocational nurses	30.7
Medical and clinical laboratory technicians	29.3
Radiologic technologists and technicians	26.5
Respiratory therapists	26.4
Diagnostic medical sonographers	23.4
Healthcare support occupations	
Massage therapists	56.6
Dental assistants	55.9
Nursing aides, orderlies, and attendants	46.0
Medical transcriptionists	28.8
Medical assistants	22.90

Source: Author's analysis of O*NET data

Factors that increase these challenges

Any debate about the needs of the nation's healthcare workforce must navigate the often-conflicting interests of a bewildering array of stakeholders: consumers, providers, insurers, employers, professional associations, regulatory and licensing bodies, accrediting bodies, community organizations, pharmaceutical and biochemical companies, researchers, schools, investors and—not least—federal, state, and local governments. That long list of stakeholders represents an even longer list of potential concerns: the cost and quality of care, access to services, patient and public safety, employee productivity, return on investment and the ethics of dealing with end-of-life decisions—to name just a few.

The volume of this debate has increased as the nation's elected officials have wrestled with the whole issue of health care reform. The Patient Protection and Affordable Care Act (PPACA), passed by Congress in 2010, is changing the delivery of healthcare in myriad ways, and it will significantly affect the healthcare workforce.

To address workforce challenges, the Association of Academic Health Centers (AAHC) has called for a comprehensive national strategy (AAHC, 2008). The AAHC believes that the National Health Care Workforce Commission, established by PPACA, could help develop such a strategy,²³ and its members have been appointed. Congress, however, has yet to appropriate money for this commission to start its work.

However, there are certain steps that health systems and individual organizations can begin implementing to ensure they recruit and retain a ehealthcare workforce that will be prepared to deal with increasing demand for care and associated challenges. Such initiatives include career mentoring aimed at improving job satisfaction and worker retention, career ladders that offer chances for advancement or expanding one's skill set for health professionals at all levels, the use of self-directed work teams, increased social and organizational recognition for healthcare support paraprofessionals, and the use of information and assistive technologies.²⁴

²³. (AAHC, 2008).

²⁴. (IOM, 2008).

New Emerging Models of Care

Accountable Care Organization (ACO)	A group of health care providers (including physicians and hospitals) who provide coordinated care and chronic disease management, and thereby improve the quality of care their patients get. The organization's payment is tied to achieving healthcare quality goals and outcomes that result in cost savings.
Patient Centered Medical Home (PCMH)	A comprehensive, team-based primary care practice, which might include physicians, advanced practice nurses, physician assistants, pharmacists, nurses, nutritionists, social workers, educators and care coordinators, that takes care of large majority of each patient's needs while coordinating any other care patients may need, including specialty, hospital, home and community-based care services. Medical homes partner with patients and families to facilitate shared decision-making and guide patients in managing their own care and conditions, while demonstrating commitment to quality and improving patient experience.
Episode-Based Care (Bundled Payments)	A type of care where different healthcare providers treating an individual for the same or related conditions over set time period are reimbursed by overall sum, rather than for individual test, treatment, or procedure, and as a result providers are encouraged to coordinate care, prevent errors and complications, and reduce duplicative tests and treatments.

Sources: Agency for Healthcare Research and Quality (AHRQ), U.S. Department of Health & Human Services (HHS). "AHRQ's Definition of the Medical Home." Patient Centered Medical Home (PCMH) Resources Center, last modified September 20, 2011, http://pcmh.ahrq.gov/portal/server.pt/community/pcmh_home/1483/what_is_pcmh_. U.S. Department of Health & Human Services (HHS). "Glossary," HealthCare.Gov, accessed May 7, 2012, <http://www.healthcare.gov/glossary>.

The Patient Protection and Affordable Care Act, (aka OBAMACare)

Healthcare Jobs and the Healthcare Law in a Nutshell

To evaluate the effect of Obamacare on jobs, the first step is to size up its impact on subsidies and taxes. These taxes and subsidies will have a net negative effect on low-wage jobs.

Over the next decade, Obamacare will:²⁵

- Cost \$1.5²⁶ trillion over 11 years²⁷
- Yield \$400 billion in federal revenues from taxes and penalties
- Create additional jobs for mid-level healthcare professionals and primary care physicians
- Marginally reduce the number of jobs in medical equipment manufacturing
- Marginally reduce the number of low-wage jobs held by persons who were in them only because the jobs provided health insurance²⁸
- Cause a net decline of 0.5 percent in the workforce over ten years, although the net effect on healthcare jobs should be negligible

NOTE: Since it's impossible to predict exactly how the provisions of the act will be implemented in 2014 and beyond, or how providers, consumers and employers may respond, actual impacts may differ from these estimates.

²⁵ http://www.cbo.gov/sites/default/files/cbofiles/attachments/hr4872_0.pdf

²⁶ This will result in \$1.1 trillion net cost.

²⁷ There have been several revisions to this estimate. Prior to the net value of \$1.1 trillion, CBO estimated cost at 1.76 trillion with \$510 billion revenues for a net cost of \$1.25 trillion dollars over 11 years. In 2009, the original cost was estimated at 900 billion over 10 years.

²⁸ Bradley et. al. show that "employment-contingent health insurance creates incentives for ill workers to remain employed at a sufficient level (usually full-time) to maintain access to health insurance coverage." With new coverage for all through Obamacare, the incentive for ill-workers to remain employed is reduced.

The Patient Protection and Affordable Care Act, (aka OBAMACare) *continued***Conclusion**

Projections of the growth of the healthcare workforce are based on current trends, demographic changes, and other standard factors. But there are unknowns that could make these projections less reliable.

Given that per capita spending on healthcare is higher in the U.S. than in any other developed country (\$8,087, which translates into 18 percent of GDP), can healthcare's share of GDP continue to grow? As of now, this per capita cost is projected to increase to \$13,709, or 19.8 percent of GDP, by 2020 (Keehan, et al., 2011). As such spending sops up more and more of the nation's income, we can expect intensifying efforts to rein in that spending—with implications for the number and mix of healthcare positions. With the public paying a growing percentage of healthcare costs at the same time that there is growing concern about the national debt and the size of government, healthcare is certain to fall under intense scrutiny.

In addition, new models of care are emerging—notably accountable care organizations (ACOs) and patient-centered medical homes (PCMHs). As defined by the Centers for Medicare and Medicaid Services (CMS), an ACO is “an organization of health care providers that agrees to be accountable for the quality, cost, and overall care of Medicare beneficiaries who are enrolled in the traditional fee-for-service program who are assigned to it.” In anticipation of the formation of ACOs, hospitals are acquiring more physician practices—in effect, turning small businesses into one more group of salaried employees.²⁹ PCMHs are intended to be a network of state-of-the-art primary care practices which will share best practices and cost-cutting techniques. Both of these innovations will undoubtedly affect the organization and delivery of care, as well as the demand for specific types of healthcare worker. ACOs are a prominent feature of the PPACA, which itself is currently under review by the U.S. Supreme Court.

Details

In 2010 Congress passed the Patient Protection and Affordable Care Act (H.R.3590) and the Health Care and Education Reconciliation Act of 2010 (H.R.4872). Obamacare, as it is commonly known, will systematically change the way healthcare is provided to most Americans, and is being implemented in stages over the next decade. The most controversial changes do not take effect until 2014, when the law will require most U.S. residents to have health insurance or face penalties ranging from \$695 to \$12,500. (Those with annual income below 133% of the federal poverty level, or FPL, are exempt from penalty).

Penalties will be paid by some individuals, medical equipment manufacturers, tanning salons and employers whose workers seek health insurance from state exchanges.

²⁹. (Kocher and Sahni, 2011).

The Patient Protection and Affordable Care Act, (aka OBAMACare) *continued*

WINNERS:

- Medicaid and CHIP (Children's Health Insurance Program) will be expanded, mostly to cover the uninsured and low-income (defined as below 133% of FPL)
- There will be an estimated \$3.2 billion in prescription drug savings, thanks to \$250 rebate subsidies, 50 percent discounts for name-brand drugs for seniors falling into the Medicare "donut hole," and discounts for some brand-name medications
- Young adults can stay on a parent's plan up to the age of 26
- Small businesses will receive tax credits of 25 to 35 percent of the contribution to employees' health insurance
- Insurers will be required to spend at least 80 percent of the premiums they collect on actual patient care, as opposed to things like administrative salaries or advertising
- Accountable care organizations (ACOs) will be created to reward providers for patient outcomes, rather than just the number of patients seen and number of procedures performed
- People with pre-existing conditions cannot be denied coverage
- States can form compacts to allow for the interstate sale of health insurance
- Scholarships and loan forgiveness will provide incentives to increase the number of primary care doctors, nurses and physician assistants in shortage areas
- A 10 percent bonus in Medicare payments will go to primary care physicians in shortage areas.

But the expansion of coverage comes at a cost, and the burden is not equally shared.

LOSERS:

- There are deep cuts in Medicare Advantage, the private managed care option
- Of the 54 million currently uninsured, only 24 million will be covered by Medicaid; another 30 million are expected to opt out
- Doctors no longer can refer Medicare patients to their "partner" hospitals, a practice that offers continuity of care but can also represent a financial conflict of interest for the doctor
- Medical device makers will face a 2.9 percent excise tax
- Tanning salons must pay a 10 percent tax

State financial concerns

States must expand Medicaid coverage. In addition, they are to create exchanges where individuals can buy insurance. Such exchanges will, in theory, facilitate competition across state lines, but there are no long-term subsidies for these new state burdens. For the first three years, there are some federal matching funds to cover additional low-income residents on Medicaid.

The Patient Protection and Affordable Care Act, (aka OBAMACare) *continued***States that joined Florida in suing the U.S. Department of HHS over the individual mandate and Medicaid expansion:**

Alabama, Alaska, Arizona, Colorado, Georgia, Idaho, Indiana, Iowa, Kansas, Louisiana, Maine, Michigan, Mississippi, Nebraska, Nevada, North Dakota, Ohio, Pennsylvania, South Carolina, South Dakota, Texas, Utah, Washington, Wisconsin, and Wyoming

States filing suit separately:

Oklahoma, Virginia

Removal of the mandate would make it extremely difficult for insurers to cover everyone they are expected to cover—including those with preexisting conditions—without increasing premiums. The mandate guarantees the spreading of risk by covering both the healthy and the sick. Many argue that some facets of Obamacare are so well entrenched by now that a ruling that throws out portions of the law will decrease healthcare spending and employment. A vote by Congress to repeal the law completely could result in:

- Reduction in the deficit by \$282 billion (net) over 10 years (CBO)
- Loss of \$27 billion in federal revenue from individual mandate penalties
- 16 million fewer insured by 2021 (CBO)
- Loss of 2.5 to 4 million jobs by 2021 (Center for American Progress)³⁰

³⁰. Includes direct and indirect effects.

Chapter 2:

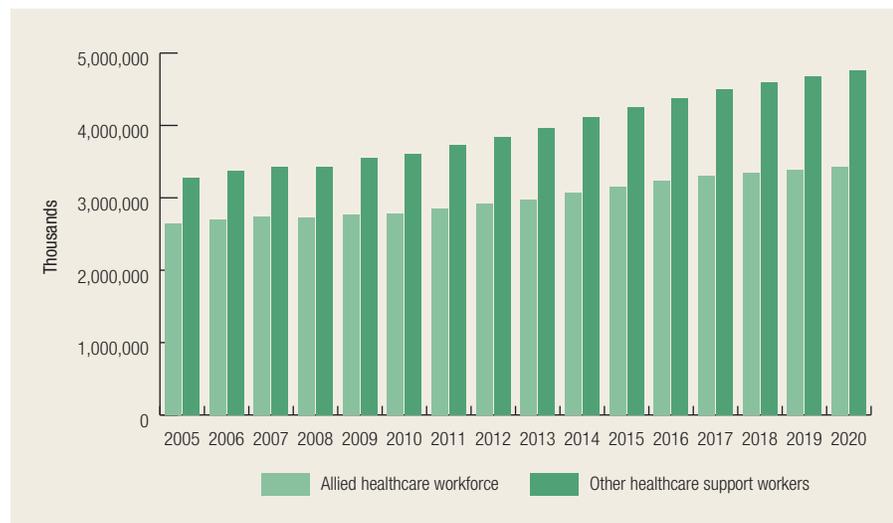
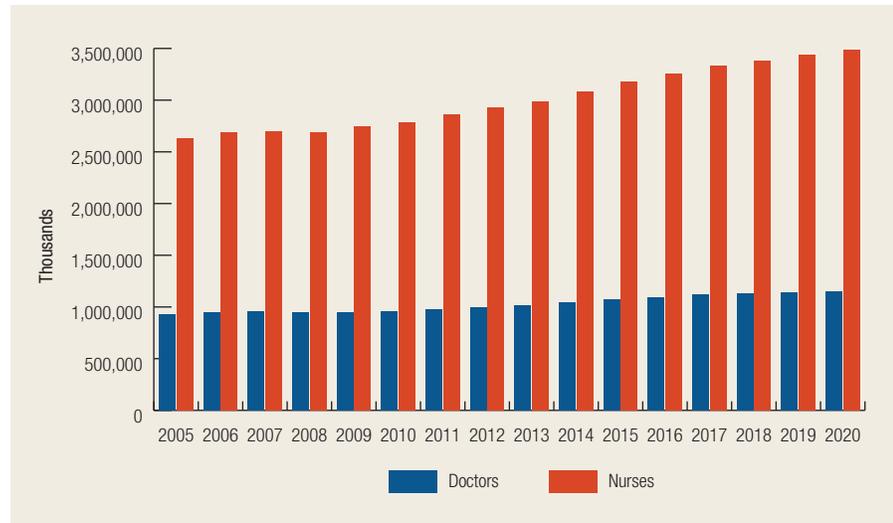
Healthcare, growth and opportunity by occupational group



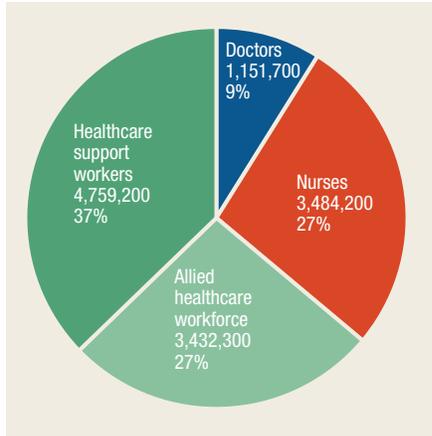
There are vast differences in the education and training required for healthcare jobs, as well as in salaries, but there are also a few commonalities. For one thing, jobs in healthcare tend to offer clearly defined career paths and the unique kind of personal fulfillment that comes from being of service to others. Because healthcare workers are in a unique position—both in their potential to inadvertently cause physical harm to others and to become targets for groundless lawsuits—these jobs have strict licensure, credentialing and malpractice insurance requirements.

Figures 10 and 11:
Allied health and support workers outnumber doctors and nurses and continue to grow at faster rates

Source: Georgetown University Center on Education and the Workforce forecasts of educational demand through 2020



In this section we divide healthcare occupations into four broad classes of workers—doctors, nurses, allied healthcare and paraprofessional healthcare support—and discuss job prospects, economic opportunity, growth and educational demand for each category. In the chart above, we see steady growth of all workers in the healthcare sector.



As the pie chart shows, by 2020, allied healthcare will account for 3.4 million of all the healthcare occupations. Combined with healthcare support staff, these two sectors will account for 64 percent of all occupations in healthcare. Doctors and nurses will account for 1.2 million and 3.5 million jobs respectively, totaling 36 percent of all healthcare occupations by 2020.

Figure 12:
Healthcare support paraprofessionals are the largest segment of healthcare occupations

Source: Center on Education and the Workforce forecasts of educational demand through 2020

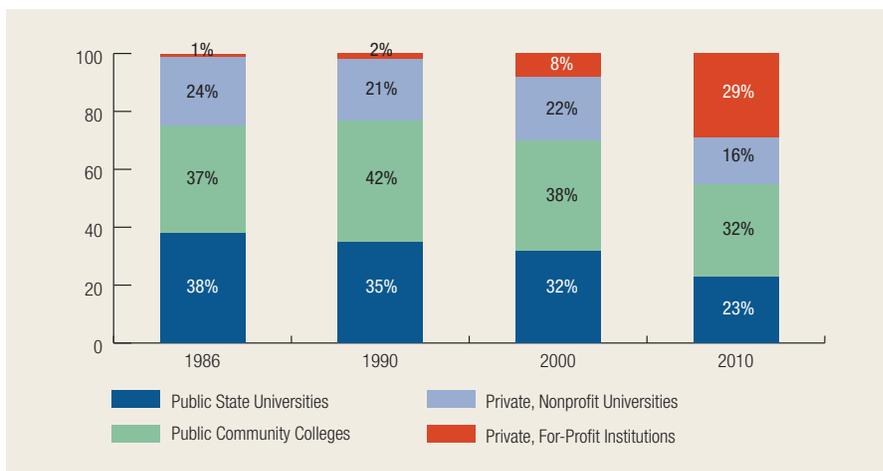


Figure 13:
Private for-profits have dramatically increased their market share of supply of healthcare credentials

Source: IPEDS completions survey, various years

Who will train all these people? Increasingly, it will be private for-profit institutions (light blue in the bar chart above). In 1986, 75 percent of all healthcare graduates came from public universities and public community colleges. By 2010, that number had declined to 65 percent. The percentage of those trained at private non-profit institutions also declined over the same period, from 24 to 16 percent. Private for-profit schools picked up the slack: between 1986 and 2010, the number of healthcare workers trained in such schools rose from 1 to 29 percent.

Though they’ve managed to increase their share of credentials in the healthcare fields, for-profit institutions tend to produce graduates trained for healthcare support and paraprofessional occupations; community colleges still produce nearly 50 percent of nurses entering the field today. The U.S. Department of Education’s new “gainful employment” rule, intended to protect students and taxpayers from for-profit schools that overpromise the value of the degrees they offer, could shut down hundreds of these programs should they fail to produce graduates able to find jobs that pay enough to support a family.³¹

³¹. There are no domestic for-profit allopathic medical schools and only one osteopathic medical school. Thus, there are no domestic MDs who have been trained at for-profit institutions and only a handful of domestically trained DOs. However, a rising number of MDs have received training at for-profit medical schools abroad – such as schools in the Caribbean.

Persistence in healthcare occupations

Career pathways in healthcare occupations are among the most direct of all occupational groups – a nursing certificate leads to a nursing job. Using NCES data we trace the behavior of healthcare graduates six years into the future.

Table 10: Nearly three-quarters of healthcare graduates end up working in healthcare six years later

Current job: Occupational category 2003				
	Other	Medical	Teachers, managers, professionals	Total
	(%)	(%)	(%)	
Estimates				
Total	31.8	9	59.1	100%
April 1997 occupation code				
<i>Health</i>	6.6	73.7	19.7	100%
<i>Other</i>	53.3	2.4	44.3	100%
<i>Teachers, managers, professionals</i>	17.7	3.3	79	100%

Source: *Bachelor's and Beyond*, 2003

Seventy-four percent of healthcare graduates work in healthcare occupations six years into the future, while 20 percent divert to teaching, managerial and professional occupations. Workers trained in the teaching profession or other professions are less likely to work in the medical professions later on. The bottom line: workers with little or no clinical training who are trying to get into the healthcare field will most likely wind up in healthcare support paraprofessional occupations or non-clinical roles (e. g. medical secretaries, financial managers, stock clerks, etc.).

Doctors

Doctors play the central role in our health care system, from making ultimate decisions about direct patient care to helping shape public policy. That elevated status is their reward for completing arduous medical or professional doctorate degrees, which are usually followed by extensive clinical residencies (BLS, 2012). They are generally the highest paid of medical professions, with annual median incomes ranging from \$71,490 to well over \$166,400 (BLS, 2012). The salary range reflects the type of degree earned³² and the wide variety of settings where they work: hospitals, outpatient healthcare facilities, private offices, provider groups, clinics, community health centers, urgent care centers and retail clinics.

The number of doctors has grown steadily in recent decades, with an increase in the rate of growth over the 1990s. Since 2000, the number of doctors entering the workforce has continued to increase, but the rate of increase has declined.

³² The range of doctors' degrees includes MDs, DOs, Optometrists, Chiropractors, Veterinarians, Dentists, Podiatrists, Obstetricians, Oncologists, Naturopaths, etc.

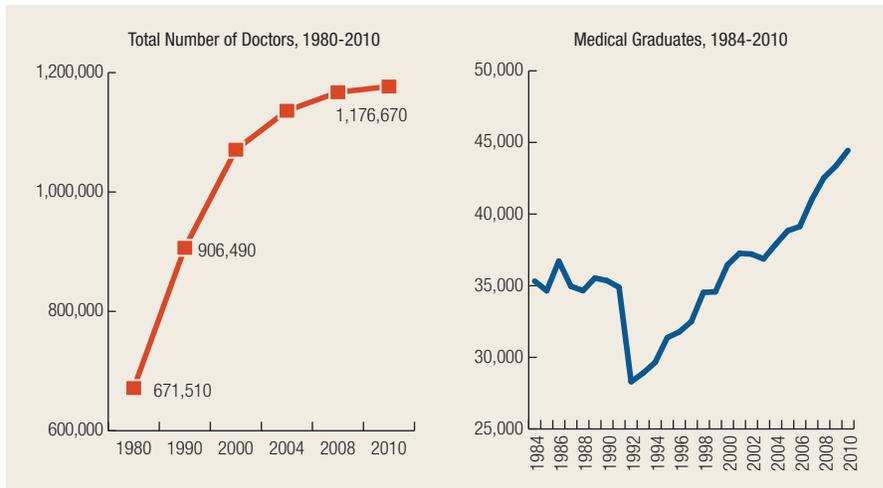


Figure 14 and 15:
The supply of doctors continues to grow, though at a slower rate over the last decade

Source: Author's analysis of IPEDS and AAMC data
 We use the term doctors here rather loosely to include physicians and surgeons as well as dentists, optometrists, podiatrists, etc.
 See Appendix 1 for more details

Despite the increasing numbers of support staff and the use of time-saving technologies, the number of hours worked by doctors (including physicians, veterinarians, dentists, etc.) has stayed remarkably stable over the last few decades. The role of doctors, however, is changing rapidly. The old-fashioned solo family practitioner who diagnosed, prescribed, followed up on patients and ran his own office is a thing of the past. Today's doctors are more likely to specialize in a particular aspect(s) of care; a consulting physician may make a difficult diagnosis, then hand the patient off to a team of other healthcare personnel to follow through on treatment. These changing and increasingly specialized roles make it especially hard to predict where skill shortages are likely to be.

This debate—do we need more doctors, and if so what kind?—is at least 50 years old. In the 1960s, a perceived shortage of doctors prompted Congress to pass legislation providing subsidies to medical schools. In the 1980s, when that perceived shortage had become a perceived surplus, Congress responded by eliminating those subsidies. That was partly a response to new analyses, which showed that fewer doctors in a given area did not necessarily translate into

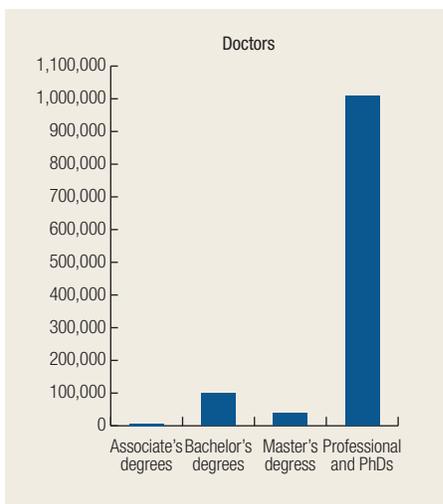


Table 11: The average number of hours doctors work per week has remained stable at 44-45 hours since 1980

Year	Average usual hours worked per week
1980	45
1990	45
2000	45
2004	45
2008	44
2010	44

Source: IPUMS

Figure 16:
The education level of doctors is clearly defined as a medical degree

Source: Center on Education and the Workforce forecasts of educational demand through 2020

worse medical outcomes, and that—Say's law—the more doctors there were, the more demand for their services increased. In 1997, Congress went a step further by passing the Balanced Budget Act of 1997, which caps the number of residents eligible for graduate medical education payments for hospitals.

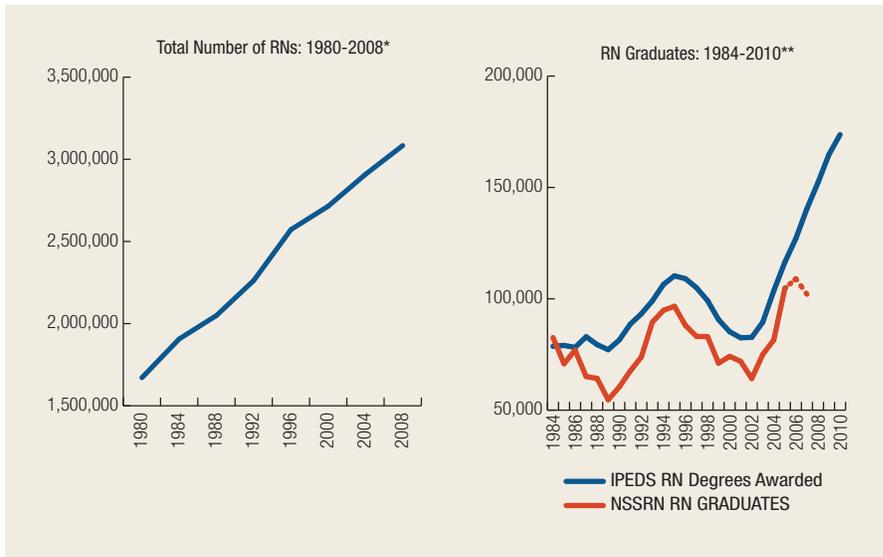
Today the pendulum has swung back again: the general consensus is that the nation faces a doctor shortage—though the surplus discussion isn't dead; in academic circles, analysts such as Goodman and Fisher (2008) maintain that the shortages are overstated. Nevertheless, the Association of American Medical Colleges (AAMC) has estimated that there will be a shortage of some 21,000 primary care physicians by 2015³³, and it has called for a 30 percent increase in medical school enrollment. The belief that we are not producing enough doctors is so entrenched that federal legislation now has built in incentives for doctors—especially those in high-demand areas such as primary care and family care—to complete their training and enter the market.³⁴ Others have called for amending the Balanced Budget Act of 1997.³⁵ Nonetheless the demand for doctors will continue to rise over the next decade, approaching 1.2 million by 2020. The growth and aging of the U.S. population, aging of the current physician workforce, potential increases in healthcare coverage, and advances in medical technology all contribute to this high level of job growth (HRSA, 2008; AAMC, 2008).

With such stringent education requirements, it's not surprising that doctors rack up the highest student loan burdens of all occupational groups. According to the AAMC, 33 percent of graduating medical students owed more than \$200,000—not counting the interest that will accrue over payback periods of 25 to 30 years. The median yearly tuition at public medical schools is \$29,000, and at private institutions it is \$47,000—figures that reflect an increase of 312 percent and 165 percent, respectively, over the last two decades. Cost remains a key deterrent for pre-medical students and is an important reason there aren't more African-American, Hispanic and Native American doctors. Despite the huge wage premiums paid to medical doctors, many will continue to pay student loans well into their 40s.

³³. Cooper et al., 2002; COGME, 2005; Dill and Salsberg, 2008 predict a shortage of between 85,000 and 200,000 doctors by 2020.

³⁴. Recent healthcare reform legislation promises loan forgiveness for doctors willing to serve in "shortage" and underserved areas.

³⁵. Iglehart, 2008.



Figures 17 and 18:
The supply of nurses continues to grow, while the supply of graduates has not kept pace

Source:
 * National Sample Survey of Registered Nurses (NSSRN) 1980-2008, Health Resources and Services Administration (HRSA).
 ** National Sample Survey of Registered Nurses (NSSRN) 2008, Health Resources and Services Administration (HRSA).³⁶ IPEDS Completions Survey 1984-2010, National Center for Educational Statistics (NCES).
 Note: 2006 and 2007 RN graduates are indicated in dotted form because they were underrepresented in 2008 NSSRN. NSSRN is a survey of active RNs, and many 2006 and 2007 RN graduates were not fully active in the field yet in 2008.

Nurses

Nursing is the largest of all licensed health professions in the U.S., and it's been expanding steadily since the 1980s, thanks to the aging of the Baby Boomers generation, rising disposable incomes, increased health coverage and changing health care delivery models (HRSA 2004; NSSRN, 1980-2008). The nursing profession offers some of the best opportunities for qualified job seekers, with the largest expected job totals of any occupation (2.7 million RN jobs in 2020) and an annual median wage nearly double that of all other occupations. It also has the highest pay of the ten occupations with largest expected job growth (\$64,690) (BLS, 2012).

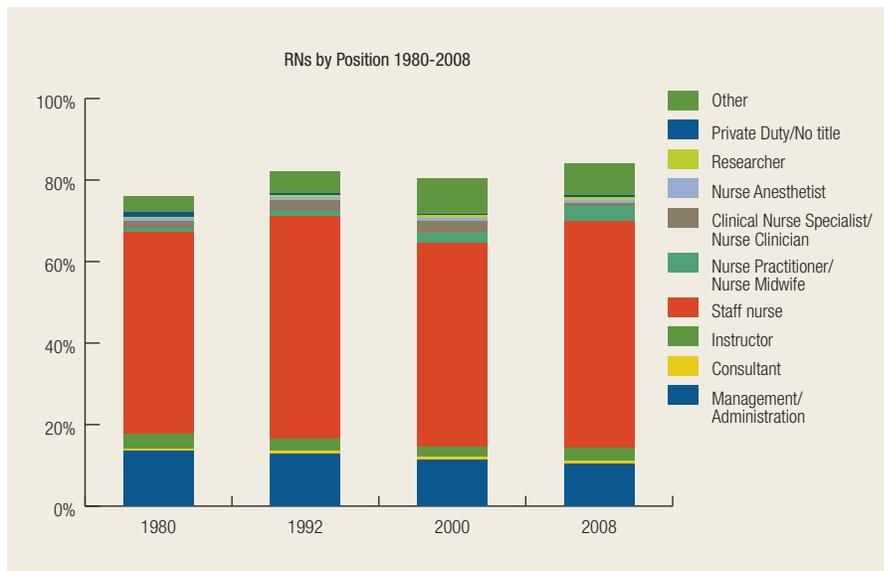


Figure 19:
Staff nurse is the most popular role that RNs perform

Source: National Sample Survey of Registered Nurses (NSSRN) 1980-2008, Health Resources and Services Administration (HRSA).
 Note: The total share of nurses in all positions does not add up to 100% as the NSSRN survey includes NA category, which accounts for 16 to 24 percent of respondents.

³⁶ NSSRN surveys RNs who are already in the field and collects their year of graduation from initial nursing education program. Since the survey was conducted in 2008, 2006 and 2007 graduates were just entering the field and thus were likely to be underrepresented in the sample. Thus, it appears that the number of RN graduates is declining, whereas in actuality, as IPEDS data show, it continues to grow.

During this period of steady growth, “staff nurse” has remained the most common job category for RNs, with the number of RNs in these positions actually increasing to 56 percent in 2008, up from 49 percent in 2004. The share of RNs in management has slowly declined since 1980, down from 14 to 11 percent. The number of RNs in the broad category of “other” positions increased in the first few years of this century, as new opportunities opened up in areas of quality improvement, informatics, and legal functions, but by 2009 it had shrunk back to 1996 levels as more RNs took traditional staff positions. The share of RNs in the rest of the positions has generally been small and has stayed relatively constant.

Table 12: The average number of hours nurses work per week increased from 1980-2004, then dropped off slightly from 2004-2008.

Year	Average usual hours worked per week
1980	34
1984	34
1988	35
1992	34
1996	35
2000	35
2004	40
2008	38

Source: National Sample Survey of Registered Nurses (NSSRN) 1980-2008, Health Resources and Services Administration (HRSA).

Table 13: Nurses in managerial and administrative positions work the most hours per week; nurse anesthetists work the second most number of hours per week

Position Title	Average Number of Work Hours Per Week
Management/Administration	46
Consultant	37
Instructor	38
Staff nurse	37
Nurse Practitioner/Nurse Midwife	40
Clinical Nurse Specialist	41
Nurse Anesthetist	42
Researcher	39
Private Duty/No title	30
Other	39

Source: National Sample Survey of Registered Nurses (NSSRN) 1980-2008, Health Resources and Services Administration (HRSA).

The average number of hours RNs worked per week increased to 40 by 2004, then declined slightly to 38 in 2008. Nurses in administrative jobs worked the most hours per week in 2008 (46), followed by nurse anesthetists (42). Nurses with no official title worked the fewest hours per week (30).

While nursing offers some of the best opportunities of any occupation in terms of job availability and salary, it is a highly regulated profession with strict requirements for entry. Registered nurses must complete an approved nursing education program, pass the NCLEX-RN exam, and get licensed by the board of nursing of the state where he or she wants to work.³⁷

There are three major types of educational programs that lead to this point: Associate of Nursing (ADN), Bachelor of Nursing or Bachelor of Science in Nursing

³⁷. (BLS, 2012).

(BSN), and Diploma, which are usually awarded by hospital-based training programs.³⁸ A small number of people also become RNs after completing a master’s or even a doctorate degree in nursing, but the more common route into the profession is by earning an associate’s or bachelor’s degree, leaving open the option to pursue higher-level educational programs later. A number of transition programs are designed for this—for instance, programs that allow a licensed practical nurse to become a registered nurse, or an RN with an associate’s degree to earn a bachelor’s.

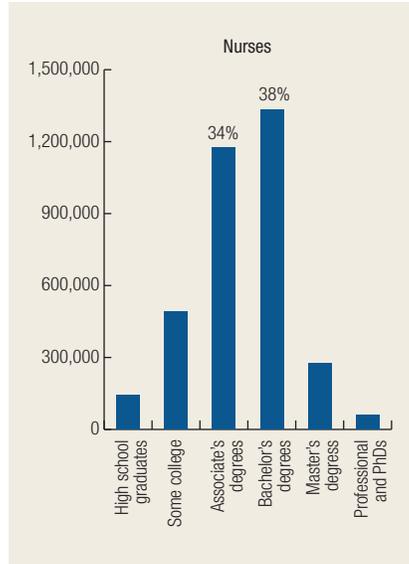


Figure 20:
The majority of nurses have bachelor’s and associate’s degrees - though master’s degrees are growing in importance

Source: Georgetown University Center on Education and the Workforce forecasts of educational demand through 2020.

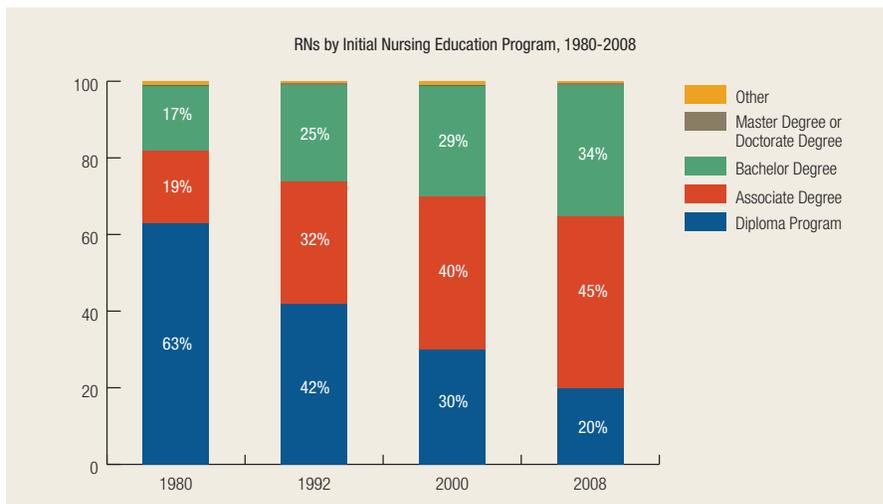


Figure 21:
Over the last 30 years, the share of associate’s nurses has grown at a faster rate than the share of bachelor’s nurses

Source: National Sample Survey of Registered Nurses (NSSRN) 1980-2008, Health Resources and Services Administration (HRSA).

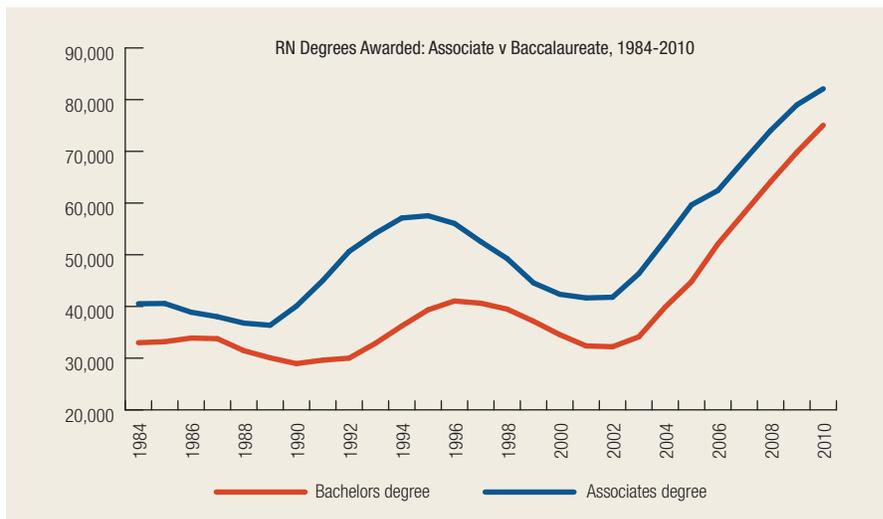


Figure 22:
The supply of nurses rises and falls together, regardless of degree level. There are still more (associate degree) ADN nurses than (bachelor’s degree) BNS nurses

Source: IPEDS Completions Survey 1984-2010, National Center for Educational Statistics (NCES).

³⁸. (BLS, 2012).

Box: What Nurses Do

The debate about whether entry level nurses should have a bachelor's degree (BSN) or an associate's degree (ADN) is almost 50 years old. Those on the side of more ADNs point to the fact that both pass the licensure exam at similar rates and they have similar starting salaries. Those on the side of more BSNs point to improved patient outcomes and the rising complexity of healthcare delivery requiring more entry-level knowledge. Career trajectories leading to more senior positions such as advanced practice nurses: nurse practitioners, nurse-midwives, clinical nurse specialists or nurse anesthetists, however, also require more advanced degrees. Some hospitals, as well, require a BSN degree for entry. Since the majority of BSN programs are full-time, they can eliminate a large cadre of potential nursing students. Graduates of either an ADN or BSN program are prepared for entry-level nursing careers, so the ADN should be considered an effective stepping stone to a nursing career.

The following lists are compiled from O*NET and provide a bit of insight into the differentiated tasks of various types of nurses.

REGISTERED NURSES (RN):

(64% say associate's degree required, 29% say bachelor's degree required)

Monitor, record, and report symptoms or changes in patients' conditions.

Maintain accurate, detailed reports and records.

Record patients' medical information and vital signs.

Order, interpret, and evaluate diagnostic tests to identify and assess patient's condition.

Modify patient treatment plans as indicated by patients' responses and conditions.

Direct or supervise less-skilled nursing or healthcare personnel or supervise a particular unit.

Consult and coordinate with healthcare team members to assess, plan, implement, or evaluate patient care plans.

Monitor all aspects of patient care, including diet and physical activity.

Instruct individuals, families, or other groups on topics such as health education, disease prevention, or childbirth and develop health improvement programs.

Prepare patients for and assist with examinations or treatments.

LICENSED PRACTICAL (LPN) AND LICENSED VOCATIONAL NURSES (LVN):

(67% of incumbents say associate's degree required, 23% of incumbents say bachelor's degree required)

Administer prescribed medications or start intravenous fluids, noting times and amounts on patients' charts.

Observe patients, charting and reporting changes in patients' conditions, such as adverse reactions to medication or treatment, and taking any necessary action.

Provide basic patient care or treatments, such as taking temperature or blood pressure, dressing wounds, treating bedsores, giving enemas or douches, rubbing with alcohol, massaging, or performing catheterizations.

Sterilize equipment and supplies, using germicides, sterilizer, or autoclave.

Answer patients' calls and determine how to assist them.

Measure and record patients' vital signs, such as height, weight, temperature, blood pressure, pulse, and respiration.

Work as part of a healthcare team to assess patient needs, plan and modify care, and implement interventions.

Collect samples, such as blood, urine, or sputum from patients, and perform routine laboratory tests on samples.

Prepare patients for examinations, tests, or treatments and explain procedures.

Assemble and use equipment, such as catheters, tracheotomy tubes, or oxygen suppliers.

ACUTE CARE NURSES-RN:

(75% of incumbents say associate's degree required, 20% of incumbents say bachelor's degree required)

Perform emergency medical procedures, such as basic cardiac life support (BLS), advanced cardiac life support (ACLS), and other condition-stabilizing interventions.

Document data related to patients' care, including assessment results, interventions, medications, patient responses, or treatment changes.

Manage patients' pain relief and sedation by providing pharmacologic and non-pharmacologic interventions, monitoring patients' responses, and changing care plans accordingly.

Administer blood and blood product transfusions or intravenous infusions, monitoring patients for adverse reactions.

Assess urgent and emergent health conditions using both physiologically and technologically derived data.

Order, perform, or interpret the results of diagnostic tests and screening procedures based on assessment results, differential diagnoses, and knowledge about age, gender and health status of clients.

Interpret information obtained from electrocardiograms (EKGs) or radiographs (x-rays).

Set up, operate, or monitor invasive equipment and devices such as colostomy or tracheotomy equipment, mechanical ventilators, catheters, gastrointestinal tubes, and central lines.

Diagnose acute or chronic conditions that could result in rapid physiological deterioration or life-threatening instability.

Discuss illnesses and treatments with patients and family members

CRITICAL CARE NURSES-RN:

(50% of incumbents say associate's degree required, 45% of incumbents say bachelor's degree required)

Assess patients' pain levels and sedation requirements.

Monitor patients for changes in status and indications of conditions such as sepsis or shock and institute appropriate interventions.

Set up and monitor medical equipment and devices such as cardiac monitors, mechanical ventilators and alarms, oxygen-delivery devices, transducers, and pressure lines.

Administer medications intravenously, by injection, orally, through gastric tubes, or by other methods.

Evaluate patients' vital signs and laboratory data to determine emergency intervention needs.

Prioritize nursing care for assigned critically ill patients based on assessment data and identified needs.

Document patients' medical histories and assessment findings.

Advocate for patients' and families' needs, or provide emotional support for patients and their families.

Conduct pulmonary assessments to identify abnormal respiratory patterns or breathing sounds that indicate problems.

Administer blood and blood products, monitoring patients for signs and symptoms related to transfusion reactions.



As the demand for nurses continues to increase, so does the demand for nursing education. The total number of nursing graduates has been increasing steadily since 2001-2002, reversing a decline in the 1990s that resulted from the rise of managed care and other cost-control measures. Associate and bachelor degree programs are the most widely available educational routes into the profession, accounting for 90 percent of all new RN graduates (IPEDS, 2010). A total of 79 percent of all nurses in the field got their education this way (NSSRN, 2008).

Associate degree programs have graduated more RNs than bachelor degree programs, though the gap between the two is narrowing. However, the gap between RNs with an initial nursing education of associate degree and RNs with initial nursing education of bachelor degree has not narrowed, but rather has been widening. It would seem, then, that the decrease in the difference between the number of graduates from associate's degree programs and the number of graduates from bachelor's degree programs is the result of more RNs already in the field upgrading their skills by completing a bachelor's program, as opposed to an increase in the number of new nurses graduating from bachelor's degree programs. This conclusion is supported by the growth in the number of RNs with a bachelor's degree as their highest degree in nursing. In fact, in 2008, 37% of RNs held a bachelor's degree as their highest degree in nursing, making it the most widely held top nursing degree among RNs.

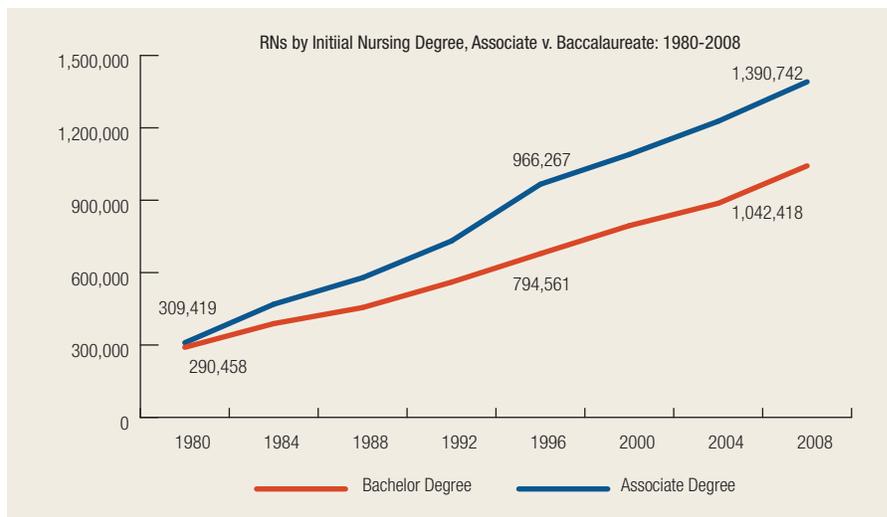


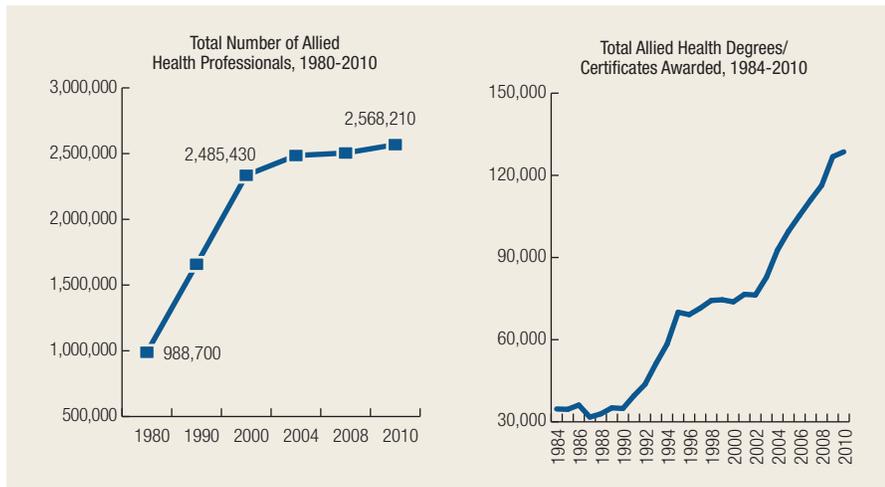
Figure 23:
The gap that exists between the supply of nurses by education level continues to rise

Source: National Sample Survey of Registered Nurses (NSSRN) 1980-2008, Health Resources and Services Administration (HRSA).

Allied healthcare

Figures 24 and 25:
The supply of graduates in allied health rose sharply in the 1990s

Source: Author's analysis of IPEDS and IPUMS data



Definitions of allied health professionals vary widely across the industry, as do the specific occupations that get included in the group. For example, the Association of Schools of Allied Health Professions (ASAHP) defines allied healthcare as professionals “involved with the delivery of health or related services pertaining to the identification, evaluation and prevention of diseases and disorders; dietary and nutrition services; rehabilitation and health systems management, among others.”³⁹

Table 14: The average number of hours per week worked by allied health professionals has remained consistent since 1990

Year	Average of Usual hours worked per week
1980	37
1990	38
2000	38
2004	38
2008	38
2010	38

Source: IPUMS

We define allied healthcare professionals as health care practitioners with formal education and clinical training who are credentialed through certification, registration, and/or licensure. This definition excludes doctors, nurses, administrative support staff and aides, and includes a variety of technologists, technicians and related professionals who support care delivery in healthcare facilities, practitioners’ offices and community settings.⁴⁰ Allied health professionals encompass a number of health care providers of increasing importance to the delivery of health services in an evolving healthcare system, including physician assistants (PAs), dental hygienists and physical and occupational therapists (PTs and OTs).

³⁹. The ASAHP list includes specifically dental hygienists, diagnostic medical sonographers, dietitians, medical technologists, occupational therapists, physical therapists, radiographers, respiratory therapists, and speech language pathologists.

⁴⁰. Analysts use doctors, nurses, allied healthcare and support paraprofessionals to define workers in healthcare occupations. The use of the phrases “professional and technical healthcare occupations” and “healthcare support occupations” is unique to economists and social scientists addressing and describing workforce needs in the sector.

The demand for allied health professions is expected to continue its strong growth. By 2020, we expect 3.6 million available jobs, representing a 30 percent growth from 2010. The education requirements of allied healthcare jobs vary widely, but over 40 percent of allied healthcare jobs require a postsecondary vocational certificate or an associate's degree.

Physician assistants, along with doctors, RNs and nurse practitioners, make up the backbone of primary care—an area of increasing importance as doctors and policy makers try to rein in rising costs by emphasizing disease prevention and effective chronic disease management (Dower & O'Neil, 2011). PAs are licensed professionals who practice medicine under the direction of physicians and surgeons in a variety of primary and specialty care settings. They generally have a master's degree (BLS, 2012).

Dental hygienists play a similar role in the area of dental care, especially among vulnerable populations, such as children who live in poverty, the elderly, and people in underserved rural areas (IOM, 2009). These are licensed health care professionals who provide a variety of oral health services including cleaning teeth, examining patients for signs of oral disease, and educating patients on proper oral hygiene. They usually complete an associate's degree in dental hygiene.

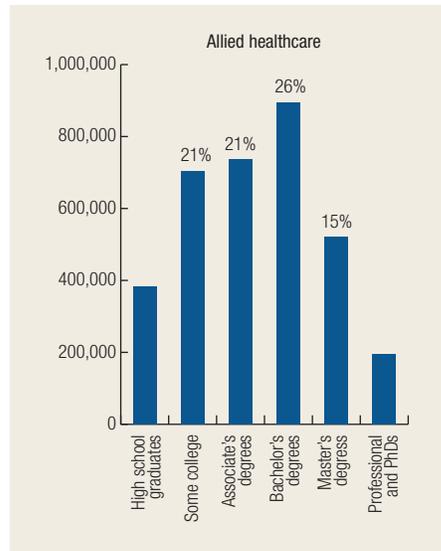
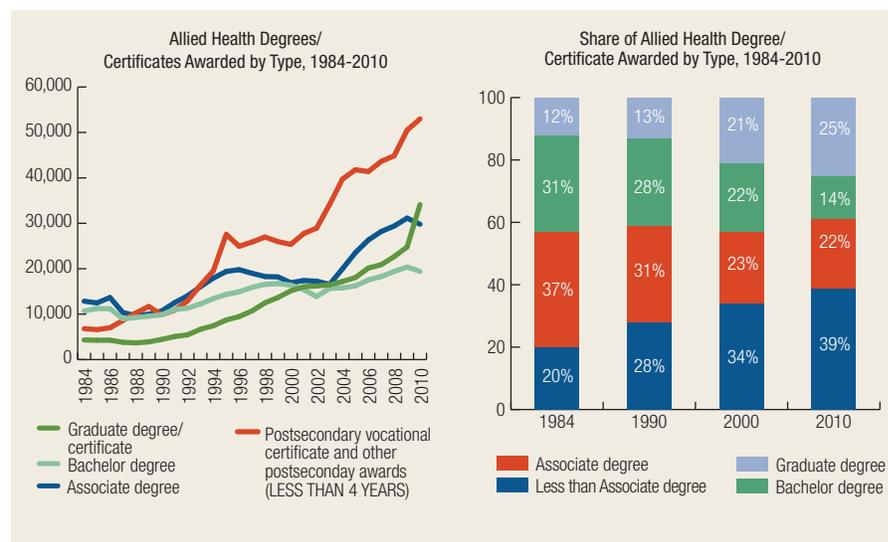


Figure 26:
Allied health is fairly evenly distributed across all education levels with the highest proportion of workers with bachelor's degrees

Source: Georgetown University Center on Education and the Workforce forecasts of educational demand through 2020.



Figures 27 and 28:
Postsecondary vocational certificates have grown substantially and are now the most popular credential in allied health

Source: Author's analysis of IPEDS and IPUMS data

Physical and occupational therapists (PTs and OTs) are highly trained, usually with master's or, for physical therapists, often even doctorate degrees. Both are licensed health professionals who help people with injuries or disabilities recover their movement, reduce pain from chronic illnesses and manage everyday tasks.⁴¹ PTs use exercises, stretches and a variety of equipment to increase general range of motion. OTs focus on helping patients with injuries or disabilities manage everyday tasks and teaching them how to use equipment such as wheelchairs and eating aids.

The category of allied health professionals also includes dietitians and nutritionists, who advise people on eating habits and healthy lifestyle; respiratory therapists, who help people with chronic breathing problems or who are on respiratory equipment, and speech language pathologists, who assist individuals with communication and swallowing disorders.⁴²

The importance of still another sub-group of allied health professionals is likely to grow in coming years as diagnostic and surgical technology becomes both more complex and commonplace: the technologists and technicians who understand how to use these new machines. Technology is particularly important in the fields of cardiovascular surgery, radiology and nuclear medicine.⁴³ Technologists usually need to obtain some level of formal education, such as an associate's or bachelor's degree, whereas for technicians certificate and on-the-job training is usually sufficient. As technology continues to change and diagnostic techniques become more complex, it's likely that the education requirements for these jobs will also increase.

Another occupational group of increasing importance in the allied health field is medical records and health information technicians, who organize and manage health information data (BLS, 2012). As health information technology (HIT) gains broader adoption, health care providers will increasingly rely on this group of professionals to ensure the accessibility, quality, accuracy, timeliness and security of health information and HIT systems.

Finally, there are opticians (dispensing) and pharmacy technicians, who dispense eyewear and prescription medication, and usually require little formal education (BLS, 2012), as well as emergency medical technicians (EMTs) and paramedics, who provide indispensable emergency care and transport for the sick and injured.⁴⁴

⁴¹. (BLS, 2012).

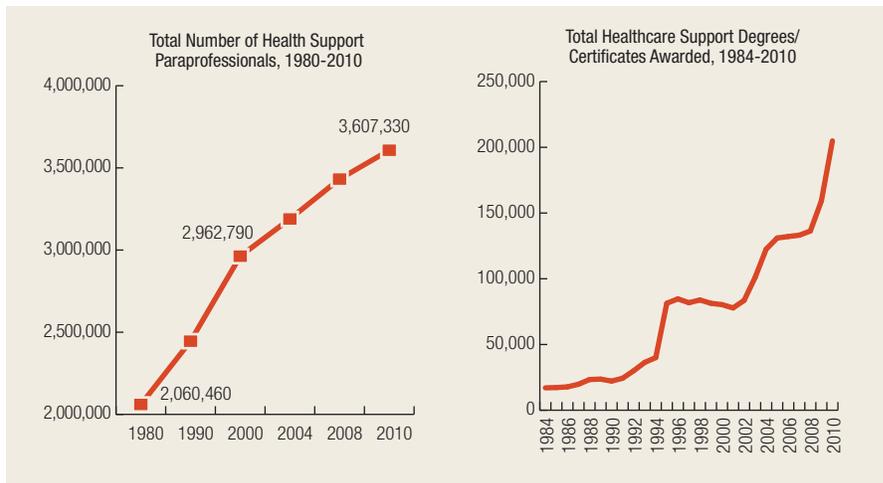
⁴². (BLS, 2012).

⁴³. (BLS, 2012).

⁴⁴. (BLS, 2012).

Healthcare support

Healthcare support paraprofessionals are the people who do most of the heavy lifting—often literally—in patient care, and certainly most of the hands-on care. They fall into three broad groups: medical/dental assistants or physical/occupational therapy assistants and aides who directly assist doctors in clinical settings; nursing assistants who work in hospitals, psychiatric institutions, nursing homes or assisted living facilities; and home health and personal care aides who work in private homes providing care to the elderly or disabled.⁴⁵ The second and the third groups provide 70 to 80 percent of long-term care services to the elderly and disabled⁴⁶—and for that reason, they are the people likely to have the most influence over the quality of patients’ lives.⁴⁷



Figures 29-30: Healthcare support paraprofessional degrees shot up with the increase in private for-profit institutions

Source: Authors’ analysis of IPEDS and IPUMS data

The demand for healthcare paraprofessionals is expected to grow faster than for any other group of healthcare workers, with 4.8 million projected by 2020. Why? As the population ages, the number of people needing long-term care will also increase—to nearly 15 million by 2025 and 19 million by 2050.⁴⁸ Family size is decreasing, too, which means those aging adults have fewer adult children around to depend on. With more people living longer, more people will be living with debilitating chronic conditions

Table 15: The average number of hours per week worked by healthcare support paraprofessionals has remained steady at 35-36 hours since 1990

Year	Average of Usual hours worked per week
1980	34
1990	35
2000	35
2004	36
2008	36
2010	35

Source: IPUMS

⁴⁵. (BLS, 2012; PHI, 2011).

⁴⁶. (PHI, 2011).

⁴⁷. (Stone & Harahan, 2010).

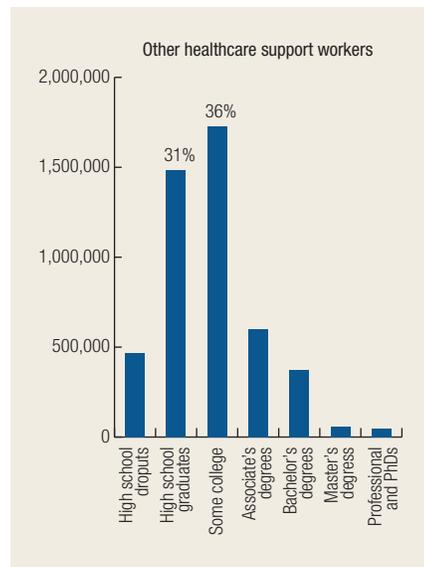
⁴⁸. HHS & DOL, 2003.

that impair their ability to keep up with routine daily activities like eating and getting dressed. Finally, more people want to “age in place” in their own homes if at all possible, driving up the demand for caregivers who work in residential and community settings (Friedland, 2004).

Yet this category also illustrates one more way in which healthcare does not operate by the ordinary laws of supply and demand: despite the growing demand for these workers, they are often the lowest-paid—though there’s a wide range in median annual wages. Physical and occupational therapy assistants can make as much as \$47,500, but wages for those at the bottom are somewhere between \$20,000 and \$24,000.⁴⁹ The lower wages reflect the lower education requirements for getting into the field: more than 75 percent of jobs in healthcare support do not require a college degree.

Figure 31:
Healthcare support paraprofessional workers have low education levels; the majority have some college, but no degree

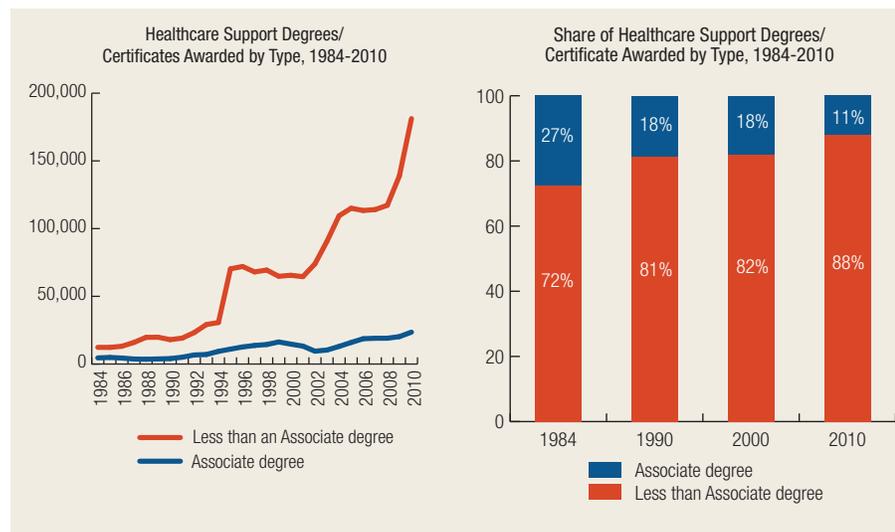
Georgetown University Center on Education and the Workforce forecasts of educational demand through 2020.



The relatively low wages in this field are one reason for growing concern about meeting the increasing demand for these workers, but there are other factors at play, too. Most healthcare support paraprofessionals are women, and the pool of working-age women is not expanding. Then there are the negative stereotypes about this kind of work: the lack of autonomy, inflexible job design and workflow, and few chances for advancement.⁵⁰ Overcoming these barriers will require a willingness to think creatively about job descriptions and career advancement paths.

Figures 32 and 33:
A declining share of the healthcare support paraprofessional workforce has an associate's degree

Source: Author's analysis of IPEDS and IPUMS data



⁴⁹. (BLS, 2012).

⁵⁰. (Stone & Harahan, 2010).

Healthcare professions: Definitions and Characteristics⁵¹

The word “doctor” encompasses a range of subtypes and education requirements:

- Physicians and surgeons (M.D.s and D.O.s) diagnose and treat illnesses and injuries, take medical histories, perform physical exams, order diagnostic tests, operate on individuals, advise patients on their diet and hygiene, and answer questions regarding their health and any conditions they may have. Physicians complete medical school with an M.D. or D.O. degree and then undertake a three-to-eight-year clinical residency, depending on their choice of specialty.
- Optometrists perform eye exams, check for eye diseases and conditions, prescribe eye-glasses, contact lenses and medications, provide pre- and postoperative care to people undergoing eye surgery, and provide counseling on good eye health. Optometrists complete a doctor of optometry (O.D.) degree, which combines classroom education with clinical training, and some complete another year of clinical residency to gain advanced training in a specialty.
- Dentists diagnose and treat problems with teeth, gums and related parts of the mouth. Dentists complete dental school, which combines classes with supervised dental practice, with a D.D.S. or D.M.D degree. Those who want to practice in a dental specialty go on to complete a one- to two-year residency following graduation.
- Podiatrists diagnose and treat disorders affecting the foot, ankle and lower leg. Podiatrists receive a doctor of podiatric medicine (D.P.M.) degree and then complete a three-year medical and surgical residency.
- Pharmacists dispense prescription medication, verify instructions from physicians for proper dosage, check for negative interactions between medications, and advise patients on how and when to take medications, potential side effects, and general health topics. Pharmacists earn Pharm. D. degree, which includes coursework and supervised work experience. Pharmacists who seek advanced positions in clinical pharmacy or research complete a one- to two-year residency after earning their degree.
- Chiropractors treat people with injuries and conditions of the musculoskeletal system, including bones, muscles, ligaments, and tendons. They earn a doctor of chiropractic (D.C.) degree, which combines classroom education with supervised clinical experience.
- Veterinarians diagnose and treat animals. They complete a doctor of veterinary medicine (D.V.M. or V.M.D.) degree, which includes classroom, laboratory, and clinical experience components.

⁵¹. (BLS, 2012).

Healthcare professions: Definitions and Characteristics *(continued)***Healthcare support paraprofessional job descriptions:**

- Medical assistants work primarily in physician offices and clinics, where among other things they take medical histories, measure vital signs, schedule appointments and prepare blood for laboratory tests. Most states have no formal education requirements for medical assistants. Most learn via on-the-job training, though some are certified.
- Dental assistants prepare patients for treatment, sterilize dental instruments, assist with equipment during procedures, schedule appointments, process x-rays and advise people on proper oral hygiene. They typically complete a one-year certificate or diploma program; some states also require certification or licensure.
- Physical and occupation therapy assistants and aides help with exercises and therapeutic techniques during treatment, record patient progress and teach them how to use equipment, clean the treatment area and equipment and help with clerical duties. Assistants generally have to graduate from an associate's degree program in either physical therapy or occupational therapy and get licensed in the state where they practice; aides generally are required to have a high school diploma, then receive on-the-job training.
- Nursing assistants and aides provide basic care for people in hospitals and long-term care settings: helping patients bathe or dress, measuring vital signs and assisting with food and medication intake. Psychiatric aides perform similar duties, but at mental health facilities, and they also lead care recipients to educational or therapeutic activities and restrain patients who become violent. Nurse assistants and aides generally complete a postsecondary certificate program, then take certification exams to use official titles such as certified nursing assistant. Psychiatric aides receive on-the-job training.
- Home health and personal care aides help clients with activities of daily living, such as bathing and dressing. They also provide companionship and do basic housekeeping: shopping for groceries, cooking meals and washing dishes. They monitor the patient's temperature and pulse, assist with prescribed exercises, make sure medications are taken on schedule and change simple dressings. Home health aides working for agencies receiving Medicare or Medicaid funding must complete a formal training program and pass a competency evaluation to be certified by the state where they work. Personal care aides receive on-the-job training.

Chapter 3:
**Wages in
Healthcare**



Summary

As a rule, educational level confers earning power⁵²—but in healthcare, it's a rule with exceptions. Intangibles like job status count, too. A healthcare professional worker with some college or an associate's degree, for example, makes almost twice as much as a support worker with a bachelor's degree.

Wage growth for healthcare occupations has been substantial over the past three decades.

Wages for healthcare professional and technical workers have grown at a steady pace and are among the best in the nation, although 20 percent of healthcare professional and technical workers earn less than \$38,000. Between 1983 and 2010, real wages for healthcare practitioners grew by 90 percent (an average of 2.5% per year), compared to 40 percent (1.5% per year) for healthcare support workers. While some of the observed difference in wages between support and professional workers is related to disparate education levels, healthcare professionals earn more at every level of education. Wages within healthcare support occupations also vary, but are uniformly low.

There are twice as many healthcare professional and technical workers (a category we define as any occupation that requires at the very least some post-secondary education) as there are support workers. Healthcare professional and technical workers are overwhelmingly White (80%), female (75%) and over 40 (65%).

The impressive income growth in professional and technical occupations reflects the increased education required for those workers to keep up with the increasingly complex demands of their jobs. Between the 1980s and 2000s, the real wage growth for those with some college or an associate's degree was about 30 percent. It was 41 percent for those earning bachelor's degrees.

Healthcare Professional And Technical Versus Healthcare Support

The healthcare workforce includes two broad categories: professional and technical workers and support workers. Professional and technical workers tend to have relatively high education levels and high wages. Indeed, physicians and surgeons at the top of this totem pole are among the highest-paid workers in the country. Healthcare support occupations, on the other hand, tend to be low-education and low-wage.

80% of healthcare professional and technical education workers have at least some college or better in a field directly related to their occupation.

50% of healthcare support workers have no education directly related to the field.

⁵² Help Wanted: Projections of Jobs and Education Requirements through 2018. Carnivale, Smith and Strohl, 2010.

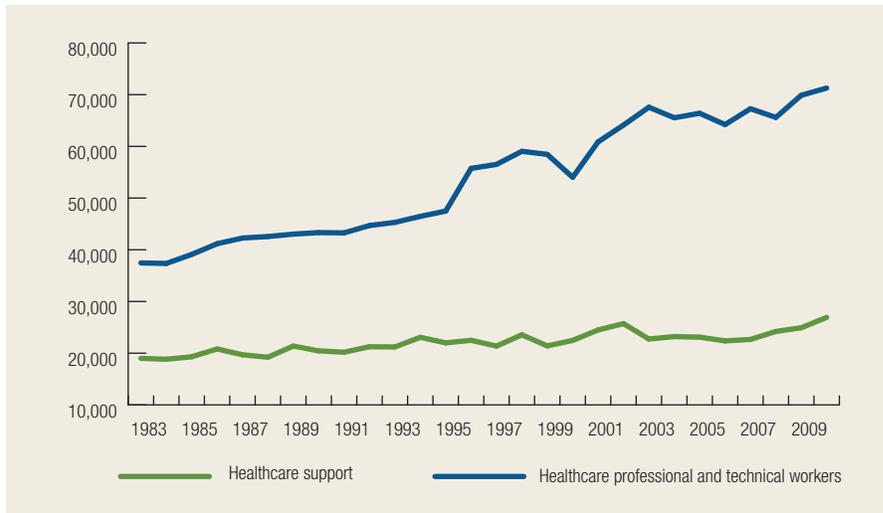
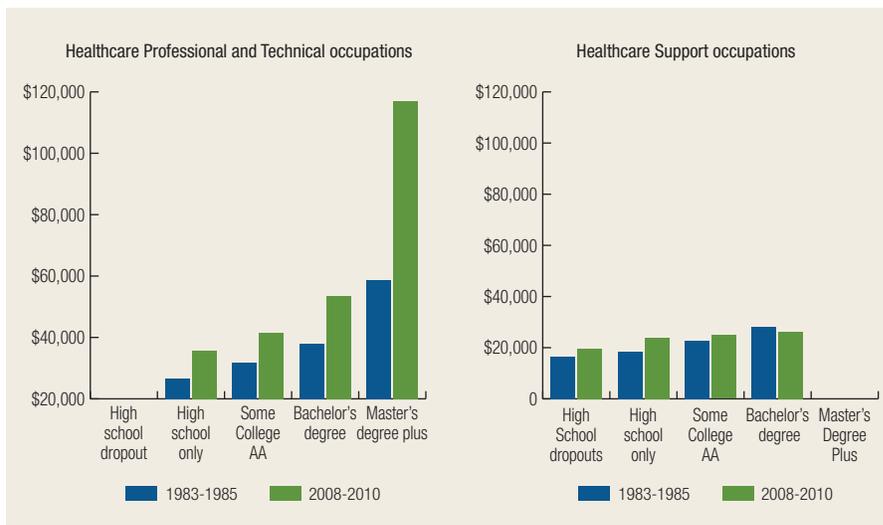


Figure 34: Healthcare professional and technical workers, especially doctors and nurses, were responsible for substantial wage gains in the cluster during the 1990s

Source: CPS, various years



Figures 35 and 36: The benefits of more education are reflected in the wage premium, which is higher for professional and technical occupations

Georgetown University Center on Education analysis of pooled CPS data, various years

A master's degree enabled professional and technical workers to double their average wages.

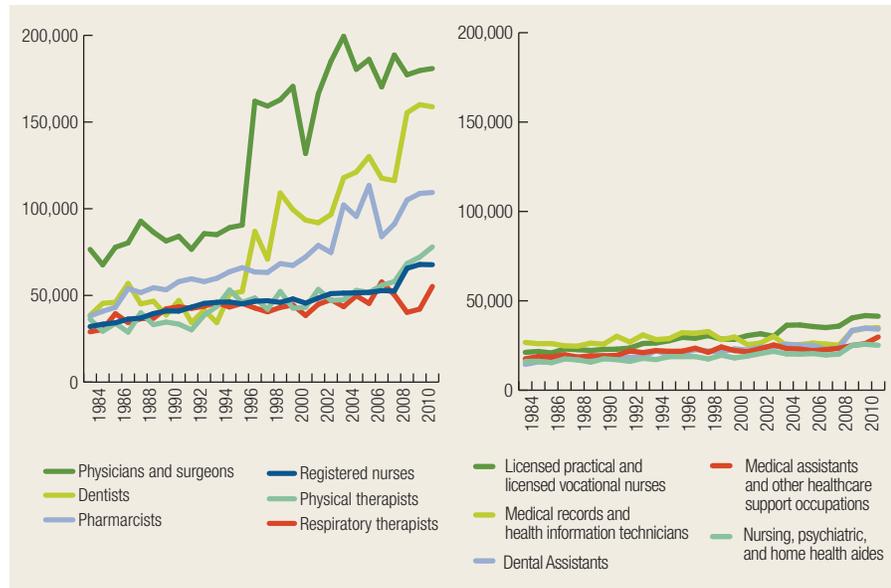
For healthcare support jobs, however, it's apparently possible for a worker to be *over-educated*: in five of 11 healthcare support occupations, median wages were actually *lower* for workers with a bachelor's degree than for those with only an associate's degree. While wages for support workers with only a high school diploma grew by 34 percent (compared to 30 percent for high school graduates in professional and technical positions), the wages of middle-skills healthcare support workers increased by only 10 percent, compared to 30 percent for similarly educated healthcare professionals.

The bottom line: support workers with higher education will have to move into more technical occupations if they hope to see their education reflected in their paycheck.

Figure 37: (left)
There is great disparity in wages of professional and technical workers driven by doctors' growing wages

Figure 38: (far right)
Wages for healthcare support grew over the past three decades but are still low by national standards

Source: Authors' analysis of CPS data, March (various years)



For professional and technical occupations, wages are relatively high, mainly because doctors' and surgeons' large incomes drive up the average. (The charts above disaggregate the occupations to show this impact.) For support workers, however, wages are uniformly low compared to the national average—a fact that no doubt explains why many workers view them as transitional jobs.

Healthcare support jobs pay better than the alternative

Workers in support roles, however, stay in healthcare jobs for quite a while, for one basic reason: they pay better than the available job alternatives. Based on test scores,⁵³ females in healthcare support earned more than those outside of healthcare, across all four quartiles. The difference averaged \$2,000 per year, though it ranged widely, from just \$170 for the third quartile to \$3500 for the fourth.

Even so, the vast majority of healthcare support jobs pay less than the minimum required to sustain a family of four in the average American household,⁵⁴ which is \$35,000 a year. Seventy percent of healthcare support workers earn less than \$30,000. Like healthcare professional and technical jobs, healthcare support jobs attract a disproportionate number of women: 90 percent of support workers are female. Unlike professional and technical workers, this group is young (nearly half are younger than 40), and a disproportionate percentage come from minority groups. For example, 21 percent are African American. Only one percent of support workers earn \$60,000 per year.

⁵³. We compared results by test quartiles using data in the National Educational Longitudinal Study, to wages for new workforce entrants.

⁵⁴. The minimum earnings threshold of \$35,000 is an absolute, poverty-based definition of the earnings level necessary to enter the middle class. It is also equivalent to 150% of the federal poverty line (FPL) for a family of four. The adequacy of this figure differs by state. However, it serves as a reference point for the earnings potential of career clusters.

Table 16: Young employees without college education earn higher wages in healthcare than in other fields

Test Score Quartile	Healthcare	Not in healthcare	Benefit from working in healthcare
Quartile 1 (Bottom Quartile)	\$ 21,180	\$ 18,470	\$2,700
Quartile 2	\$ 23,710	\$ 21,490	\$2,200
Quartile 3	\$ 25,060	\$ 24,890	\$170
Quartile 4	\$ 33,480	\$ 29,950	\$3,530

Source: Authors' analysis of NELS data

Table 17: 48% of healthcare professionals and technical occupations earn \$60,000 a year or more, while 70% of healthcare support workers earn less than \$30,000

Distribution of healthcare workers by wage range, May 2010	Healthcare professional and Technical Occupations	Healthcare Support Occupations
Under \$23,920	4.2%	45.9%
\$23,920 to \$30,139	6.1	25.6
\$30,139 to \$37,939	9.7	17.1
\$37,939 to \$47,299	13.3	7.4
\$47,299 to \$59,779	18.6	2.8
\$59,779 to \$74,859	18.1	0.9
\$74,859 to \$94,099	12.4	0.2
\$94,099 to \$118,539	7.0	0.1
Over \$118,539	10.6	
	100	100

Source: Occupational Employment Statistics (OES)

Mid-level healthcare professionals and technical workers earn extremely good wages

While most of these occupations have modest postsecondary education requirements, only 20 percent of healthcare professional and technical occupations earn less than \$38,000 per year, and almost 50 percent earn more than \$60,000. Most can expect to earn more than the national median.

Wages by sex

Healthcare as a whole is still an overwhelmingly female occupation: 80 percent of all workers in this field are female. Within the field, though, there are some broad gender delineations.

Most doctors are men, while most nurses and support workers are women

Men have always dominated the ranks of physicians and still do: doctors are still three times as likely to be male. Even though the proportion of women doctors

has steadily increased, the effect of their entry into these professions has been a kind of gender clumping in some specialties, such as pediatrics. Physicians, surgeons, chiropractors, and podiatrists still tend to be men. Other fields, such as optometry, pharmacy and veterinary practice, have achieved a rough kind of gender equality.

Female doctors earn less overall, but the gap varies by specialties

In healthcare, as in virtually every segment of the U.S. economy, men earn more than women. The largest gender pay gap in healthcare (48%) is for physicians and surgeons, 70 percent of whom are male. Naturally, the earnings gap partly reflects seniority and experience, so as more women move up the seniority ladder, the pay gap should narrow.⁵⁵

Table 18: Female doctors continue to earn less than male doctors, even as the share of female doctors is increasing

	Male wages (\$)	Female wages (\$)	%Difference in wages by sex	% female
Dentists	\$110,450	\$89,350	24%	22%
Optometrists	73,710	56,450	31	21
Physicians and Surgeons	179,830	121,100	48	30
Veterinarians	76,990	61,960	24	52

Source: ACS, 2008-2010

Male nurses earn more than females at every level of education.

Male nurses, who make up only eight percent of the total, earn more than females at every level of education. One reason is that men in nursing are slightly more likely to be registered nurses, who generally are paid more than licensed practical nurses.

Table 19: Female nurses earn less than male nurses at every education level, even though women represent overwhelming majority of nurses

	Male wages (\$)	Female wages (\$)	Percentage Difference
High school diploma	**	\$41,530	
Some college	\$58,970	47,080	25%
Associate's degree	59,690	49,010	22
Bachelor's degree	63,310	56,220	13
Masters or better	76,620	64,160	19

Source: ACS, 2008-2010

⁵⁵ Especially if female doctors increase average hours worked to the level of male doctors or increase labor force participation rates to equal those of male doctors.

Table 20: Advanced Practice Registered Nurses (APRNs) earn the most and have the highest entry-level education requirements in nursing, while ER Nurses have the highest share of men

Wage, Sex and Entry requirements for different types of nurses

	% male*	**Average wage	Sample of Entry Education required
All nurses	8%	\$17,558 - \$108,064	License, BSN preferred
RN	11	\$40,340 - \$79,970	License, BLS, ACLS, BSN preferred
CNA	10	\$17,558 - \$32,000	HS diploma, Certification
LPN	8	\$27,364 - \$51,834	License, AA or AAS
Staff Nurse	13	\$40,948 - \$88,496	License, BSN
Charge Nurse	11	\$46,489 - \$88,828	License, BSN, Active CPR, computer skills
APRN	11	\$60,536 - \$108,064	Licensed and registered, certified, AHA or ARC BLS required, ACLS preferred, MSN required
ER Nurse	24	\$42,728 - \$88,343	RN license, BSN, BLS, ACLS, PALS, computer experience, CERNER experience required
OR Nurse	14	\$44,607 - \$89,853	RN license, BCLS, CPR
Psychiatric Nurse	18	\$40,889 - \$80,578	RN license, BSN, CPR

Source: *Surveys of Nurses, various years; **PayScale. Com 2012

AHA – American Heart Association
 BLS – Basic Life support
 BCLS – Basic Cardiac Life Support
 CPR – Cardiopulmonary resuscitation
 BSN – Bachelor of Science in Nursing
 ACLS – Advanced Cardiac life support
 PALS – Pediatric Advanced Life Support
 CERNER – Proprietary healthcare information systems technology
 AA – Associate's degree
 AAS – Associate of Applied Science, Nursing
 MSN- Master of Science, Nursing

Men also have a slightly higher rate of bachelor's and graduate degrees, which are entry-level requirements for some of the better-paying nursing positions, such as certified registered nurse anesthetist (CRNA), nurse practitioner (NP) and psychiatric nurse. Male nurses also tend to work longer hours, according to the National Sample Survey of Registered Nurses (NSSRN), thus boosting pay.

Chapter 4:

Healthcare Competencies: Knowledge, Skills, Abilities, Values, and Interests



O*NET DATA: BRIEF METHODOLOGY

The data in this section came from:

- O*NET (Occupational Information Network) 16.0, and
- The American Community Survey (ACS) for the year 2010.

To determine critical competencies for Healthcare Practitioners and Healthcare Support, data values for importance and levels in O*Net were standardized to a 0 to 1 scale. They were then combined together by taking various measures of central tendency. Next, a weighted average was calculated using occupation size from ACS as the weight. The competencies were ranked from highest to lowest based on this weighted average. The more critical competencies had the larger weighted average data values.

Charts were then made using only the importance data values. Occupations were classified into their proper scales (i.e. Not Important, Somewhat Important, Important, Very Important, Extremely Important) using rounding techniques for the associated data values. For example, an occupation was classified as “Very Important” (4 on the importance scale) if the associated data value was between 3.5 and 4.5. The occupation size for each importance level was then calculated for each competency. This occupation size was used to determine the distribution of importance for each competency area within the charts.

Degree labels and job titles in themselves don't answer a very basic question: what, exactly, does a person have to know in order to do a particular job? Specifically, what are the differences in knowledge, skills and abilities (KSA) between healthcare professional and technical workers and healthcare support workers? And how much overlap is there between healthcare and STEM (science, technology, engineering and mathematics) occupations?⁵⁶

As it turns out, the answer to both questions is the same: considerable. There are big differences between what a healthcare professional and a healthcare support person needs to know and be able to do, and significant similarities between some professional healthcare jobs and STEM occupations.

To make our comparisons, we used O*NET (Occupational Information Network) to show how these two subsets are similar and how they differ. We did this by identifying the cognitive KSA's and non-cognitive competencies, such as work values and work interests, with high levels of correlation within all healthcare occupations, and analyzed how transferrable these were to STEM occupations.⁵⁸ The last question is important: in *STEM*, Carnevale et al. (2011) identified healthcare professional and technical occupations as a major "poacher" of STEM talent.⁵⁹

Table 21: Healthcare occupations require a broad array knowledge, including scientific, personal and technological knowledge-bases

Knowledge-Bases Associated with Healthcare occupations	
Biology:	Knowledge of plant and animal organisms and their tissues, cells, functions, interdependencies, and interactions with each other and the environment.
Chemistry:	Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal methods.
Medicine and Dentistry:	Knowledge of the information and techniques needed to diagnose and treat human injuries, diseases, and deformities. This includes symptoms, treatment alternatives, drug properties and interactions, and preventive healthcare measures.
Therapy and Counseling:	Knowledge of principles, methods, and procedures for diagnosis, treatment, and rehabilitation of physical and mental dysfunctions, and for career counseling and guidance.
Psychology:	Knowledge of human behavior and performance; individual differences in ability, personality, and interests; learning and motivation; psychological research methods; and the assessment and treatment of behavioral and affective disorders.
Customer and Personal Service:	Knowledge of principles and processes for providing customer and personal services. This includes customer needs assessment, meeting quality standards for services, and evaluation of customer satisfaction.
Computers and Electronics:	Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
Mathematics:	Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

⁵⁶. Healthcare professional and technical occupations (SOC 29-1011 – SOC 29-9099). Healthcare support occupations (SOC 31-1011 through SOC 31-9099).

⁵⁷. The O*NET database specifies the full set of occupational competencies required for success in particular occupations and related clusters of similar careers. Operated by the National O*NET Consortium and funded by the U.S. Department of Labor, the database includes occupational knowledge, skills, abilities, work values, work contexts, and work interests, as well as key performances (tasks and activities). Its primary use so far has been as a counseling tool for career planning, delivered online through a user-friendly interface.

⁵⁸. The approach to this connection was two-fold. First, we determined the extent of the "relatedness of occupational clusters," based on the similarities of the intensity of responses from workers in those occupations. Second, we determined the incidence in the national economy, controlling for the size of occupations. Factor analysis was the primary data-reduction tool employed.

⁵⁹. Carnevale, Smith and Melton. *STEM*. Georgetown University Center on Education and the Workforce, 2011.

This analysis was carried out at the occupational level. However, each occupation contains information obtained from surveys conducted on incumbents in the occupation. Answers to the questions therefore reflect the distribution of responses from persons in that occupation.

For the most part, the divide that exists between healthcare professionals and support occupations is so great that we discuss the two groups separately. Career trajectories within the professional category are clearly demarcated, and the education, licenses and certifications required to move from one healthcare profes-

sional field to another often require full-time enrollment⁶⁰—a fact that explains the difficulty of crossing the knowledge gap between healthcare support and healthcare professional and technical occupations.

Healthcare Knowledge

Medical knowledge is probably the most occupation-specific competency, and therefore the least transferable. The eight knowledge bases in Table 21 are, for the most part, extremely important to healthcare occupations, though there is some overlap with STEM.

Medicine and dentistry is the most occupation-specific knowledge base in healthcare. Ninety percent of healthcare professional and technical workers consider medical knowledge either very important or extremely important to fulfilling their function (see figure 39).

All doctors and any nurses who require postsecondary education and training require extensive knowledge of biology to perform their jobs. In healthcare technical jobs, 96 percent of workers reported

Figure 39:
Knowledge of medicine and dentistry is unique to healthcare

Source: Authors' analysis of O*NET

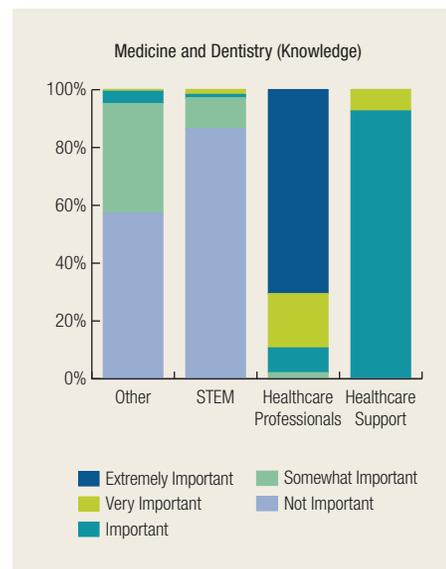
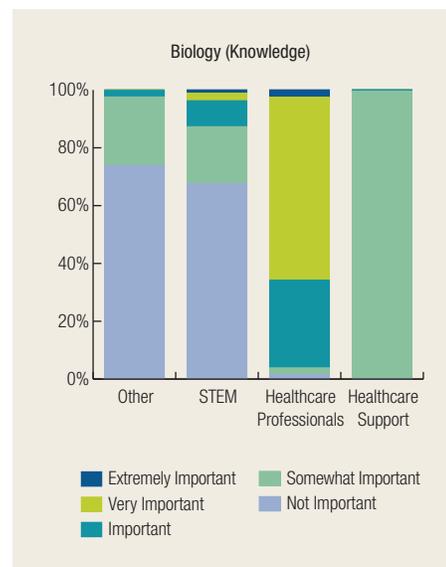


Figure 40:
Knowledge of biology is critical in healthcare, with marginal transferability to STEM occupations

Source: Authors' analysis of O*NET



⁶⁰. LPN to RN programs, for example, provide trajectories to advancement within the healthcare practitioner cluster.

that knowledge of biology is important, (see figure 40). For STEM occupations, the figure is about 30 percent. The overlap here is in the area of life and physical scientists and STEM postsecondary teachers, many of whom could easily move into a healthcare technical occupation.

The type of expertise most transferable between professional healthcare and STEM occupations is computer and electronics knowledge. For healthcare professional and technical occupations, 98 percent of workers said this was either important or very important knowledge; for STEM occupations, the number who consider this type of expertise important to extremely important would be 100 percent. In contrast, 75 percent of healthcare support workers reported this knowledge domain as only somewhat important.

Mathematical knowledge is another highly transferable kind of healthcare knowledge. Almost all occupations today find that mathematics is at least somewhat important to the fulfillment of the job's responsibilities. In 90 percent of healthcare professional occupations, mathematical skill is considered at least important to fulfilling the requirements of that occupation.⁶¹ Writing prescriptions and ordering medicine for patients require arithmetic ability, since even a simple error could be fatal.

Healthcare Skills

Skills that are important in healthcare include, among others, active listening and learning, critical thinking, reading comprehension, speaking and service orientation. It goes without saying that these are valuable attributes in almost any job—critical thinking in particular.

⁶¹. Mathematics is considered both a knowledge and a skill that differentiates between having the information and using the information to solve problems.

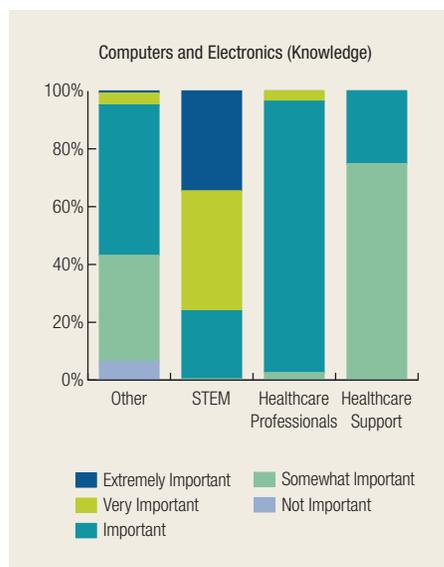


Figure 41:
Knowledge of computers and electronics is highly concentrated in STEM but is transferable to other occupations

Source: Authors' analysis of O*NET

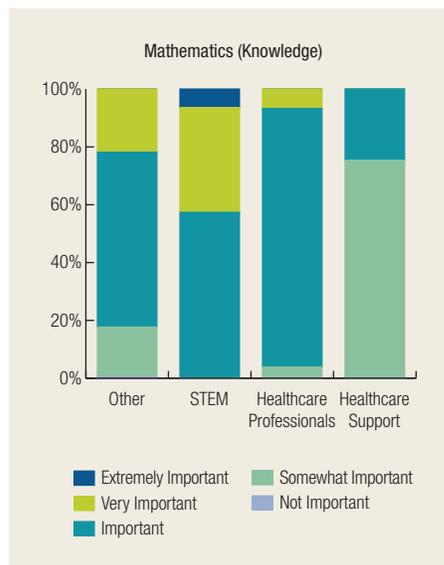


Figure 42:
Mathematical knowledge is transferable across the national economy

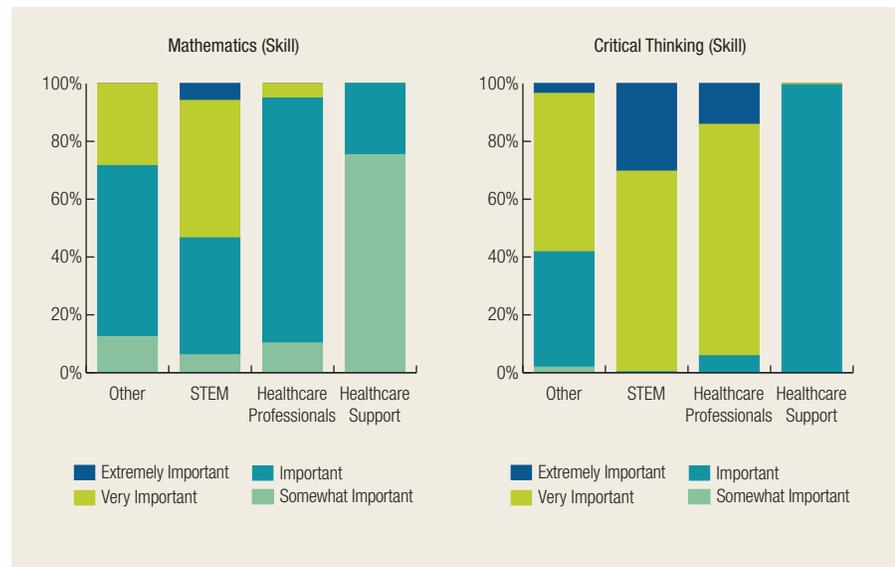
Source: Authors' analysis of O*NET

Table 22: Scientific, social, communications, and analytical skills are important in healthcare occupations

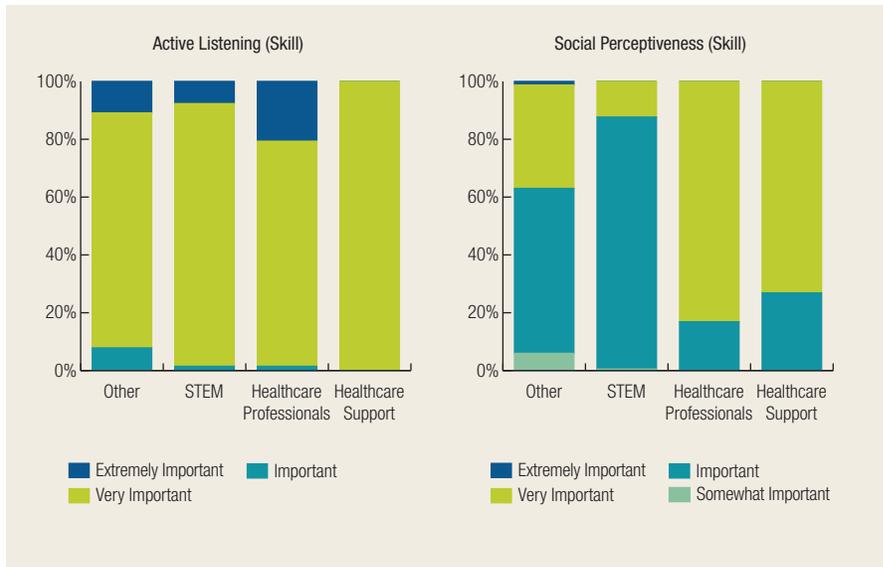
Skills Associated with Healthcare Occupations	
<i>Basic Skills</i>	
Active Learning:	Understanding the implications of new information for both current and future problem-solving and decision-making.
Active Listening:	Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
Mathematics:	Using mathematics to solve problems.
Science:	Using scientific rules and methods to solve problems.
Critical Thinking:	Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
Speaking:	Talking to others to convey information effectively.
Reading Comprehension:	Understanding written sentences and paragraphs in work related documents.
Monitoring:	Monitoring/assessing performance of oneself, other individuals, or organizations to make improvements or take corrective action.
<i>Social Skills</i>	
Coordination:	Adjusting actions in relation to others' actions.
Service Orientation:	Actively looking for ways to help people.
Social Perceptiveness:	Being aware of others' reactions and understanding why they react as they do.
Complex Problem Solving:	Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.

Figures 43 and 44
Mathematics is important to healthcare, but critical thinking matters more

Source: Authors' analysis of O*NET



O*NET data show that critical thinking is viewed as either very or extremely important by 100 percent of those in STEM occupations and by 94 percent of those in healthcare practitioner occupations. It's viewed as less essential for those in healthcare support jobs.



Figures 45 and 46
Active listening skills are important to all jobs; social perception is key in all healthcare occupations

Source: Authors' analysis of O*NET

Active listening skills are extremely important in jobs that require working in hierarchical teams or serving customers, which is especially true of jobs in healthcare.

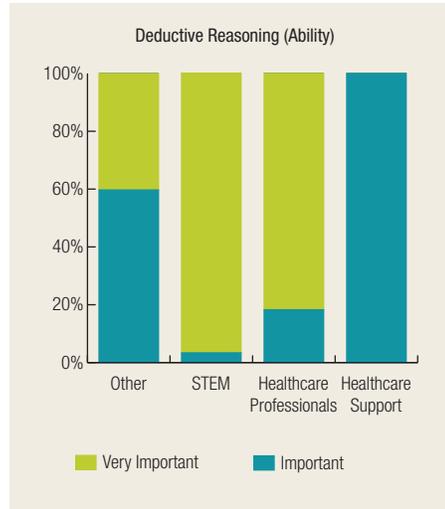
Table 23: Individuals with abilities that predispose them to excel in problem-solving and communications are likely to perform well in healthcare occupations

Abilities Associated with Healthcare occupations:	
<i>Cognitive Abilities</i>	
Problem Sensitivity:	The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing that there is a problem.
Deductive Reasoning:	The ability to apply general rules to specific problems.
Inductive Reasoning:	The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
Information Ordering:	The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).
Oral Comprehension:	The ability to listen to and understand information and ideas presented through spoken words and sentences.
Oral Expression:	The ability to communicate information and ideas in speaking so others will understand.
Written Comprehension:	The ability to read and understand information and ideas presented in writing.
<i>Sensory Abilities</i>	
Near Vision:	The ability to see details at close range (within a few feet of the observer).
Speech Clarity:	The ability to speak clearly so others can understand you.
Speech Recognition:	The ability to identify and understand the speech of another person.

Almost by definition, a caregiver must have social perceptiveness, and it is considered very important in more than 70 percent of support positions and more than 80 percent of professional and technical occupations.

Figure 47:
Deductive reasoning matters most in STEM but is also highly relevant to healthcare professionals

Source: Authors' analysis of O*NET



Healthcare Abilities

Both skills and abilities can be roughly defined as the capacity to use knowledge to solve problems. The difference is that skills can be learned; abilities are enduring capacities that are innately present in some form at birth, though they can be enhanced through life experiences and training. For example, one’s ability might be the capacity to easily acquire new skills—i.e., being a “quick study.”⁶²

A capacity for deductive reasoning and information ordering is very important in both healthcare practitioner and STEM occupations.

Information ordering reflects the level of precision that must be adhered to in healthcare occupations. Seventy-five percent of healthcare practitioners consider it to be very important, and all healthcare support workers view it as important.

Written comprehension is regarded as very important in almost all STEM and healthcare practitioner occupations, while it is rated as important in healthcare support work.

⁶². Tippins and Hilton 2010.

Figure 48:
Information ordering is just as important for a healthcare professional as it is for STEM

Source: Authors' analysis of O*NET

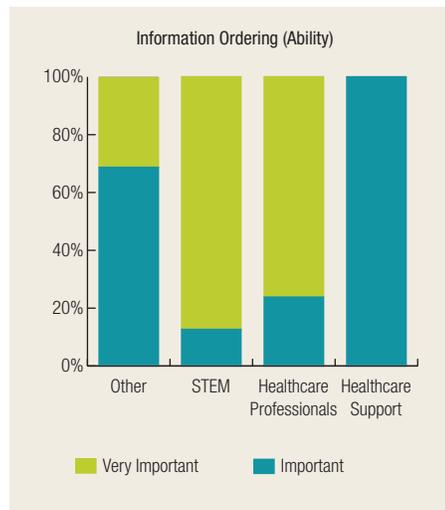
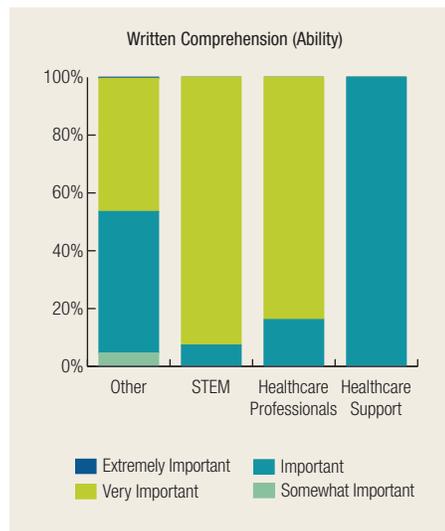


Figure 49:
Written Comprehension matters in the translation of prescriptions and patient notes

Source: Authors' analysis of O*NET



Healthcare Values

Workers in both STEM and healthcare occupations place a high value on personal achievement and independence, which suggests that those who don't find it in one field might be able to find it in the other. In particular, STEM workers might be attracted by the higher pay found at the top of the healthcare professional and technical cluster. Since pay is a widely accepted indicator of achievement and recognition, these work values and pay scales can be mutually reinforcing. In general, achievement, independence, congenial work relationships and supportive work values are valuable in healthcare occupations, as are realistic, investigative and social interests.

Yet healthcare values differ from STEM values in two key areas: healthcare workers across the board put a high value on good work relationships and a supportive work environment; many of those in STEM occupations don't.

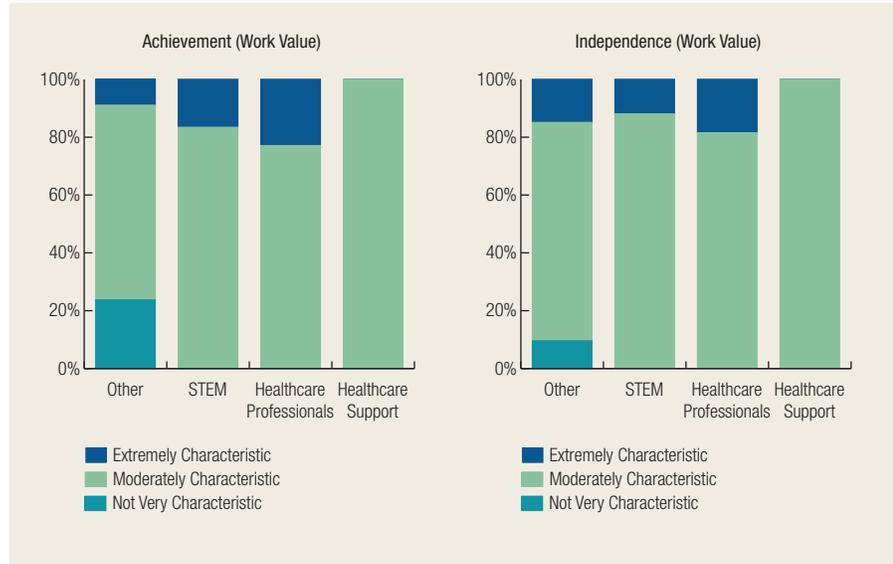
Table 24: Healthcare professionals value achievement, independence, good work relationships and supportive work environment; their professional interests are realistic, investigative and social

<i>Values</i>	
Achievement:	These jobs let you use your best abilities, see the results of your efforts and get the feeling of accomplishment.
Independence	These jobs allow you to do things on your own initiative, and make decisions on your own.
Relationships:	Occupations that satisfy this work value allow employees to provide service to others and work with others in a friendly, non-competitive environment. Corresponding needs are congenial co-workers who share some basic moral values and have a similar commitment to social service.
Support:	Occupations that satisfy this work value offer supportive management that stands behind employees. Company policies are clear and there is consistent supervision.
<i>Interests</i>	
Realistic:	Realistic occupations frequently involve work activities that include practical, hands-on problems and solutions. They often deal with plants, animals and materials like wood, tools, and machinery. Many of the occupations require working outside, and do not involve a lot of paperwork or working closely with others.
Investigative:	Investigative occupations frequently involve working with ideas, and require an extensive amount of thinking. These occupations can involve searching for facts and figuring out problems mentally.
Social:	Social occupations frequently involve working with, communicating with, and teaching people. These occupations often involve helping or providing service to others.



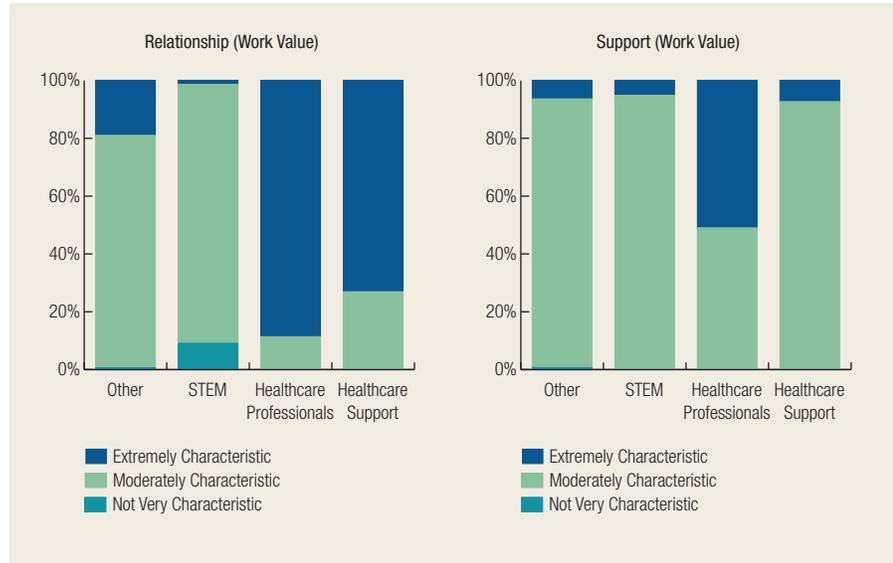
Figures 50 and 51: Achievement and independence are equally important to healthcare professionals and STEM workers

Source: Authors' analysis of O*NET



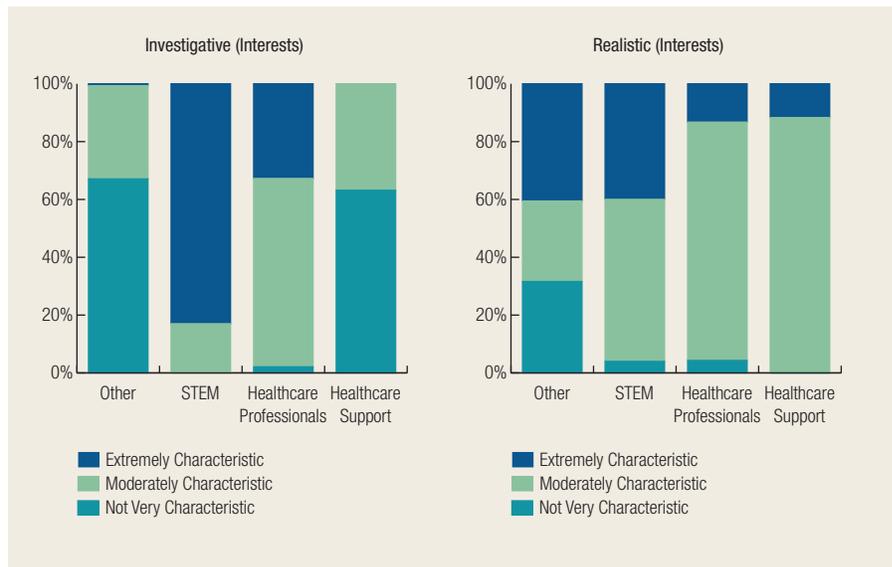
Figures 52 and 53: Relationship and support are work values that distinguish healthcare occupations from STEM occupations

Source: Authors' analysis of O*NET



Healthcare Interests

Healthcare occupations are unique in that they make use of two otherwise disparate interests: an investigative interest in working with ideas, looking for facts and solving problems, along with a social interest in communicating with and teaching people. STEM jobs generally do not emphasize the latter, so a student with good STEM competencies who also wants to work with people may find he can satisfy both interests in a healthcare professional role. A biologist, for example, may decide that being a doctor will allow him to work with people while still using his scientific expertise.



Figures 54 and 55: Investigative and realistic interests are important for both healthcare professionals and STEM workers, though at different levels

Source: Authors' analysis of O*NET

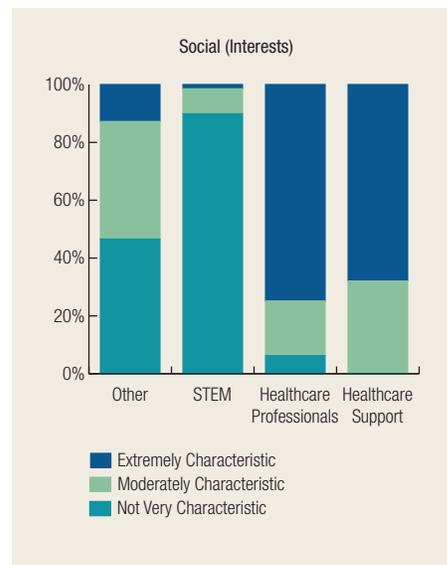


Figure 56: Social interests are very well developed in healthcare occupations but matter less for STEM

Source: Authors' analysis of O*NET

Chapter 5:
Diversity in Healthcare



Until relatively recently, healthcare jobs were a collection of walking stereotypes: most doctors were male, and for the most part everyone else was female. Today, however, 30 percent of all doctors are women, and 11 percent of all nurses are men. Both percentages are growing.⁶³

The racial and ethnic diversity of the healthcare workforce is increasing too. In 1970, 90 percent of all nurses were White, and only five percent of all physicians were African American or Hispanic.⁶⁴ Today, the percentage of nurses who are White has declined to 80 percent, while the number of African American and Hispanic physicians has more than doubled, to 11 percent (6% African American, and 5% Hispanic). Asian Americans have increased their share of physicians to 16 percent.⁶⁵

This trend towards increased diversity will help the healthcare industry meet the needs of an increasingly multicultural population. By 2050, according to the U.S. Census Bureau, Whites will lose their historic status as the majority population in the U.S., mainly because fertility rates in minority populations—especially foreign-born, new U.S. citizens—are so much higher than among Whites. This is especially true for Hispanics, whose numbers are expected to increase the most.⁶⁶

This has major implications both for the opportunities available to the traditionally underrepresented groups in this major sector of the economy and for the provision of healthcare. The healthcare disparities experienced by traditionally underserved minority groups are well documented and include lower life expectancy, higher infant mortality rates, higher rates of mortality from major chronic illnesses (such as diabetes, cancer, and heart disease), and higher likelihood of receiving lower quality care.⁶⁷ Increasing diversity in healthcare professions plays a major role in addressing these disparities. Since more than 35 percent of Hispanics and 60 percent of Asians are foreign-born, communicating in English may not always be effective, and even those who speak English may not be health literate (understand language and practices used in healthcare settings). The ability to communicate with people from diverse ethnic backgrounds and general cultural competence are important in health care, where hidden cultural attitudes can stand in the way of effective treatment. Healthcare employers need to recruit more workers from these minority groups.

⁶³. Data in this section are based on the American Community Survey (ACS) and Current Population Survey (CPS) from the U.S. Census Bureau, as well as information from the Bureau of Labor Statistics (BLS), the National Center on Education Statistics (NCES), the Association of American Medical Colleges (AAMC), and the National Sample Survey of Registered Nurses (NSSRN). Prime-age workers in this report are 25-54. We, however, include workers for age cohorts 18-74 to reflect the age distribution of the very diverse healthcare workforce.

⁶⁴. 2% African American and 3% Hispanic.

⁶⁵. U.S. Bureau of the Census, decennial estimates.

⁶⁶. Fertility rates are currently 2.91, 2.13 and 2.07 for Hispanic, African American and White women respectively. According to the Census Bureau, a total fertility rate of 2.11 represents “replacement level” for the total population under current mortality conditions. Further, a study by the U.S. Census Bureau in June 2012 showed that women who are Latino, Asian, African American or mixed race are now giving birth to just over 50% of American babies.

⁶⁷. Cohen, Gabriel, and Terrell, 2002

This is true not just for new immigrants, but also for people of color whose roots go back for generations. On average, people of color have lower life expectancies than Whites, higher rates of chronic illnesses such as cardiovascular disease, diabetes and HIV than Whites, and higher mortality rates from those diseases. Those disparities reflect access to healthcare, insurance, income, as well as intangible cultural attitudes.^{68,69}

Since the Civil Rights Movement, the enrollment of minorities at medical colleges and universities has increased dramatically, improving access to medical care in minority populations and in underserved rural areas. But that progress has been threatened by the dismantling of affirmative action programs in recent years, and two issues before the U.S. Supreme Court hold important implications for minority enrollment in medical schools. One involves the constitutionality of a section of the Patient Protection and Affordable Care Act aimed at increasing opportunities for minority applicants to health care professions; the other is a Texas case involving the constitutionality of race-based admissions criteria for college undergraduates.⁷⁰

In the meantime, the main strategy for preventing worker shortages has been immigration. One notable example is the Philippines, where nearly 10 percent of the native population now lives abroad, thanks in large part to a 30-year-old system of training nurses for “export” to the United States. Workers from other countries are now a significant proportion of many healthcare fields, and some countries have well-established systems for the exportation of trained healthcare workers to this country.⁷¹ Meanwhile, the United States has eased immigration requirements for healthcare workers. While most immigrants applying to work in the United States must prove that they are uniquely qualified for a position no U.S. citizen is available to fill, foreign-born healthcare workers are eligible to work if their “training, license, experience, and English-language ability meet minimum standards and are comparable with that required for an American health care worker of the same type.”^{72,73}

The money these foreign-born workers send back to their native countries contributes significantly to their countries’ financial well-being (World Bank 2005; UNFPA 2006). But a disproportionate number of these workers are women leaving their families and homes in search of opportunity abroad. Their absence takes a serious social toll that is not so easily quantified.⁷⁴

^{68.} Kington & Nickens, 2001.

^{69.} Since 2000, the Office of Minority Health (OMH) at the U.S. Department of Health and Human Services (HHS) has compiled a list of 14 national standards aimed at insuring non-traditional patients with language barriers receive adequate and appropriate healthcare.

^{70.} Fisher v. University of Texas at Austin.

^{71.} (Engman, 2010).

^{72.} The healthcare occupations requiring certification are nurses (licensed practical nurses, licensed vocational nurses, and registered nurses), physical therapists, occupational therapists, speech-language pathologists and audiologists, medical technologists (also known as clinical laboratory scientists), medical technicians (also known as clinical laboratory technicians) and physician assistants.

^{73.} H-1A and H-1C programs specifically designed to address nursing shortages have been phased out (in 1995 and 2009, respectively) and replaced.

^{74.} Ireland, England and South Africa are facing nursing shortages themselves. These nations are major sources of our own foreign-born nurses.

Gender

Historically, the dominance of women in the healthcare field has been based on their caretaking role, and in some ways very little has changed: today 91 percent of all registered nurses are female, compared with 95 percent in 1970. Among professional and technical workers, 75 percent are female; 90 percent of support workers are female.

In the ranks of physicians, however, the end of the gender gap is in sight. The percentage of seats in U.S. medical schools occupied by women rose from 32 percent in 1985⁷⁵ to 47 percent in 2011. By 2020, roughly half of all medical school graduates will be female.

Table 25: Optometrists, chiropractors and dentists have the highest concentration of men, while pediatricians, veterinarians and pharmacists have the lowest

Concentration of male workers (sample of medical practitioner occupations)	
	Male (%)
All physicians	70
Child Psychiatrists*	51
Obstetricians/Gynecologists*	51
Pediatricians*	44
Family medicine	63
Optometrists	79
Podiatrists	71
Pharmacists	45
Veterinarians	44
Chiropractors	74
Dentists	72

* Lowest concentration of males among physician specialties
Source: AAMC, 2012

For the time being, though, women doctors are most prevalent in a handful of specialties, such as pediatrics and child psychiatry, which also happen to be among the lower-paying. (In the wages section, we show that the gender wage gap for doctors is 24-48%.) There are few women in the higher-paying specialties, such as neurological surgery (8%), orthopedic surgery (6%) and thoracic surgery (5%).

⁷⁵. (<http://www.ncbi.nlm.nih.gov/pubmed/3747074>)

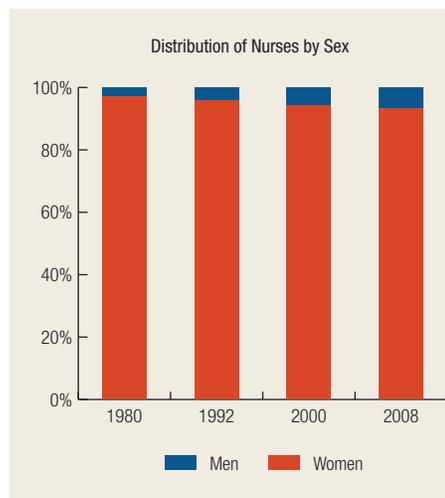
Table 26: Healthcare support occupations have low concentrations of men, with men making up a quarter or less of any health support occupation

Concentration of male workers (Sample of Healthcare support occupations)	
	Male (%)
Physical therapist assistants and aides	25
Healthcare support, all others	24
Pharmacy aides	20
Massage therapists	17
Veterinary assistants and laboratory animal caretakers	16
Phlebotomists	12
Nursing, psychiatric, and home health aides	12
Medical assistants	6
Dental assistants	4

Source: ACS, 2008-2010

Figure 57:
The proportion of male registered nurses is increasing, but at a very slow pace

Source: National Sample Survey of Registered Nurses, Health Resources and Services Administration (HRSA). Various years.

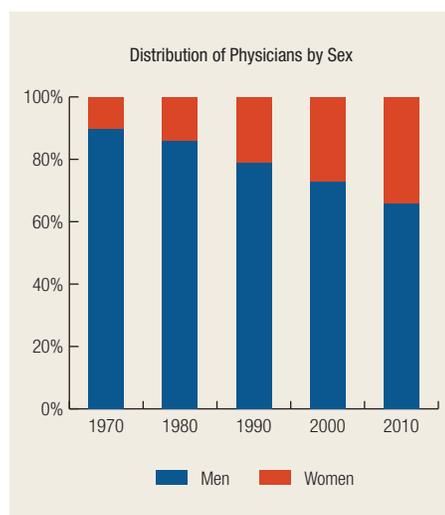


Enrollment and graduation distributions by sex, however, paint a different picture for the future of the medical profession. As we discuss above, the percentage of seats in U.S. medical schools occupied by women has risen dramatically.⁷⁶ By 2020, roughly half of all graduates will be female. Should this trend persist, the gender gap in the number of practicing physicians will resolve itself.

Age

Figure 58:
The proportion of female physicians has increased steadily through time

Source: National Sample Survey of Registered Nurses, Health Resources and Services Administration (HRSA). Various years.



Healthcare professional and technical workers tend to be older, in part because most need to spend a longer time obtaining degrees and licenses. In addition, many medical professionals continue working later in life. For example, 15 percent of dentists and 11 percent of physicians and surgeons are practicing beyond the age of 65, compared to eight percent of all employees in the U.S. In

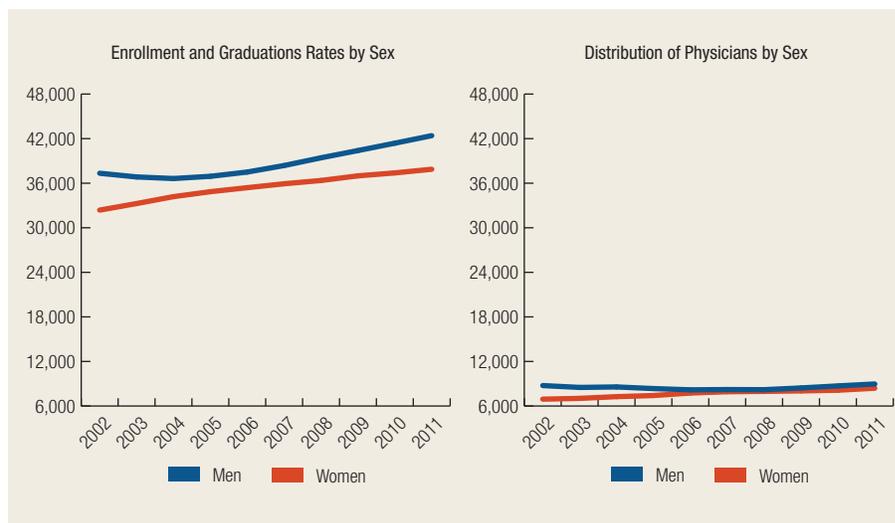
⁷⁶. (<http://www.ncbi.nlm.nih.gov/pubmed/3747074>)

contrast, healthcare support workers are disproportionately young; 50 percent of dental assistants are younger than 35, compared to 31 percent in the national workforce.

Table 27: The average healthcare worker is 36 years old, with women averaging 37 and men, 35

	All healthcare workers	Healthcare professional and technical	Healthcare support
Male	35	44	37
Female	37	43	39
All	36	43	39

Source: ACS, 2008-2010



Figures 59 and 60: The enrollment and graduation rates of female medical students has steadily increased, while male figures rise and fall

Source: Association of American Medical Colleges, 2011.

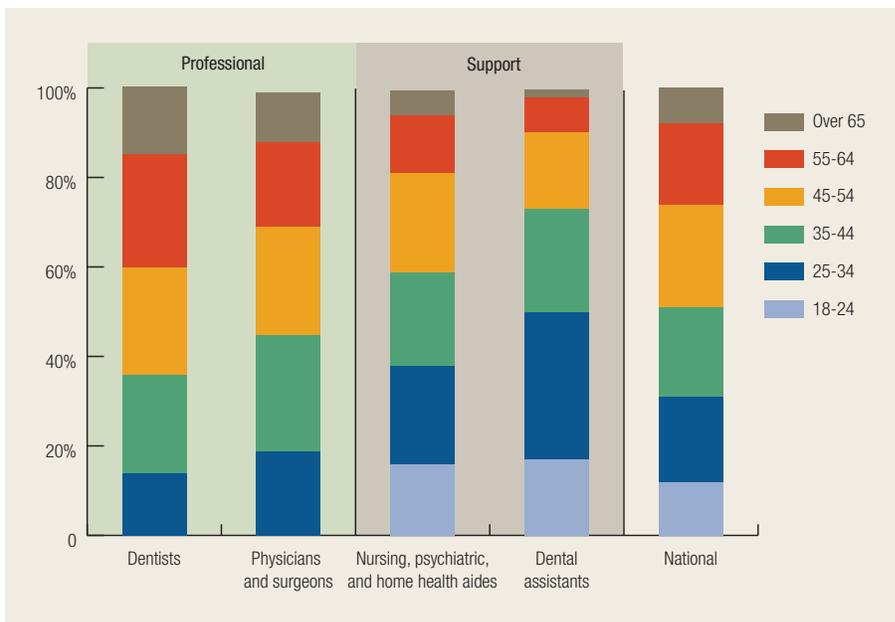


Figure 61: Professional healthcare workers are older on average than paraprofessional support workers

Source: Pooled CPS data (2008-2010)

Table 28: Female physicians tend to be younger than male, while male nurses tend to be younger than female nurses

		25-34	35-44	45-54	55-64	65 and over	Total
Physicians and surgeons	Female	25%	32%	24%	13%	5%	100%
	Male	13%	22%	24%	24%	17%	100%
Registered nurses	Female	17%	22%	29%	24%	8%	100%
	Male	20%	30%	26%	20%	4%	100%
Allied healthcare	Female	26%	25%	26%	18%	5%	100%
	Male	25%	26%	24%	19%	6%	100%
Support workers	Female	24%	24%	26%	18%	7%	100%
	Male	26%	25%	25%	17%	6%	100%

Source: ACS, 2008-2010

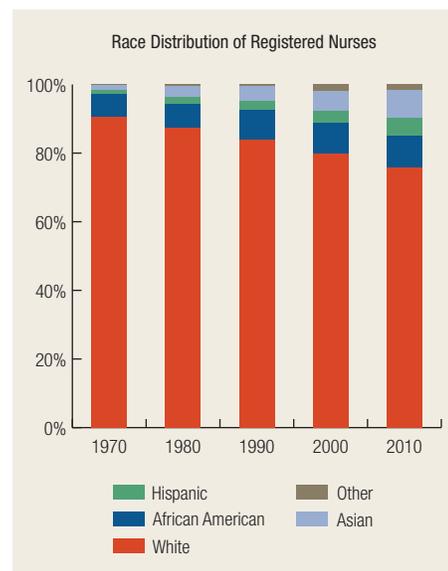
The relatively recent entrance of an increasing number of women doctors is reflected in the age distribution of the table. Among those over 55, only 18 percent are women, while 57 percent are under 44. Among nurses, the traditional domination of women in that field is reflected in the fact that 32 percent of female nurses are over 55, compared to 24 percent of male nurses. The professional allied healthcare workforce and healthcare support workers have comparable age distributions across sex. Fifty-one percent of allied healthcare workers—male and female—are under 44. and 48 percent of female support workers and 51 percent of male support workers are under 44.

Race

By race, healthcare professionals are disproportionately White, while healthcare support workers are disproportionately persons of color.

Figure 62:
The proportion of minority nurses has increased steadily through time

Source: IPUMS data, various years



Over time, the share of White physicians has declined; for the most part, their numbers have been replaced by Asian Americans, who have been the most successful at increasing their numbers in the medical professions. Between 2000 and 2010, the total physician population increased by 15 percent, down from nearly 25 percent in the previous decade. Since 2000, the proportion of White doctors has increased by seven percentage points, while the proportions of African American, Hispanic and Asian doctors have

grown by 18 percent, 26 percent and 45 percent respectively. Despite these increases, African American and Hispanic doctors remain an under-represented proportion of all doctors.

A similar story is true for nurses, who used to be predominantly White. While the number of White nurses increased by 11 percent in the last decade, the number of African American and Hispanic nurses grew much faster. Asian nurses have increased their overall proportion most rapidly.

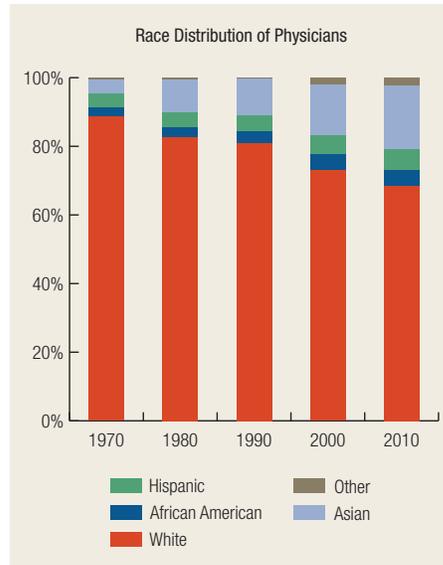


Figure 63:
The proportion of minority physicians has increased steadily through time

Source: IPUMS data, various years

Table 29: Diversity is still a challenge for many health professions, with African Americans and Hispanics making up 10% or less of doctors and registered nurses

MEN	White	African American	Hispanic	Asian	Other
Dentists	81%	3%	5%	11%	***
Physicians and surgeons	72	4	6	17	***
Registered nurses	70	10	7	12	1
Licensed practical and licensed vocational nurses	54	24	12	9	***
Nursing, psychiatric, and home health aides	46	32	12	8	1
WOMEN	White	African American	Hispanic	Asian	Other
Dentists	61%	5%	5%	25%	
Physicians and surgeons	63	7	6	22	1
Registered nurses	77	10	5	8	1
Licensed practical and licensed vocational nurses	66	23	7	3	1
Nursing, psychiatric, and home health aides	47	35	13	4	1

Source: Source: ACS, 2008-2010

Almost 90 percent of male and female physicians and surgeons are White or Asian, as are 93 percent of male dentists and 86 percent of female dentists.

Only four percent of male physicians and surgeons and six percent of female surgeons are African American. African Americans are four times more likely to be LPNs than physicians or surgeons. Hispanic healthcare workers are also concentrated in support occupations.

Figures 64-67:
Younger registered nurses
have higher attainment levels
than more mature nurses on
average; Asian nurses have
the highest attainment levels
overall

Source: National Sample Survey of Registered Nurses, Health Resources and Services Administration (HRSA), 2010

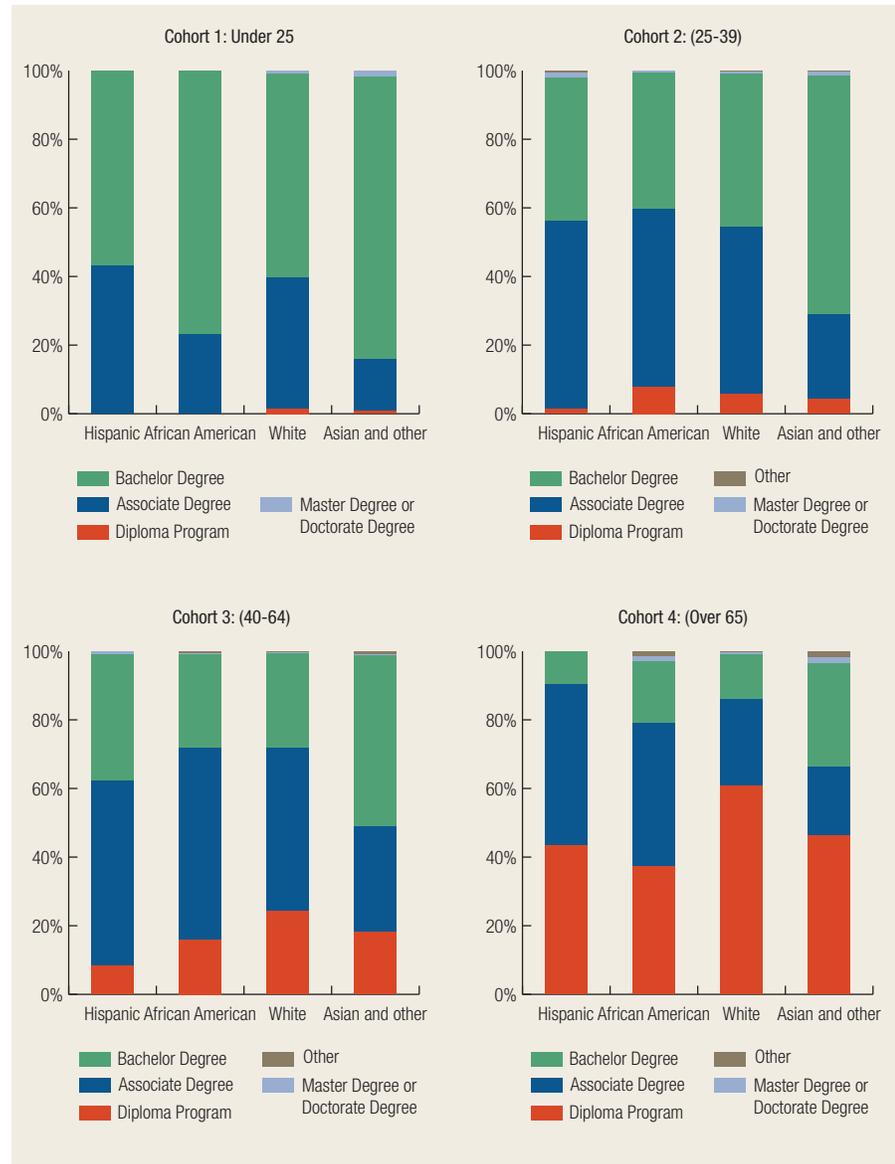


Table 30: Nurses are more likely to be in older cohorts than healthcare workers overall, with 65% of nurses being 40 and older

	Under 25	25-39	40-64	Over 65	Total
All healthcare workers	11%	33%	50%	6%	100%
All nurses	5	30	59	6	100
Registered nurses	5	30	60	6	100
Nurse anesthetists	2	34	58	6	100
Nurse practitioners	1	30	66	4	100
LPNs	8	30	55	8	100

Source: Source: ACS, 2008-2010

Cohort 1: (18-25)

The youngest cohort of registered nurses is by far the most educated. Across all racial groups, over 50 percent of RNs have a bachelor's degree; for African American nurses under age 25 this share is much higher, at 77 percent. For White nurses, the number is 59 percent, and for Hispanics it is 57 percent. Younger Hispanic RNs in this age group are much more likely to have an associate's degree. Any policy decision to require a BA for all nurses, then, will disproportionately affect this last group.

Cohort 2: (25-39)

Asian RNs in this age cohort are the most educated: 70 percent have a bachelor's degree, compared to an average of roughly 40 percent overall. In general, though, this age group has relatively less education than cohort 1. White, African American and Hispanic RNs have roughly the same number of bachelor's degrees. Associate's degrees are much more popular among workers in this age cohort than in cohort 1: roughly half of nurses 25-39 have an associate's degree (52% of African American RNs, 55% of Hispanic nurses and 49% of White RNs).

Cohort 3: (40-64)

Associate's degrees and postsecondary vocational diplomas dominate the education levels of RNs in cohort 3. White RNs between 40 and 64 have the highest proportion of diplomas. African American and Hispanic RNs have roughly equal shares of associate's degrees in this age cohort. Bachelor's degrees are less popular and make up about one quarter of all RNs in this age cohort—except among Asians, half of whom have a bachelor's degree.

Cohort 4: (Over 65)

Although this age cohort represents workers who have reached retirement age, close to 10 percent of the healthcare workforce – particularly those in professional and technical occupations—works past retirement age.⁷⁷ By far, the largest fraction of workers in this group has postsecondary vocational diplomas or associate's degrees as their main preparation for a nursing career. Less than a third of Asian RNs have a bachelor's degree, an unusually low statistic for a racial group that traditionally has higher levels of education.

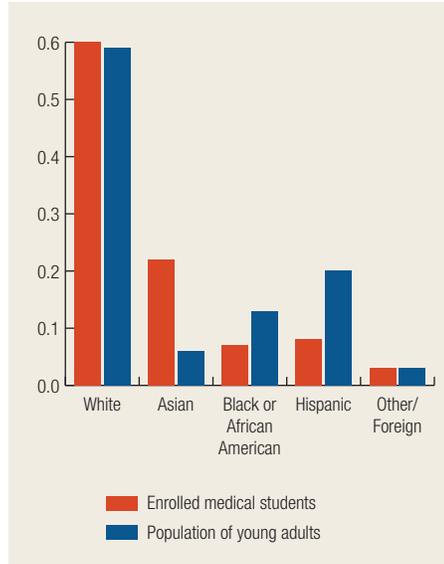
By race, proportions of enrolled White doctors reflect national statistics; African-American and especially Hispanic doctors are under-represented

Sixty percent (or 45,800) of the students in U.S. medical schools are White, a number roughly proportional to the number of young White workers in the national workforce. Asians, including people of Indian descent, accounted for 22 percent of medical students—a disproportionately high percentage that reflects

⁷⁷. 6% nurses and 15% doctors work past retirement age

Figure 68:
By race, the proportion of enrolled White medical students reflect national statistics; African-American and especially Hispanic doctors are under-represented.

Source: Association of American Medical Colleges, 2011.



their strong cultural bias favoring the medical professions. Asians continue to increase their enrollment at a faster rate than Whites and African Americans.

African Americans comprise seven percent of medical students, six points below their percentage of the population. Hispanic enrollment (8%) is a full 12 points lower than the population total for this age level. The male-female split is 50-50 for Hispanic and Asian medical students. But most White students

Figures 69-72:
Enrollment in medical school reflects the racial, ethnic and sex distribution of medical doctors in the workforce.

Source: Association of American Medical Colleges, 2011.





Figures 73-76:
Though similar to enrollment, graduation rates for medical students reveal interesting trends by race, ethnicity and sex

Source: Association of American Medical Colleges, 2011.

Note: Cohort differences exist over time. For the most part, enrolled students in year t, would be the graduates of year t+4.

are male (by a margin of 5,000, up slightly from previous years), while an overwhelming majority of African American students are female (62% versus 38%).

Socioeconomic Status⁷⁸

The strong correlation between socioeconomic status (SES) and access to medical school is well documented by the American Association of Medical Colleges (AAMC).

⁷⁸. Low SES (no parent with a college degree); Middle SES (at least one parent with a college degree, but none with a graduate degree); and High SES (at least one parent with a graduate degree).

Table 31: Students who score high on MCAT are more likely to come from families with high socioeconomic status

	SES	N	%
ALL	SES – Low	9,493	15.0
	SES – Middle	16,942	26.7
	SES – High	37,003	58.3
	Total	63,438	100
MCAT 27 or lower	SES – Low	3,753	23.9
	SES – Middle	4,581	29.2
	SES – High	7,338	46.8
	Total	15,672	100
MCAT 28 or higher	SES – Low	5,623	12.1
	SES – Middle	12,030	26.0
	SES – High	28,675	61.9
	Total	46,328	100

Source: Brewer and Grbic, 2010

Over 50 percent of medical students in 2010 came from families in the top income quintile in the country (combined family income of over \$115,000). Seventy-five percent of medical students come from families in the top two quintiles (over \$88,000 per year). Fewer than 5 percent come from the bottom quintile.⁷⁹

Over 85 percent of medical students have at least one parent with a college degree, and over 50 percent have at least one parent with a graduate degree. Sixty-one percent of Asian students have at least one parent with a graduate degree, compared to 52 percent of White students. But that broad generalization doesn't hold for African American and Hispanic students: in those groups, parents are equally likely to have no college degree as they are to have a graduate degree – socioeconomic status does not matter.

In general, there's also a clear correlation between performance on the Medical College Admissions Test (MCAT) – a marker for developed ability – and SES. Sixty-one percent of students with MCAT scores of 28 and above are from families where at least one parent has a graduate degree. Even for those with lower MCAT scores, almost 50 percent come from high-SES families. This implies that high SES matters substantially, irrespective of the MCAT score, for admission into medical school.

The good news in these results is that students of color can reach medical school even if their parents have no college education. The flip side, as the numbers for White and Asian students demonstrate, is that parental education levels do play an extremely important role.

⁷⁹. Jolly, 2008 drew similar conclusions with data up to 2005.

Table 32: Medical school students are increasingly likely to come from highly educated households

	1992	2000	2008	2011
ALL	100%	100%	100%	100%
No college degree	29	24	20	18
Bachelor's degree	23	26	28	26
Graduate degree	48	51	52	56
African American	100%	100%	100%	100%
No college degree	50	42	37	32
Bachelor's degree	17	21	26	27
Graduate degree	33	36	37	40
Asian	100%	100%	100%	100%
No college degree	14	15	16	15
Bachelor's degree	19	22	23	21
Graduate degree	67	64	61	64
Hispanic	100%	100%	100%	100%
No college degree	47	42	37	33
Bachelor's degree	17	23	25	26
Graduate degree	35	35	37	42
White	100%	100%	100%	100%
No college degree	28	23	18	15
Bachelor's degree	24	27	30	28
Graduate degree	48	50	52	57

Source: Grbic, Garrison and Jolly, 2010, Authors' analysis of AAMC data 2012

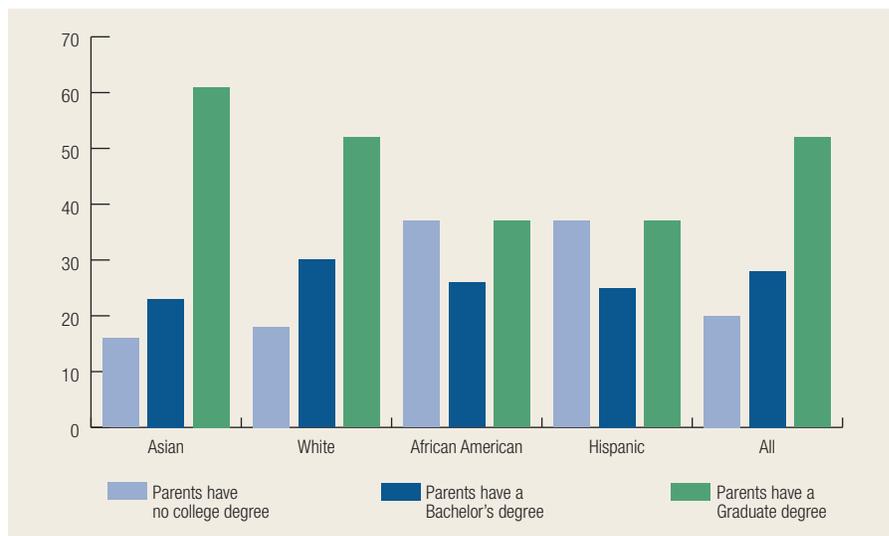


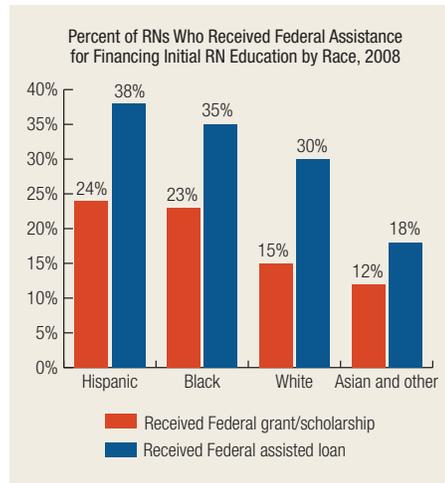
Figure 77:
For African Americans and Hispanics, there is no correlation between parental SES and enrollment in medical school

Source: Adaptation of data from Grbic, Garrison and Jolly, 2010

If anything, the relationship between SES and medical school enrollment has been growing in the last two decades. Since 1992, when AAMC began recording information on parental education, the proportion of students whose parents have a bachelor's degree or better increased from 71 to 80 percent.

Figure 78:
Larger proportions of African American and Hispanic nursing students receive financial aid

Source: National Sample Survey of Registered Nurses, Health Resources and Services Administration (HRSA). Various years



The proportion of students whose parents hold graduate degrees is increasing for all races except Asians. These numbers raise the concern that medical school is increasingly becoming the domain for the offspring of upper-income families.⁸⁰

There is no good indicator of socioeconomic status for nursing students. Instead, we use access to financial aid to indicate the SES of nursing students, by race.

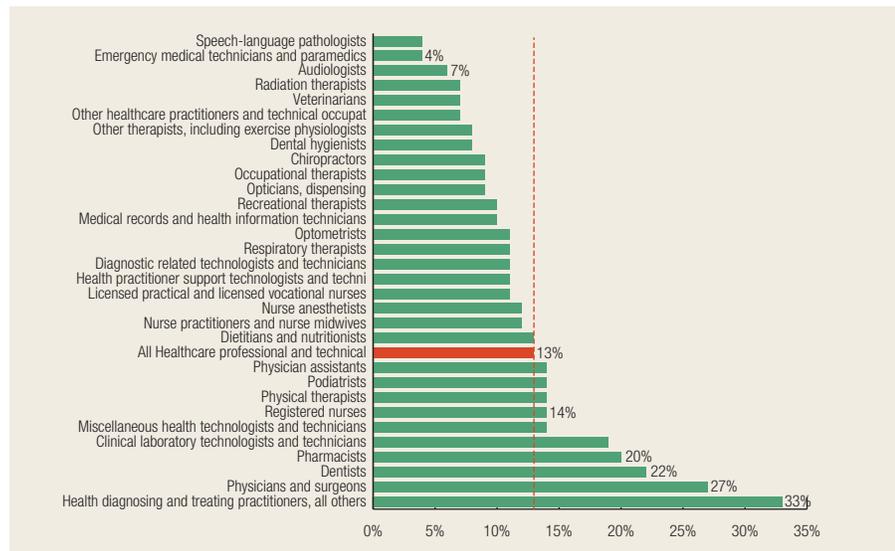
Hispanic and African American nursing students were much more likely than White or Asian ones to receive financial assistance, either as federally funded grants and scholarships or federally assisted loans.⁸¹

Nativity

Foreign-born workers see great opportunity in healthcare

Figure 79:
Many professional and technical workers have higher proportions of foreign-born workers than the national average

Source: Pooled ACS data (2008-2010)



⁸⁰. Jolly (2010) notes a similar trend by parental income: "A real concern is a possible increase in the systemic skewing toward children of upper-income families. From 2000, when 50.8 percent of matriculated students came from the top quintile, to 2005, when 55.2 percent came from that quintile, there may be the beginning of an undesirable trend."

⁸¹. Since substantial proportions of Asian nurses are foreign-born, they would not have access to federal aid if they entered nursing school on an F-1, J-1 or other student-related immigration status.

U.S. institutions have failed to enroll and graduate healthcare workers at the pace required to keep up with the rapidly rising demand, and in fact, many potential students in this country are turned away by nursing programs because the programs are full. The resulting worker shortage is reflected in the fact that today 22 percent of U.S. healthcare workers are immigrants—a number nine percentage points higher than the national average.

For physicians and surgeons the figure is 28 percent; for dentists, 21 percent; and for registered nurses, 15 percent. The numbers are also disproportionately high in healthcare support occupations: 23 percent of home health aides are foreign-born, as are 18 percent of dental assistants and 17 percent of pharmacy aides.

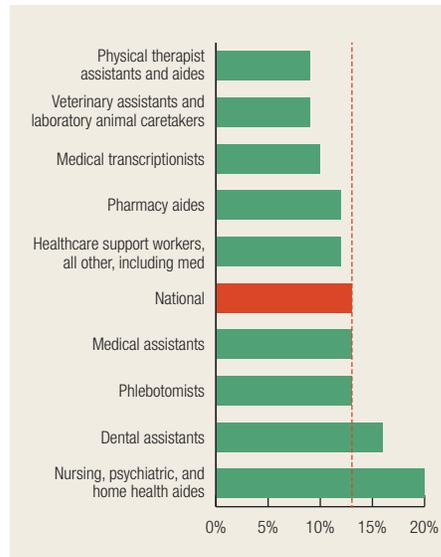
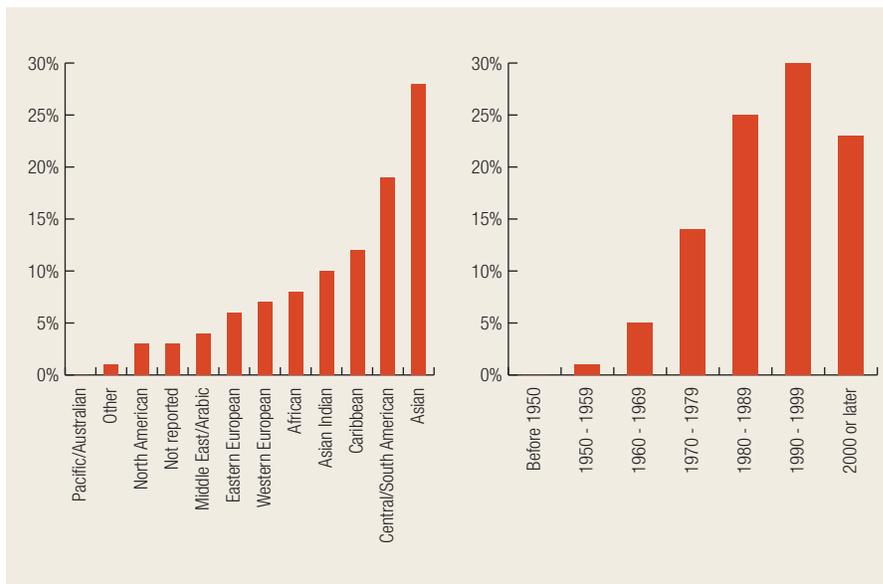


Figure 80:
Support paraprofessionals also have a higher-than-average proportion of foreign-born workers

Source: Pooled ACS data (2008-2010)

Nearly 30 percent of foreign-born workers come from India, China or the Philippines; other major groups come from Nicaragua, Jamaica and South Africa. But the origins of these foreign-born workers tend to cluster by occupation. Doctors tend to come from developed countries such as the UK, Canada



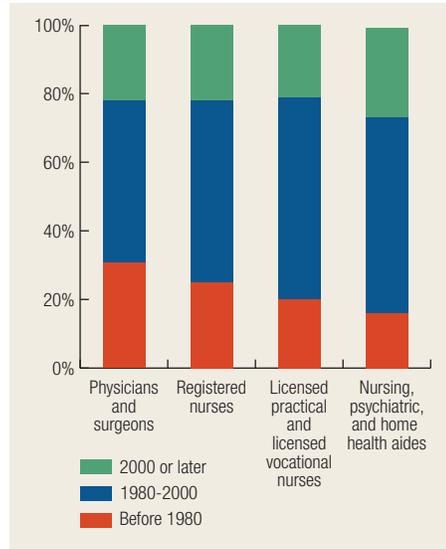
Figures 81 and 82:
Asian workers represent the highest proportion of foreign-born in healthcare; the highest proportion of foreign-born workers entered the country in the 1990s

Source: American Community Survey, 2010

and Western Europe; nurses and healthcare support workers generally come from the Philippines, Central and South America, the Caribbean, Canada and South Africa.

Figure 83:
One-third of foreign-born physicians and surgeons entered the country prior to 1980

Source: American Community Survey, 2010



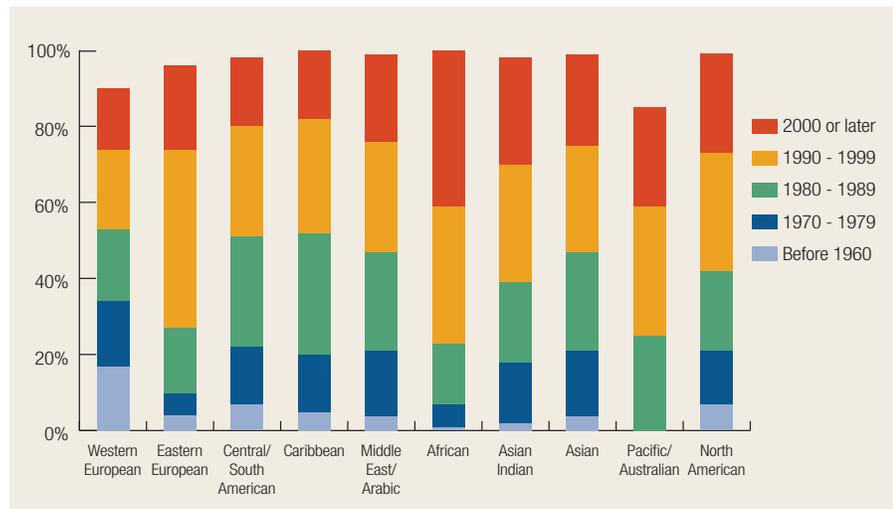
Over 50 percent of foreign-born workers entered the country after 1990

The number of foreign-born health care workers in this country rose sharply after the passage of federal laws in 1989 and 1999 aimed at relieving nursing shortages in underserved regions.⁸² Eighty percent of today's foreign-born healthcare workers immigrated to the U.S. after 1980—30 percent of them in the 1990s, with another 25 percent arriving in the 2000s.⁸³

Over that time, though, the face of the immigrant healthcare worker has changed from European to African, Middle Eastern and Asian. Today African, Asian-Indian, Asian, Central/South American and Caribbean immigrants make up 76 percent of foreign-born healthcare workers in the U.S., with more than half of them entering this country after 1990. Africans (78%) and Eastern Europeans (70%) make up the largest groups of post-1990 arrivals. In contrast, only 18 percent of the foreign-born healthcare workers who have immigrated here since 2000 have been Western Europeans.

Figure 84:
Eastern Europeans came in the 1990s, while African workers came in the 2000s

Source: Pooled ACS data (2008-2010)
 Figure 84 excludes data prior to 1960, therefore percents do not add up to 100.



⁸² The Immigration Nursing Relief Act of 1989 and the Nursing Relief for Disadvantaged Areas Act of 1999 created H-1A⁸² and H-1C⁸² visas to boost importation of professional and technical healthcare workers. Today the Schedule A labor certification is highly favored by skilled healthcare immigrants, since it provides a more direct line to permanent residency for registered nurses and physical therapists with a bachelor's degree or better and the ability to obtain a state license. Registered nurses and physical therapists qualify for this category of workers if "the Secretary of the Department of Labor previously has determined that there are not sufficient U.S. workers who are able, willing, qualified and available and that the wages and working conditions of U.S. workers similarly employed will not be adversely affected by the employment of aliens in such occupations."

⁸³ A combination of demand factors and new immigration legislation implemented by the Department of Homeland Security are contributing factors.

These numbers mark a reversal from immigration patterns before 1960, when 24 percent were Western Europeans and only 9 percent were from Central or South America. It's worth bearing in mind, though, that the numbers also partly reflect the reality that many of the earlier immigrants have retired.

Asian workers are more likely to work in professional and technical occupations

Registered nurses are more likely to come from Eastern Europe and Asia; doctors from Western Europe, North America, the Middle East and India; and support workers from the Caribbean, Central/South America and Africa.

Foreign workers in healthcare support are more likely to have some college education

The education levels of foreign-born healthcare workers tend to be higher, on average, than natives', in part because of these occupational choices: Asian immigrants, for example, are concentrated in professional and technical occupations that require higher education levels. However, even in support occupations, foreign-born workers are likely to have higher levels of education.

Table 33: Foreign-born healthcare professionals are more likely to have a college degree than those born in the U.S.

Share of BAs by occupation and nationality	Native	Foreign born
Registered nurses	42%	57%
Licensed practical and licensed vocational nurses	3	11
Respiratory therapists	23	31
Dental hygienists	29	43
Nursing, psychiatric, and home health aides	4	11
Dental assistants	6	15
Medical assistants	8	13

Source: Brewer and Grbic, 2010

American doctors continue long-standing trend of leaving our shores to study medicine

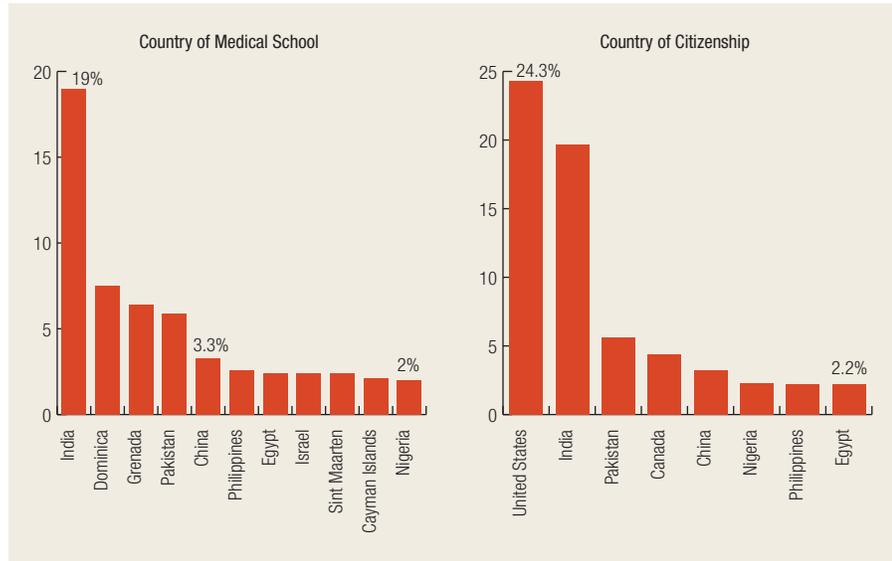
At the same time that we are importing healthcare workers from other countries, the U.S. is sending sizable numbers of medical students abroad to be trained. Many of them are students who failed to get into a U.S. institution, which in 2010 rejected more than half (53%) of all applicants.⁶⁴

⁶⁴. For the 2011-2012 class, 19,230 of the 43,919 applicants were accepted. (The average number of applications per applicant was 16.) <https://www.aamc.org/download/153708/data/charts1982to2012.pdf>

This is not a new phenomenon. Any foreign-trained doctor, even U.S. citizen, must receive a license to practice from the Education Commission for Foreign Medical Graduates, a private nonprofit whose primary task is to assess whether foreign-trained medical students are qualified to enter accredited U.S. residency and fellowship programs. In the 1980s close to a quarter of those seeking such validation were Americans, and that number was roughly the same in 2010.

**Figures 85 and 86:
India, Dominica and Grenada
are key destination countries
for medical study; 25% of
American doctors have studied
abroad**

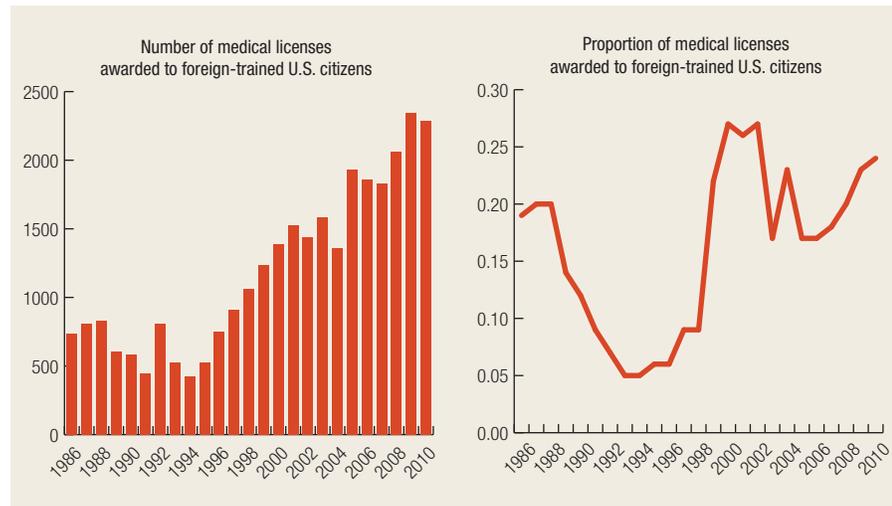
Source: Education Commission for Foreign Medical Graduates (ECFMG) database. Citizenship is at the time of entrance into Medical School.



**Figures 87 and 88:
The number of medical licenses
awarded to foreign-trained
U.S. citizens has steadily
increased**

**The proportion of medical
licenses awarded to foreign-
trained U.S. citizens began to
rise again in the late 2000s**

Source: Education Commission for Foreign Medical Graduates (ECFMG) database. Citizenship is at the time of entrance into Medical School.



References



- Aiken, L.H. and Cheung, (2008). Nurse Workforce Challenges in the United States: Implications for Policy. *OECD Health Working Papers, No.35*. Available online at <http://www.oecd.org/dataoecd/34/9/41431864.pdf>.
- Alabama Board of Pharmacy. *Statutes and Rules*, last updated March 3, 2012, <http://www.albop.com/>.
- Alabama Board of Respiratory Therapy. "Continuing Education for Licensure (Chapter 798-X-8)," *Administrative Code*, accessed April 9, 2012, http://www.asbrt.alabama.gov/Rules.aspx#CHAPTER_798-X-8.
- Alliance for Health Reform. (2011, April). *Health Care Workforce: Future Supply vs. Demand*. Available online at http://www.allhealth.org/publications/Medicare/Health_Care_Workforce_104.pdf.
- American Academy of Nurse Practitioners (AANP). Certification Program, accessed April 9, 2012, <http://www.aanpcertification.org>.
- American Association of Nurse Anesthetists (AANA). *Qualifications and Capabilities of the Certified Registered Nurse Anesthetist*, accessed April 9, 2012, <http://www.aana.com/ceandeducation/becomeacrna/Pages/Qualifications-and-Capabilities-of-the-Certified-Registered-Nurse-Anesthetist-.aspx>.
- American Dental Association (ADA), Health Policy Resource Center. 2011 *American Dental Association Dental Workforce Model: 2009 – 2030*.
- American Dental Association (ADA). "DDS/DMD Programs-U.S.," *Dental Education: Schools and Programs*, accessed April 10, 2012, <http://www.ada.org/267.aspx>.
- American Dental Hygienists Association (ADHA). *States Requiring Continuing Education for License Renewal*, March 2012, http://www.adha.org/governmental_affairs/downloads/CE.pdf.
- American Midwifery Certification Board. "Certificate Maintenance," *Certificate Maintenance Program*, accessed April 9, 2012, <http://www.amcbmidwife.org/c/97/certificate-maintenance>.
- American Physical Therapy Association (APTA). (2012, January). *A Model to Project the Supply and Demand of Physical Therapists 2010-2020*. Available online at: <http://www.apta.org/WorkforceData/>.
- Andreoni, James, Brian Erard, and Jonathan Feinstein. 1998. "Tax Compliance." *Journal of Economic Literature*, XXXVI(2), 818–860.
- Arizona Board of Respiratory Care Examiners. *Continuing Education*, accessed April 9, 2012, <http://www.rb.state.az.us/contedu.htm>.
- Ashenfelter, Orley, and Robert S. Smith. 1979. "Compliance with the Minimum Wage Law." *Journal of Political Economy*, 87(2), 333–350.
- Association of Academic Health Centers (AAHC). (2008). *Out of Order out of Time: The State of the Nation's Health Workforce*. Available online at: http://www.aahcdc.org/policy/AAHC_OutofTime_4WEB.pdf.
- Auerbach, David, and Sabina Ohri. 2006. "Price and the Demand for Nongroup Health Insurance." *Inquiry*, 43(2), 122–134.
- Bärnighausen, Till and David E. Bloom Changing Research Perspectives on the Global Health Workforce. NBER Working Paper No. 15168, July 2009
- Bipartisan Policy Center, Health Project (2011, October 18). *The Complexities of National Health Care Workforce Planning (Executive Summary)*. Available online at: <http://bipartisanpolicy.org/library/report/complexities-national-health-care-workforce-planning>.
- Block, Sandra. 2010. "IRS Lacks Clout to Enforce Mandatory Health Insurance." *USA Today*, April 29. www.usatoday.com/money/perfi/insurance/2010-04-29/healthirs28_CV_N.htm?loc=interstitialskip.
- Board of Communications Disorders and Sciences, Tennessee Department of Health. *Licensure and Education Information*, accessed April 10, 2012, <http://health.state.tn.us/boards/Cd/education.htm>.
- Board of Dietitians/Nutritionists Examiners, Tennessee Department of Health. *Licensure and Education Information*, accessed April 10, 2012, <http://health.state.tn.us/boards/DN/education.htm>.
- Board of Optometry, Tennessee Department of Health. *Statutes, Rules and Policies*, accessed April 10, 2012, <http://health.state.tn.us/boards/Optometry/legislative.htm>.
- Board of Pharmacy, Alaska Department of Commerce, Community, and Economic Development. *Statutes and Regulations*, accessed April 10, 2012, <http://www.commerce.state.ak.us/occ/ppha0.htm>.

- Board of Respiratory Care, Tennessee Department of Health. *Licensure and Education Information*, accessed April 10, 2012, <http://health.state.tn.us/boards/RC/education.htm>.
- Board of Vocational Nursing and Psychiatric Technicians (CA), Department of Consumer Affairs. *License Renewal*, accessed April 9, 2012, http://www.bvnpt.ca.gov/licensing/renewal_application_form.shtml.
- Brewer, Lindsay and Douglas Grbic. Medical Students' Socioeconomic Background and Their Completion of the First Two Years of Medical School. Analysis in Brief. Association of American Medical Colleges Volume 9, Number 11. December 2010.
- Buchan, James and Mario R. Dal Poz. Skill mix in the health care workforce: reviewing the evidence. *Bulletin of the World Health Organization* 2002, 80 (7).
- Bureau of Health Professions, Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services (DHHS). (2008, December). *The Physician Workforce: Projections and Research into Current Issues Affecting Supply and Demand*. Available online at: <http://bhpr.hrsa.gov/healthworkforce/reports/physwissues.pdf>.
- Bureau of Health Professions, Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services (DHHS). (2004, September). *What Is Behind HRSA's Projected Supply, Demand, and Shortage of Registered Nurses?* Available online at: http://dwd.wisconsin.gov/healthcare/pdf/behind_the_shortage.pdf.
- Bureau of Health Professions, Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services (DHHS). (2008, December). *The Adequacy of Pharmacist Supply: 2004 to 2030*. Available online at: <http://bhpr.hrsa.gov/healthworkforce/reports/pharmsupply20042030.pdf>.
- Bureau of Labor (BLS). *Occupational Outlook Handbook*, 2012-13 Edition, accessed April 9, 2012, <http://www.bls.gov/ooh/>.
- Bureau of Labor Statistics, U.S. Department of Labor. (2012). *Occupational Outlook Handbook, 2012-13 Edition*. Available online at: <http://www.bls.gov/ooh/>.
- Cassidy, John. 2010. "ObamaCare by the Numbers." *New Yorker*, Posted March 26. www.newyorker.com/online/blogs/johncassidy/2010/03/obamacare-by-the-numbers-part-2.html.
- CBO (Congressional Budget Office). 2008. *Key Issues in Analyzing Major Health Insurance Proposals*, December. www.cbo.gov/doc.cfm?index=9924.
- CBO (Congressional Budget Office). 2010a. Letter to the Honorable Olympia Snowe about estimated premiums for "Bronze" coverage under the Patient Protection and Affordable Care Act. January 11. www.cbo.gov/ftpdocs/108xx/doc10884/01-11-Premiums_for_Bronze_Plan.pdf.
- CBO (Congressional Budget Office). 2010b. Cost estimate for H.R. 4872, Reconciliation Act of 2010. March 20. <http://www.cbo.gov/ftpdocs/113xx/doc11379/AmendReconProp.pdf>.
- CBO (Congressional Budget Office). 2010c. "Payments of Penalties for Being Uninsured Under the Center for Health Workforce Studies, School of Public Health, University at Albany. (2007, December). *Podiatric Medicine Workforce Study*. Available online at: <http://www.apma.org/MainMenu/News/Surveys/2007/2007PodiatricMedicineWorkforceReport.aspx>
- Center for Sustainable Health Spending. Health Sector Economic Indicators. Labor Brief. October 2011.
- Center for Workforce Studies, American Association of Medical Colleges (AAMC). (2010, June). *The Impact of Health Care Reform on the Future Supply and Demand for Physicians Updated Projections through 2025*. Available online at: https://www.aamc.org/download/158076/data/updated_projections_through_2025.pdf.
- Clark, Paul F.; James B Stewart; Darlene A Clark. The globalization of the labour market for health-care professionals. *International Labour Review*; 2006 145.
- Clearfield, Esha and Jeanne Batalova. *Foreign-Born Health-Care Workers in the United States*. Migration Policy Institute. 2007
- Cohen, J.J., Gabriel, B.A., and Terrell, C. (2002, September-October). The Case for Diversity in the Health Care Workforce. *Health Affairs* 30, (8). Available online at <http://content.healthaffairs.org/content/early/2011/07/27/hlthaff.2011.0662> (doi: 10.1377/hlthaff.2011.0662).
- Cohn, Jonathan. *Sick: The Untold Story of America's Health Care Crisis—and the People Who Pay the Price*. HarperCollins Publishers, New York, 2007.

- Committee on Physician Assistants, Tennessee Department of Health. *Licensure and Education Information*, accessed April 10, 2012, <http://health.state.tn.us/boards/PA/education.htm>.
- Committee on the Future Health Care Workforce for Older Americans. *Retooling for an Aging America: Building the Health Care Workforce*. Board on Health Care Services. 2008
- Cooper, R.A., et al. "Economic and Demographic Trends Signal an Impending Physician Shortage," *Health Affairs*, Vol. 21, No. 1, 2002, pp: 140-54.
- Council on Graduate Medical Education. "Physician Workforce Policy Guidelines for the United States, 2000-2020, Sixteenth Report," Health Resources and Services Administration, U.S. Department of Health and Human Resources, 2005.
- Cutler, David M. 2003. "Employee Costs and the Decline in Health Insurance Coverage." *Frontiers in Health Policy Research*, 6(3), 27–53.
- Daugherty, Lindsay; Raquel Fonseca; Krishna B. Kumar; Pierre-Carl Michaud. *An Analysis of the Labor Markets for Anesthesiology*. Published 2010 by the RAND Corporation.
- Dental Board of California, Department of Consumer Affairs. "Renew Your License," *Licensed Dentists*, accessed April 9, 2012, <http://www.dbc.ca.gov/licensees/dds/renewals.shtml>.
- Department of Health and Human Services (DHHS) and Department of Labor (DOL). (2003, May). *The Future Supply of Long-Term Care Workers in Relation to Aging Baby Boom Generation: Report to Congress*. Available online at: <http://aspe.hhs.gov/daltcp/reports/lcwork.pdf>.
- Department of Licensing and Regulatory Affairs (LARA) (MI). "Licensing Information [for physician assistants]," *Bureau of Health Professions*, accessed April 9, 2012, http://www.michigan.gov/lara/0,4601,7-154-35299_28150_27529_27550--,00.html.
- Derksen Daniel J. and Ellen-Marie Whelan. *Closing the Health Care Workforce Gap. Reforming Federal Health Care Workforce Policies to Meet the Needs of the 21st Century*. December 2009
- Dill, J.M., and Salsberg, E.D., Center for Workforce Studies, American Association of Medical Colleges (AAMC). (2008, November). *The Complexities of Physician Supply and Demand: Projections Through 2025*. Available online at: http://www.innovationlabs.com/pa_future/1/background_docs/AAMC%20Complexities%20of%20physician%20demand,%202008.pdf.
- Emergency Medical Services Unit, Wisconsin Department of Health Services. *License and Certification Information*, accessed April 10, 2012, http://www.dhs.wisconsin.gov/ems/License_certification/index.htm.
- Engman, Michael, *A Tale of Three Markets: How Government Policy Creates winners and losers in the Philippine Health Sector*. Working Paper. October, 2010. Available at http://gem.sciences-po.fr/content/publications/pdf/Engman_Philippine_Nurses102010.pdf
- Erard, Brian, and Jonathan Feinstein. 1994. "Honesty and Evasion in the Tax Compliance Game." *Rand Journal of Economics*, 25(1), 1–19.
- Federation of Chiropractic Licensing Boards (FCLB). *Official Directory*, accessed April 9, 2012, <http://directory.fclb.org/U.S..aspx>.
- Finkelstein, Amy. 2009. "EZTax: Tax Salience and Tax Rates." *Quarterly Journal of Economics*, 124 (3), 969–1010.
- Finocchio LJ, Dower CM, Blick NT, Gagnola CM and the Taskforce on Health Care Workforce Regulation, Pew Health Professions Commission. (1998, October). *Strengthening Consumer Protection: Priorities for Health Care Workforce Regulation*. Available at: http://futurehealth.ucsf.edu/Content/29/1998-12_Strengthening_Consumer_Protection_Priorities_for_Health_Care_Workforce_Regulation.pdf
- Friedland, R.B., Georgetown University Long-term Care Financing Project, Health Policy Institute, Georgetown University. (2004, July). *Caregivers And Long-Term Care Needs in the 21st Century: Will Public Policy Meet The Challenge? – Issue Brief*. Available online at: <http://www.ltc.georgetown.edu/pdfs/caregiversfriedland.pdf>.
- Georgia Board of Nursing. *Regulation of Advanced Nursing Practice*, accessed April 10, 2012, http://rules.sos.state.ga.us/cgi-bin/page.cgi?g=GEORGIA_BOARD_OF_NURSING%2FREGULATION_OF_ADVANCED_NURSING_PRACTICE%2Findex.html&d=1.

- Georgia Board of Occupational Therapy. *Renewal of License/Penalties/Continuing Education Requirements*, accessed April 10, 2012, <http://sos.georgia.gov/plb/ot/OT%20Rule%20671-3-.08.pdf>.
- Georgia State Board of Physical Therapy. *Georgia State Board of Physical Therapy Board Policies*, accessed April 10, 2012, <http://sos.georgia.gov/plb/pt/pt%20Board%20Policies.pdf>.
- Georgia State Board of Veterinary Medicine. *Board Rules*, accessed April 10, 2012, <http://sos.georgia.gov/plb/veterinary/>.
- Gerolamo, A. M. and Roemer, G.F. (2011, September-October). Workload and the Nurse Faculty Shortage: Implications for Policy and Research. *Nursing Outlook* 59, (5), 259-265.e1. Available online at <http://www.sciencedirect.com/science/article/pii/S0029655411000236> (doi: 10.1016/j.outlook.2011.01.002)
- Goodman David C. and Elliott S. Fisher. Physician Workforce Crisis? Wrong Diagnosis, Wrong Prescription. *New England Journal of Medicine* 2008; 358:1658-1661 April 17, 2008.
- Grbic, Douglas and Brewer Roskovensky, Lindsay Which Factors Predict the Likelihood of Reapplying to Medical School? An Analysis by Gender. *Academic Medicine*: April 2012 - Volume 87 - Issue 4 - p 449-457
- Grbic, Douglas; Gwen Garrison and Paul Jolly. Diversity of U.S. Medical School Students by Parental Education. Analysis in Brief. *Association of American Medical Colleges* Volume 9, Number 10. August 2010.
- Gruber, Jonathan. 2010. "Why We Need the Individual Mandate." Posted April 8. Center for American Progress, Washington, D.C.
- Health Professional Licensing Administration (HPLA) (District of Columbia). License Renewal Information for Boards of Dietitians and Nutritionists, Pharmacists, Optometrists, Physicians, Physician Assistants, Podiatrists, Audiologists, Occupational Therapists, Physical Therapists, Respiratory Therapists, Speech-Language Pathologists, Veterinarians, Nurses, Occupational Therapy Assistants and Aides, Physical Therapy Assistants and Aides, Massage Therapists, and Dental Assistants, *Professional Licensing Boards and Registrations*, accessed April 9, 2012, <http://hpla.doh.dc.gov/hpla/cwp/view,a,1195,q,488169,hplaNav,%7C30661%7C,.asp>
- Holmes , Denise E. Editor. From Education to Regulation: Dynamic Challenges for the Health Workforce. Association of Academic Health Centers, 2008.
- Iglehart, John K. Grassroots Activism and the Pursuit of an Expanded Physician Supply. *New England Journal of Medicine* 2008; 358:1741-1749 April 17, 2008. Available online at <http://www.nejm.org/doi/full/10.1056/NEJMhpr0800058>
- Indiana State Department of Health (ISDH). *Medical Radiology Services Program*, accessed April 10, 2012, <http://www.state.in.us/isdh/23279.htm>.
- Institute of Medicine (IOM), Committee on the Future Health Care Workforce for Older Americans. (2008). *Retooling for an Aging America: Building the Health Care Workforce*. Available online at <http://www.nap.edu/catalog/12089.html>.
- Insurance Research Council. 2006. *Uninsured Motorists*, 2006 Edition. Insurance Research Council, Malvern, Pa.
- Iowa Workforce Information Network. "Radiation Therapist," *Occupational Information Center*, accessed April 9, 2012, <http://iwin.iwd.state.ia.us/iowa/OIC?action=license&licid=0000000405>.
- IRS (Internal Revenue Service). 2007. *Reducing the Federal Tax Gap: A Report on Improving Voluntary Compliance*. IR-2007-137. Department of the Treasury.
- IRS (Internal Revenue Service). 2009. *Internal Revenue Service Data Book*. Publication 55B. Department of the Treasury.
- Jacobs, Paul, 2009. "Health Insurance Demand and the Generosity of Benefits: Fixed Effects Estimates of the Price Elasticity." *Forum for Health Economics and Policy*, 12 (2), 1-25. www.bepress.com/fhep/12/2/3.
- JCT (Joint Committee on Taxation). 2010. *Technical Explanation of the Revenue Provisions of the "Reconciliation Act of 2010," as Amended, in Combination with the "Patient Protection and Affordable Care Act*. JCX-18-10. U.S. Congress. www.jct.gov/publications.html?func=startdown&id=3673.
- Joint Committee on Administrative Rules (IL). "Illinois Physical Therapy Act (Title 68, Chapter VII, Subchapter b, Part 1340)," *Administrative Code*, accessed April 9, 2012, <http://www.ilga.gov/commission/jcar/admincode/068/06801340sections.html>.

- Jolly, Paul. Diversity of U.S. Medical Students by Parental Income. Analysis in Brief. Association of American Medical Colleges Volume 8, Number 1. January 2008.
- Keehan, S.P., Sisko, A.M., Truffer, C.J., Poisal, J.A., Cuckler, G.A., Madison, A.J., Lizonitz, J.M., and Smith, S. D. (2011, August). National Health Spending Projections Through 2020: Economic Recovery And Reform Drive Faster Spending Growth. *Health Affairs* 30, (8). Available online at <http://content.healthaffairs.org/content/early/2011/07/27/hlthaff.2011.0662> (doi: 10.1377/hlthaff.2011.0662).
- Kentucky Board of Pharmacy. *Kentucky Statutes and Regulations*, last updated March 27, 2012, <http://pharmacy.ky.gov/laws/>.
- Kentucky Board of Podiatry. *Statutes and Regulations*, last updated September 15, 2005, http://podiatry.ky.gov/statute_reg.htm.
- Kington, R.S., & Nickens, H.W. (2001). Racial and ethnic differences in health: Recent trends, current patterns, future directions. In *America becoming: Racial trends and their consequences*, NJ Smelser, WJ Wilson, and F Mitchell. (Eds). Washington, D.C., National Academy Press.
- Kling, Arnold, 2010. "Incentives vs. Intentions." Posted March 24, Library of Economics and Literature, Indianapolis, Ind., http://econlog.econlib.org/archives/2010/03/incentives_vs_i.html.28
- Kocher, R., and Sahini, N.R. (2011, May). Hospitals' Race to Employ Physicians — The Logic Behind a Money-Losing Proposition. *New England Journal of Medicine* 364, (19), 1790-1793. Available online at <http://www.nejm.org/doi/full/10.1056/NEJMp1101959>.
- Liebman, Jeffrey, and Richard Zeckhauser. 2008. "Simple Humans, Complex Insurance, Subtle Subsidies." In Aaron, Henry, and Leonard Burman (eds.). *Using Taxes to Reform Health Insurance: Pitfalls and Promises*. Brookings Institution Press, Washington, D.C. 230–255.
- Long, Sharon, and Karen Stockley. 2009. "An Update on Insurance Coverage and Support for Reform as of Fall 2008." Massachusetts Health Reform Survey Policy Brief, Urban Institute, Washington, D.C.
- Louisiana Board of Massage Therapy. *Continuing Education Questions*, accessed April 10, 2012, <https://www.labmt.org/site360.php>.
- Louisiana State Board of Medical Examiners, "Chapter 15: Physicians, Surgeons and Midwives," *Laws*, Accessed April 9, 2012, <http://www.lsbme.louisiana.gov/laws.html>.
- Lowell, B. Lindsay and Stefka Georgieva Gerova. 2004. "Immigrants and the Healthcare Workforce: Profiles and Shortages." *Work and Occupations* 31(4): 474-498.
- Marquis, M. Susan, and Stephen Long. 1995. "Worker Demand for Health Insurance in the Non-Group Market." *Journal of Health Economics*, 14(1), 47–63.
- Maryland Department of Health and Mental Hygiene (DHMH). Laws and Regulations for Board of Physical Therapy Examiners and Board of Nursing, accessed April 9, 2012, <http://dhmh.maryland.gov/SitePages/boards.aspx>.
- Maryland State Board of Veterinary Medical Examiners. "Continuing Education Requirements (Chapter 10)," *Regulations*, accessed April 9, 2012, http://www.mda.state.md.us/vetboard/regulations/regulation_chap10.php.
- Matherlee, Karen. The U.S. Health Workforce: Definitions, Dollars, and Dilemmas. NHPF Background Paper. April 11, 2003
- McCubbin, Janet. 2004. "Optimal Tax Enforcement: A Review of the Literature and Practical Implications." OTA Working Paper. 90. Department of the Treasury, Office of Tax Analysis.
- Medical Board of California, Department of Consumer Affairs. *License Renewal*, accessed April 9, 2012, http://www.mbc.ca.gov/licensee/renew_license.html.
- Minnesota Department of Health, Division of Compliance Monitoring, *Health Occupations Program*. Health Occupations Program, accessed April 10, 2012, <http://www.health.state.mn.us/divs/hpsc/hop/index.html>.
- Minnesota State Board of Physical Therapy. *Continuing Education*, accessed April 10, 2012, <http://www.physicaltherapy.state.mn.us/ce.asp>.
- Morgan, Julie Margetta and Ellen-Marie Whelan. Profiting from Health Care. The Role of For-Profit Schools in Training the Health Care Workforce Center for American Progress. Available at http://www.americanprogress.org/issues/2011/01/pdf/for_profit_health_care.pdf

- National Center for Health Workforce Analyses. Bureau of Health Professions. Health Resources and Services Administration. Nursing Aides, Home Health Aides, and Related Health Care Occupations —National and Local Workforce Shortages and Associated Data Needs. February 2004
- National Resident Matching Program, Charting Outcomes in the Match, 2011. Characteristics of Applicants Who Matched to Their Preferred Specialty in the 2011 Main Residency Match. 4th Edition. Prepared by: National Resident Matching Program and Association of American Medical Colleges, August 2011.
- NHTSA (National Highway Transportation Safety Administration). 2008. *Seat Belt Use in 2007—Use Rates in the States and Territories*. DOT HS 810 949. Department of Transportation, National Center for Statistics and Analysis.
- North Carolina Board of Recreational Therapy Licensure (NCBRTL). *Laws and Rules*, accessed April 9, 2012, http://www.ncbrtl.org/index.cfm?includefile=forms_contracts.cfm&cat=Law_Rules.
- Occupational Therapy Licensing Board (OR). *Continuing Education*, accessed April 10, 2012, http://www.oregon.gov/otlb/Pages/CE.aspx#TWO__YEAR_LICENSES.
- Office of Laboratory Services, Bureau of Public Health, WV Department of Health and Human Resources. Clinical Laboratory Technician and Technologist Licensure and Certification, last updated June 24, 2011, <http://www.wvdhhr.org/labservices/about/index.cfm>.
- Office of Professional and Occupational Regulation, Department of Professional and Financial Regulation (ME). *Radiologic Technologist*, last updated July 20, 2011, <http://www.maine.gov/pfr/professionallicensing/professions/radiological/technologist.htm>.
- Ohio Occupational Therapy, Physical Therapy, and Athletic Trainers Board. *Ohio Occupational Therapy, Physical Therapy, and Athletic Trainers Board Laws and Rules*, accessed April 10, 2012, <http://www.otptat.ohio.gov/PracticeActs.aspx>.
- Oklahoma Medical Board. *Therapeutic Recreation Specialists – Rules*, updated June 25, 2011, http://www.okmedicalboard.org/therapeutic_recreation_specialists#laws-rules.
- Opticians Association of America State Societies (OAA). “State License and Examination Requirements,” State Societies, accessed April 9, 2012, <http://www.oaa.org/index.php?id=24>.
- Orcutt, V.L. (2007, May). *The Supply and Demand of Physician Assistants in the United States: A Trend Analysis*. Available online at: http://digital.library.unt.edu/ark:/67531/metadc3633/m1/1/high_res_d/dissertation.pdf.
- Oregon Board of Medical Imaging. *Rules and Statutes*, accessed April 10, 2012, <http://www.oregon.gov/OBMI/rules.shtml>
- Organization for Economic Co-operation and Development (OECD). (2009). *Health at a Glance 2009: OECD Indicators*. Available online at http://www.oecd-ilibrary.org/social-issues-migration-health/health-at-a-glance-2009_health_glance-2009-en (doi: 10.1787/health_glance-2009-en)
- Paraprofessional Healthcare Institute (PHI). (2011). Direct-Care Workers Fact Sheet (Update). Available online at: <http://www.ltc.georgetown.edu/pdfs/caregiversfriedland.pdf>.
- Patient Protection and Affordable Care Act.” Posted April 22, revised April 30. www.cbo.gov/ftpdocs/113xx/doc11379/Individual_Mandate_Penalties-04-30.pdf.
- Pearson, Disparities in health expenditure across OECD countries: Why does the United States spend so much more than other countries? 30th September 2009. Written Statement to Senate Special Committee on Aging, Health Division, OECD.
- Physical Therapy Board of California, Department of Consumer Affairs. *License Renewal*, accessed April 9, 2012, http://www.ptbc.ca.gov/licensees/license_renewal.shtml.
- Physician Assistant Committee of the Medical Board of California, Department of Consumer Affairs. *License Renewal*, accessed April 9, 2012, <http://www.pac.ca.gov/licensees/renewals.shtml>.
- Ricketts, T.C. (2011). The Health Care Workforce: Will It Be Ready as the Boomers Age? A Review of How We Can Know (or Not Know) the Answer. *Annual Review of Public Health* 32, 417-430. Available online at <http://www.annualreviews.org/doi/abs/10.1146/annurev-publhealth-031210-101227> (doi: 10.1146/annurev-publhealth-031210-101227).

- Ruggles, Steven, J. Trent Alexander, Katie Genadek, Ronald Goeken, Matthew B. Schroeder, and Matthew Sobek. Integrated Public Use Microdata Series: Version 5.0 [Machine-readable database]. Minneapolis: University of Minnesota, 2010.
- Sargen, M., Hooker, R.S., and Cooper, R.A. (2011, March). Gaps in the Supply of Physicians, Advance Practice Nurses, and Physician Assistants. *Journal of American College of Surgeons* 212, 991-999. Available online at <http://www.sciencedirect.com/science/article/pii/S1072751511001852> (doi: 10.1016/j.jamcollsurg.2011.03.005).
- Schoemaker, Paul, and Howard Kunreuther. 1979. "An Experimental Study of Insurance Decisions." *Journal of Risk and Insurance*, 46(4), 603–618.
- Schultz, Wesley, Jessica Norma, Robert Cialdini, Noah Goldstein, and Vlasdas Griskevicius. 2007. "The Constructive, Destructive, and Reconstructive Power of Social Norms." *Psychological Science*, 18(5), 429–434.
- Sheffrin, Steven, and Robert Triest. 1992. "Can Brute Deterrence Backfire? Perceptions and Attitudes in Taxpayer Compliance," in Slemrod, Joel (ed.), *Why People Pay Taxes: Tax Compliance and Enforcement*. University of Michigan Press, Ann Arbor, Mich. 193–218.
- Sheldon, George F and Anneke T. Schroen. Supply and demand—surgical and health workforce. *Surgical Clinics of North America* 84 (2004) 1493–1509
- Simpson, Clay E. Jr. and Remy Aronoff. Factors Affecting the Supply of Minority Physicians in 2000. *Public Health Reports* (1974-), Vol. 103, No. 2 (Mar. - Apr., 1988), pp. 178-184.
- Sisko, Andrea M., Christopher J. Truffer, Sean P. Keehan, John A. Poisal, M. Kent Clemens, and Andrew J. Madison. National Health Spending Projections: The Estimated Impact of Reform Through 2019. *Health Affairs* 29, No 10. October 2010.
- Slemrod, Joel, and Shlomo Yitzhaki. 1987. "The Optimal Size of a Tax Collection Agency." *Scandinavian Journal of Economics*, 89(2), 183–192.
- Sorensen, Andrew A. Black Americans and the Medical Profession, 1930-1970. *The Journal of Negro Education*. Vol. 41, No. 4 (Autumn, 1972), pp. 337-342. Published by: Journal of Negro Education
- Staiger Douglas O., David I. Auerbach, and Peter I. Buerhaus. Health Care Reform and the Health Care Workforce — The Massachusetts Experience. *The New England Journal of Medicine*. 2011.
- Stone, R. and Harahan, M.F. (2010, January). Improving the Long-Term Care Workforce Serving Older Adults. *Health Affairs* 29(1), 109-115. doi: 10.1377/hlthaff.2009.0554.
- Stone, R. I., and Wiener, J.M. (2001, October). *Who Will Care for Us?: Addressing the Long-term Care Workforce Crisis*. Available from The Urban Institute and the American Association of Homes and Services for the Aging, at <http://www.urban.org/publications/310304.html>.
- Taylor, David L. III, "Should the entry into nursing practice be the baccalaureate degree?" *Association of periOperative Registered Nurses (AORN) Journal*. March, 2008.
- Tippins, Nancy T. and Margaret L. Hilton, eds 2010. A database for a changing economy: review of the occupational network (O*NET). Washington D.C.: National Academies Press
- The Center for Health Workforce Studies, School of Public Health, University at Albany. (2010, March). *Health Care Employment Projections: An Analysis of Bureau of Labor Statistics Occupational Projections, 2008 – 2018*. Available online at: http://chws.albany.edu/index.php?center_reports.
- The Center for Health Workforce Studies. Health Care Employment Projections: An Analysis of Bureau of Labor Statistics Occupational Projections, 2008-2018.. School of Public Health, University at Albany. March 2010
- The New York Center for Health Workforce Studies. The United States Health Workforce Profile. October, 2006.
- U.S. Bureau of Labor Statistics (BLS). (2011). *Career Guide to Industries, 2010-2011* ed. Available online at: <http://www.bls.gov/oco/cg/>.
- U.S. Bureau of Labor Statistics (BLS). (2011). *National Employment Matrix 2008-2018*. Available online at: http://www.bls.gov/emp/ep_table_108.htm.
- U.S. Citizenship and Immigration Services. "Immigration Classifications and Visa Categories." Available at <http://www.uscis.gov/portal/site/uscis>

- U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. Integrated Postsecondary Education Data System (IPEDS), 2010.
- U.S. Department of Health and Human Services, Health Resources and Services Administration; Bureau of Health Professions U.S. Department of Health and Human Services, Office of Public Health and Science; Office of Minority Health. *Pipeline Programs to Improve Racial and Ethnic Diversity in the Health Professions: An Inventory of Federal Programs, Assessment of Evaluation Approaches, and Critical Review of the Research Literature*. April 2009
- U.S. Department of Health and Human Services. The Registered Nurse Population Findings from the 2008 National Sample Survey of Registered Nurses. Health Resources and Services Administration. September 2010
- Utah Division of Occupation and Professional Licensing (DOPL). "Statutes and Rules," *Recreation Therapy*, accessed April 9, 2012, http://www.dopl.utah.gov/licensing/recreation_therapy.html.
- Virginia Board of Audiology and Speech-Language Pathology. *Laws and Regulations*, accessed April 9, 2012, http://www.dhp.virginia.gov/aud/aud_laws_regs.htm.
- Virginia Board of Medicine. *Virginia Board of Medicine Laws and Regulations*, accessed April 9, 2012, http://www.dhp.virginia.gov/medicine/medicine_laws_regs.htm.
- Virginia Board of Optometry. *Laws and Regulations*, accessed April 9, 2012, http://www.dhp.virginia.gov/optometry/optometry_laws_regs.htm.
- Washington State Department of Health. "Dental Assistant FAQs," *Dentist, Dental Assistant and Expanded Function Dental Auxiliary*, last updated March 15, 2012, <http://www.doh.wa.gov/hsqa/professions/dental/faqDA.htm>.
- West Virginia State Board of Examiners for Licensed Practical Nurses. "Goal V - Continuing Competence," *Our Goals and Services*, accessed April 10, 2012, <http://www.lpnboard.state.wv.us/>.
- Wilson, R. (2010, April). *Rx for the Health Care Workforce: Promising Practices and Their Implications for State and Federal Policy*. Available from Jobs for the Future (JFF), at: <http://www.jff.org/publications/workforce/rx-new-health-care-workforce-promising-p/1048>
- Wood, Catherine A. Employment in health care: a crutch for the ailing economy during the 2007–09 recession. *Monthly Labor Review*, April 2011.
- Workforce Facts and Trends at a Glance: The Hospital Leader's Guide. American Hospital Association. January 2010. www.americanprogress.org/issues/2010/04/pdf/individual_mandate.pdf.

Appendices



Appendix 1: Forecast of detailed healthcare occupations, 2010-2020

	Occupation	2010	2020
29-1011	Chiropractors	48,840	59,500
29-1029	Dentists, all other specialists	6,300	7,330
29-1021	Dentists, general	106,400	125,410
29-1041	Optometrists	37,250	45,410
29-1022	Oral and maxillofacial surgeons	6,430	7,700
29-1023	Orthodontists	6,710	7,960
29-1069	Physicians and surgeons	673,880	807,680
29-1081	Podiatrists	17,580	20,010
29-1024	Prosthodontists	750	1,040
29-1131	Veterinarians	53,640	69,650
	Doctors	957,780	1,151,690
29-2061	Licensed practical and licensed vocational nurses	618,260	762,760
29-1111	Registered nurses	2,165,510	2,721,470
	Nurses	2,783,770	3,484,230
29-9091	Athletic trainers	13,300	18,490
29-1121	Audiologists	11,180	13,920
29-2031	Cardiovascular technologists and technicians	40,210	51,230
29-2021	Dental hygienists	143,740	194,330
29-2032	Diagnostic medical sonographers	43,030	51,730
29-2051	Dietetic technicians	20,210	23,950
29-1031	Dietitians and nutritionists	61,470	70,630
29-2041	Emergency medical technicians and paramedics	181,880	212,710
29-1199	Health diagnosing and treating practitioners, all other	76,190	90,940
29-9099	Healthcare professionals and technical workers, all other	48,150	56,890
29-2099	Healthcare technologists and technicians, all other	78,520	94,020
29-2012	Medical and clinical laboratory technicians	126,510	149,650
29-2011	Medical and clinical laboratory technologists	137,770	157,410
29-2071	Medical records and health information technicians	142,310	173,600
29-2033	Nuclear medicine technologists	18,030	21,390
29-9011	Occupational health and safety specialists	43,760	49,930
29-9012	Occupational health and safety technicians	8,520	10,320
29-1122	Occupational therapists	95,360	122,160
29-2081	Opticians, dispensing	53,130	59,760
29-2091	Orthotists and prosthetists	5,500	6,100
29-1051	Pharmacists	218,900	264,730
29-2052	Pharmacy technicians	271,480	353,490
29-1123	Physical therapists	169,950	222,870
29-1071	Physician assistants	67,030	91,880
29-2053	Psychiatric technicians	57,880	64,060
29-1124	Radiation therapists	13,030	17,020

Appendix 1: Forecast of detailed healthcare occupations, 2010-2020

Occupation		2010	2020
29-2034	Radiologic technologists and technicians	178,410	212,420
29-1125	Recreational therapists	18,530	21,750
29-1126	Respiratory therapists	89,320	112,850
29-2054	Respiratory therapy technicians	12,250	12,700
29-1127	Speech-language pathologists	135,810	166,390
29-2055	Surgical technologists	75,930	98,230
29-1129	Therapists, all other	64,760	79,490
29-2056	Veterinary technologists and technicians	65,070	85,250
Allied healthcare workforce		2,787,120	3,432,290
31-9091	Dental assistants	243,200	328,470
31-9099	Healthcare support workers, all other	167,770	203,900
31-1011	Home health aides	924,370	1,395,020
31-9011	Massage therapists	106,180	141,510
31-9092	Medical assistants	420,980	558,950
31-9093	Medical equipment preparers	41,940	49,050
31-9094	Medical transcriptionists	133,570	157,190
31-1012	Nursing aides, orderlies, and attendants	1,279,870	1,575,780
31-2012	Occupational therapist aides	7,230	9,570
31-2011	Occupational therapist assistants	24,460	31,930
31-9095	Pharmacy aides	44,280	42,070
31-2022	Physical therapist aides	37,860	51,280
31-2021	Physical therapist assistants	55,060	73,230
31-1013	Psychiatric aides	57,570	65,330
31-9096	Veterinary assistants and laboratory animal caretakers	62,990	75,930
Healthcare support workers		3,607,330	4,759,210

Appendix 2: Forecast of detailed job openings in healthcare occupations by education, 2010 through 2020

Occupation	General occupational category	Specific occupational category	High school dropouts	High school graduates	Some college	Associate's degrees	Bachelor's degrees	Master's degrees	Professional degrees	PhDs	Total
Athletic Trainers	Healthcare professional and technical	Allied Healthcare	1,620	4,570	3,500	1,290	760	120	30	10	11,900
Audiologists	Healthcare professional and technical	Allied Healthcare	-	-	370	-	140	140	3,510	1,450	5,610
Cardiovascular Technologists and Technicians	Healthcare professional and technical	Allied Healthcare	-	2,380	3,080	11,880	4,250	510	-	-	22,100
Dental Hygienists	Healthcare professional and technical	Allied Healthcare	-	3,850	7,770	50,590	37,000	3,520	2,180	-	104,890
Diagnostic Medical Sonographers	Healthcare professional and technical	Allied Healthcare	-	3,410	4,420	17,040	6,100	730	-	-	31,700
Dietetic Technicians	Healthcare professional and technical	Allied Healthcare	50	1,960	3,020	1,630	1,100	70	80	180	8,090
Dietitians and Nutritionists	Healthcare professional and technical	Allied Healthcare	960	4,710	2,760	3,810	10,240	12,200	720	-	35,400
Emergency Medical Technicians and Paramedics	Healthcare professional and technical	Allied Healthcare	950	19,510	46,230	32,360	15,120	-	6,620	-	120,790
Health Diagnosing and Treating Practitioners, All Other	Healthcare professional and technical	Allied Healthcare	-	2,060	1,790	-	3,710	8,970	3,140	1,530	21,200
Health Technologists and Technicians, All Other	Healthcare professional and technical	Allied Healthcare	1,690	4,030	5,830	3,110	17,570	7,260	910	-	40,400
Healthcare Professionals and Technical Workers, All Other	Healthcare professional and technical	Allied Healthcare	4,470	12,590	9,660	3,560	2,090	320	90	20	32,800
Medical and Clinical Laboratory Technicians	Healthcare professional and technical	Allied Healthcare	20	4,790	7,400	12,920	23,630	4,350	840	1,140	55,090
Medical and Clinical Laboratory Technologists	Healthcare professional and technical	Allied Healthcare	20	4,530	7,000	12,220	22,350	4,110	800	1,080	52,110
Medical Records and Health Information Technicians	Healthcare professional and technical	Allied Healthcare	1,740	26,290	19,880	3,350	17,050	4,550	-	850	73,710
Nuclear Medicine Technologists	Healthcare professional and technical	Allied Healthcare	-	810	1,040	4,030	1,440	170	-	-	7,490
Occupational Health and Safety Specialists	Healthcare professional and technical	Allied Healthcare	3,510	9,860	7,570	2,790	1,640	250	70	20	25,710

Appendix 2: Forecast of detailed job openings in healthcare occupations by education, 2010 through 2020

Occupation	General occupational category	Specific occupational category	High school dropouts	High school graduates	Some college	Associate's degrees	Bachelor's degrees	Master's degrees	Professional degrees	PhDs	Total
Occupational Health and Safety Technicians	Healthcare professional and technical	Allied Healthcare	700	1,960	1,500	550	320	50	10	-	5,090
Occupational Therapists	Healthcare professional and technical	Allied Healthcare	-	-	-	-	-	37,990	1,750	17,350	57,090
Opticians, Dispensing	Healthcare professional and technical	Allied Healthcare	940	7,780	7,680	5,240	7,790	1,180	-	-	30,610
Orthotists and Prosthetists	Healthcare professional and technical	Allied Healthcare	-	-	200	200	300	1300	-	-	2,000
Pharmacy Technicians	Healthcare professional and technical	Allied Healthcare	1,060	40,290	62,060	33,540	22,520	1,380	1,650	3,790	166,290
Physical Therapists	Healthcare professional and technical	Allied Healthcare	-	-	-	11,040	54,370	34,550	-	630	100,590
Physician Assistants	Healthcare professional and technical	Allied Healthcare	610	840	3,790	6,320	8,890	19,260	-	890	40,600
Psychiatric Technicians	Healthcare professional and technical	Allied Healthcare	160	5,960	9,180	4,960	3,330	200	240	560	24,590
Radiation Therapists	Healthcare professional and technical	Allied Healthcare	-	80	240	110	2,450	2,440	260	1,110	6,690
Radiologic Technologists and Technicians	Healthcare professional and technical	Allied Healthcare	-	10,230	13,250	51,130	18,300	2,190	-	-	95,100
Recreational Therapists	Healthcare professional and technical	Allied Healthcare	-	-	250	4,590	4,550	1,210	-	1,310	11,910
Respiratory Therapists	Healthcare professional and technical	Allied Healthcare	-	3,950	19,160	10,930	18,670	-	-	-	52,710
Respiratory Therapy Technicians	Healthcare professional and technical	Allied Healthcare	20	730	1,120	610	410	20	30	70	3,010
Speech-Language Pathologists	Healthcare professional and technical	Allied Healthcare	240	-	8,270	28,000	13,810	1,390	600	-	52,310
Surgical Technologists	Healthcare professional and technical	Allied Healthcare	220	8,210	12,650	6,840	4,590	280	340	770	33,900
Therapists, All Other	Healthcare professional and technical	Allied Healthcare	-	110	220	-	1,680	14,300	-	-	16,310
Veterinary Technologists and Technicians	Healthcare professional and technical	Allied Healthcare	360	13,500	20,790	11,230	7,540	460	550	1,270	55,700
			19,400	199,480	291,980	336,010	333,920	164,250	24,420	34,030	1,403,490

Appendix 2: Forecast of detailed job openings in healthcare occupations by education, 2010 through 2020

Occupation	General occupational category	Specific occupational category	High school dropouts	High school graduates	Some college	Associate's degrees	Bachelor's degrees	Master's degrees	Professional degrees	PhDs	Total
Chiropractors	Healthcare professional and technical	Doctors	100	-	-	-	2,470	390	9,800	12,540	25,300
Dentists, All Other Specialists	Healthcare professional and technical	Doctors	-	-	-	-	80	60	1,870	1,190	3,200
Dentists, General	Healthcare professional and technical	Doctors	-	-	-	60	1,590	1,170	38,900	24,670	66,390
Optometrists	Healthcare professional and technical	Doctors	-	-	-	-	1,530	-	12,070	9,800	23,400
Oral and Maxillofacial Surgeons	Healthcare professional and technical	Doctors	-	-	-	-	100	70	2,400	1,520	4,090
Orthodontists	Healthcare professional and technical	Doctors	-	-	-	-	100	70	2,460	1,560	4,190
Pharmacists	Healthcare professional and technical	Doctors	-	1,420	2,300	3,600	58,950	13,920	17,760	41,660	139,610
Physicians and Surgeons	Healthcare professional and technical	Doctors	-	-	-	-	-	-	299,000	6,080	305,080
Podiatrists	Healthcare professional and technical	Doctors	-	-	-	-	-	-	3,530	1,570	5,100
Prosthodontists	Healthcare professional and technical	Doctors	-	-	-	-	10	10	290	190	500
Veterinarians	Healthcare professional and technical	Doctors	-	-	-	-	-	3,520	29,990	690	34,200
Child, Family, and School Social Workers	Community and social services	Other healthcare	100	2,580	2,810	7,990	71,890	64,570	271,290	189,830	611,060
Clinical, Counseling, and School Psychologists	Life, physical and social scientists	Other healthcare	500	7,970	10,570	6,210	60,580	40,530	890	1,050	128,300
Counselors, All Other	Community and social services	Other healthcare	-	-	760	1,420	2,440	33,920	5,100	38,660	82,300
Educational, Guidance, School, and Vocational Counselors	Community and social services	Other healthcare	210	1,070	1,430	950	3,470	5,860	220	280	13,490
	Community and social services	Other healthcare	1,810	9,050	12,010	8,000	29,260	49,320	1,880	2,390	113,720

Appendix 2: Forecast of detailed job openings in healthcare occupations by education, 2010 through 2020

Occupation	General occupational category	Specific occupational category	High school dropouts	High school graduates	Some college	Associate's degrees	Bachelor's degrees	Master's degrees	Professional degrees	PhDs	Total
Environmental Science and Protection Technicians, Including Health	Life, physical and social scientists	Other healthcare	-	3,120	5,800	3,090	6,020	1,390	-	70	19,490
Epidemiologists	STEM	Other healthcare	-	-	20	-	390	360	180	550	1,500
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	STEM	Other healthcare	-	-	730	460	4,740	2,260	-	-	8,190
Health Educators	Community and social services	Other healthcare	-	3,560	2,150	5,710	20,850	4,630	-	-	36,900
Healthcare Social Workers	Community and social services	Other healthcare	340	5,430	7,200	4,230	41,270	27,610	600	720	87,400
Marriage and Family Therapists	Community and social services	Other healthcare	360	1,800	2,390	1,590	5,810	9,800	370	470	22,590
Medical and Health Services Managers	Managerial and Professional	Other healthcare	2,480	13,340	14,890	22,630	44,370	33,560	2,280	8,330	141,880
Medical Scientists, Except Epidemiologists	STEM	Other healthcare	-	-	450	-	11,160	10,190	5,080	15,730	42,610
Mental Health and Substance Abuse Social Workers	Community and social services	Other healthcare	270	4,310	5,720	3,360	32,770	21,920	480	570	69,400
Mental Health Counselors	Community and social services	Other healthcare	1,100	5,520	7,330	4,890	17,860	30,110	1,150	1,460	69,420
Rehabilitation Counselors	Community and social services	Other healthcare	1,020	5,130	6,800	4,530	16,570	27,940	1,060	1,350	64,400
Social Workers, All Other	Community and social services	Other healthcare	120	1,880	2,500	1,470	14,310	9,570	210	250	30,310
Substance Abuse and Behavioral Disorder Counselors	Community and social services	Other healthcare	660	3,320	4,400	2,940	10,730	18,090	690	880	41,710
Dental Assistants	Healthcare support paraprofessional	Healthcare support paraprofessional	8,870	65,500	85,150	71,480	322,600	327,060	20,190	72,760	973,610
Healthcare Support Workers, All Other	Healthcare support paraprofessional	Healthcare support paraprofessional	3,910	40,350	55,270	37,810	14,310	820	1,520	-	153,990
Home Health Aides	Healthcare support paraprofessional	Healthcare support paraprofessional	13,770	21,200	17,750	4,160	7,660	1,260	-	-	65,800
	Healthcare support paraprofessional	Healthcare support paraprofessional	196,230	376,460	173,780	91,040	-	-	-	-	837,510

Appendix 2: Forecast of detailed job openings in healthcare occupations by education, 2010 through 2020

Occupation	General occupational category	Specific occupational category	High school dropouts	High school graduates	Some college	Associate's degrees	Bachelor's degrees	Master's degrees	Professional degrees	PhDs	Total
Massage Therapists	Healthcare support paraprofessional	Healthcare support paraprofessional	1,020	9,380	23,140	9,370	10,120	1,740	930	210	55,910
Medical Assistants	Healthcare support paraprofessional	Healthcare support paraprofessional	8,220	49,780	100,490	60,660	17,800	5,750	1,100	-	243,800
Medical Equipment Preparers	Healthcare support paraprofessional	Healthcare support paraprofessional	-	2,040	6,830	5,070	2,260	-	-	-	16,200
Medical Transcriptionists	Healthcare support paraprofessional	Healthcare support paraprofessional	-	2,550	8,520	6,320	2,810	-	-	-	20,200
Nursing Aides, Orderlies, and Attendants	Healthcare support paraprofessional	Healthcare support paraprofessional	-	116,240	223,000	102,940	53,930	-	-	-	496,110
Occupational Therapy Aides	Healthcare support paraprofessional	Healthcare support paraprofessional	-	400	630	1,360	830	290	-	80	3,590
Occupational Therapy Assistants	Healthcare support paraprofessional	Healthcare support paraprofessional	-	1,880	2,950	6,360	3,850	1,370	-	390	16,800
Pharmacy Aides	Healthcare support paraprofessional	Healthcare support paraprofessional	160	3,260	8,430	3,540	6,920	-	-	-	22,310
Physical Therapist Aides	Healthcare support paraprofessional	Healthcare support paraprofessional	-	3,090	4,840	10,450	6,330	2,240	-	650	27,600
Physical Therapist Assistants	Healthcare support paraprofessional	Healthcare support paraprofessional	-	4,610	7,230	15,600	9,450	3,350	-	960	41,200
Psychiatric Aides	Healthcare support paraprofessional	Healthcare support paraprofessional	-	-	4,450	8,540	3,940	2,070	-	-	19,000
Veterinary Assistants and Laboratory Animal Caretakers	Healthcare support paraprofessional	Healthcare support paraprofessional	2,540	5,790	4,650	2,560	6,070	-	-	-	21,610
			226,260	635,240	632,090	370,930	151,580	20,830	2,620	2,080	2,041,630
Licensed Practical and Licensed Vocational Nurses	Healthcare professional and technical	Nurses	2,070	76,650	125,900	134,170	26,210	1,990	1,290	960	369,240
Registered Nurses	Healthcare professional and technical	Nurses	1,570	10,630	48,900	470,040	579,310	79,810	14,730	2,420	1,207,400
			2,070	76,650	125,900	134,170	26,210	1,990	838,140	371,510	1,576,640

Appendix 3: Wage premium by educational attainment for healthcare professionals over support workers

2008-2010	Support	Professional	
High school only	\$19,520	\$35,760	83%
Some College_AA	\$23,960	\$41,405	73%
Bachelor's degree	\$24,870	\$53,480	115%
Master's degree plus	\$26,160	\$117,070	348%

1983-1985	Support	Professional	
High school only	\$16,470	\$26,650	62%
Some College_AA	\$18,460	\$31,870	73%
Bachelor's degree	\$22,550	\$37,920	68%
Master's degree plus	\$28,140	\$58,570	108%

Appendix 4: Wages of detailed healthcare occupations by education

	Education				
	HS or less	Some college	AA	BA	Grad
	Mean earnings				
Audiologists	***	***	***	***	63,000
Chiropractors	***	***	***	***	81,000
Clinical laboratory technologists and technicians	36,000	38,000	41,000	51,000	58,000
Dental assistants	26,000	27,000	28,000	28,000	29,000
Dental hygienists	40,000	40,000	44,000	47,000	50,000
Dentists	***	***	***	95,000	157,000
Diagnostic related technologists and technicians	44,000	48,000	51,000	56,000	67,000
Dietitians and nutritionists	28,000	31,000	34,000	43,000	50,000
Emergency medical technicians and paramedics	43,000	44,000	47,000	47,000	51,000
Health diagnosing and treating practitioners, all others	***	***	***	40,000	51,000
Health practitioner support technologists and technicians	30,000	32,000	32,000	33,000	39,000
Healthcare support workers, all others	24,000	27,000	28,000	31,000	40,000
Licensed practical and licensed vocational nurses	37,000	37,000	37,000	45,000	53,000
Massage therapists	21,000	20,000	20,000	24,000	23,000
Medical assistants	25,000	26,000	27,000	31,000	33,000
Medical records and health information technicians	29,000	30,000	33,000	37,000	47,000
Medical transcriptionists	26,000	26,000	27,000	30,000	39,000
Miscellaneous health technologists and technicians	33,000	35,000	42,000	55,000	78,000
Nurse anesthetists	***	***	59,000	64,000	141,000
Nurse practitioners and nurse midwives	***	50,000	54,000	58,000	80,000
Nursing, psychiatric, and home health aides	21,000	23,000	25,000	28,000	63,000

Appendix 4: Wages of detailed healthcare occupations by education

	Education				
	HS or less	Some college	AA	BA	Grad
	Mean earnings				
Occupational therapists	***	***	42,000	55,000	56,000
Occupational therapy assistants and aides	***	38,000	40,000	40,000	***
Opticians, dispensing	31,000	33,000	43,000	42,000	***
Optometrists	***	***	***	***	90,000
Other healthcare professionals and technical occupations	47,000	56,000	49,000	57,000	67,000
Other therapists, including exercise physiologists	31,000	32,000	41,000	43,000	45,000
Pharmacists	71,000	44,000	52,000	94,000	101,000
Pharmacy aides	24,000	27,000	26,000	43,000	38,000
Phlebotomists	26,000	27,000	26,000	34,000	37,000
Physical therapist assistants and aides	25,000	27,000	40,000	33,000	49,000
Physical therapists	47,000	35,000	44,000	63,000	66,000
Physician assistants	39,000	39,000	49,000	72,000	84,000
Physicians and surgeons	140,000	86,000	70,000	149,000	185,000
Podiatrists	***	***	***	***	119,000
Radiation therapists	***	75,000	66,000	72,000	***
Recreational therapists	29,000	25,000	***	39,000	40,000
Registered nurses	53,000	52,000	53,000	59,000	73,000
Respiratory therapists	44,000	49,000	50,000	57,000	62,000
Speech-language pathologists	***	***	***	43,000	54,000
Veterinarians	***	***	***	70,000	88,000
Veterinary assistants and laboratory animal caretakers	22,000	24,000	28,000	24,000	***

*** Sample size too small.

Appendix 5: Sample of healthcare wages and employment levels

	Average annual wages	% of healthcare employment
Registered Nurses	69,110	24
Licensed Practical and Licensed Vocational Nurses	42,040	6
Pharmacy Technicians	30,020	3
Emergency Medical Technicians and Paramedics	34,030	2
Nursing Aides, Orderlies, and Attendants	25,420	13
Home Health Aides	21,820	8
Personal Care Aides	20,560	7

Source: Occupational Employment Statistics (OES), May 2011

Appendix 6: Mean annual healthcare wages

Occupation	Mean Annual Wage	Mean RSE*
Surgeons	225,390	0.013
Anesthesiologists	220,100	0.022
Oral and Maxillofacial Surgeons	214,120	0.049
Obstetricians and Gynecologists	210,340	0.016
Orthodontists	200,290	0.047
Internists, General	189,480	0.016
Physicians and Surgeons, All other	180,870	0.01
Family and General Practitioners	173,860	0.009
Psychiatrists	167,610	0.015
Pediatricians, General	165,720	0.016
Dentists, All other Specialists	162,190	0.044
Dentists, General	158,770	0.014
Prosthodontists	139,620	0.226
Podiatrists	133,410	0.019
Pharmacists	109,380	0.003
Optometrists	106,750	0.014
Veterinarians	92,570	0.012
Physician Assistants	87,140	0.005
Health Diagnosing and Treating Practitioners, All other	81,830	0.019
Chiropractors	79,820	0.017
Radiation Therapists	78,290	0.009
Physical Therapists	77,990	0.003
Occupational Therapists	73,380	0.004
Healthcare Professionals and Technical Occupations	71,280	0.002
Speech-Language Pathologists	69,880	0.004
Audiologists	69,840	0.013
Nuclear Medical Technologists	69,050	0.005
Orthodontists and Prosthetics	68,930	0.017
Dental Hygienists	68,680	0.006
Registered Nurses	67,720	0.003
Occupational Health and Safety Specialists	65,610	0.004
Diagnostic Medical Sonographers	64,900	0.004
Medical and Clinical Laboratory Technologists	56,870	0.003
Radiological Technologists and Technicians	55,730	0.006
Respiratory Therapists	55,200	0.003
Dietitians and Nutritionists	54,340	0.006
Healthcare Professionals and Technical Workers, All Others	52,580	0.013
Therapists, All Other	51,980	0.013
Cardiovascular Technologists and Technicians	50,720	0.005
Occupational Health and Safety Technicians	47,520	0.009
Respiratory Therapy Technicians	46,340	0.005
Athletic Trainers	44,030	0.01
Health Technologists and Technicians, All other	42,240	0.005

Appendix 6: Mean annual healthcare wages

Occupation	Mean Annual Wage	Mean RSE*
Recreational Therapists	41,440	0.006
Licensed Practical and Licensed Vocational Nurses	41,360	0.002
Surgical Technologists	41,310	0.004
Medical and Clinical Laboratory Technicians	38,190	0.004
Medical Records and Health Information Technicians	35,010	0.004
Opticians, Dispensing	34,800	0.008
Emergency Medical Technicians and Paramedics	33,300	0.007
Psychiatric Technicians	31,520	0.017
Veterinary Technologists and Technicians	31,030	0.006
Pharmacy Technicians	29,330	0.003
Dietetic Technicians	28,820	0.007

* The relative standard error (RSE) is a measure of the reliability of a survey statistic. The smaller the relative standard error, the more precise the estimate.
Source: Occupational Employment Statistics (OES), May 2010

Occupation	Mean Annual Wages	Mean RSE*
Occupational Therapy Assistants	51,300	0.006
Physical Therapists Assistants	49,810	0.005
Massage Therapists	39,770	0.013
Dental Assistants	34,140	0.004
Medical Transcriptionists	33,530	0.004
Healthcare support workers, All other	31,670	0.004
Occupational Therapy Aides	31,090	0.017
Medical Equipment Preparers	30,350	0.004
Medical Assistants	29,760	0.003
Healthcare Support Occupations	26,920	0.002
Psychiatric Aides	26,710	0.007
Nursing Aides, Orderlies and Attendants	25,140	0.002
Physical Therapists Aides	25,000	0.006
Veterinary Assistants and Laboratory Animal Caretakers	23,660	0.007
Pharmacy Aides	22,830	0.01
Home Health Aides	21,760	0.004

Footnotes:

Annual wages have been calculated by multiplying the hourly mean wage by 2080 hours; where an hourly mean wage is not published the annual wage has been directly calculated from the reported survey data.

SOC code: Standard Occupational Classification code – see <http://www.bls.gov/soc/home.htm>

Data extracted on March 26 2012

Appendix 8: Occupation distribution of top 1% of family income in the nation

ACS 2008-2010

1 percent - cutoff = 195941

Top 20 by occupation

Occupation	percent
Physicians and surgeons	13.8%
Chief executives and legislators	11.5
Lawyers, and judges, magistrates, and other judicial	8.4
Miscellaneous managers, including funeral service ma	7.5
Financial managers	3.3
Accountants and auditors	2.8
First-line supervisors of non-retail sales workers	2.7
Marketing and sales managers	2.7
General and operations managers	2.6
Securities, commodities, and financial services sale	2.3
Sales representatives, wholesale and manufacturing	2.2
Personal financial advisors	1.9
First-line supervisors of retail sales workers	1.7
Management analysts	1.7
Dentists	1.6
Sales representatives, services, all other	1.3
Construction managers	1.2
Retail salespersons	1.1
Insurance sales agents	1.1
Computer and information systems managers	1.0

Appendix 9: Distribution of female doctors and male nurses

	female doctors	Male nurses
1983	23%	5%
	21	4
1985	23	5
	23	6
1987	23	5
	25	6
1989	24	7
	26	5
1991	24	7
	25	6
1993	28	4
	27	6
1995	29	6
	31	5
1997	35	7
	33	7
1999	30	7
	33	7
2001	35	7
	34	7
2003	34	7
	33	8
2005	35	8
	35	8
2007	36	8
	36	9
2009	36	10
	37	11
2011	37	11

Appendix 10: Age distribution of detailed healthcare occupations

Occupation	Age					
	18-24	25-34	35-44	45-54	55-64	65-74
Audiologists	***	28%	23%	27%	16%	***
Chiropractors	***	21%	29%	29%	17%	4%
Clinical laboratory technologists and technicians	11%	24%	19%	24%	17%	4%
Dental assistants	19%	31%	23%	18%	8%	1%
Dental hygienists	4%	27%	26%	27%	12%	3%
Dentists	***	15%	22%	26%	26%	11%
Diagnostic related technologists and technicians	7%	25%	26%	25%	14%	3%
Dietitians and nutritionists	7%	24%	21%	24%	18%	6%
Emergency medical technicians and paramedics	19%	35%	26%	14%	5%	1%
Health diagnosing and treating practitioners, all others	***	11%	25%	31%	26%	7%
Health practitioner support technologists and technicians	23%	31%	19%	16%	9%	2%
Healthcare support workers, all other, including med	20%	26%	18%	19%	13%	3%
Licensed practical and licensed vocational nurses	6%	20%	23%	24%	20%	6%
Massage therapists	9%	28%	24%	24%	13%	2%
Medical assistants	18%	31%	22%	17%	10%	2%
Medical records and health information technicians	12%	20%	20%	25%	17%	6%
Medical transcriptionists	14%	24%	21%	21%	16%	4%
Miscellaneous health technologists and technicians	10%	24%	23%	24%	14%	4%
Nurse anesthetists	***	20%	26%	28%	19%	4%
Nurse practitioners and nurse midwives	2%	18%	24%	29%	22%	5%
Nursing, psychiatric, and home health aides	16%	23%	21%	22%	14%	5%
Occupational therapists	2%	30%	32%	23%	11%	2%
Occupational therapy assistants and aides	7%	33%	22%	26%	11%	***
Opticians, dispensing	9%	20%	23%	24%	19%	5%
Optometrists	***	22%	27%	27%	19%	6%
Other healthcare professionals and technical occupations	11%	25%	22%	23%	17%	3%
Other therapists, including exercise physiologists	6%	30%	23%	20%	17%	4%
Pharmacists	7%	26%	24%	20%	17%	6%
Pharmacy aides	21%	30%	19%	18%	10%	3%
Phlebotomists	15%	31%	23%	20%	9%	2%
Physical therapist assistants and aides	21%	28%	23%	20%	8%	1%
Physical therapists	3%	29%	33%	23%	10%	2%
Physician assistants	7%	33%	26%	19%	13%	3%
Physicians and surgeons	0%	20%	26%	25%	20%	8%
Podiatrists	***	15%	29%	29%	21%	***
Radiation therapists	***	29%	28%	27%	9%	***
Recreational therapists	10%	22%	24%	23%	15%	6%
Registered nurses	3%	19%	24%	28%	20%	5%
Respiratory therapists	3%	22%	25%	29%	18%	2%
Speech-language pathologists	3%	29%	26%	22%	18%	3%
Veterinarians	***	23%	27%	25%	19%	6%
Veterinary assistants and laboratory animal caretakers	26%	28%	19%	17%	8%	2%

Appendix 11: Nativity of detailed healthcare occupations

Occupation	Nativity	
	Native	Foreign born
Audiologists	96.90%	***
Chiropractors	92.04%	7.96%
Clinical laboratory technologists and technicians	79.98%	20.02%
Dental assistants	82.33%	17.67%
Dental hygienists	91.89%	8.11%
Dentists	78.64%	21.36%
Diagnostic related technologists and technicians	89.02%	10.98%
Dietitians and nutritionists	86.56%	13.44%
Emergency medical technicians and paramedics	95.78%	4.22%
Health diagnosing and treating practitioners, all others	64.59%	35.41%
Health practitioner support technologists and technicians	87.29%	12.71%
Healthcare support workers, all other, including med	85.91%	14.09%
Licensed practical and licensed vocational nurses	87.64%	12.36%
Massage therapists	86.08%	13.92%
Medical assistants	85.82%	14.18%
Medical records and health information technicians	89.14%	10.86%
Medical transcriptionists	97.73%	***
Miscellaneous health technologists and technicians	86.01%	13.99%
Nurse anesthetists	91.82%	***
Nurse practitioners and nurse midwives	91.06%	8.94%
Nursing, psychiatric, and home health aides	77.16%	22.84%
Occupational therapists	90.14%	9.86%
Occupational therapy assistants and aides	93.69%	***
Opticians, dispensing	91.13%	8.87%
Optometrists	89.11%	10.89%
Other healthcare professionals and technical occupations	92.20%	7.80%
Other therapists, including exercise physiologists	91.59%	8.41%
Pharmacists	79.56%	20.44%
Pharmacy aides	83.08%	16.92%
Phlebotomists	88.08%	11.92%
Physical therapist assistants and aides	90.41%	9.59%
Physical therapists	84.97%	15.03%
Physician assistants	86.26%	13.74%
Physicians and surgeons	72.44%	27.56%
Podiatrists	94.22%	***
Radiation therapists	92.81%	***
Recreational therapists	86.03%	***
Registered nurses	84.82%	15.18%
Respiratory therapists	89.34%	10.66%
Speech-language pathologists	95.98%	4.02%
Veterinarians	93.02%	6.98%
Veterinary assistants and laboratory animal caretakers	93.95%	***

Source: ACS 2008-2010 (pooled sample)

Appendix 12: Household income by detailed healthcare occupation

Occupation	Share in each household income quartile				Total
	Q1 Percent	Q2 Percent	Q3 Percent	Q4 Percent	
Audiologists	***	8%	24%	65%	100%
Chiropractors	6	11	25	58	100
Clinical laboratory technologists and technicians	6	20	33	40	100
Dental assistants	10	24	36	30	100
Dental hygienists	3	10	31	56	100
Dentists	2	4	9	85	100
Diagnostic related technologists and technicians	3	14	35	48	100
Dietitians and nutritionists	7	17	29	47	100
Emergency medical technicians and paramedics	6	20	36	37	100
Health diagnosing and treating practitioners, all others	13	18	28	41	100
Health practitioner support technologists and technicians	11	27	35	28	100
Healthcare support workers, all other, including med	17	30	32	21	100
Licensed practical and licensed vocational nurses	9	27	37	27	100
Massage therapists	19	26	30	24	100
Medical assistants	15	28	33	23	100
Medical records and health information technicians	13	28	34	26	100
Medical transcriptionists	13	27	34	26	100
Miscellaneous health technologists and technicians	10	24	32	33	100
Nurse anesthetists	***	9	22	65	100
Nurse practitioners and nurse midwives	2	7	28	63	100
Nursing, psychiatric, and home health aides	28	32	26	15	100
Occupational therapists	2	7	28	63	100
Occupational therapy assistants and aides	***	18	38	38	100
Opticians, dispensing	8	26	37	30	100
Optometrists	***	4	13	80	100
Other healthcare professionals and technical occupations	3	15	34	48	100
Other therapists, including exercise physiologists	7	20	30	43	100
Pharmacists	3	3	9	85	100
Pharmacy aides	15	25	34	27	100
Phlebotomists	15	29	35	21	100
Physical therapist assistants and aides	8	23	35	34	100
Physical therapists	2	6	27	65	100
Physician assistants	4	10	23	63	100
Physicians and surgeons	2	7	10	82	100
Podiatrists	***	***	13	79	100
Radiation therapists	***	***	23	71	100
Recreational therapists	11	26	35	28	100
Registered nurses	3	10	30	57	100
Respiratory therapists	3	14	37	46	100
Speech-language pathologists	2	7	27	63	100
Veterinarians	3	6	20	71	100
Veterinary assistants and laboratory animal caretakers	16	26	35	23	100

Appendix 13: Sample of healthcare professions, average education and general licensure requirements

Profession	Education Required	Licensure	Maintenance of license
Chiropractors	Doctor of Chiropractic (D.C.), postgraduate professional degree, takes 4 years to complete.	All states and D.C.; in addition to completion of education program, specific jurisdiction exam, national exam administered by the National Board of Chiropractic Examiners or both are required for licensure.	Annual (AL, TX) or biennial (AK, DE, MD) license renewal, with required continuing education.
Dentists	Doctor of Dental Surgery (D.D.S.) or Doctor of Dental Medicine (D.M.D.) degree; 2-4 years specialty training 1-2 year postgraduate residency in chosen specialty are required to practice in one of nine specialties.	All states and D.C.; in addition to completion of education program, written and practical examination required for licensure; practice in specialty requires additional licensure in that specialty	Two year license renewal term (CA), with continuing education requirements.
Dietitians and nutritionists	Bachelor's Degree in a related field and usually supervised training after graduation.	Most states require license, some require only registration or certification, and small number have no regulations at all. License requirements include completion of Bachelor's program, examination, and supervised training.	Every other year license renewal (D.C., TN), with continued education or demonstration of continued competency, in states where license is required.
Optometrists	Doctor of Optometry (O.D.), 4 year professional doctorate program; one-year postgraduate residency for specialty training.	All states and D.C.; in addition to completion of education program, passage of National Boards in Optometry examination and in some states also additional examinations is required for licensure.	Annual (VA) or biennial (D.C., TN) license renewal term, with continued education requirements.
Pharmacists	Doctor of Pharmacy (Pharm. D.), 3-4 year professional degree; 1-2 year postgraduate residency required for advanced positions in areas such as clinical practice and research.	All states and D.C.; in addition to completion of education program, passage of two exams, one in pharmacy skills and knowledge, and one in pharmacy laws of the state granting the license is required for pharmacy practice.	Annual (AL, KY) or biennial (D.C.) license renewal term, with continued education requirements.
Physicians and surgeons	Doctor of Medicine (M.D.) or Doctor of Osteopathy (D.O.) 4 year medical school degree followed by 3-8 years of hospital residency training, depending on specialty.	All states and D.C.; in addition to completion of medical school and residency in chosen specialty, all M.D.'s are required to pass U.S. Medical Licensing Examination (USMLE) and all DOs are required to pass Comprehensive Osteopathic Medical Licensing Examination (COMLEX-USA).	Annual (LA) or biennial (D.C., CA, and VA) license renewal, with continued education or continued competency requirements.
Physician assistants	P.A. programs generally last two years; majority of P.A. programs offer Master's degree, but some exist at Bachelor's level and very small number offer associate's degree or graduate certificate.	All states and D.C.; in addition to completion of education program, are required to pass Physician Assistant National Certifying Examination from the National Commission on Certification of Physician Assistants (NCCPA).	Biennial (D.C., VA, CA, MI, TN) license renewal, with continued education or continued competence requirements, and re-certification exam or alternative program combining learning experience and take-home exam every 6 years.
Podiatrists	Doctor of Podiatric Medicine (D.P.M.) 4 year professional doctorate degree, followed by 3 years of clinical residency.	All states and D.C.; in addition to completion of education program, passage of oral or written state examination, and in most states completion of postgraduate residency program, are required for licensure	Annual (KY) or Biennial (D.C.), with continued education requirements.
Audiologists	Doctor of Audiology (Au. D.), 4yr graduate degree.	All states and D.C.; requirements for licensure vary by state, but generally include completion of the educational program and some combination of passage of qualifying examination, completion of supervised practice, and/or obtainment of Certificate of Clinical Competence in Audiology from American Speech-Language-Hearing Association or certification through American Board of Audiology.	Annual (VA) or biennial (D.C., TN) license renewal term, with continued education requirements.

Appendix 13: Sample of healthcare professions, average education and general licensure requirements

Profession	Education Required	Licensure	Maintenance of license
Occupational therapists	Master's degree in Occupational Therapy (a few doctoral programs are also available, but doctorate degree is not required)	All states and D.C.; in addition to completion of educational program, passage National Board for Certification of Occupational Therapists (NBCOT) is required for licensure.	Biennial (D.C., OH, OR, GA) license renewal term, with continued education requirements
Physical therapists	Doctor of Physical Therapy (DPT) 3 yr or Master of Physical Therapy (MPT) 2-3yr postgraduate professional degree, with majority of programs awarding DPT.	All States and D.C.; requirements for licensure vary by state, but generally include completion of the educational program and passage of National Physical Therapy Examination or equivalent state administered exam.	Biennial (MD, D.C., GA, IL, CA) license renewal term, with continued education or continued competency requirements.
Radiation therapists	12-month certificate, Associate's degree or Bachelor's degree.	Most states require license; requirements for licensure vary by state, but generally include completion of the educational program and certification by the American Registry of Radiologic Technologists (ARRT), which includes ARRT certification exam.	Biennial (OR, IA) license renewal term with continued education requirements
Recreational therapists	Bachelor's degree in therapeutic recreation or related field (less common Associate's, Master's and Doctorate degrees are also available)	As of 2010, NC, UT, OK, and NH require licensure; licensure requirements vary by state, but generally include completion of educational program that meets requirements laid out by state licensing authorities, being of good moral character as verified by background check, and certification by National Council for Therapeutic Recreation Certification	Biennial (OK, UT, NC) license renewal term, in states that require licensure, with continued education requirements (that may be waived in some cases, in some states)
Respiratory therapists	Associate's or Bachelor's degree in Respiratory Therapy	All states (and D.C.), except Alaska; in addition to completion of educational program, passage of state or professional certification exam is generally required for licensure	Biennial (D.C., AZ, AL, TN) license renewal term, with continuing education requirements
Speech-language pathologists	Master's degree in Speech-Language Pathology	Nearly all states and D.C.; licensure generally requires at least completion of master's degree and supervised clinical experience.	Biennial (D.C., MN) license renewal term, with continuing education requirements.
Veterinarians	Doctor of Veterinary Medicine (D.V.M. or V.M.D.) 4 yr degree	All states and D.C.; in addition to completion of accredited education program in veterinary medicine, passage of North American Veterinary Licensing Exam, and, in most states, state exam that covers laws and regulations related to veterinary medicine is required for licensure	Annual (MD) or biennial (D.C.) license renewal term, with continuing education requirements
Registered nurses	Bachelor of Science in Nursing (B.S.N.) degree, Associate Degree Nursing (A.D.N.) degree, or diploma in nursing.	All states, D.C., and U.S. territories; licensing requirements include at the minimum the completion of approved educational program and passage of the National Council Licensure Examination (NCLEX-RN).	Annual (MD) or biennial (D.C.) license renewal term, with continuing education requirements
Nurse anesthetists	Master's degree or Doctorate degree in nurse anesthesia (licensed RN required to enroll in the program).	Most states provide special license, certificate or authorization to licensed RN to indicate that individual is authorized to practice as CRNA; requirements for certificate or authorization generally include RN license, completion of approved graduate level educational program, and certification from the Council on Certification of Nurse Anesthetists	Renewed either separately (annual, D.C.) or at the same time as RN license (biennial, GA) and biennial national recertification, with continuing education and substantial engagement in the profession requirements
Nurse practitioners and nurse midwives	Master of Nursing (MSN) degree or Doctorate degree, with concentration in NP training (for NPs) or nurse midwifery for CRNMs) (licensed RN required to enroll in the program).	Most states provide special license, certificate or authorization to licensed RN to indicate that individual is authorized to practice as NP or CRNM; requirements for certificate or authorization generally include RN license, completion of approved graduate level educational program, and passage of national examination	Renewed either separately (biennial, D.C.) or at the same time as RN license (biennial, GA) and national recertification programs (terms vary depending on the program), with continuing education and clinical practice, and/or examination requirements

Appendix 13: Sample of healthcare professions, average education and general licensure requirements

Profession	Education Required	Licensure	Maintenance of license
Medical and Clinical laboratory technologists and technicians	Bachelor's Degree in related field for technologists; Associate's degree or postgraduate certificate for technicians.	Some states require licensure or registration; minimum of Bachelor's program in a related field and passage of the national examination is required to be licensed as technologist in states that require licensure.	Annual (WV) renewal, with continued education requirements in some states.
Dental hygienists	Associate's degree in dental hygiene; less commonly awarded are certificates, Bachelor's degrees and Master's degrees.	All States and D.C.; licensure requirements generally include completion of the accredited program in the field and passage of written and practical examinations.	Annual (AL, CT), biennial (AK, FL, HI) or 3 year (AZ, MT, NM) license renewal term, with continuing education requirement.
Cardiovascular Technologists and Technicians and Vascular Technologists	Associate's degree in the discipline; Bachelor's degree and one-year certificate programs are also offered.	Not licensed, but certification is required by some payers; variety of certifications available depending on clinical area of focus; certifications generally require passage of certification exam following completion of educational program	NA
Diagnostic Medical Sonographers	Associate's degree or Bachelor's degree in diagnostic medical sonography; One-year certificate programs available for those already in related healthcare field.	Majority of States do not require licensure, but a few (including OR and NM) do; licensure typically requires prove of professional certifications; certifications are obtained by passing examination in particular specialty following completion of educational program.	NA for majority of states; Biennial (OR) license renewal term; some credentialing organizations require continuing education/competence for renewal of license.
Nuclear Medicine Technologists	Associate's degree or Bachelor's degree in nuclear medicine; One-year certificate programs available for those with degree in related healthcare field.	Some states require licensure or certification (31 states require some form of licensure, credentialing or other professional standards fulfillment for regulations); licensure requirements include completion of educational program and examination or professional certification.	Biennial (ME, IN), with continued education requirements.
Radiologic Technologists	Associate's Degree, Bachelor's Degree or Certificate Program in Radiography.	Most states require licensure or certification; licensure requirements include completion of accredited program and passage of certification exam from state licensing authority or The American Registry of Radiologic Technologist (ARRT).	Biennial (ME, IN), with continued education requirements.
Emergency medical technicians and paramedics	Formal EMT training program; Formal EMT/Paramedic training or Associate's degree for paramedics.	All states; licensure requirements include completion of formal training program, background check, passage of examination, and/or certification from National Registry of Emergency Medical Technicians.	Biennial (WI), with continued education requirements.
Health practitioner support technologists and technicians	High school diploma or equivalent and on the job training for pharmacy technicians and ophthalmic laboratory technicians; Associate's degree or post-secondary certificate for surgical technologists; Bachelor's degree for veterinary technologists; Associate's degree for veterinary technicians.	Licensure, Certification or Registration is required in most states for veterinary technologists and technicians, and in most states the regulations require passage of Veterinary Technician National Examination; Most states license or require certification for pharmacy technicians, with background check and examination generally included in the licensing/certification requirements; Surgical technologists are not licensed, but have a number of national certification options; No licensing or certification is required for ophthalmic laboratory technicians.	Biennial (AK) license renewal term, with continued education requirements for pharmacy technicians; Biennial (GA) license renewal term, with continued education requirements for veterinary technologists and technicians.
Licensed practical and licensed vocational nurses	Certificate from accredited one year program.	All states and D.C.; in addition to completion of educational program, passage of National Council Licensure Examination (NCLEX-PN) is required for licensure.	Biennial (WV, CA), with continued education requirements.
Medical records and health information technicians	Associate's degree or postsecondary certificate in the discipline.	Not licensed, but professional certification is available; some certificates require passage of examination in addition to completion of accredited educational program.	NA

Appendix 13: Sample of healthcare professions, average education and general licensure requirements

Profession	Education Required	Licensure	Maintenance of license
Opticians, dispensing	High School degree with formal on the job training is the minimum requirement; Associate's degree and certificate programs are offered.	Twenty-three states require licensure; licensure requirements include completion of approved program or apprenticeship, a state written exam, a state practical exam, or certification exams from the American Board of Opticianry (ABO) and National Contact Lens Examiners (NCLEX-PN)	Annual (AZ, CT) or biennial (AK, FL), with continued education requirements.
Nursing, psychiatric, and home health aides	Postsecondary Certificate for nursing aides and attendants and psychiatric technicians, high school diploma for psychiatric aides; on the job or formal training for home health aides.	Four states AR, CA, CO, and TX require license of psychiatric technicians; completion of accredited program and passage of examination generally required for licensure; Certification through competence exam is available for certified nursing assistants (CNAs) and home health aides (HHAs) and required by certain payers for HHAs and for placement on state registry lists for CNAs.	NA for nursing aides and attendants, home health aides, psychiatric aides and psychiatric technicians in most states; Biennial (CA) license renewal term, with continuing education requirements for psychiatric technicians.
Occupational therapy assistants and aides	Associate's degree in occupational therapy for occupational therapy assistants; High School Diploma or equivalent and on the job training for occupational therapy aides.	Occupational therapy assistants are licensed in most states; licensure requirements include completion of accredited program and passage of an exam. Aides are not required to be licensed.	Biennial (MN, D.C.) license renewal term, with continuing education requirements for occupational therapy assistants; NA for occupational therapy aides.
Physical therapist assistants and aides	Associate's degree in physical therapy for physical therapy assistants; High School Diploma or equivalent and on the job training for physical therapy aides.	Physical therapy assistants are licensed in most states; licensure requirements include completion of accredited program and passage of National Physical Therapy Exam and for some states additional state exams. Aides are not required to be licensed.	Biennial (MN, D.C.) license renewal term, with continuing education requirements for physical therapy assistants; NA for physical therapy aides.
Massage therapists	Completion of formal postsecondary education program in massage therapy.	Licensure or Certification required in 43 states; licensure/certification requirements include completion of accredited training program and passage of Massage and Bodywork Licensing Examination (MBLEx), or the National Certification Examination for Therapeutic Massage & Bodywork (NCETMB), or state exam.	Annual (LA) or biennial (D.C.) license renewal term, with continued education or continued competency requirements.
Dental assistants	Certificate or Diploma is required in some states; other states have no formal education requirements; Associate degree programs are also offered.	Some states require licensure or registration with Dental Assisting National Board (DANB) for completion of certain regulated tasks.	Annual (WA) or biennial (D.C.) license/registration/certification renewal term, generally with no continued education requirements.
Medical assistants	High School Diploma and on the job training constitute minimum qualifications; certificate, diploma and Associate's degree program are also offered.	Not licensed and no certification required, however national professional certificates are available.	NA
Medical transcriptionists	Certificate or Associate's degree in the discipline.	Not licensed and no certification required, however national professional certificates are available from Association for Healthcare Documentation Integrity.	NA
Pharmacy aides	On the job training.	Not licensed or certified	NA
Veterinary assistants and laboratory animal caretaker	High School Diploma or equivalent and on the job training.	Not licensed and no certification required, however national professional certificates are available from American Association for Laboratory Animal Science.	NA
Phlebotomists	Certificate or Associate's degree in the discipline.	Not licensed in most state, however certification is available.	NA

Sources of information: Bureau of Labor Occupational Outlook Handbook, 2012-13 Edition; Rules and Regulations from the websites of state health departments and professional licensing boards for AL, AK, AZ, CA, D.C., GA, IA, IL, IN, KY, LA, MD, ME, MI, MN, NC, OH, OK, OR, TN, UT, VA, WA, WI, and WV; Federation of Chiropractic Licensing Boards Official Directory; Opticians Association of America State Societies; American Academy of Nurse Practitioners; American Association of Nurse Anesthetists; American Dental Association; American Dental Hygienists Association, American Midwifery Certification Board.

Appendix 14: Summary Table of projections of surplus/shortages by various institutions/authors

Profession	Organization/Author	Shortage/Surplus	2020 Shortfall/Surplus	2020 % Shortfall/Surplus
Doctors				
Physicians ⁶⁵	American Association of Medical Colleges (AAMC)	Shortage	91,500	10.7
Physicians ⁶⁶	Health Resources and Services Administration (HRSA)	Shortage	49,400	5.1
Pharmacists ⁶⁷	Health Resources and Services Administration (HRSA)	Shortage	28,900	10
Podiatrists ⁶⁸	Center for Health Workforce Studies, School of Public Health, University at Albany	Shortage	851	5.5
Nurses				
Registered Nurses	Health Resources and Services Administration (HRSA)	Shortage	808,416	29
Allied Health				
Physical Therapists	American Physical Therapy Association (APTA).	Shortage	25,000	11.6
Physician Assistants ⁶⁹	Orcutt, V.L.	Surplus	17,636	14.4

65. The shortage projection is based on update to the “most plausible” scenario based on assumption of greater demand in 2014 and beyond due to more people having health plan coverage as a result of provisions in ACA.

66. The projected shortage is based on the difference between baseline demand and supply projections.

67. The projected shortage is the difference between demand projected under assumption of moderate growth in prescription medications (Rx) consumed per capita and supply projected under baseline scenario.

68. The projected shortage is the difference between number of podiatrists projected under scenario where enough podiatrists are trained to meet increased demand from increases in population and increase in per capita demand, and supply of physicians under status quo scenario, which assumes the number of new entrants into profession remains constant

69. The projected shortage is the difference between demand projected based on expected increases in U.S. population and growth in GDP and supply under status quo scenario, where current enrollment rates into PA programs continue into the future.

Appendix 15: Summary table of projection methodologies employed by various institutions to forecast demand for the healthcare workforce

Study	Supply/ Demand projections	General Approach	Assumptions	Factors Considered	Main Results
BLS (All Classified Health Occupations)	Demand	Macroeconomic model applied to labor force projections distributed on the basis of industry market share and occupations to industries relationship matrices in the base year.	Variety of underlying assumptions regarding demographic changes, global economic growth, fiscal policy, monetary policy, government spending, and energy prices and supply.	Demographic changes, global economic growth, fiscal policy, monetary policy, government spending, and energy prices and supply.	Health care industry will add 3.2 million jobs by 2018.
AAMC Physicians	Both	Extension of current supply, utilization, disease and practice patterns to the projected population in the future; adjusted based on assumptions for “most plausible” scenario.	Increased physician utilization by those over 45, decreased number of hours worked by physicians due to changes in generational and gender makeup of the physician workforce, a moderate growth in Graduate Medical Education (GME), moderate increase in productivity due to changes in the care delivery models, greater demand due to increased health coverage in 2014 and beyond, and higher utilization due to obesity epidemic.	Physician utilization, productivity of physicians by age and gender, changes in medical education, changes in care delivery, changes in health coverage and changes in health status.	Shortage of 130,600 physicians across all specialties and 65,800 primary care physicians by 2025.
HRSA Physicians	Both	Supply: previous year supply + new U.S. and international graduates entering U.S. workforce - attrition due to retirement, death or disability, adjusted for physician productivity changes. Demand: model based on population projections, insurance coverage and physician utilization patterns.	Current trends in factors affecting physician supply, health care services utilization, and health care delivery will continue into the future (baseline scenario).	Graduation trends, physician demographic makeup, physician productivity, retirement, death and disability rates, demographic population changes, physician utilization patterns, and insurance coverage.	Shortfall of 49,000 physicians by 2020 (baseline scenario).
HRSA Nurses	Both	Supply: based on age-specific entrants and exits from licensed workforce, including addition of new graduates (projected on the basis of historical trends), subtraction of deaths and “net losses” in license renewals, and adjustments for additional education, “activity rates” through employment in nursing, and FTE for part-time employees Demand: combining empirical analysis and input from health care experts, extends current supply for 6 settings and 32 demographic subgroups into the future on the basis of changing utilization rates that include estimated per capita utilization modified by scalar based on expected trends.	Continuation of historical trends in entry and graduation from nursing programs at all levels, death rates and life expectancy, “activity rates,” and relative hours worked by part-time and full-time nurses; application of general population death rates and life expectancy to nursing; variation in utilization rates for different settings and population subgroups (particularly greater growth for settings focusing on services to the elderly).	Age, new graduates, additional education, licensure, deaths, employment in nursing, FTE, care settings, population demographics (age, sex, urban/rural location), expected changes in industry trends (based on expert input), and utilization rates.	Shortage of 808,416 nurses, 29% of nursing workforce by 2020.

Appendix 15: Summary table of projection methodologies employed by various institutions to forecast demand for the healthcare workforce

Study	Supply/ Demand projections	General Approach	Assumptions	Factors Considered	Main Results
HRSA Pharmacists	Both	Supply: inventory model based on number of pharmacists in the beginning of the year (by age, gender and education level) + new U.S. and foreign graduates - pharmacists leaving workforce due to mortality and attrition. Demand: based on filled positions + vacancies and projected into the future on the bases of projected growth and aging of the population, growth in prescriptions per capita utilization rate, and permanent 6% increase in utilization for 65+ population due to impact of Medicare Part D (for some scenarios also change in pharmacists' productivity is factored in).	One new pharmacy program will be added every year after 2008, based on planned expansions, resulting in 100 additional graduates each year; the number of foreign graduates will remain at 600; the mortality risk by gender for pharmacists is equivalent to the one for the overall population; the self-reported pharmacists on 2000 Census were actively employed as pharmacists at that time; the Rx per capita growth rate will be half of historical (1995-2004) due to balancing economic, policy and industry forces; Medicare Part D will result in permanent 6% increase in prescriptions per capita for 65+ population. (baseline supply/moderate Rx capita growth demand scenario).	Current supply and its demographic makeup, U.S. and foreign graduates, expansion in educational programs, mortality, retirement, Rx per capita growth rate, growth and aging of population, impact of Medicare part D, changes in complexity of medications, availability and affordability of generics and OTC drugs, cost-containment measures, potential changes in technology and delivery model.	Shortage of 37,900 pharmacists by 2030 (baseline supply and moderate Rx/capita growth demand scenario).
Center for Health Workforce Studies Podiatrists	Both	Supply: Current BLS reported supply of podiatrists - attrition + number of new entrants Demand: estimate of 5% U.S. population utilizing podiatric services, adjusted upward over the projection period based on growth in population over 65 and increased prevalence of obesity and diabetes.	The number of new entrants will remain at the same (2010) level past 2010 (status quo scenario). The increase in over 65 population and prevalence of diabetes and obesity will lead to greater utilization of podiatrists.	Current supply, enrollment and admissions, attrition, utilization rate for podiatric services, aging U.S. population, trends in prevalence of diabetes and obesity.	The Supply of Podiatrists is expected to decrease by 835 from 2010 to 2030 (status quo scenario); while demand is projected to increase by 891 positions over the same time period.
ADA Dentists	Supply	Dental workforce model projects number of professionally active dentists based on number of dentists in the workforce in the beginning of the year + new dental school graduates + foreign dentists starting practice in the U.S. - dentists exiting due to death, retirement or change of occupations. Statistical transition models are used in forecasting changes in number of new dental graduates by gender, choice of practice location, retirements, specialty dental education, deaths, changes of occupation, foreign dentist immigration, and how these factors impact long-term growth in dental workforce compared to population growth.	Current trends will continue with no major political, economic, or technological changes and without major changes to the way dental care is organized and delivered. New dental schools and potential changes in productivity of U.S. dentists are not considered.	Number of new dental graduates by, choice of practice location, retirements, specialty dental education, deaths, changes of occupation, foreign dentist immigration, and U.S. population.	The Supply of dentists is projected to reach 202,913 dentists or 0.54 dentists per 1,000 people by 2030.

Appendix 15: Summary table of projection methodologies employed by various institutions to forecast demand for the healthcare workforce

Study	Supply/ Demand projections	General Approach	Assumptions	Factors Considered	Main Results
APTA PTs	Both	Supply: number of PTs for previous year + new U.S. graduates + international PTs who pass NPTE - U.S. graduates who do pass NPTE - PTs leaving due to retirement and attrition. Demand: estimated using demand ratio based on FTE supply in base year + PT vacancy rate in base year divided by insured U.S. population in base year, and demand ratio is multiple by insured U.S. population in each projected year.	Failure to pass NPTE after 3 subsequent attempts is considered as failure to pass NPTE. The number of foreign PTs who pass NPTE is assumed to remain constant through 2020. The percentage of full-time PTs (85%) and part-time PTs (15%), and part-time PTs work hours (69% of FTE) are assumed to continue at 2010 levels. The percent of U.S. population with health insurance is assumed to remain constant at 2010 level.	Graduation of new PTs, passage of NPTE for U.S. graduates and international PTs, FTE work hours for part-time pts, retirement and attrition, PT vacancy rate, growth in U.S. population, and insurance coverage status.	Shortage of Physical therapists will reach 25,295 by 2020.
Sargen, Hooker, & Cooper Physicians, APRNs and PAs	Both	Supply: Base year supply estimated for physicians, advanced practice nurses (APRNs) and physician assistants (PAs), projected based on addition of new graduates/residents, with assumed growth levels for different scenarios and subtraction of losses due to attrition for each professional group. Demand: Two different models used with the first based on 0.5% increase in demand for clinician services for every 1% increase in inflation adjusted GDP; second based on health care spending in 1990 \$ projected forward based on assumed relationship between health care spending and GDP, varied for different scenarios.	Equivalence of physician, PA and APRN services; new residents annual growth level at base year level, base year level+500 after 2012, or base year level+1,000 (depending on scenario); continuation of APRNs graduates growth level at 3%, or increase to 5%; PA graduates growth rates increase to 5% in 2011 and then increase at decreasing rate, or continue increasing in rate to 7% in 2020; health care spending continuing at GDP+2.5%, or decreasing to GDP+1.5%, or to GDP+1%; no change in number of hours worked; APRNs follow retirement patterns for all RNs; Medical Care Consumer Price Index will be at 5.3, its 1986-2006 average.	Current supply, growth in number of new graduates in different professional programs, attrition, inflation adjusted GDP growth, inflation adjusted growth in health care spending relative to GDP.	Shortage of 12% to 15% among advanced clinicians by 2025. (1.5% above GDP growth, 500 medical residents with either high or lower enrollment of APRNs and PAs scenarios).
Orcutt PAs	Both	Supply: estimate PA supply at the beginning of time period + newly certified PAs - attrition due to retirement. Demand: based on time-series model, where PA Demand (PAs per 100,000) is a function of GDP (in 2000 \$) and U.S. population.	Automatic retirement was assumed at 67 years of age for all PAs. Under status quo scenario the number of students annually entering PA programs was assumed to remain constant at base year (2006) levels.	Currently certified PAs, number of students annually admitted to PA programs, attrition rate among PA students, PA certification exam passage rates, U.S. population, GDP, aging and retirement of PAs.	Shortage of PAs will last through 2013 at which point excess will materialize and grow to 17,636 PAs by 2020 (status quo scenario).
DHHS & DOL Direct care workers	Demand	BLS growth rate for direct care occupation in long-term care industries for 2000 - 2010 extended to 2050 under assumptions of three different scenarios.	Scenario 1: 200-2010 BLS growth rates continue to 2050 unchanged. Scenario 2: 200-2010 BLS growth rates continue to 2050 unchanged for nursing home and personal care industry, but for home health and residential care industries decrease to match those of nursing home and personal care industry. Scenario 3: Same as 2, except growth rates for home health are 0 for 2000-2010 period due to BBA of 1997 and related legislation.	2000-2010 BLS growth rates, demographics, Medicare spending, consumer preferences, impact of legislation.	3.88 to 12.14 million growth in number of direct care workers demanded by long-term care industries.

Healthcare

is comprised of a full report, a state report and an executive summary.
Each can be accessed at cew.georgetown.edu/healthcare

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