Nationwide Inpatient Sample (NIS).[29] Rather than focusing on total encounters, the analysis estimated the proportion of office-based services provided to each population defined by seven age groups, sex, four race/ethnicity groups, and three insurance categories.[30] This usage information, combined with estimates of the number of FTE primary care clinicians providing office-based care (discussed later), forms the basis for constructing national practitioner-to-population ratios.

Many physicians trained in primary care participate in patient care activities outside of office visits—such as hospital rounds and ambulatory visits in clinics, hospital outpatient clinics, emergency departments, and urgent care centers. The analysis utilizes patient diagnosis codes and demographics found in the NIS (used to model hospital inpatient care) and the NHAMCS (used to model hospital outpatient and emergency care) for its estimates. With these data, the analysis estimates the patients most likely to be seen in the hospital by a family practitioner or general internist, a pediatrician, or a geriatrician. This information, in combination with estimates of the portion of physician time spent in hospital rounds and hospital outpatient or emergency departments, informed the estimates of practitioner-to-population ratios for inpatient care and for outpatient/emergency-based care.

Information from the following sources contributed to the estimate of the average proportion of time physicians spend providing care in different settings:

- The Medical Group Management Association's Physician Compensation and Production Survey (2009 report based on 2008 data), which contains information on average volume of services provided in each setting;

- The American Board of Internal Medicine's Practice Characteristics Survey combined across multiple years, which provides estimates of the proportion of physician time engaged in different care activities; and

- AMA's 2003 Physician Socioeconomic Statistics, which provides estimates of the amount of time and services provided in different care delivery settings.

---

[29]National Center for Health Statistics (NCHS), Division of Health Care Statistics. National Ambulatory Medical Care Survey. Hyattsville, MD: Author. Available online at: www.cdc.gov/nchs/ahcd.htm. See also National Center for Health Statistics, Division of Health Care Statistics. (n.d.). National Hospital Medical Care Survey. Hyattsville, MD: Author. Available online at: www.cdc.gov/nchs/ahcd.htm and Agency Healthcare Research and Quality, Healthcare Cost and Utilization Project. *Nationwide Inpatient Sample*. Rockville, MD: Author. Available online at: www.hcup-us.ahrq.gov/nisoverview.jsp.

[30]The age categories are 0 to 5, 6 to 17, 18 to 20, 21 to 44, 45 to 64, 65 to 74, and 75 years and older. The race/ethnicity categories are non-Hispanic (NH) White, NH Black, NH other, and Hispanic. The insurance categories are commercially insured under age 65, publically insured (with the age 65 and older population primarily consisting of Medicare patients), and uninsured.

Estimates of FTE practitioners per 100,000 persons in each age group (see Exhibit 6) produce the practitioner-to-population ratio estimates. These ratios reflect: (1) patient encounters and physician time across different settings of care (based upon analysis of the multiple data sources outlined above); and (2) how the current primary care workload is distributed across patients (by age) and primary care discipline. At the national level, there are an estimated 98 FTE PCPs actively engaged in patient care per 100,000 population. Aggregate estimates range from a low of 41 FTE practitioners per 100,000 persons age 18 to 20 years to a high of 194 FTEs per 100,000 persons age zero to 5 years.

Exhibit 6. Estimated Use of PCPs (FTEs) per 100,000 Persons Within Each Age Group, 2010
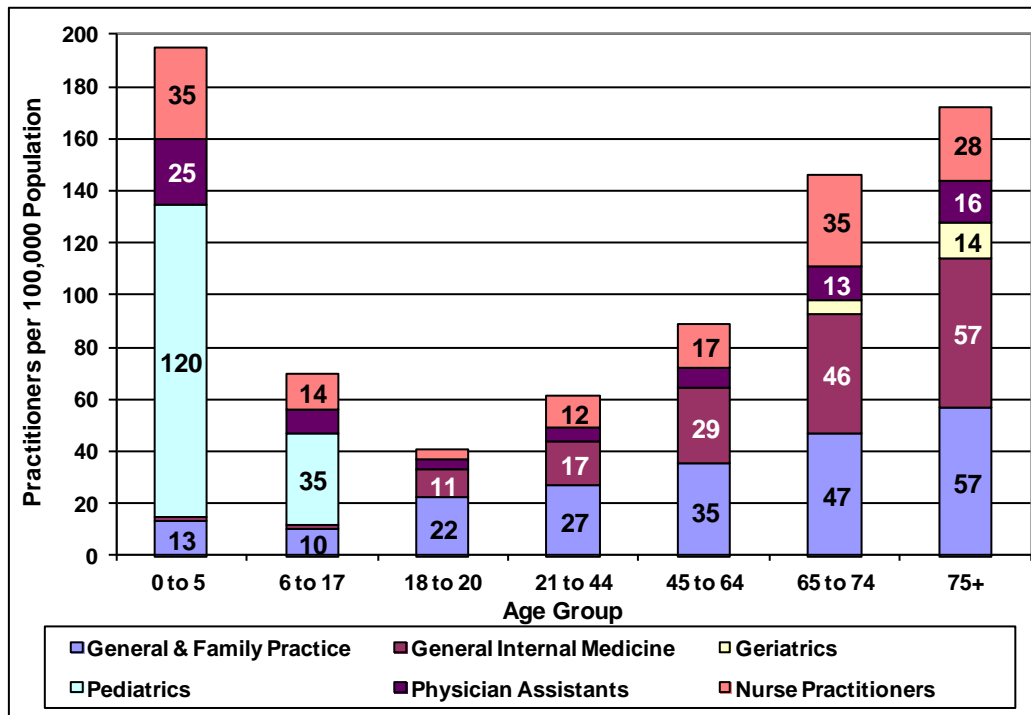
Data Source: Analysis of the multiple sources of data outlined in this report on patient utilization by setting (e.g., the NAMCS, NHAMCS, and NIS) and those on physician time allocation across settings of care.

2. Key Determinants of Future Demand

To estimate future demand for primary care services, national practitioner-to-population ratios to the projected future population are applied—adjusting for demographics, obesity rates, and insurance coverage (including the anticipated expansion of health insurance coverage

due to the passage of the Affordable Care Act[31]). This section discusses these key demand determinants and trends.

i.   Population Aging and Growth

Projections of the population developed by the U.S. Census Bureau for 2008 through 2050 (based on the 2000 Census and released in 2008) for age, sex, and race/ethnicity informed the study projections. U.S. Census Bureau projections suggest that the overall U.S. population will grow by approximately 10 percent over the next decade. However, the projected growth rate is much higher for the populations age 65 to 74 (50-percent growth) and age 75 and older (20 percent). The growth rate is lower for the age group zero to 17 (9 percent) and the age 18 to 64 population (5 percent). Since the amount of primary care services sought by patients varies substantially by age, these demographics suggest a growing demand for geriatrics. The demographics also suggest that a greater percentage of the patients seen by family physicians and general internists will be older individuals who require significantly more services. The study makes similar projections of demand for primary care services stratified by sex and race/ethnicity.[32]

ii.   Health Insurance Coverage

Using the 2007 and 2008 American Community Survey,[33] the study estimates the proportion of the population uninsured in each demographic group. Applying these rates to the 2010 population suggests that 44.5 million people lack insurance coverage.

The Affordable Care Act extends coverage to many uninsured individuals beginning in 2014. The Congressional Budget Office (CBO) estimated that 8 percent of the U.S. population younger than 65 years of age would remain uninsured after implementation of the Affordable Care Act, assuming complete Medicaid expansion across U.S. states.[34] In order to model the

---

[31]These projections assume that all states will expand Medicaid coverage as authorized by the Affordable Care Act because the projections were developed before the decision of the Supreme Court making the expansion optional. Since the number of states that will expand eligibility for Medicaid is unknown, the projections have not been revised. To the extent that some states do not expand eligibility, the projections will overestimate primary care demand.

[32]Since preparation of these projections, in December of 2012, the U.S. Census Bureau has published new projections of the U.S. population for 2020. The newer projections project a slightly slower rate of overall population growth. Consequently, the projections may slightly overestimate the growth in demand in 2020.

[33]U.S. Census Bureau. American Community Survey. Available online at: www.census.gov/acs/www/.

[34]Douglas W. Elmendorf. CBO's Analysis of the Major Health Care Legislation Enacted in March 2010. Testimony before the Subcommittee on Health, Committee on Energy and Commerce, and U.S. House of Representatives, March 30, 2011. Available online at: www.cbo.gov/publication/22077. The CBO modified its estimate of insurance coverage after the Supreme Court decision on June 28, 2012, that lessened the requirement of states to expand Medicaid in the manner outlined in the Affordable Care Act. The most recent CBO estimate, released in May 2013, has 11 percent ultimately remaining uninsured rather than the 8 percent estimate released at the time that analysis for this report was conducted (see www.cbo.gov/sites/default/files/cbofiles/attachments/44190_EffectsAffordableCareActHealthInsuranceCoverage_2.p

implications of the Affordable Care Act, the study uses estimates of the proportion uninsured in each demographic who are non-citizens as a proxy for undocumented immigrants who may remain uninsured. The study also scales the proportion of citizens remaining uninsured in each demographic based upon the CBO estimate of 8-percent uninsured among the population younger than 65.

For modeling primary care demand, the study assumes that newly insured individuals will take on the health care use patterns of the commercially insured population within their demographic. Therefore, the anticipated increase in demand for primary care services reflects the difference between patterns for the commercially insured and patterns for the uninsured, controlling for age, sex, and race/ethnicity.

It is important to note that the demand for primary care services will likely also change because of other provisions included in the Affordable Care Act, such as changes in reimbursement rates and practice design. However, there is insufficient information to quantify the effect of these changes.

iii.   Disease Risk Factors: Obesity Rates

The demand projections reflect variation in obesity rates and their implications for use of primary care services. Although a number of disease risk factors influence the demand for primary care services, available data and modeling techniques limited the number of risk factors that could be incorporated into this study. Obesity was selected for use because of its correlation with multiple diseases, including heart disease, stroke, and type 2 diabetes, as well as its increasing prevalence over the past few decades.[35] The study relies on survey findings from the Behavioral Risk Factor Surveillance System (BRFSS), which is fielded by CDC, and captures information on obesity and other health characteristics of a representative sample of adults throughout the United States. In order to increase the sample size, two years (2007 and 2008) of data were combined.[36] Because of small sample size in some demographic groups, to estimate obesity rates, logistic regression was used, with each individual in BRFSS as the unit of observation. The dependent variable is whether the person is obese (yes=1, no=0). The explanatory variables include dichotomous variables (yes=1, no=0) for age group, sex, race/ethnicity group, and state of residence.[37]

---

df). This increase in the percent remaining uninsured might result in less demand, however slight, than projected in this report. See also National Federation of Independent Business v. Sebelius, 132 S. Ct. 2566 (2012).

[35] For more information on obesity and health, including Healthy People 2020 goals for improvement, see www.healthypeople.gov/2020/LHI/nutrition.aspx?tab=overview.

[36] Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System Annual Survey Data. Atlanta, GA: Author. Available online at: www.cdc.gov/brfss/annual_data/annual_data.htm.

[37] State was included in the regression analysis since the model used to project future demand calculated estimates at the state level and then aggregated the estimates to produce national totals.

Obesity rates vary significantly by age, sex, and race/ethnicity. As reported by CDC and reflected in this analysis, compared with White adults, obesity rates for African Americans/Blacks are 36 percent higher, and rates for Hispanics are nearly 20 percent higher.[38] Trends in obesity rates suggest that the rate of growth has slowed substantially.[39] For modeling demand, it is assumed that obesity rates within each demographic group will remain constant over time. Hence, changes in demand over time associated with obesity in the modeling of demand are driven by the overall obesity rate produced by changes in the population demographic composition.

D.   Results: Drivers of Projected Future Demand for Primary Care Services

Changing demographics of the population, including the aging and growth of the population, account for the majority (81 percent) of the projected increase in demand for PCPs between 2010 and 2020. In contrast, only 19 percent of the increased demand for PCPs from 2010 through 2020 is associated with the estimated expansion of the population covered by health insurance with the full implementation of the Affordable Care Act. Overall, the expected total demand for primary care services in 2020 will increase only slightly because of expanded health insurance coverage. Only 2 percent of the total demand projected for PCPs in 2020 is due to the expansion of coverage. If all states do not expand Medicaid, the percent of demand due to coverage expansion will be even less. This finding is consistent with several recent studies that have estimated the increased demand for primary care resulting from coverage expansions under the Affordable Care Act at 2 to 3 percent.[40]

---

[38]See age-adjusted rates in Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010). Prevalence and trends in obesity among U.S. adults, 1999-2008. *Journal of the American Medical Association*, *303*(3), 235–241; Centers for Disease Control and Prevention. *Adult obesity facts.* Available online at: www.cdc.gov/obesity/data/adult.html.

[39]Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R. (2010). Prevalence and trends in obesity among U.S. adults, 1999-2008. *Journal of the American Medical Association*, *303*(3), 235–241; Ogden, C. L., Carroll, M. D., McDowell, M. A., & Flegal, K. M. (2007). *Obesity among adults in the United States—No statistically significant change since 2003–2004.* NCHS data brief no 1. Hyattsville, MD: National Center for Health Statistics. Available online at: www.cdc.gov/nchs/data/databriefs/db01.pdf.

[40]See, for example, Hofer, A. N., Abraham, J. N., & Moscovice, I. (2011). Expansion of coverage under the Patient Protection and Affordable Care Act and primary care utilization. *Milbank Quarterly*, *89*(1), 69–89; Huang, E. S., & Finegold, K. (2013). Seven million Americans live in areas where demand for primary care may exceed supply by more than 10 percent. *Health Affairs*, *32*(3), 614–621.

VII. PROJECTED ADEQUACY OF FUTURE SUPPLY OF PCPs

The study applies the national practitioner-to-population ratios for each demographic and insurance category to the projected future population. Then, the study translates projected demand for primary care services to projected demand for primary care practitioners, assuming continuation of current utilization patterns of physicians, NPs, and PAs.

A. Physicians

Between 2010 and 2020, the estimated total supply of primary care physicians grows more slowly than the levels needed to meet projected demand for health care services from physicians. The number of primary care physicians is projected to increase from 205,000 FTEs in 2010 to 220,800 in 2020, an 8-percent increase. However, the total demand for primary care physicians is projected to grow by 28,700, from 212,500 FTEs in 2010 to 241,200 FTEs in 2020, a 14-percent increase (see Exhibit 7). Without changes such as how primary care is delivered, the growth in primary care physician supply will not be adequate to meet demand in 2020, with a projected shortage of 20,400 physicians.

Exhibit 7. Projected Demand for Primary Care Physicians

	2010	2020
Total primary care physician demand (FTE)	212,500[a]	241,200[c]
General[b]	164,400	187,300
Pediatrics	44,800	49,600
Geriatrics	3,300	4,300
Primary care physician supply	205,000	220,800
Supply and demand	(7,500)	(20,400)

[a] National demand projections presented in this report assume that in 2010 the national supply of primary care physicians was adequate except for the approximately 7,500 FTEs needed to de-designate the primary care HPSAs.

[b] This category includes general and family practice, and general internal medicine.

[c] Assumes all states expand Medicaid.

B. NPs and PAs

The supply of primary care NPs and PAs is estimated to grow faster than the levels required to meet demand if the current physician-to-NP/PA ratios in care delivery are maintained (see Exhibit 8). From 2010 through 2020, the supply of primary care NPs is projected to increase by 30 percent and the supply of primary care PAs is projected to increase by 58 percent. Assuming that NPs and PAs provide the same proportion of services in 2020 that they did in 2010, the combined demand for NPs and PAs would increase by only 17 percent. However, if

NPs and PAs provide a greater share of primary care services, their effective demand would be higher.

Exhibit 8. Projected Supply and Demand for Primary Care NPs and PAs

Provider Type/Specialty	2010	2020
Supply		
Nurse Practitioners	55,400	72,100
Physician Assistants	27,700	43,900
Demand		
Nurse Practitioners	55,400	64,700
Physician Assistants	27,700	32,700
Supply and Demand		
Nurse Practitioners	*	7,400
Physician Assistants	*	11,200

*There were no data available for estimating if there were base year shortages of NPs and PAs.
Note: Counts of NPs and PAs are not adjusted for productivity.

VIII.   DISCUSSION

At the national level, both the supply of and demand for PCPs will grow over the next decade. The growth in primary care physician supply alone will not be adequate to meet demand in 2020 under current configurations of care provisions. Given the projected growth in the NP and PA workforce, as well as ongoing efforts to effectively integrate these providers into the primary care delivery system, the projected physician shortage could be somewhat alleviated. Efficient use of NPs and PAs will require patient and health system acceptance and the continued dissemination of more effective models of workforce deployment. There are indications of the acceptance of these practitioners by patients.
.

NPs and PAs are not substitutes for physicians, but they have an important role in the health care system and are trained to provide some of the same services as physicians. Additionally, since NPs and PAs do not provide the same volume of services as physicians, projections of the extent to which NPs and PAs could help alleviate the physician shortage are dependent upon productivity assumptions.

Applying a 0.75 weighting to NPs and PAs relative to primary care physicians could help estimate the potential impact NPs and PAs could have on alleviating the primary care physician shortage. This weighting reflects the consensus of the Negotiated Rulemaking Committee on the Designation of Medically Underserved Populations and Health Professional Shortage Areas.[41]

Under a scenario in which the rapidly growing NP and PA supply can be effectively integrated, and using a 0.75 FTE weight, the shortage of 20,400 physicians in 2020 could be reduced to 6,400 PCPs. Physicians would still remain the dominant providers of primary care, decreasing from 77 percent of the primary care services in 2010 to 72 percent in 2020, but the percent of primary care services provided by NPs and PAs would grow from 23 percent in 2010 to 28 percent in 2020.

Such offset assumes a reorganization of primary care in which NPs and PAs deliver a greater proportion of the services than they do within the present system. It also anticipates, to some extent, a redesign of service delivery in physician practices whereby NPs and PAs provide a

---

[41]"Negotiated Rulemaking Committee on the Designation of Medically Underserved Populations and Health Professional Shortage Areas: Final Report to the Secretary," October 31, 2011. It is important to note that the Committee did not intend for this weighting to represent the general relative cost or value of NP and PA services compared with physician services. The Committee also acknowledged that these providers often deliver a different set of services than a physician, and that weighting them at 1.0 would overstate the assessment of primary care capacity.

greater share of primary care services than they do now, to complement the services provided by physicians.

Improving the efficiency of health care service delivery through team-based models of care will help increase access to services. In 2009, the AAMC conducted a survey of primary care physicians and asked the physicians what steps they would take if their practice experienced a significant increase in demand, such as from the Affordable Care Act. Preliminary findings suggest that many practices would likely respond to increases in demand for services by hiring additional support staff (52.7 percent), physicians (46.5 percent), NPs (43.7 percent), and PAs (33.6 percent).[42] When asked what they thought society should do to expand primary care capacity, these same physicians responded that various health care system redesign initiatives would have an impact. The most common response was to increase the efficiency of care delivery by reducing paperwork (90-percent response), improving productivity (69 percent), and providing technology (66 percent).

Increasing the efficiency of care delivery through greater reliance on technology and reducing non-direct care activities (such as paperwork) may also have the potential to improve adequacy of primary care supply. Blanchfield et al. reported that as much as four hours per week of physician time that is spent on paperwork could be directed to other activities if the health care system streamlined clinical service billing processes.[43] These four hours per week, if redirected to patient care activities, would be equivalent to increasing primary care supply by approximately 11 percent. These efficiency gains would help close the gap between supply and demand.

Some medical and technological advances have the potential to increase practitioner productivity. For example, the Health Information Technology for Economic and Clinical Health Act, which defines and encourages "meaningful use" of Electronic Health Records (EHRs). EHRs allow practitioners to more efficiently manage patient care, thus reducing demand. In large part because of increased funding for health information technology (HIT), the proportion of primary care physicians using EHRs doubled (from 20 to 39 percent) between 2009 and 2011.[44] HIT also exists in the form of decision support systems that facilitate diagnosis and allow practitioners to print customized information to help patients understand and manage their conditions, thereby saving the practitioner time. Finally, alternative communication methods (e.g., email and telephone) can allow practitioners greater flexibility in communicating with patients and reduce the need for face-to-face visits.

---

[42]Association of American Medical Colleges, Center for Workforce Studies. (n.d.). 2009 AAMC Physician Survey on Primary Care.

[43]Blanchfield, B. B., Heffernan, J. L., Osgood, B., Sheehan, R. R., & Meyer, G. S. (2011). Saving billions of dollars – and physicians' time – by streamlining billing practices. *Health Affairs*, *29*(6), 1248–1254.

[44]Blumenthal, D. Implementation of the Federal Health Information Technology Initiative. (2011). *New England Journal of Medicine*, *365*(25), 2426–2431.

The experience over the past decade is encouraging in terms of the ability of the delivery system to make use of a growing supply of PAs and NPs. For example, the number of new PA graduates grew from 4,400 in 2000 to about 6,000 in 2010.[45] Despite this 36-percent increase, new PAs do not appear to be having any difficulty finding jobs. A recent study also found strong acceptance of care by PAs and NPs, especially by those who had previous direct experience with these practitioners.[46]

A.   Geographic Disparities Will Likely Continue

Even with the potential for greater reliance on NPs and PAs to provide primary care services to patients, disparities will continue. National projections mask problems that exist in specific geographic areas. Some areas enjoy the benefit of a supply of PCPs well above the national average. Other areas have a supply that is inadequate to meet the need for primary care services. More detailed analysis of the adequacy of supply within local geographic areas—whether counties, cities, townships, or neighborhoods—is needed to better understand the adequacy of the primary care workforce and how the primary care workforce would need to be distributed across the nation to ensure access.

Ensuring access to primary care for all Americans will continue to require programs and policies to address the maldistribution of the primary care workforce. Given the importance of access to primary care for an effective health care system, HRSA will continue to monitor the supply and distribution of PCPs. HRSA also will periodically update these projections as new data and information become available.

B.   Limitations of These Projections

Numerous factors will influence future supply and demand for PCPs. The projections in this report do not account for new programs and policies that may help grow the supply of PCPs or reform the health care delivery system. While the projections do consider the estimated impact of expanded health insurance coverage associated with full implementation of the Affordable Care Act, if all states do not expand Medicaid, the numbers in this report are likely an overestimate.

A number of new programs and policies included in the Affordable Care Act are designed to increase the supply of PCPs and increase the effectiveness of their use through models emphasizing team-based care, such as patient-centered medical homes. Such changes could

---

[45]Physician Assistant Education Association. *17th annual report on physician assistant educational programs in the United States, 2000-2001*. Alexandria, VA: Author. Available online at: www.paeaonline.org/index.php?ht=a/GetDocumentAction/i/61838; Physician Assistant Education Association. (2010, October). *26th annual report on physician assistant educational programs*. Presentation on preliminary data, 2009-2010. Baltimore, MD: Author. Available online at: www.paeaonline.org/index.php?ht=a/GetDocumentAction/i/114396.

[46]Dill, M., Pankow, S., Erikson, C., & Shipman, S. (2013). Survey shows consumers open to a greater role for physician assistants and nurse practitioners. *Health Affairs, 32*(6), 1135–1142.

allow for an increased role of NPs and PAs in the provision of primary care services and have the potential to help address the projected shortage of primary care physicians.

This study assumes that the supply and demand for PCPs was balanced in 2010 except for the number of physicians that would be needed to de-designate HPSAs. The HPSA shortfall is used as a proxy for the base-year national shortfall since it is the only federal measure of shortage currently available. Shortages may exist in areas that are not designated as HPSAs or in professions not currently covered by HPSAs (such as NPs and PAs).

Finally, while it is reasonable to use historical patterns to project future supply and demand, it is important to be aware that small changes in the parameters in the projections (such as changes in hours worked or retirement patterns) could have a notable effect on future supply and/or demand.