

2018 Update

The Complexities of Physician Supply and Demand:
Projections from 2016 to 2030

Final Report

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EXECUTIVE SUMMARY

Assessing the capacity of the nation's future physician workforce is important to give both the public and private sectors the information they need to make the targeted investments necessary for the health care system to provide high-quality, cost-efficient care and develop the workforce required to create a high-performing health care system that optimizes population health. The pace of change in health care necessitates continuously updating and improving workforce projections. Furthermore, shifts in health policy at the national and state levels create uncertainty about how to plot a successful course toward achieving major goals. For that reason, in 2015, the Association of American Medical Colleges (AAMC) made a commitment to produce annual updates of national physician workforce projections. The purpose of these updates is threefold:

- **Update and improve workforce projections:** The AAMC is committed to supporting ongoing efforts to use the most recent and best-quality data to update projections and to respond to constructive feedback about previous projections.
- **Present new analyses:** The reports present new research on implications that important issues, such as an evolving health care system and inequities in health care utilization, have on the physician workforce.
- **Identify future directions for research:** The process of modeling future supply and demand for physicians helps identify areas for future research, data collection, and analysis that will strengthen future projections and support decision making to help align the nation's physician workforce with its health needs.

Through these efforts, the AAMC invites discussion to continue advancing our collective capacity for developing improved health workforce projections with data-driven analysis.

This 2018 update uses a modeling approach and data sources similar to those used in previous reports. Like the previous reports, this update projects the future supply of physicians by taking into consideration trends in key determinants of physician supply and the sensitivity of supply projections to changes in these determinants. The demand projections reflect changing demographics as the population grows and ages, changes in health insurance coverage, the expanding role of advance practice registered nurses (APRNs) and physician assistants (PAs) in care delivery, and other important trends in health care such as a growing emphasis on achieving population health goals and improving care access and delivery. Projections of each supply scenario modeled are compared with projections from each demand scenario. Because it is impossible to predict with certainty the degree to which each scenario will manifest, this analysis reports the projected shortfalls as a range of the projected scenario pairs (based on the 25th to 75th percentile of the projections) rather than a single projection.

This report presents updated analyses of the implications for physician demand if populations facing higher barriers to accessing care (racial and ethnic minorities, the uninsured, and those living outside

metropolitan areas) had patterns of health care use similar to those of a population with fewer barriers to access.

These findings offer stakeholders insights into changes expected in physician workforce supply and demand by 2030. All supply and demand projections are reported as full-time-equivalent (FTE) physicians, where an FTE is defined for each specialty as the average weekly patient-care hours for that specialty.¹ The projections include all active physicians who have completed their graduate medical education.

Key Findings

- **We continue to project that physician demand will grow faster than supply, leading to a projected total physician shortfall of between 42,600 and 121,300 physicians by 2030** (Exhibit ES-1). The projected shortfall is higher than in last year's report (40,800–104,900). These estimates reflect model updates and larger shortfall estimates for the starting year based on recently revised federal Health Profession Shortage Area (HPSA) designations for primary care and mental health.
 - **A primary care shortage of between 14,800 and 49,300 physicians is projected by 2030.** The shortfall range reflects different assumptions about projected rapid growth in the supply of APRNs and PAs and their role in care delivery, trends in supply and demand for primary care physicians, and an estimate by the Health Resources and Services Administration that nearly 13,800 primary care physicians are needed to remove the primary care shortage designation from all currently designated shortage areas.
 - **Projected shortfalls in non-primary care specialties of between 33,800 and 72,700 physicians**, including a shortfall of between 20,700 and 30,500 physicians in 2030 for surgical specialties. Major drivers of these projected trends continue to be an aging population requiring increasingly complex care concomitant with an aging physician workforce. The range reflects different assumptions about shifting workforce patterns for physicians and other professionals. In the surgical specialties, a largely stagnant projected supply also contributes to projected shortages.
- **Demographics—specifically, population growth and aging—continue to be the primary driver of increasing demand from 2016 to 2030.** During this period, the U.S. population is projected to grow by close to 11%, from about 324 million to 359 million. The population under age 18 is projected to grow by only 3%, while the population aged 65 and over is projected to grow by 50%. Because seniors have much higher per capita consumption of health care than younger populations, the percentage growth in demand for services used by seniors is projected to be much higher than the percentage growth in demand for pediatric services.

1. For example, if average patient-care hours per week in a specialty are 40 hours, but one physician in that specialty is projected to work 35 hours, then that physician is counted as 0.875 FTEs (35/40 hours). Average patient-care hours worked per week ranged from a low of 35.3 hours for preventive medicine to a high of 54.3 hours for neonatal and perinatal medicine.

Exhibit ES-1: Total Projected Physician Shortfall Range, 2016–2030

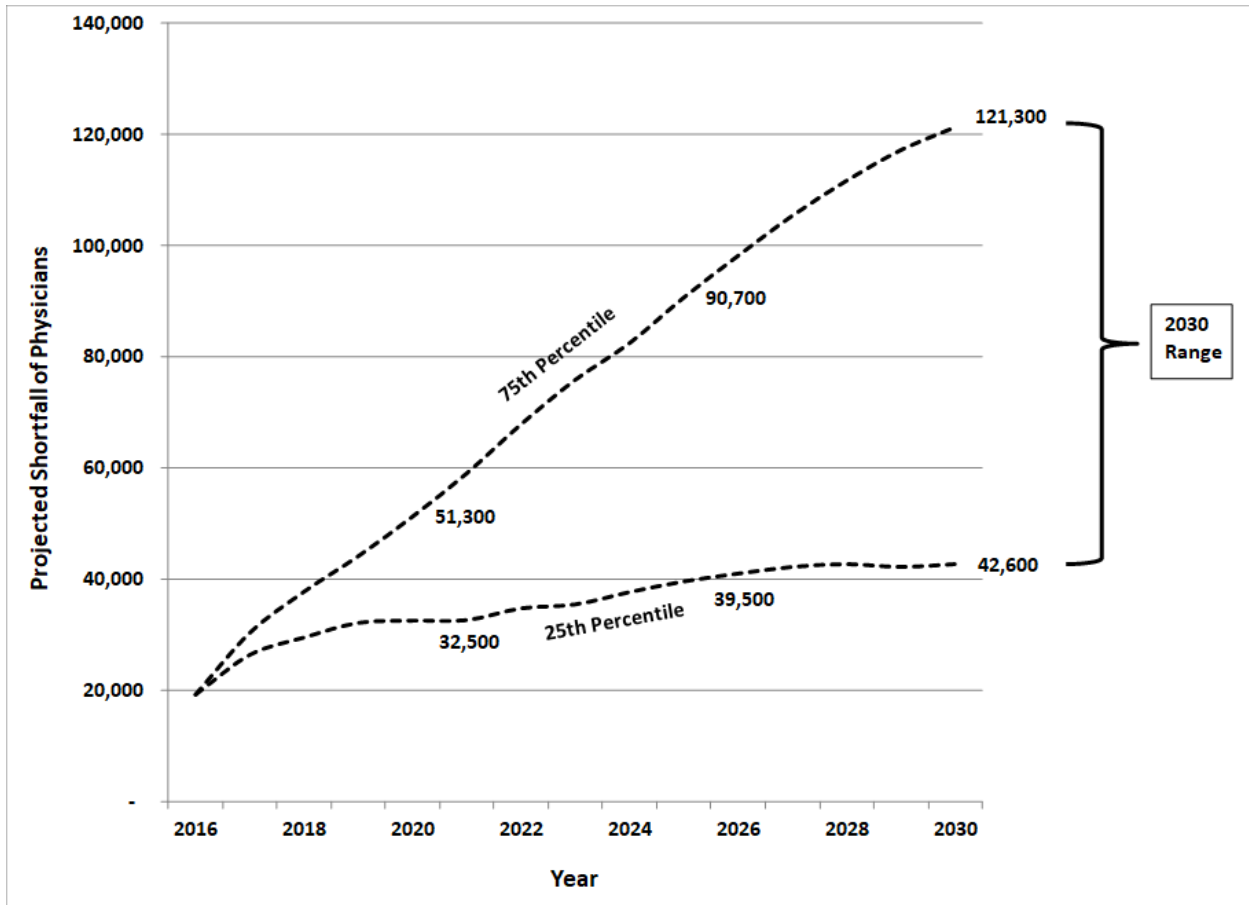


Exhibit ES-1: Because complex systems have internal checks and balances, to avoid extremes we believe that the 25th to 75th percentile of the shortage projections continues to reflect a likely range for the projected adequacy of physician supply. The projected shortfall of total physicians in 2030 is between 42,600 and 121,300, with the range widening over time to reflect growing uncertainty about key supply and demand trends.

- **Achieving population health goals will raise demand for physicians in the long term.** In this report, we have updated last year’s research on the implications for physician demand associated with achieving select population health goals (reducing excess body weight; improving control of blood pressure, cholesterol, and blood glucose levels; and reducing the prevalence of smoking). Under this scenario, short-term demand for physicians would decline slightly with improvements in population health. However, the longevity associated with improved population health would result in greater demand for services by 2030. Therefore, the demand for physicians will be 17,300 FTEs higher in 2030 relative to demand levels if these goals are not achieved. This finding suggests that although prevention efforts likely will reduce demand for some specialties, such as endocrinology, demand for other specialties, such as geriatric medicine, will increase.

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- **If underserved populations had care utilization patterns similar to populations with fewer access barriers, demand for physicians could rise substantially.** The health of the nation would benefit from more equitable access to care. We updated two hypothetical scenarios around the effects of removing access barriers. The health care utilization equity scenario models the implications for physician demand if currently underserved populations utilized health care at rates similar to those of populations facing fewer sociodemographic, economic, and geographic barriers to care. These estimates, which are excluded from the shortfall projection ranges, help illuminate the magnitude of current barriers to care and provide an additional reference point for gauging workforce adequacy.
 - **Changes in physician-retirement decisions could have the greatest impact on supply, and more than one-third of all currently active physicians will be 65 or older within the next decade** (Exhibit ES-2). Physicians between ages 65 and older account for 13.5% of the active workforce, and those between ages 55 and 64 make up nearly 27.2% of the active workforce.
 - **The supply of surgical specialists is projected to either grow slowly or possibly decline** slightly by 2030 under all modeled supply scenarios.
 - **The trend toward physicians working fewer hours per week is reducing the FTE physician supply.** Between 2002 and 2016 there was a trend toward physicians of all ages working fewer hours, with the decline in hours worked particularly large when the pattern of hours that younger physicians worked in 2016 was compared with that of physicians of a similar age in 2002. If this trend continues, then by 2030 there will be 32,500 fewer FTE physicians in the national supply than if physician work hours remained similar to current patterns. Unlike the scenario modeled in previous reports, this one reflects new data showing declines in physician working hours across all age groups, not just millennials.

Exhibit ES-2: Projected Change in Physician Supply by Specialty Category, 2016–2030

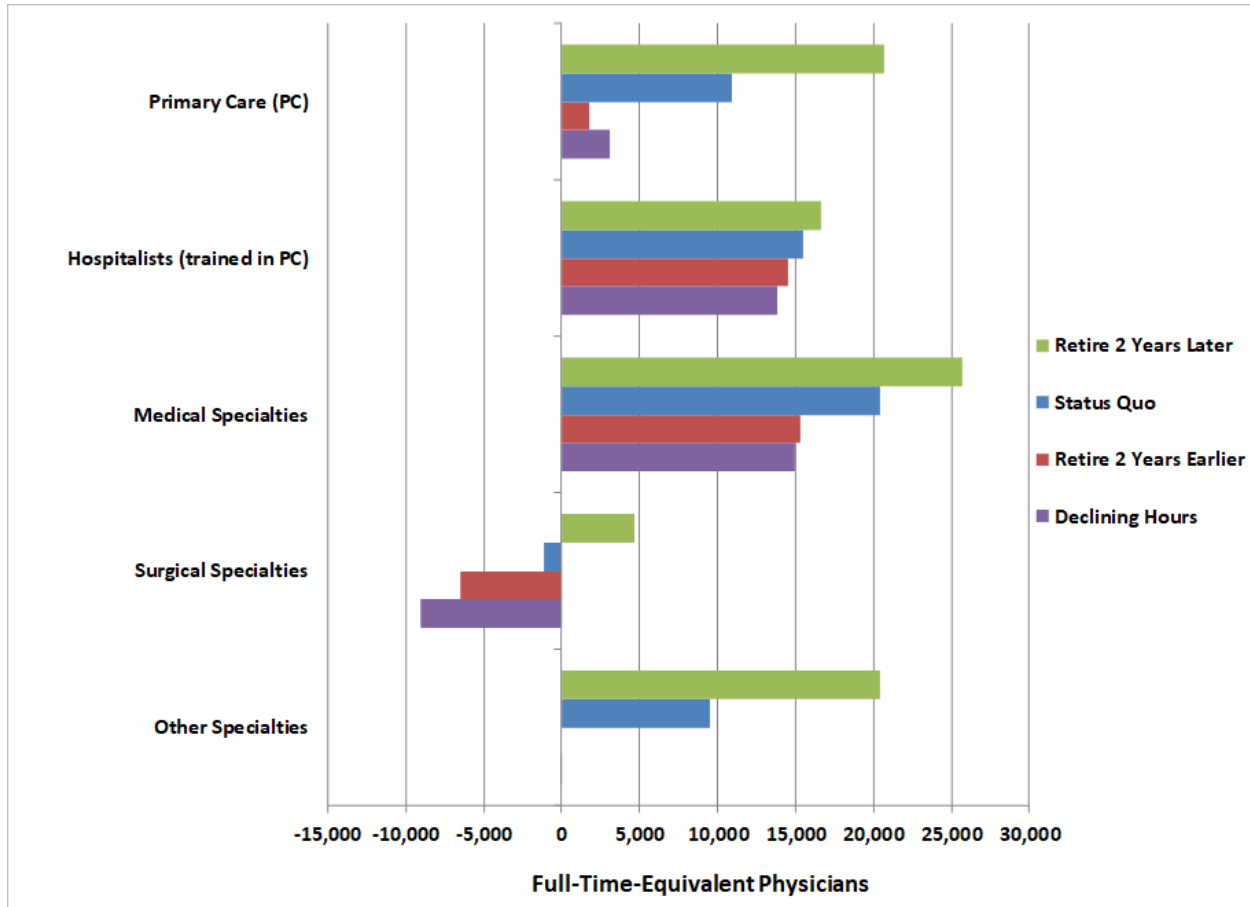


Exhibit ES-2: The status quo supply scenario models the continuation of the current number and specialty distribution of physicians completing their graduate medical education, continuing to work the same number of hours, and maintaining current retirement patterns. Two supply scenarios model the workforce implications if retirement patterns change—with one scenario modeling a shift to retiring earlier by an average of two years and a second scenario modeling an average delay in retirement of two years. The declining-hours scenario reflects that physicians today work fewer hours than physicians of a similar age did in the past and that such trends might continue.

New Research and Analyses

Differences between these updated 2018 projections and projections in previous years' reports reflect updates and refinements to supply and demand data inputs and methods. The 2018 projections:

- use a microsimulation model and supply and demand scenarios similar to those used to develop last year's projections, but incorporate the most recent updates to supply and demand data;
- extrapolate a "2016 level of care" delivery to 2030 to project future demand under the status quo scenario, whereas the previous report extrapolated a "2015 level of care" delivery; and

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- reflect the federal Health Resources and Services Administration’s upward revision of HPSA shortage designations for primary care and mental health specialties.

As a result of these refinements and updates to the model’s inputs, this year’s projected total physician shortage is greater than last year’s.

Future Directions in Physician Workforce Research

Workforce projections are constantly challenged by a health care system that is changing at a tremendous pace and often in unpredictable ways. Uncertainties continue to abound about whether, how, and how quickly emerging payment and care-delivery models might affect physician supply and demand. Still, evidence to date has not shown that changes in payment or care-delivery models substantially change physician workforce supply or demand.

The following examples of current deficits in the knowledge base present opportunities for ongoing research on the workforce implications of the evolving health care system and underscore the need for continued timely updates to physician workforce projections:

- Comprehensive, up-to-date data on physician work hours and retirement patterns could help improve supply forecasts. What patterns are reflected in the decisions made by clinicians and care settings about retirement and other topics in response to economic and other trends?
- What are the drivers of, and shifts in, physician well-being and their implications for the future physician workforce?
- It is unclear whether the rapid growth in the supply of PAs and APRNs can be sustained or if there is a saturation point. A better understanding of how the increased supply of PAs and APRNs affects demand for physicians could significantly improve workforce projections.
- Growth in demand for health care services is projected to exceed the growth of physician supply. How such a growing shortfall at the national level may exacerbate geographic imbalances in supply and aggravate existing disparities in geographic distribution needs to be better understood.
- This and earlier reports focused on the total physician workforce and broad specialty categories. There continues to be a need to look more closely at individual specialties that may experience a future shortage and conditions that may indicate such a shortage.
- Demand projections start with the assumption that physician supply and demand were in equilibrium in 2016 at the national level—except for primary care and psychiatry, where federal government HPSA estimates were used as a proxy for the current shortfall of physicians. This modeling assumption extrapolates a “2016 level of care” to future years on the basis of current care use and delivery patterns. Better measures of current shortages could help inform this starting point assumption.

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- Care-delivery models continue to evolve in response to new financing models and policies, a better understanding of best practices, new technologies, and economic factors. How will the evolution in care delivery affect demand for health care services and staffing patterns? An aging population will put increasing financial pressure on government programs such as Medicare, Medicaid, and Social Security. What are the implications for reimbursement of health care services and the physician workforce? Similarly, how will emerging technologies and payment reform that better enable telemedicine and new digital technologies affect demand for physician services, physician productivity, physician career satisfaction, patient access to care, patient-care utilization, and outcomes?

I. INTRODUCTION

Past Reports

Over the past few decades, the AAMC has published several workforce studies projecting future physician supply and demand and summarizing the implications of selected trends and policies likely to affect the physician workforce. During that period, the number of physicians trained annually has increased, the sizes of the advanced practice registered nurse (APRN) and physician assistant (PA) workforces have greatly increased, the nation has experienced turbulent economic conditions, the Affordable Care Act (ACA) expanded access to health care insurance and established new payment models, care models continued to evolve, and new data became available on the projected characteristics and changing demographics of the U.S. population and health workforce.

Mindful of the magnitude and speed of these changes, in 2015, the AAMC contracted with IHS Markit to update its previous (2010 and 2008) physician workforce reports. Titled *The Complexities of Physician Supply and Demand: Projections from 2013 to 2025*, that update incorporated the latest available data on trends and factors affecting physician supply and demand. Study findings highlighted how the pace of change in health care delivery has become too rapid for projections produced on an infrequent basis to be useful. Accordingly, the AAMC published annual study updates in 2016 and 2017. The 2017 study projected a shortfall of 40,800 to 104,900 physicians by 2030.

2018 Report

This 2018 update continues to reflect the AAMC's commitment to regularly update projections and to refine scenarios that reflect the best available evidence on trends in health care delivery and the physician workforce.

Key trends likely to affect the supply and demand for health care services were identified and modeled under multiple supply and demand scenarios. Projections for individual specialties were aggregated into five broad categories for reporting consistent with specialty groupings designated by the American Medical Association (AMA). These include primary care, medical specialties, surgical specialties, primary care-trained hospitalists—which was first reported in 2016, and “other” specialties.²

2. **Primary care** consists of family medicine, general internal medicine, general pediatrics, and geriatric medicine. **Medical specialties** consist of allergy and immunology, cardiology, critical care, dermatology, endocrinology, gastroenterology, hematology and oncology, infectious diseases, neonatal and perinatal medicine, nephrology, pulmonology, and rheumatology. **Surgical specialties** consist of general surgery, colorectal surgery, neurological surgery, obstetrics and gynecology, ophthalmology, orthopedic surgery, otolaryngology, plastic surgery, thoracic surgery, urology, vascular surgery, and other surgical specialties. The **other specialties** category consists of anesthesiology, emergency medicine, neurology, pathology, physical medicine and rehabilitation, psychiatry, radiology, and all other specialties. **Hospitalists** trained in adult primary care are modeled as their own category and have been moved out of the primary care category. Hospitalists trained in non-primary care specialties are modeled within their trained specialty.

Previous reports projected a growing physician shortfall over time as demand for health care services—driven by a growing and aging population with accompanying growing prevalence of chronic disease, expanded insurance coverage under ACA, and a recovering economy—was projected to grow faster than physician supply. The projections took into consideration the growing role of APRNs and PAs in care delivery, trends such as increased use of retail clinics staffed primarily by APRNs and PAs, and supply-related factors, including the number of new doctors being trained and trends in hours worked and retirement.

Each year the updated demand projections also shift to reflect use of new levels of care. For example, data inputs and demand projections in the 2017 report extrapolated a 2015 national average level of care, while this 2018 report extrapolates a 2016 national average level of care.

The remainder of this update is organized similarly to past reports and presents the comparison of updated physician supply and demand projections (Section II) and describes the supply scenarios and results (Section III) and the demand scenarios and results (Section IV). Section V updates the health care utilization equity scenarios. Key findings and conclusions are summarized in Section VI, and Section VII discusses possible future directions in the field of health workforce research. Appendix 1 provides additional detail on modeling data and methods, and Appendix 2 contains additional tables and charts.

II. UPDATED PROJECTIONS

Physician demand continues to grow faster than supply, leading to a projected shortfall of between 42,600 and 121,300 physicians by 2030. The projected shortfall is higher than in last year's report (40,800 to 104,900). The difference reflects several factors:

- (1) The demand projections were recalibrated to reflect a "2016 level of care" (rather than a 2015 level of care) by using updated data on health care use and physician staffing.
- (2) The federal government raised its estimates of the number of additional physicians required to provide a level of care that will remove the Health Profession Shortage Area (HPSA) designations for areas with primary care and mental health shortages—which is used as a proxy for the current national shortfall of physicians. Approximately 13,800 primary care physicians and 5,500 psychiatrists are currently needed to provide a minimum level of care that would remove the HPSA designations. Previous estimates indicated 8,400 primary care physicians and 2,400 psychiatrists were needed to remove the HPSA designations.
- (3) We modified the supply scenario for trends in hours worked. Previously, the scenario projected that millennial physicians would work fewer hours as they aged than earlier physician cohorts. New research suggests that weekly hours worked have been declining for physicians of all ages and not just for millennials.

Because of these factors, the updated primary care physician shortfall projections for 2030 range from 14,800 to 49,300 full-time-equivalent (FTE) physicians. Projected shortfalls in non-primary care specialties by 2030 range are 20,700 and 30,500 for surgical specialties and 20,300 to 36,800 for the "other" physician specialties category. For the medical specialties category, the range is a surplus of 700 to a shortfall of 9,600 physicians. As reported in previous years, projected shortfalls continue to be especially acute in select surgical specialties and other specialties such as psychiatry.

The ranges of supply and demand scenarios presented reflect the complexity and evolving nature of the environment within which physicians practice. As a result, one scenario alone is inadequate to convey the associated uncertainty. We examined five scenarios reflecting different assumptions in key supply determinants and seven scenarios reflecting changes in key determinants of demand for physician services. We compared each supply scenario with each demand scenario to estimate the likely range of paired supply and demand projections. The supply and demand scenarios modeled are described in detail in Sections III and IV, respectively.

The extreme high and low scenarios are least likely to occur—as multiple factors tend to mitigate highs and lows. For example, if physicians were to begin retiring earlier, the growing systemic stresses this could cause due to the growing shortfall of physicians might eventually lead some physicians to delay retirement. Given the propensity of such systems-level checks and balances to avoid extremes, we believe that the 25th to 75th percentile of the paired projections continues to reflect a likely range.

The updated projections reflect a similar estimate of the number of new physicians entering the workforce each year (28,836 versus the estimate of 28,698 used in the 2017 report) as well as continued growth in the number of APRNs and PAs entering the workforce. The starting supply of physicians comes from analysis of the 2016 AMA Masterfile. The updated demand projections reflect new data from the 2015 Medical Expenditure Panel Survey on health care use patterns, and updated data on population characteristics and prevalence of health risk factors as reflected by the 2016 American Community Survey and 2016 Behavioral Risk Factor Surveillance System. The U.S. Census Bureau has not revised its population projections through 2030.

Total Physician Supply and Demand

Under most of the scenarios projected, the total projected demand for physicians exceeds total projected supply (Exhibit 1). Looking at the 25th to 75th percentile projections for total physicians, demand will continue to grow faster than supply, leading to a projected shortfall of between 42,600 and 121,300 physicians by 2030 (Exhibit 2).

Exhibit 1: Projected Physician Supply and Demand by Scenario, 2016–2030

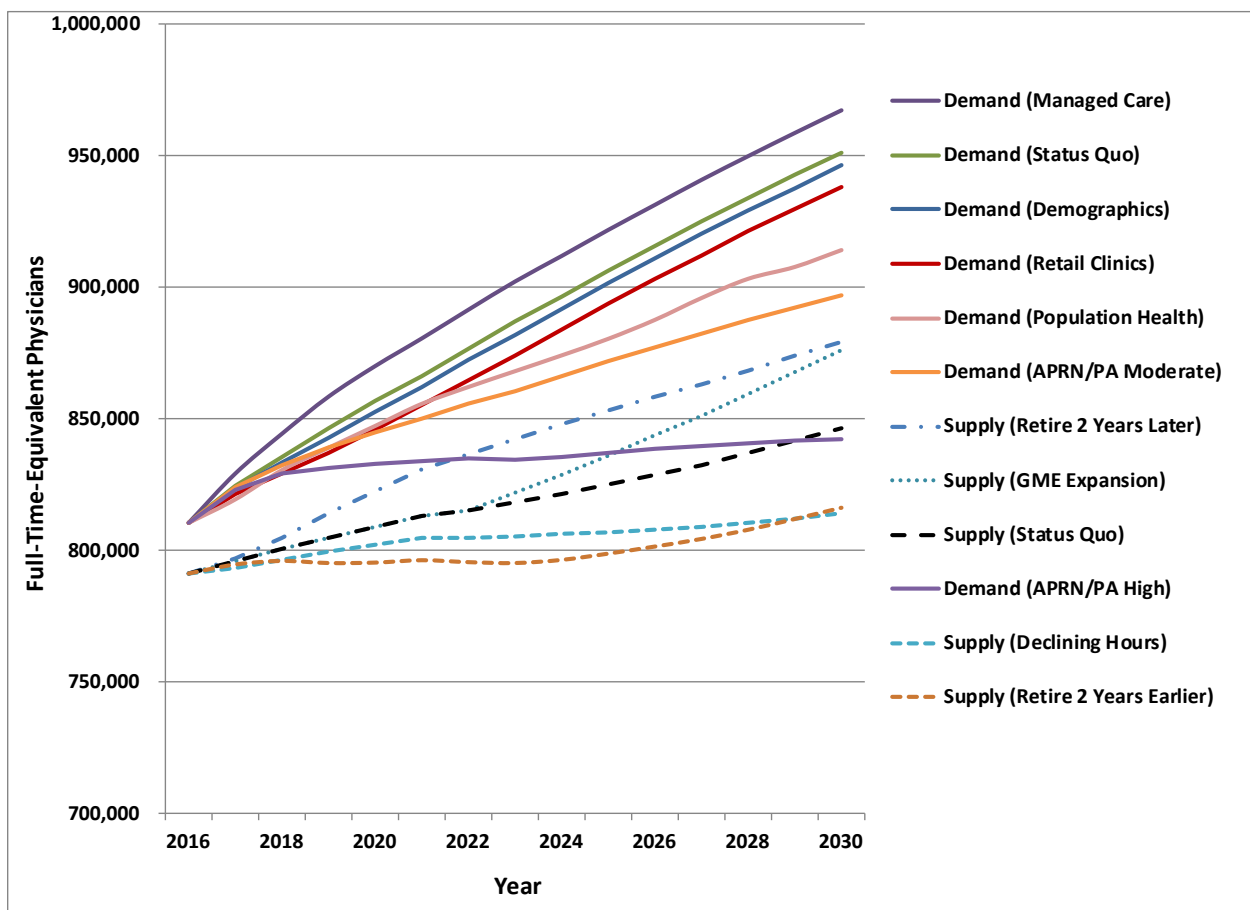
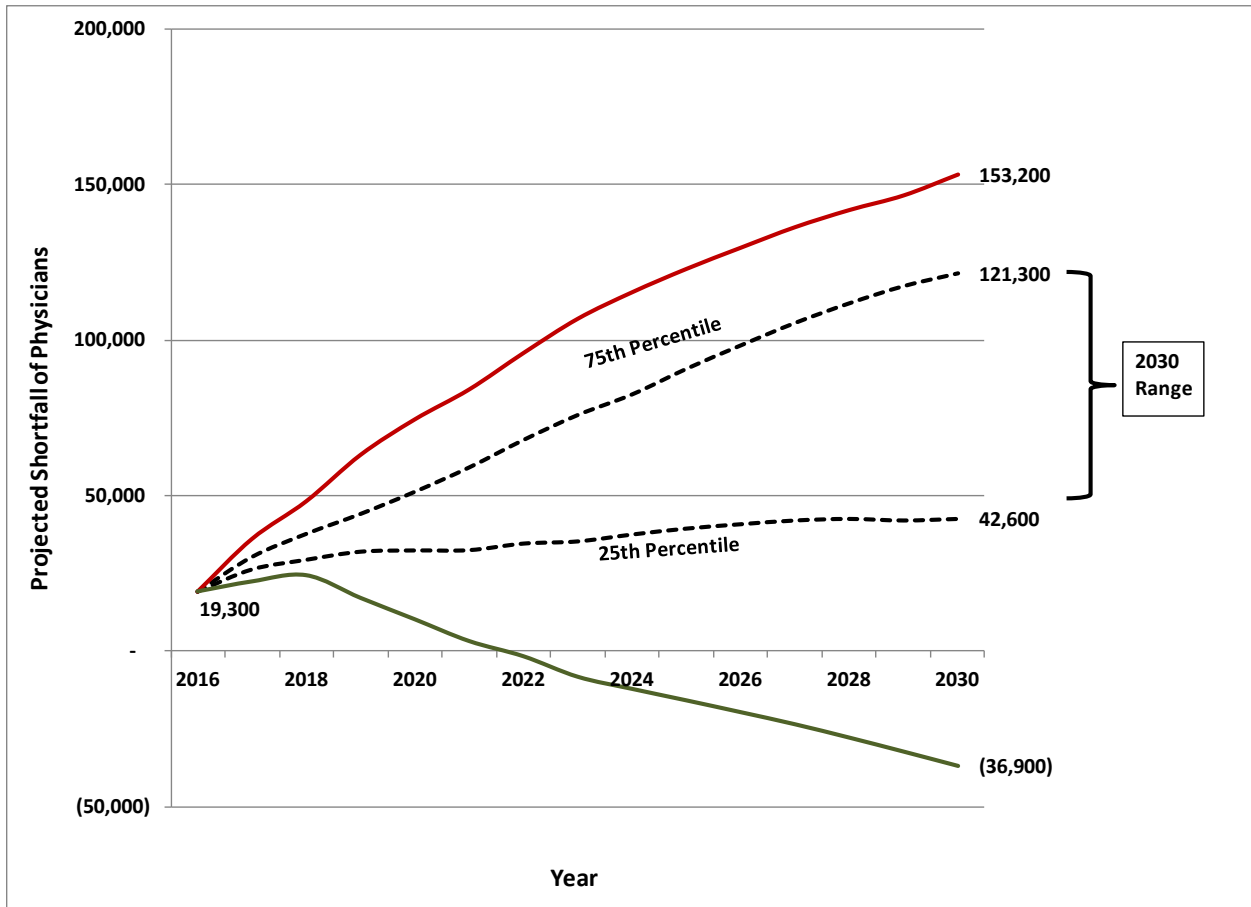


Exhibit 2: Projected Shortfall Range for Physicians, 2016–2030



Note: The top line (red) reflects the pairing of the highest demand scenario with the lowest supply scenario, and the bottom line (green) reflects the pairing of the lowest demand scenario with the highest supply scenario.

Primary Care Supply and Demand

Projected supply and demand for primary care physicians (Exhibit 3) shows that demand exceeds supply under all scenarios modeled except the scenario that reflects the highest use of APRNs and PAs. The estimated current shortfall of 13,800 primary care physicians is based on the calculation of the Health Resources and Services Administration that nearly 13,800 primary care physicians are needed to remove the primary care shortage designation in currently designated shortage areas. The modeled shortfall by 2030 ranges between 14,800 and 49,300 physicians (Exhibit 4).

Exhibit 3: Projected Supply and Demand for Primary Care Physicians, 2016–2030

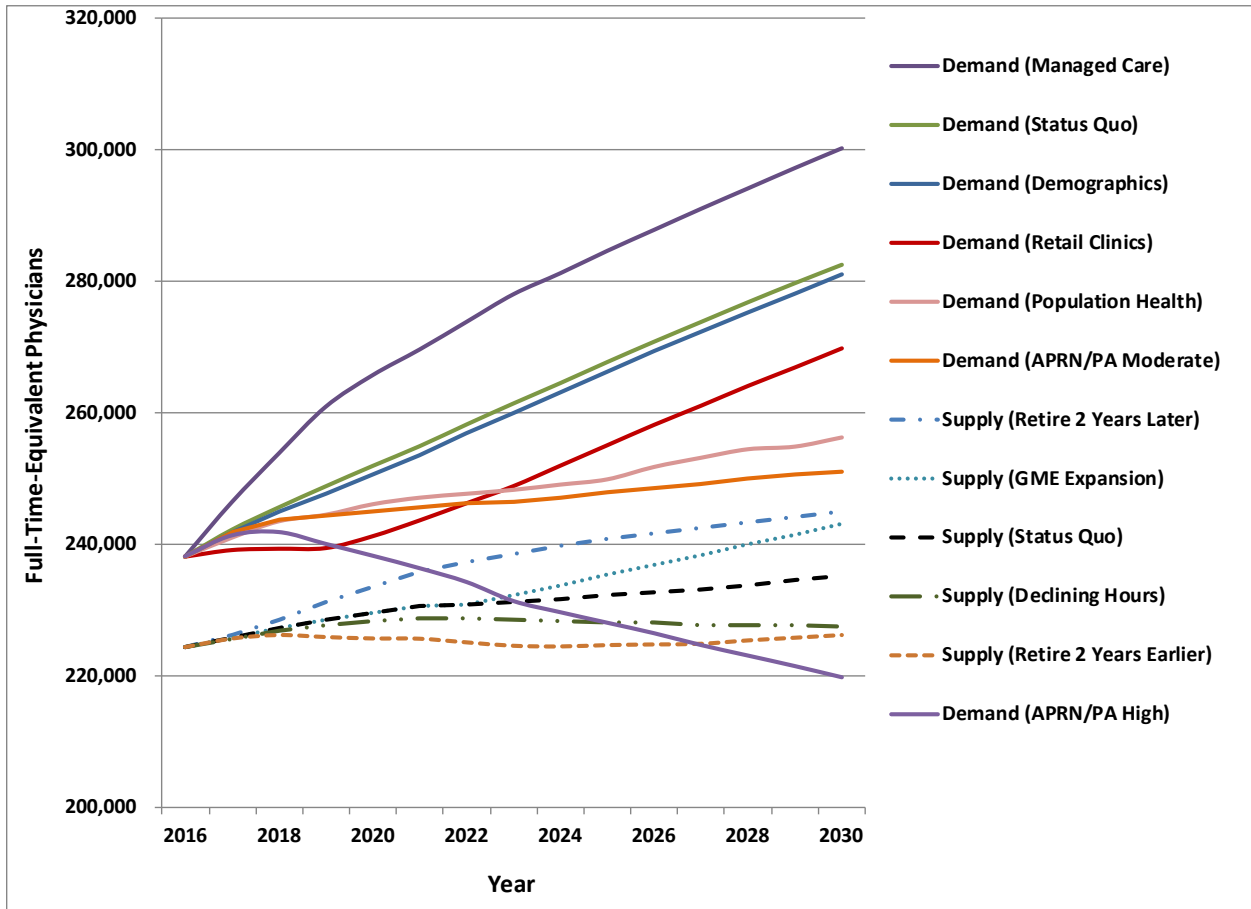
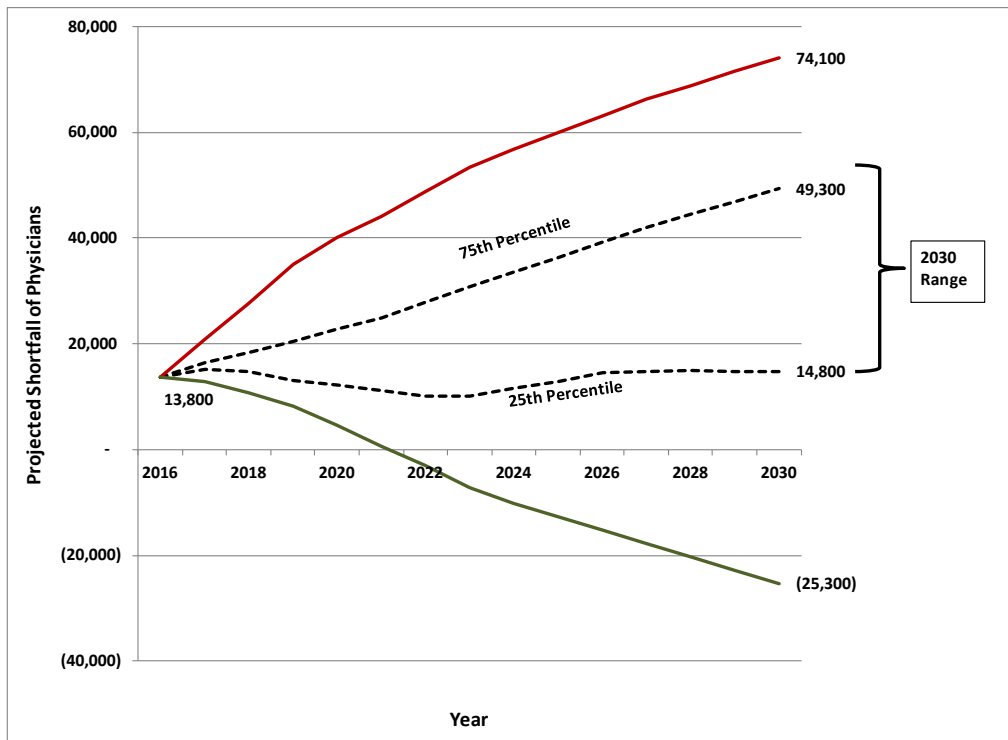


Exhibit 4: Projected Shortfall Range for Primary Care Physicians, 2016–2030



Non-Primary Care Supply and Demand

Exhibits 5 through 10 depict the overall range of supply and demand growth and projected shortfall ranges for non-primary care physicians by specialty category. Under the scenarios modeled, we project a shortfall of between 33,800 and 727,700 non-primary care physicians by 2030. Consistent with previous reports, non-primary care specialties are grouped into three categories: medical specialties, surgical specialties, and other specialties.

Medical Specialties

The demand for physicians in medical specialties is growing rapidly, but because many physicians are choosing internal medicine subspecialties and pediatric subspecialties, physician supply is also growing in the medical specialties. Under the scenarios modeled, this update projects a range from a surplus of about 700 FTEs to a shortfall of about 9,600 FTEs by 2030 (Exhibit 6). Of course, these are overall projections for the medical specialties group, and projections vary significantly by individual subspecialty.

Exhibit 5: Projected Supply and Demand for Medical Specialist Physicians, 2016–2030

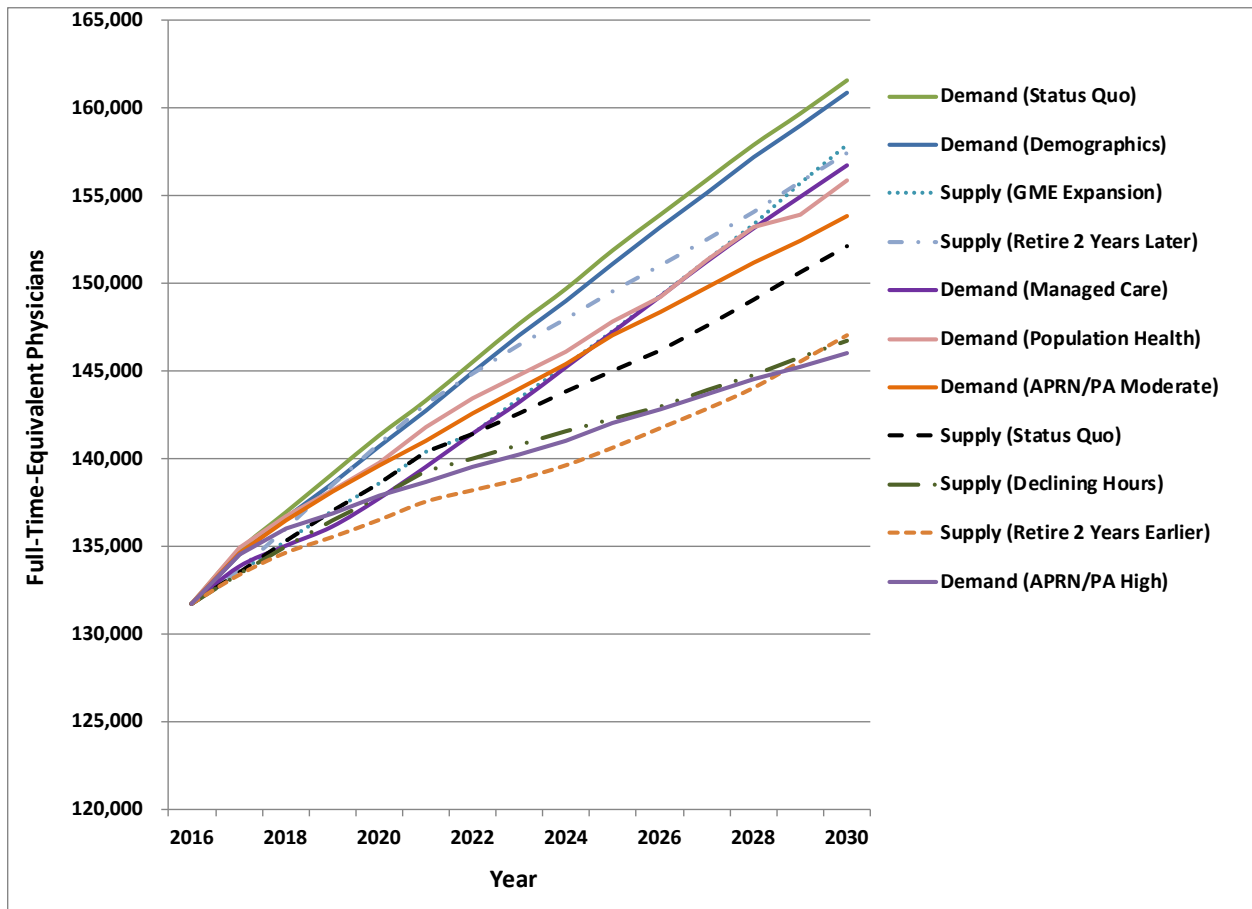
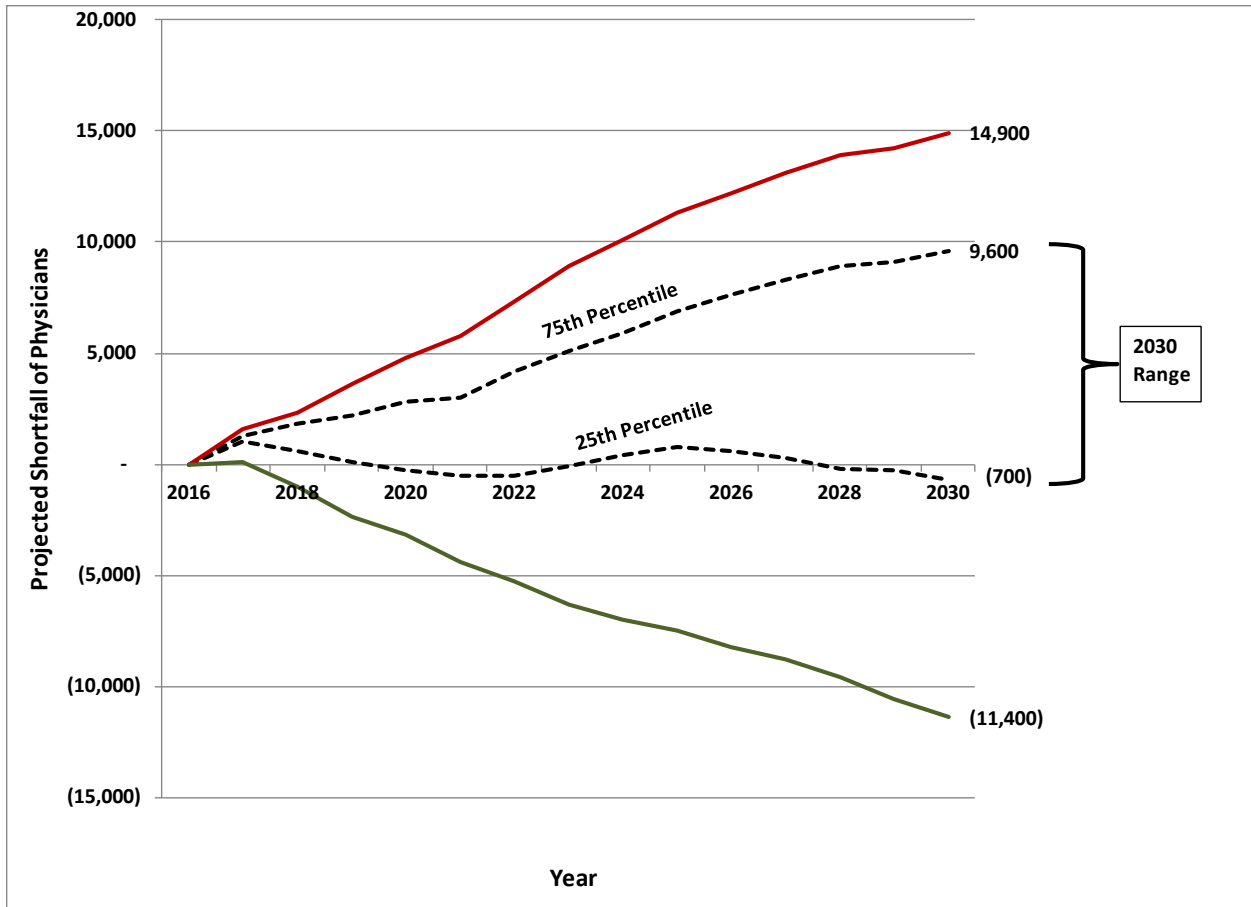


Exhibit 6: Projected Shortfall Range for Medical Specialist Physicians, 2016–2030



Surgical Specialties

On the basis of current trends, the supply of surgeons is not projected to change substantially over the next 10 to 15 years because future attrition is likely to meet or slightly exceed the number of newly trained surgeons. In addition, projected growth in demand continues to be strong, such that demand exceeds supply under all scenarios modeled (Exhibit 7). We project a shortfall of between 20,700 and 30,500 surgeons by 2030 (Exhibit 8), a range similar to last year’s projected shortfall of between 19,800 and 29,000. These projections represent an aggregation, with substantial variation in shortfall projections for individual surgical specialties.

Exhibit 7: Projected Supply and Demand for Surgeons, 2016–2030

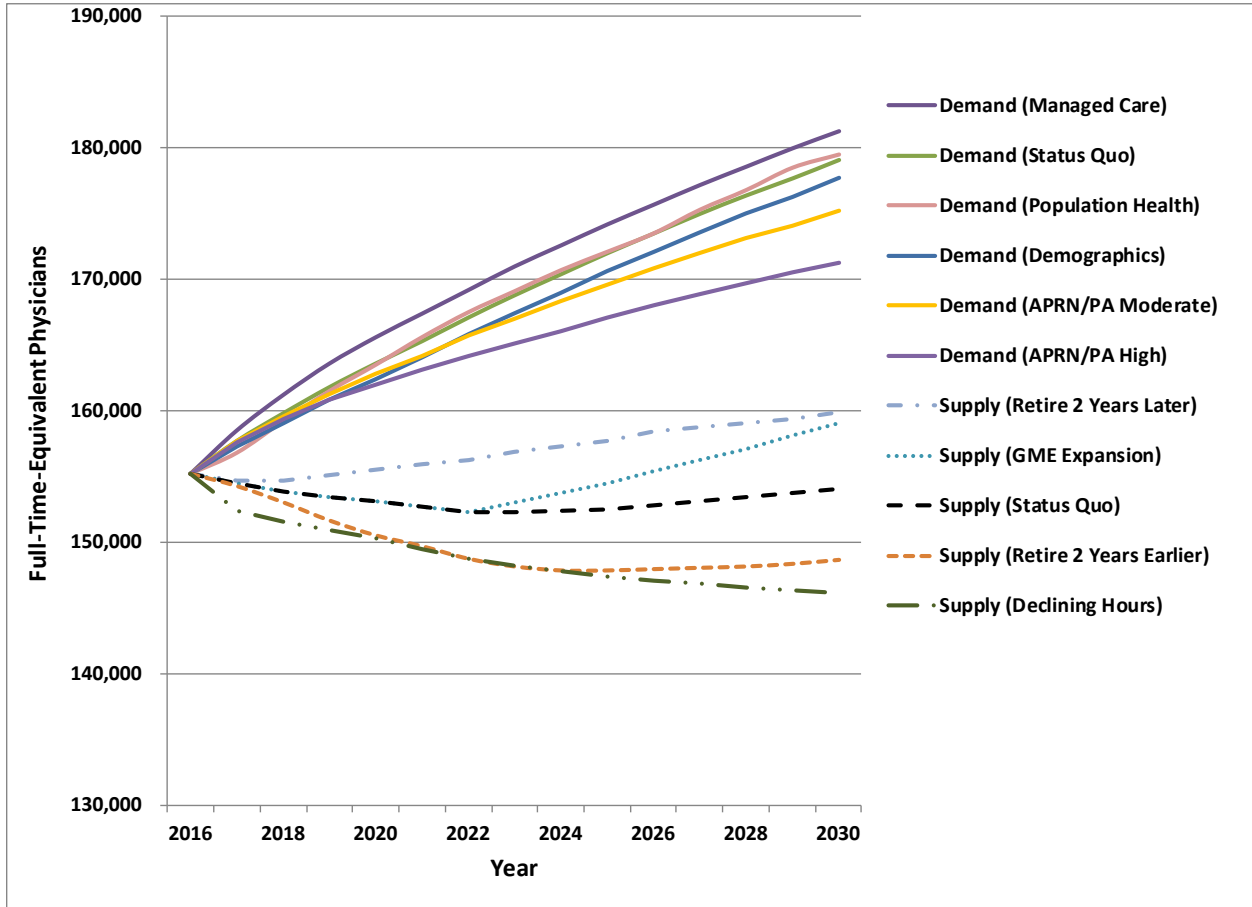
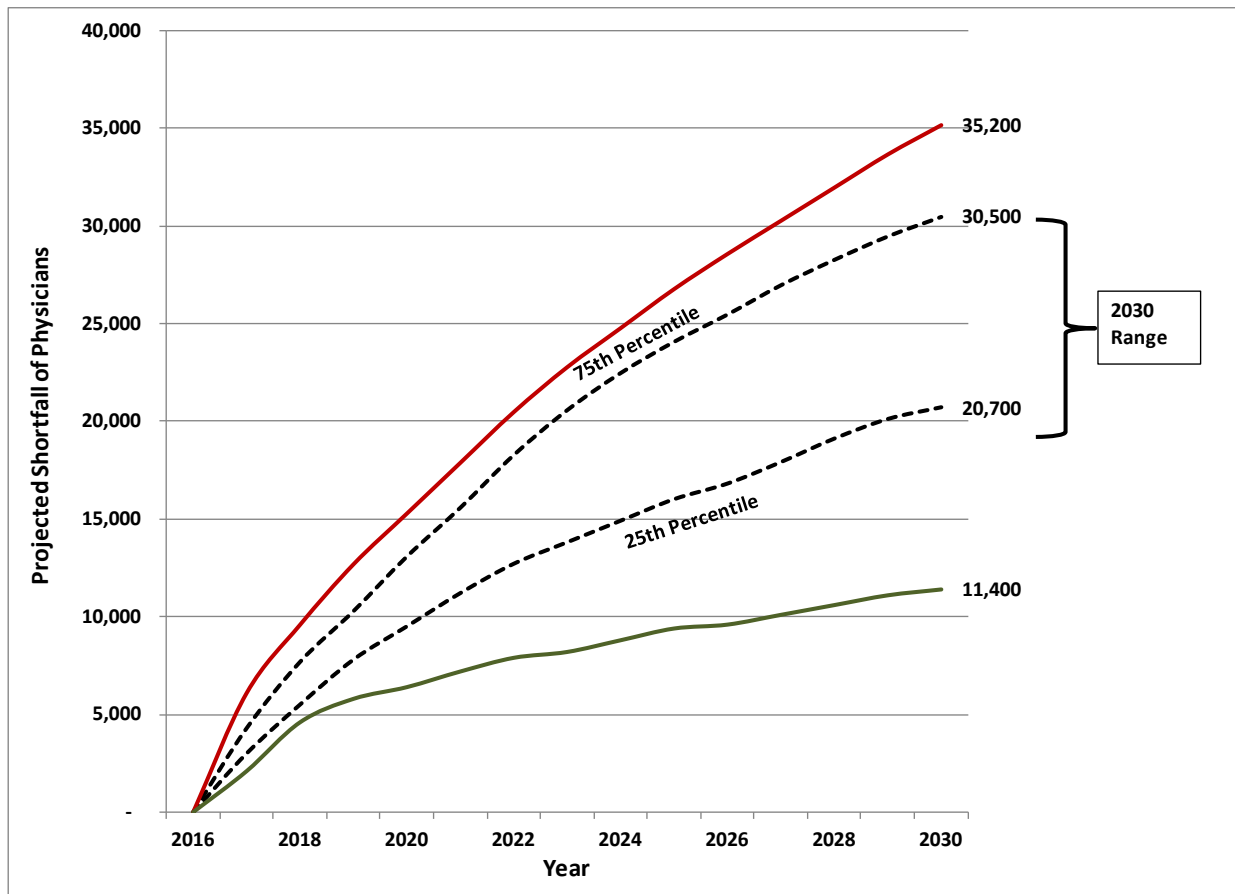


Exhibit 8: Projected Shortfall Range for Surgeons, 2016–2030



Primary Care–Trained Hospitalists

Starting with the 2016 report, we have separated primary care–trained hospitalists from the primary care category. The number of physicians working as hospitalists over the past decade has grown rapidly—reflecting a shift in how care is provided rather than growing demand for hospital inpatient services (which has declined over this same period). If recent trends in the number of primary care–trained physicians becoming hospitalists continue, the nation will likely produce between 7,500 and 9,400 more hospitalists than would be required to meet the growing demands of an aging population. If the nation reaches saturation in the supply of hospitalists, physicians who might otherwise choose to become hospitalists might choose other specialties.

Other Specialties

For the other specialties category, while the demand projections across scenarios modeled are directionally similar, the supply projections vary substantially and are sensitive to retirement assumptions (Exhibit 9). The projected shortfall range for 2030 is between 20,300 and 36,800 physicians, slightly higher than last year’s shortfall range of between 18,600 and 31,800 physicians (Exhibit 10).

Exhibit 9: Projected Supply and Demand for Other Specialties Physicians, 2016–2030

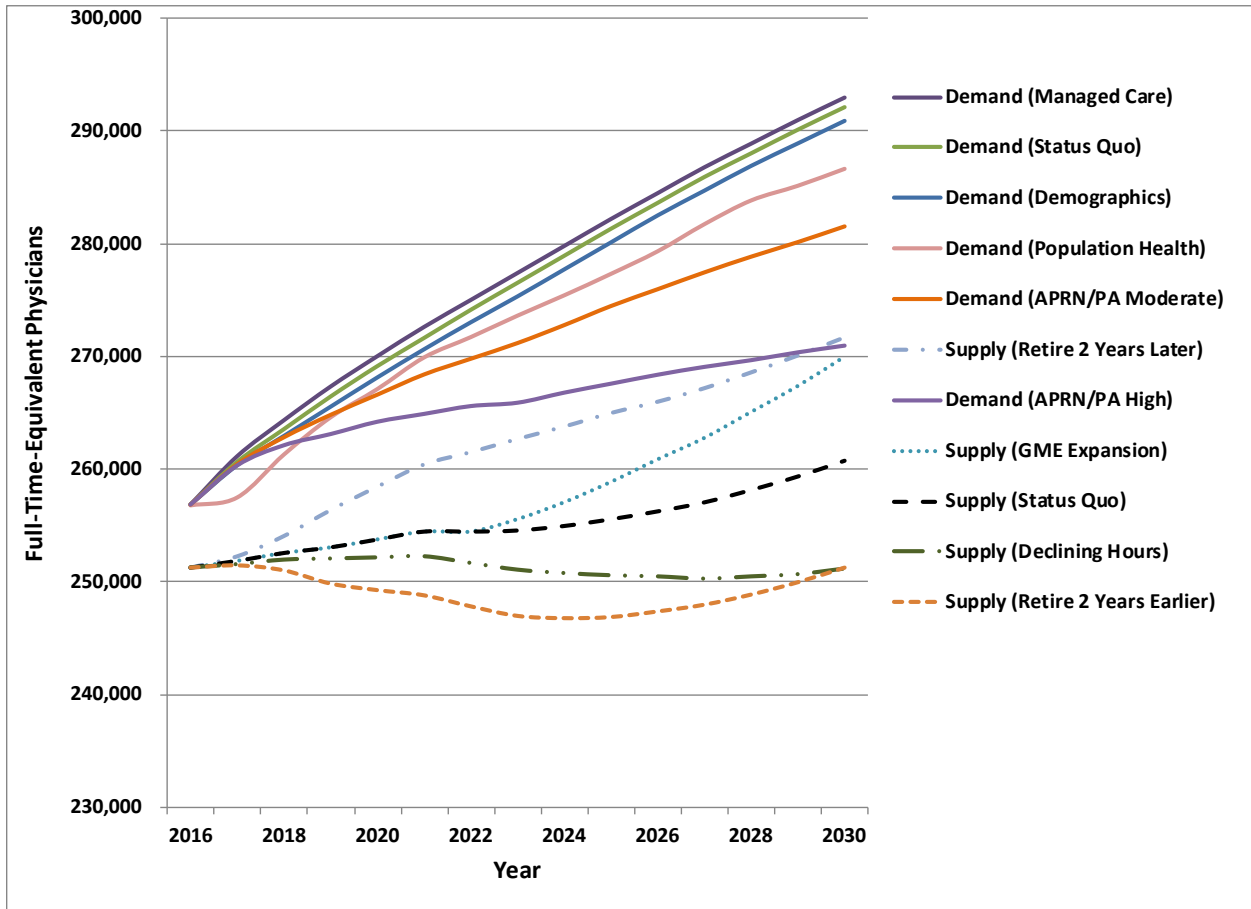
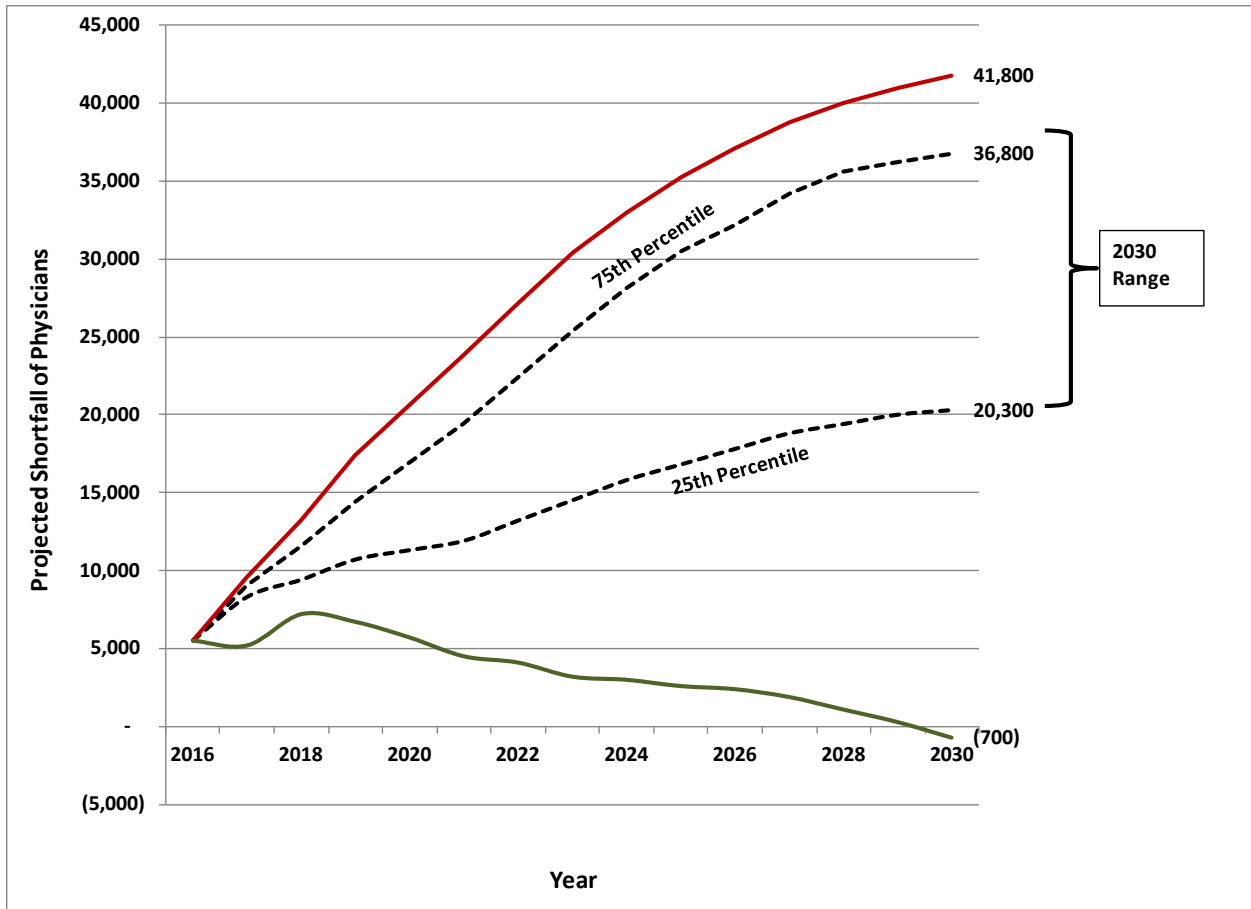


Exhibit 10: Projected Shortfall Range for Other Specialties Physicians, 2016–2030



III. SUPPLY MODELING

The microsimulation supply model projects future physician supply based on the number and characteristics of the current supply, the number and characteristics of new entrants to the physician workforce, patterns of hours worked, and retirement patterns. The projections include all active physicians who have completed their graduate medical education. The model has been documented elsewhere, and a brief description of modeling methods may be found in Appendix 1.^{3,4} Below we summarize modeling assumptions and results for supply scenarios modeled in this 2018 update.

Supply Modeling Assumptions and Scenarios

Consistent with previous reports (2015–2017), this year the status quo, retirement, and hours-worked scenarios described below were included in the analysis comparing physician supply and demand to project a range for future adequacy of physician supply. As in past years, modest graduate medical education (GME) expansion was modeled separately as a policy-oriented scenario but was not included in the shortage projections.

- **Status Quo:** This scenario assumes continuation of the status quo in terms of number and characteristics of physicians newly entering the workforce, hours worked, and retirement patterns. While the number of new physicians entering the workforce has increased in past years by about 1% annually, this trend is tempered by tightening budgets for graduate medical education.
- **Early and Delayed Retirement:** Reflecting uncertainty about future retirement patterns for physicians, the modeled scenarios assume physicians retire two years earlier or two years later, on average, relative to current patterns. Scenario assumptions reflect that physicians might decide to delay or speed retirement for financial, health, and other reasons. The *2018 Medscape National Physician Burnout and Depression Report*⁵ indicates that 42% of physician respondents reported burnout.
- **Declining Average Hours Worked:** This scenario builds on the millennial hours scenario modeled in previous reports, reflecting that younger physicians work fewer hours compared with physicians of the same age in earlier generations. We updated this scenario using more recent data—comparing

3. U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis. *Technical Documentation for HRSA's Health Workforce Simulation Model*. Rockville, MD: U.S. Department of Health and Human Services; 2015.

<https://bhw.hrsa.gov/sites/default/files/bhw/nchwa/projections/simulationmodeldocumentation.pdf>.

4. Dall TM, West T, Chakrabarti R, Iacobucci W, Semilla AP, Hansari A. *Health Workforce Model Documentation, 2016*. Washington, DC: IHS Inc.; 2016. <https://cdn.ihs.com/www/pdf/IHS-HDMM-DocumentationApr2016.pdf>.

5. *Medscape National Physician Burnout and Depression Report*. New York, NY: Medscape; January 2018.

https://www.medscape.com/slideshow/2018-lifestyle-burnout-depression-6009235?src=ban_burnout2018_desk_mscpmrk_hp#1. Burnout rates are particularly high for critical care and neurology (48% reporting burnout), followed by family medicine (47%), obstetrics and gynecology (46%), internal medicine (46%), emergency medicine (45%), and radiology (45%). Reported burnout is higher for female physicians (48%) compared with their male peers (38%)—potentially reflecting the high prevalence of women in specialties with high burnout rates. Rates vary by physician age, with half of physicians ages 45 to 54 reporting burnout. Top contributors to physician burnout are “too many bureaucratic tasks” and “spending too many hours at work.”

self-reported weekly hours worked by physicians in the combined 2000, 2001, and 2002 files of the American Community Survey (sample of 5,691 physicians) with hours worked reported by physicians in the combined 2015 and 2016 American Community Survey (sample of 18,931 physicians). In addition, we modeled a trend toward declining hours among physicians of all ages—though the declines were larger for younger physicians than for older physicians, and declines were higher for male physicians than for female physicians. On average, over this period, average weekly hours for male and female physicians declined annually by 0.23% and 0.10%, respectively, with younger physicians experiencing larger declines. For example, from 2015 to 2016, both male and female physicians aged 30 to 34 worked about 5% fewer hours than physicians of the same age from 2000 to 2002. In contrast, male physicians aged 50 to 54 worked about 4% fewer hours per week, and female physicians worked 1% fewer hours compared with physicians of the same gender and age from 2000 to 2002. We modeled the decline in hours worked by age and gender as a cohort effect.

- **GME Expansion:** This scenario assumes an increase in federally funded GME support to train an additional 5,000 physicians per year. Given an average residency length of four years, this increase is modeled as an additional 3,750 new physicians starting to enter the workforce each year beginning in 2023. This scenario is based on the proposed Resident Physician Shortage Reduction Act of 2017. The distribution of new residency slots across specialties is currently unknown, so for modeling purposes we assumed that all specialties would gain the same proportion of residency slots. This policy-related scenario was not included when calculating the shortage ranges.
- **Hospitalist Projections:** Consistent with the 2016 and 2017 reports, we modeled primary care–trained hospitalists separately from primary care physicians.⁶ The hospitalist projections build on work by the AAMC to identify hospitalists by using Medicare fee-for-service billing records linked to the AMA Masterfile. For 2017 and this year’s report we defined hospitalists as physicians who generate 90% or more of their billing for hospital-based services. We used the reported practice locations from the AMA Masterfile to reflect that a small number of pediatricians are hospitalists. The analysis suggests that there were approximately 27,800 primary care–trained hospitalists in 2016. Using data from 2013 to 2016, we estimate 1,572 new primary care–trained hospitalists per year (slightly lower than last year’s modeled estimate of 1,647 per year). Hospitalists trained in non-primary care specialties are reported in the projections for their individual specialty.

Supply Projections

Updated annual projections for physician supply across all scenarios modeled are summarized in Exhibit 11. Under the status quo scenario, total physician supply increases from 791,400 in 2016 to 846,600 in 2030—a 7% increase. This is well below the approximately 11% projected growth in the U.S. population

6. Hospitalists trained in pediatrics cannot easily be identified by using Medicare billing records. Hospitalists with specialized training in an internal medicine subspecialty or other specialty were categorized under their specialty rather than as a hospitalist for purposes of our modeling (e.g., a neurologist practicing as a hospitalist was categorized as a neurologist). In the remainder of this section, references to hospitalists focus on those whose final GME training was in general internal medicine, family medicine, or geriatric medicine.

over this period, contributing to a 3% decline in the physician-to-population ratio despite increasing health care needs associated with a growing and aging population. As illustrated in Exhibit 12, this year’s updated supply projections covering the period 2016 to 2030 are, apart from the revised declining-hours scenario, similar to projections reported in the 2017 report.

Exhibit 11: Projected Supply of Physicians, 2016–2030

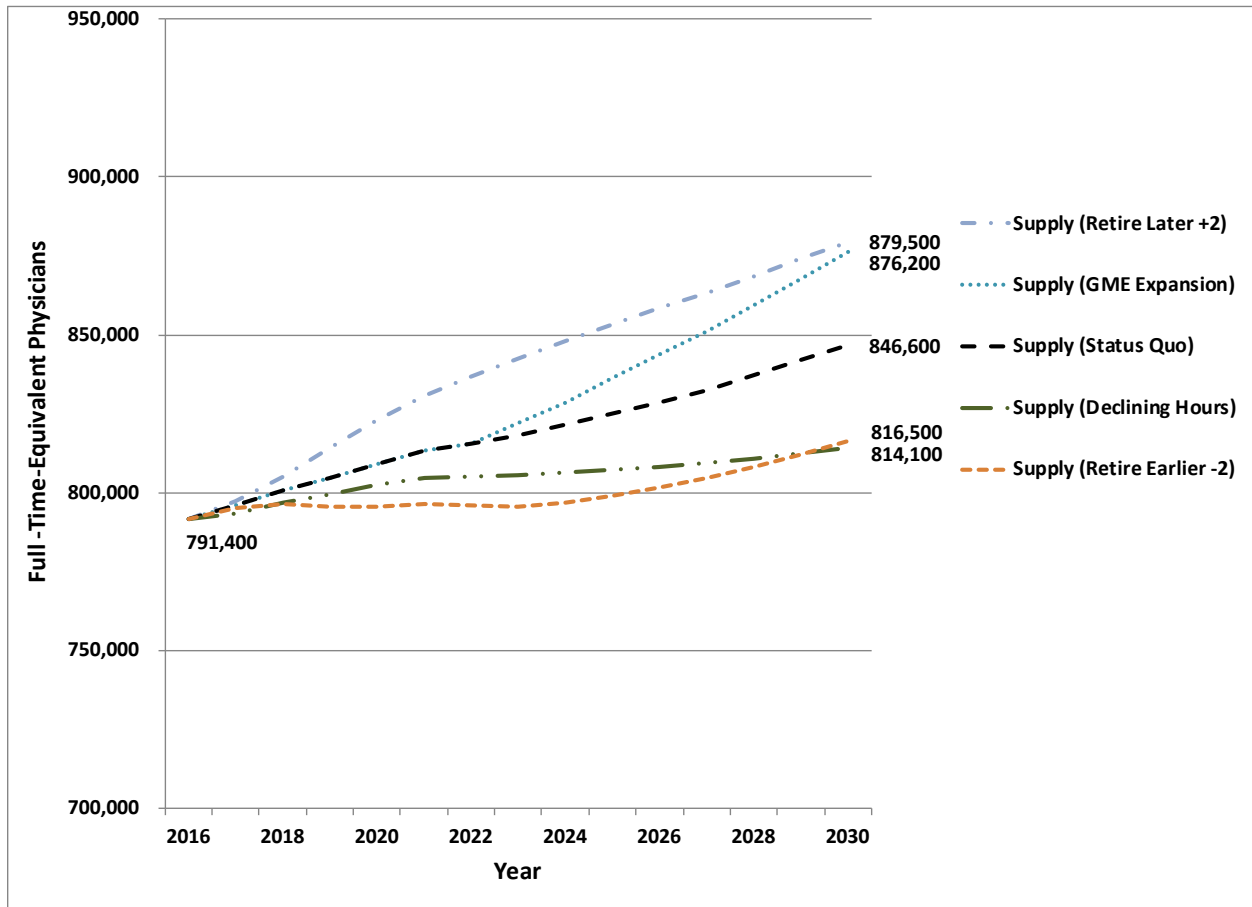
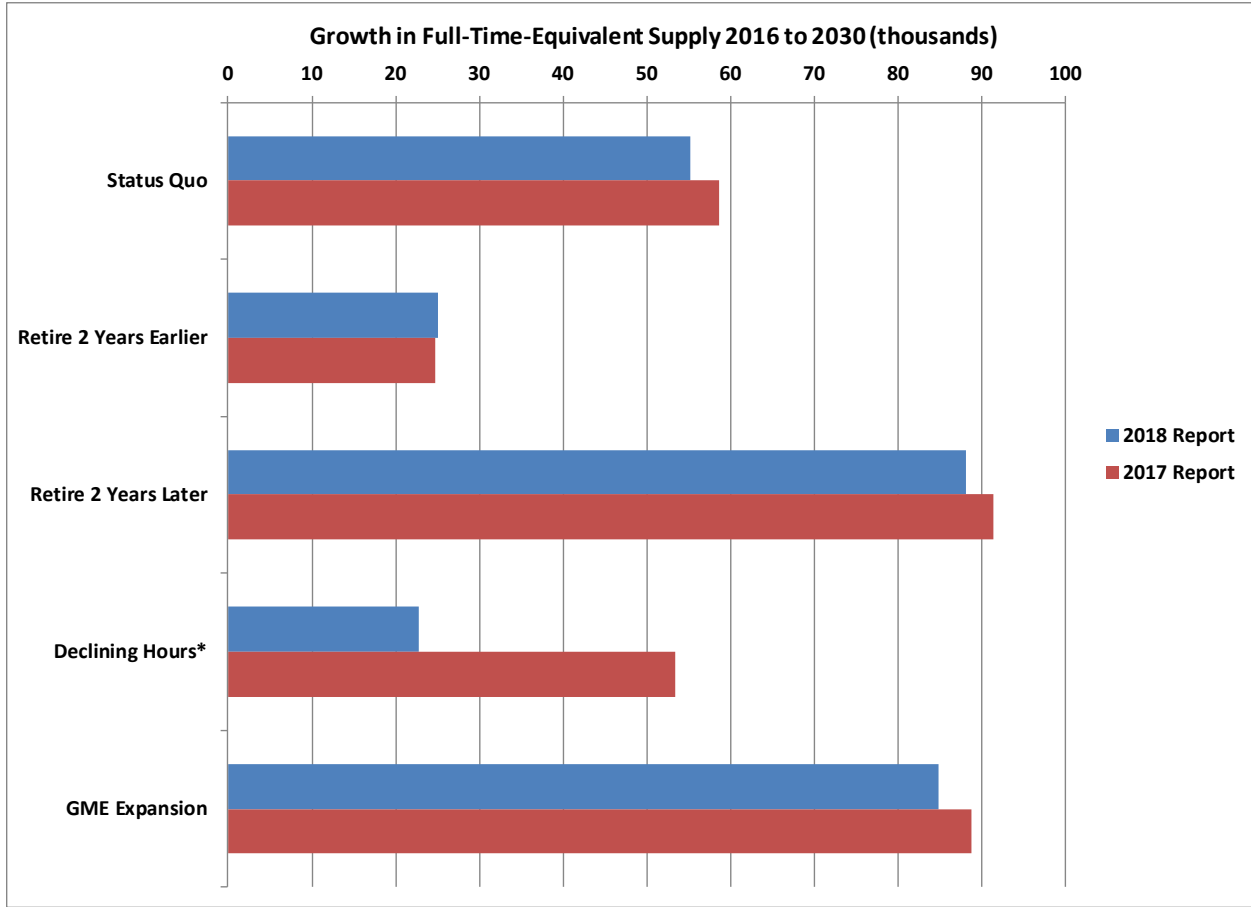


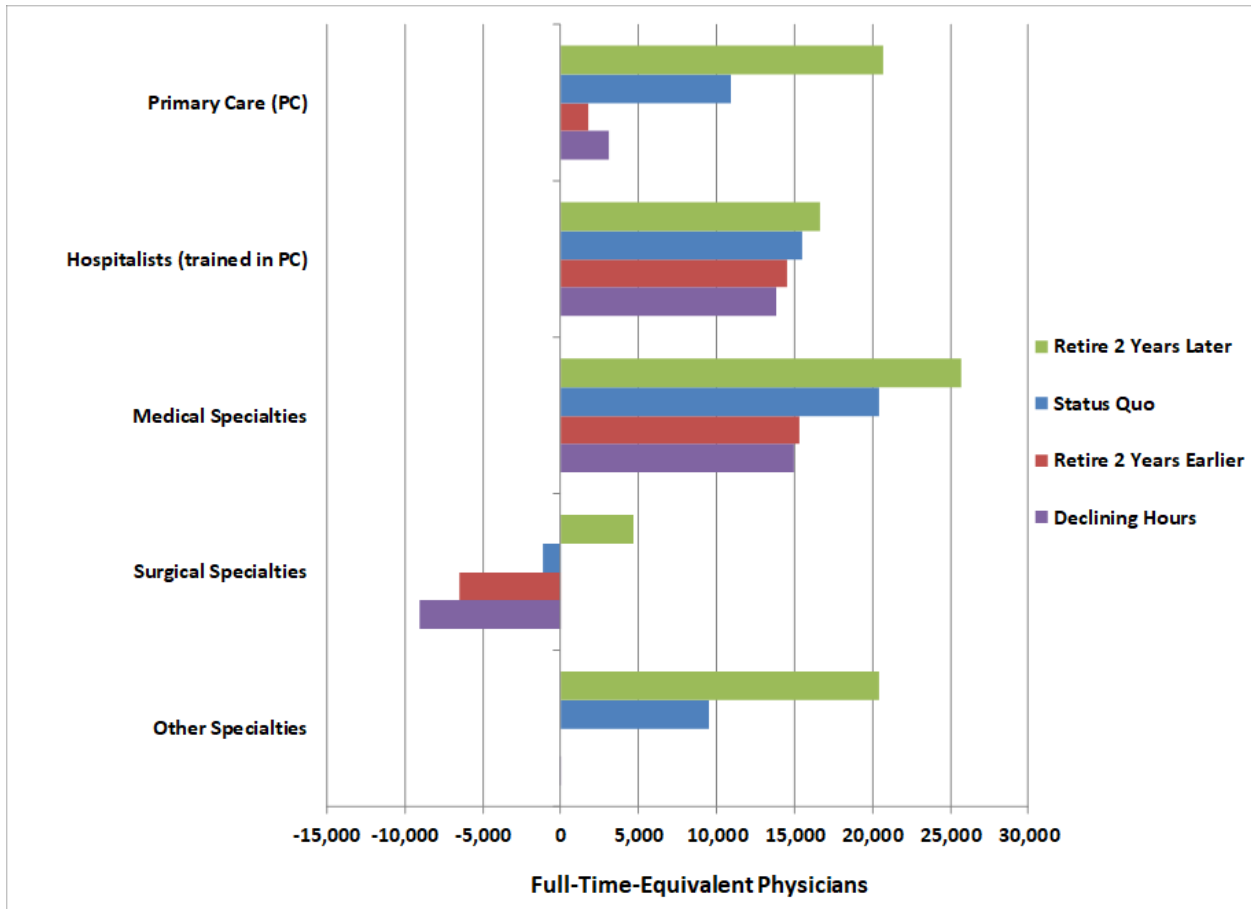
Exhibit 12: Projected Change in Physician Supply: 2018 vs 2017



*The declining-hours scenario for the 2018 report models the cohort effect of declining hours worked across physicians in all age groups. The 2017 report only modeled declining hours among millennials.

Growth in total physician supply by specialty category between 2016 and 2030 ranges from a high of about 25,700 additional FTEs among medical specialties under a delayed-retirement scenario to a projected decline among surgical specialties of about 7,000 physicians under a declining-hours scenario (Exhibit 13). Under all scenarios modeled, the supply of surgical specialists is projected to grow negligibly or decline. For primary care, medical specialties, and hospitalists, supply is projected to grow under all scenarios. The supply of physicians in the other specialties category is projected to grow under most scenarios, most notably under a delayed-retirement scenario (20,000 FTEs).

Exhibit 13: Projected Change in Physician Supply by Specialty Category, 2016–2030



IV. DEMAND MODELING

This section presents an overview of the demand scenarios that were modeled and the updated projections. As noted above, detailed information about the microsimulation modeling approach has been published elsewhere.^{7,8} A summary of demand modeling methods and data is provided in Appendix 1.

Demand Modeling Assumptions and Scenarios

We projected physician demand under scenarios that reflect varying assumptions about use of health care services and care delivery. All scenarios modeled reflect changing demographics from 2016 to 2030. In addition, except for a scenario that reflects only the effects of changing demographics, all other scenarios modeled include the projected impact of expanded medical insurance coverage under ACA. Expanded insurance coverage under ACA has largely already occurred, with some increase in coverage anticipated to occur in upcoming years. Uncertainty about the future of ACA and the implications on demand for physicians are discussed below.

As in previous editions of this report, we modeled the implications of greater use of managed care, retail clinics, the contribution of PAs and APRNs, and the implications of achieving certain population health goals to illustrate the potential impact of improved preventive care. Modeled scenarios are described below in more detail.

- **Changing demographics and continuation of ACA (status quo):** This scenario extrapolates current health care use and delivery patterns to future populations by using projected demographic shifts (e.g., age, gender, and race and ethnicity) from 2016 to 2030 and anticipated change in health care use associated with increased coverage under ACA. During this period, the U.S. population is projected to grow about 11%, from about 324 million to 359 million. The population under age 18 is projected to grow by 3%; the population aged 65 and older is projected to grow by 50%; and the population aged 75 and older is projected to grow by 69%. Based on demographics alone the percentage growth in demand for health care services used by seniors is projected to be much higher than the percentage growth in demand for pediatric services.

By 2016, much of the expanded coverage provisions of ACA had been implemented, and these changes are reflected in the starting year demand estimates. The remaining demand scenarios summarized below all build on this scenario and reflect both changing demographics and continued implementation of ACA.

7. U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis. *Technical Documentation for HRSA's Health Workforce Simulation Model*. Rockville, MD: U.S. Department of Health and Human Services; 2015.

<https://bhw.hrsa.gov/sites/default/files/bhw/nchwa/projections/simulationmodeldocumentation.pdf>.

8. Dall TM, West T, Chakrabarti R, Iacobucci W, Semilla AP, Hansari A. *Health Workforce Model Documentation, 2016*. Washington, DC: IHS Inc.; 2016. <https://cdn.ihs.com/www/pdf/IHS-HDMM-DocumentationApr2016.pdf>.

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- **Managed care as a proxy for accountable care organizations:** A variety of integrated-care delivery models are being implemented for both publicly and privately insured populations. Goals include improving the coordination and quality of patient care, reducing inefficiencies, shifting care to appropriate lower-cost settings and providers, improving preventive care efforts, and better controlling cost growth. Many of the goals of accountable care organizations (ACOs) are similar to those of other risk-bearing organizations such as managed care organizations. As of the end of the first quarter of 2017, there were an estimated 923 active public and private ACOs across the United States, covering more than 32 million lives.⁹ Relatively little information has been published on the impact of ACOs on utilization of health care services. Looking historically at the effect of managed care on the use of services provides insights into what might happen if ACOs and other integrated-care models gain greater prominence. We analyzed systematic differences in use of health care services for patients in a managed care plan versus patients not in managed care. Consistent with assumptions guiding the projections in previous reports, this scenario models physician demand implications if 100% of the population were enrolled in risk-based entities.
 - **Expanded use of retail clinics:** Accenture projected that the number of retail health clinics would exceed 2,800 in 2017, rising 47% since 2014.¹⁰ Chief drivers of retail clinic utilization include convenience, accessibility, cost-effectiveness, and widespread coverage by many insurance plans. As a result, retail clinics may be an alternative to traditional primary care for many consumers. The recent announcement of a CVS Health–Aetna merger could substantially increase the number of retail clinics available. What remains to be seen is how a large increase in retail clinics might be staffed and whether the scope of services provided in such locations might broaden beyond addressing relatively non-complex, acute care issues. This scenario explores the demand implications of shifting care from primary care physician offices to retail clinics for 10 conditions typically treated at retail clinics.¹¹ This scenario assumes the following:
 - Patients with chronic conditions will be seen by their regular primary care provider.
 - Care in retail clinics will primarily be provided by nurse practitioners (NPs) and PAs.
 - For care provided in primary care physician offices, 77% of visits to a pediatrician’s office are handled primarily by a physician (reflecting that between NPs and physicians, 77% of the pediatric workforce are physicians), and 70% of adult primary care office visits are handled primarily by a physician.
 - To reflect that the categories of visits modeled tend to be less complex than the average office visit, we used the Management Group Medical Association’s 2015 estimates for the

9. Muhlestein D, Saunders R, McLellan M. Growth of ACOs and alternative payment models in 2017. *Health Affairs* [blog]. June 28, 2017. <http://www.healthaffairs.org/doi/10.1377/hblog20170628.060719/full/>.

10. Number of U.S. retail health clinics will surpass 2,800 by 2017, Accenture forecasts. Accenture. Nov. 5, 2015. <https://newsroom.accenture.com/news/number-of-us-retail-health-clinics-will-surpass-2800-by-2017-accenture-forecasts.htm>.

11. Mehrotra A, Wang MC, Lave JR, Adams JL, and McGlynn EA. Retail clinics, primary care physicians, and emergency departments: A comparison of patients’ visits. *Health Affairs*. 2008;27(5):1272–1282.

75th percentile of annual ambulatory patient encounters for general pediatricians and family physicians to translate the reduction in office visits to reduced demand for physicians.

These assumptions suggest that 6,541 visits by children to a retail clinic rather than to a pediatrician's office reduce demand for pediatricians by one physician, and 7,266 retail clinic visits by adults reduce demand for an adult primary care physician by one physician.

- **Increased use of APRNs and PAs under “moderate use” and “high use” assumptions:** These scenarios reflect the rapid growth in supply of PAs, certified registered nurse anesthetists, certified nurse midwives, and NPs that build on analyses from previous AAMC reports and projections developed for the Health Resources and Services Administration.^{12,13} In 2016 there were an estimated 115,500 certified PAs, with approximately 5% to 6% of these PAs not employed as a PA in a clinical position.¹⁴ The supply of PAs is projected to more than double by 2030—reaching 242,000 if current growth patterns for the number of graduates continue. In 2016, there were an estimated 229,000 APRNs, with supply projected to nearly double to 449,000 by 2030 (projection based on the demographics of the current workforce, retirement patterns, and the growing number of APRNs entering the workforce). Overall demand for health care services is projected to grow by about 15% between 2016 and 2030; therefore, the supply of PAs and APRNs is growing at about six times the rate of growth of demand for health care services. An unknown portion of the supply growth will be used to provide services that are not currently offered. A portion of the supply growth will also help offset the projected growing shortfall of physicians.

Among the unknowns are (1) whether there is a market saturation point at which APRNs and PAs might have difficulty finding employment; (2) to what extent these additional clinicians provide services that currently are not provided by physicians; and (3) by how much these additional clinicians will reduce demand for physicians. While there is a growing body of literature that indicates APRNs and PAs can provide high-quality care, increase physician productivity, and, in some specialties, perform many of the same functions as physicians, there is little information to indicate the extent to which APRNs and PAs might displace demand for physicians.

For modeling purposes, the “high use” scenario assumes that each additional APRN or PA beyond the supply needed to maintain current staffing patterns will ease demand for physicians in their specialty as follows: anesthesiology (60%), women's health (40%), primary care (50%), medical specialties (30%), surgery (20%), and other medical specialties (30%). The “moderate use” scenario assumes the adjustment in physician demand is half of the above amounts. These percentages imply

12. U.S. Department of Health and Human Services. Health Workforce Projections 2016. <https://bhwh.hrsa.gov/health-workforce-analysis/research/projections>.

13. Clinical nurse specialists (CNSs) are not included in the workforce projections due to lack of data for modeling CNS supply and demand. Whereas NPs concentrate on direct patient care, CNSs often work in health care administration and are less likely to displace demand for physicians or directly affect physician productivity compared with NPs and PAs.

14. National Commission on Certification of Physician Assistants, Inc. *2016 Statistical Profile of Certified Physician Assistants: An Annual Report of the National Commission on Certification of Physician Assistants*. Johns Creek, GA: NCCPA; 2017. <https://prodcmsstoragesa.blob.core.windows.net/uploads/files/2016StatisticalProfileofCertifiedPhysicianAssistants.pdf>.

nothing about the value of services provided by APRNs and PAs relative to physicians, but rather about the role these providers will play in the future health care system and whether the role fills a currently unmet need (see Section 0) versus reducing demand for physicians.

- **Achieving select population health goals:** Last year we modeled the effects of achieving the goals of reducing excess body weight; smoking cessation; and improved control of hypertension, hypercholesterolemia, and high blood glucose levels. This hypothetical scenario could become a reality through increased use of medical homes and more emphasis on preventive care—with the assumption that there would be heavy reliance on APRNs, PAs, and other health workers to provide the additional counseling and monitoring required to achieve these goals. This scenario illustrated the potential impact on demand for physicians associated with improved population health and reduced disease prevalence and mortality. Modeling assumptions and the source of key parameters are described in the 2017 report.

Summary Demand Projections

As noted in previous editions of this report, the single factor most affecting the growth of future demand for physicians is rapidly changing demographics. High rates of projected population growth among baby boomers portend rapidly growing demand for health care services, with the highest growth expected for those specialties that disproportionately serve seniors. Because these demographic trends are inevitable, they are incorporated into all the demand scenarios. Between 2016 and 2030, changing demographics alone are projected to increase national demand for physicians by about 135,700 FTEs (17%) (Exhibit 14), with demand for primary care physicians projected to grow 43,000 FTEs (18%). Faster growth rates are expected among hospitalists (24%; 6,900 FTEs) and medical specialists (22%; 29,300 FTEs); lower growth rates are expected among surgical specialties (14%; 22,500) and the other specialties (13%; 34,100 FTEs).

The effect of expanded medical insurance coverage was already underway by 2016, but its future is uncertain. However, if ACA or its replacement were to achieve similar insurance expansion coverage, eventually an estimated 4,800 additional FTE physicians would be required to cover the newly insured (1,400 of these physicians would be for primary care and 3,400 for non-primary care specialties). The effects of ACA-related medical insurance expansion are incorporated into all but the changing-demographics scenario.

The managed care scenario has a small increase in demand, but shifts the specialty mix toward primary care. By 2030, national demand would be approximately 16,100 FTE physicians higher in this scenario than in the scenario incorporating changing demographics and expansion of ACA-related medical insurance coverage, with additional demand for 17,700 primary care physicians partially offset by reduced demand for 1,600 specialist physicians.

A simulated increase in the use of retail clinics only affected demand for primary care, with demand for primary care physicians declining by 12,800 physicians in 2030 relative to the scenario with ACA and

changing demographics. This scenario used conservative assumptions about which primary care visits would be provided in a retail clinic, so the impact could be larger than reported here. This scenario assumes that people with severe chronic disease such as diabetes and cardiovascular disease would continue to receive care from their normal primary care provider even for services that are often provided in retail clinics.

The impacts of increased use of APRNs and PAs are substantial and will vary by physician specialty and assumptions about the future level and scope of care delivery provided by these professions. Relative to the status quo scenario projections for 2030, projected physician demand declines by 54,300 physicians in 2030 with increased use of APRNs and PAs under the “moderate use” scenario and by 108,600 physicians under the “high use” scenario. This scenario reflects a doubling of the APRN and PA workforce between 2016 and 2030.

Under the population health achievement scenario, by 2030 increased demand for health care services related to reduced mortality and the associated 6.9 million population growth more than offsets the decreased demand associated with a healthier population, resulting in a net increase in demand for 17,300 physicians. This scenario is combined with the “moderate use” APRN-PA scenario, under the assumption that achieving the modeled population health goals would come through greater use of APRNs and PAs to provide counseling and follow-up care to help patients achieve the desired health outcomes. Furthermore, the additional 6.9 million people alive in 2030 under this scenario would require more APRN and PA services, so there would be fewer available APRNs and PAs to offset projected physician shortfalls. Therefore, the total increase in physician demand under this scenario is 36,900 FTEs.

Exhibit 15 compares projected growth in physician demand by scenario between the 2017 report and this 2018 update. Overall, both updates project comparable demand growth between 2016 and 2030 under the scenarios modeled.

Exhibit 14: Projected Demand for Physicians, 2016–2030

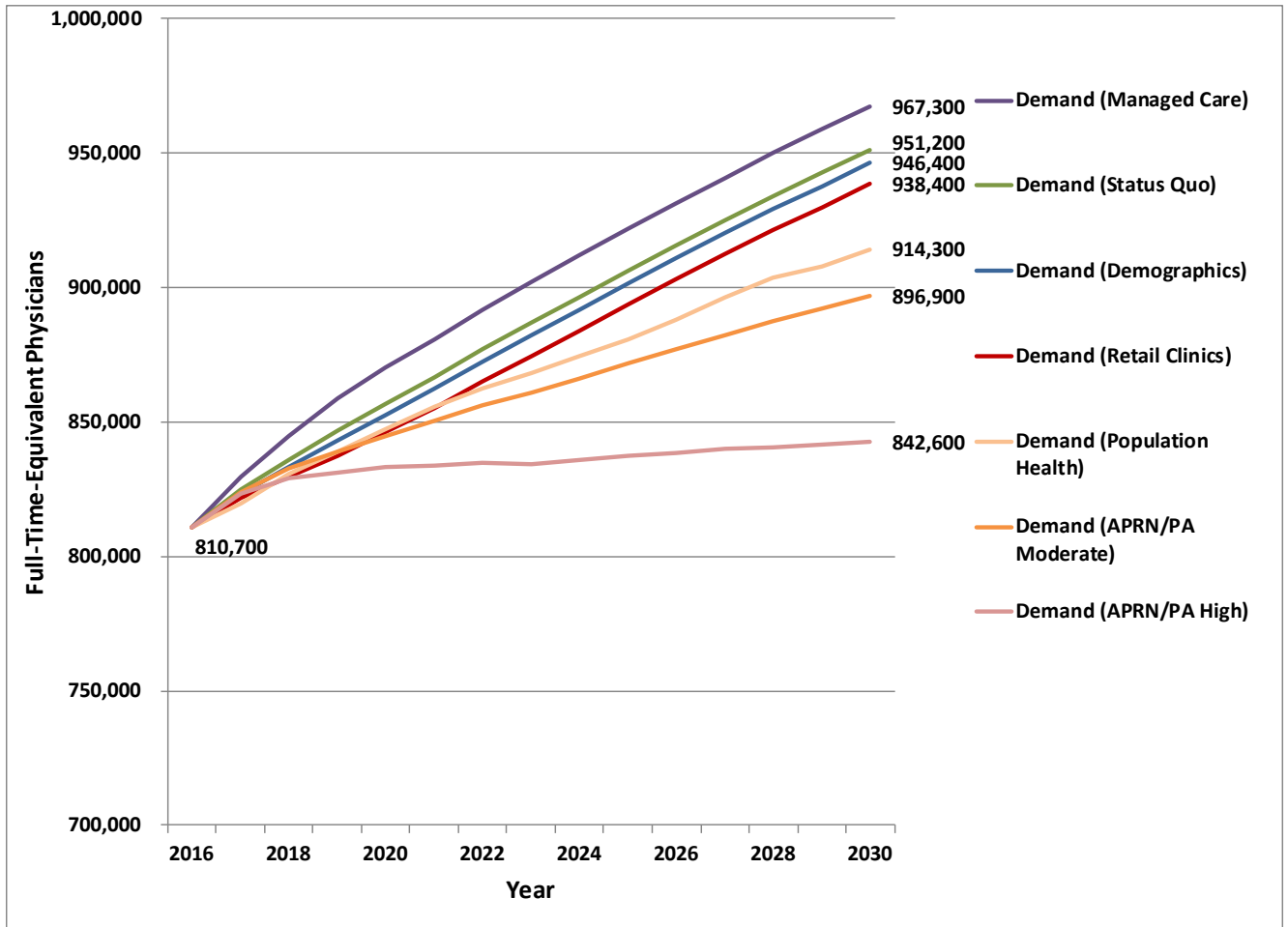
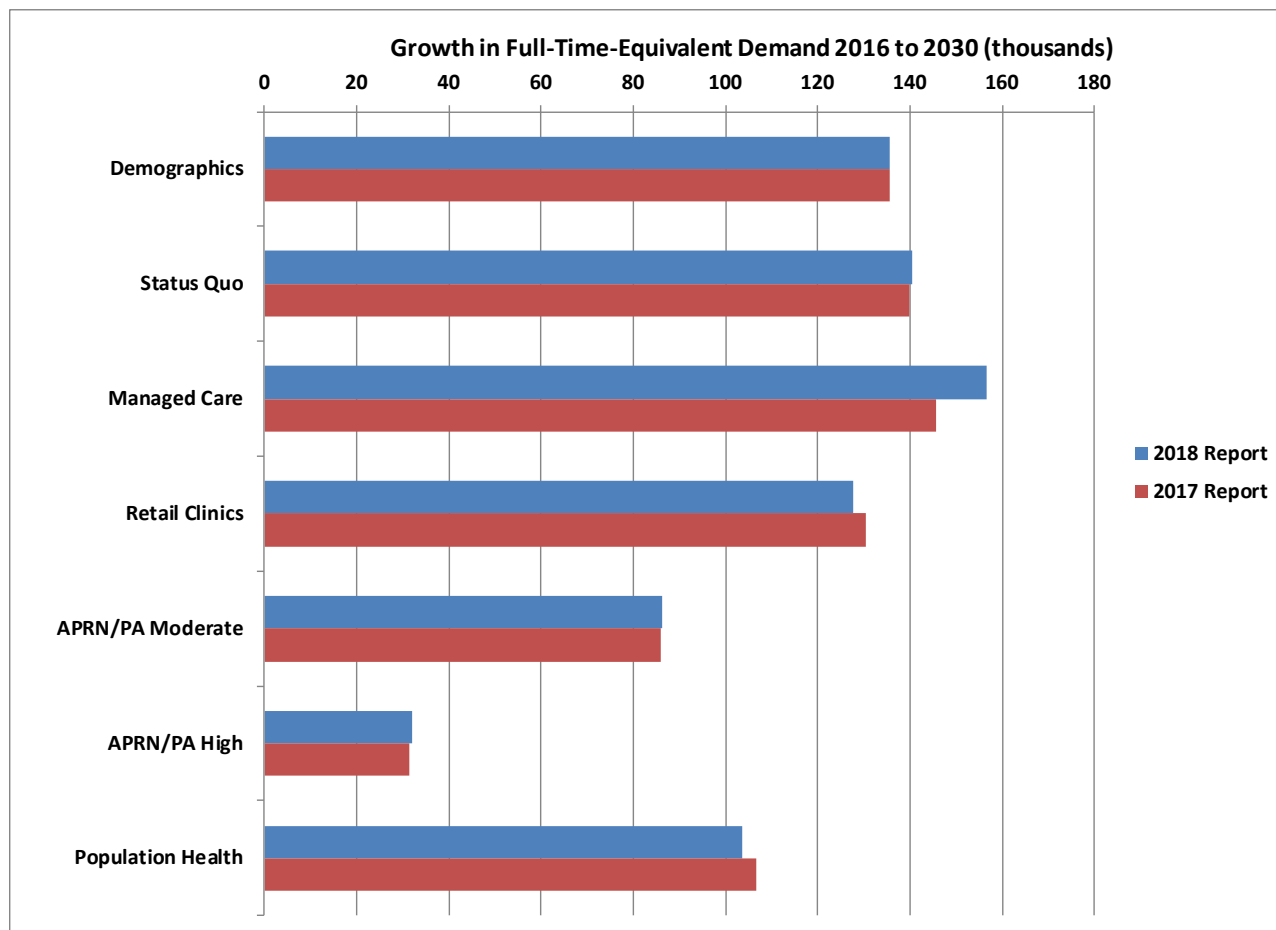


Exhibit 15: Projected Change in Physician Demand: 2018 vs 2017 Scenario Projections



We updated the physician demand projections by patient race and ethnicity¹⁵, census region, and metropolitan/non-metropolitan areas that were originally presented in the 2017 report. Tables and charts with updated findings are provided in Appendix 2 (through Exhibit 27). Study findings are summarized below:

- Physician Demand by Patient Race and Ethnicity** (Exhibit 23 and Exhibit 24): Patterns of health care use and delivery continue to differ systematically by patient race and ethnicity. In 2016, an estimated 62% of the population was non-Hispanic white and accounted for approximately 70% (567,600 FTEs) of total physician demand. By comparison, the Hispanic population represented 18% of the U.S. population but accounted for about 12% (96,400 FTEs) of physician demand. Between

15. For race and ethnicity, we divided the population into four mutually exclusive categories: non-Hispanic white, non-Hispanic black, non-Hispanic other, and Hispanic. People of Hispanic ethnicity are in the Hispanic category. For non-Hispanic populations, white only and black only are included in their respective categories. Non-Hispanic individuals listing any other race or a combination of races are included in the “other” category.

2016 and 2030, the Hispanic population is projected to grow the most rapidly in percentage terms (26%), followed by the non-Hispanic other (19%), black (11%), and white (9%) populations. Based on changing demographics alone, demand for physician services is projected to grow by 140,300 FTEs. Furthermore, demand for physician services is projected to grow proportionately faster for minority populations based on national demographic trends.

- **Physician Demand by Census Region** (Exhibit 25 and Exhibit 26): Utilization of physician services and projected growth in demand varies by census region due to differences in demographics and projected population growth, insurance coverage, health-related behavior, disease prevalence, practice patterns, and care-access barriers. If care were evenly distributed across the United States after adjusting for demographics, socioeconomic factors, and prevalence of disease and health risk factors, physician demand in 2016 would be distributed as follows across census regions: 305,100 FTEs (38%) in the South Region, 183,200 FTEs (23%) in the West Region, 176,800 FTEs (22%) in the Midwest Region, and 145,700 FTEs (18%) in the Northeast Region. For comparison, in 2016, supply was distributed as follows: 274,400 FTEs (35%) in the South Region, 181,400 FTEs (23%) in the West Region, 163,900 FTEs (21%) in the Midwest Region, and 171,900 FTEs (22%) in the Northeast Region. The Northeast Region has 22% of the nation's supply of doctors, 18% of the demand based on national average patterns of care applied to the population in the Northeast Region, and 17% of the nation's population. By 2030, demand growth is projected to be largest in the South Region (+65,900 FTEs) and lowest in the Northeast Region (+11,600 FTEs).
- **Physician Demand by Metropolitan/Non-Metropolitan Area** (Exhibit 27): A comparison of projected physician demand in metropolitan areas and non-metropolitan areas indicates that utilization of physician services is slightly higher in metropolitan areas after controlling for demographics, disease prevalence, medical insurance coverage, and other patient factors. About 89% of total FTE physician demand comes from populations residing in metropolitan areas, and about 86% of the U.S. population resides in metropolitan counties.

V. PROVIDERS REQUIRED IF U.S. ACHIEVED EQUITY IN HEALTH CARE UTILIZATION

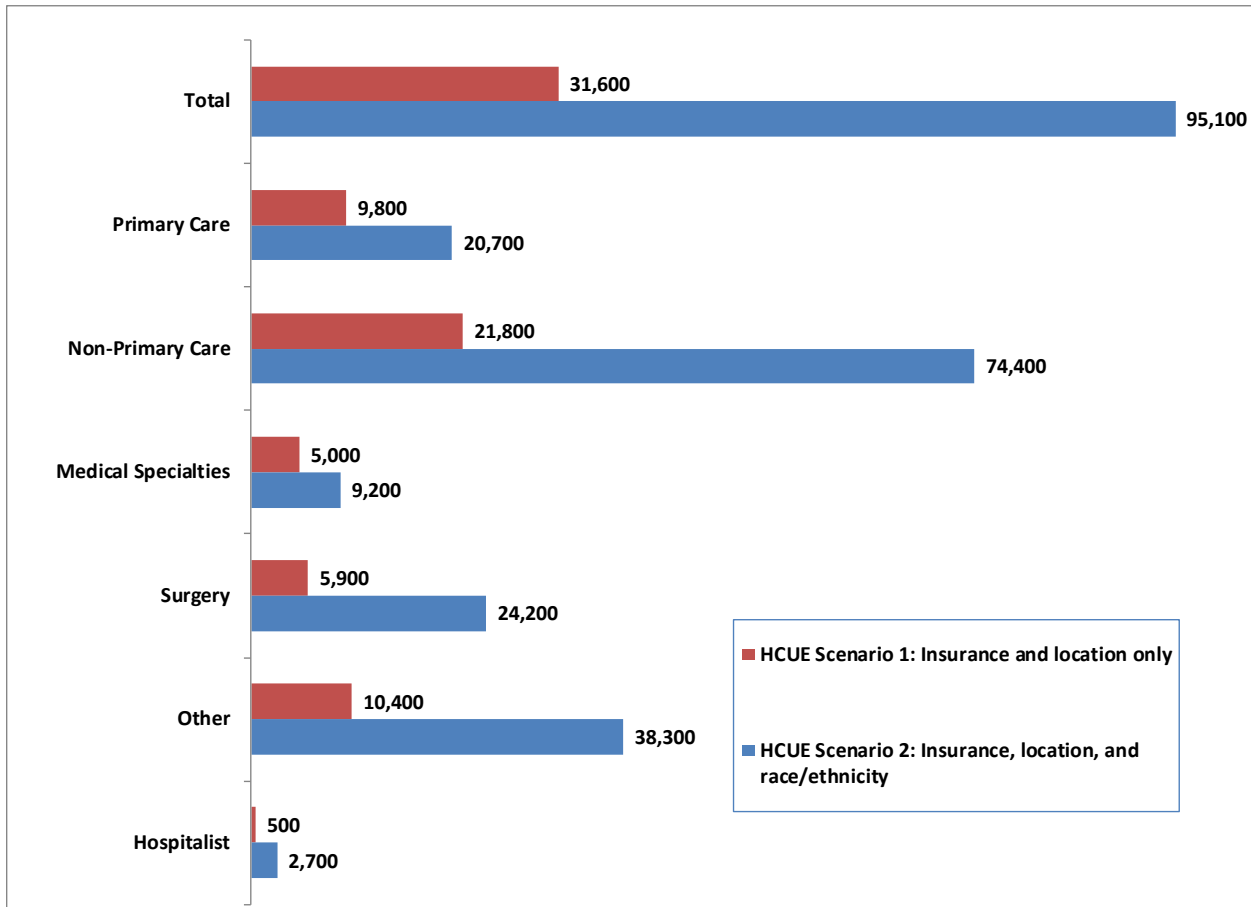
The health care–utilization equity (HCUE) analysis models the implications for physician demand if currently underserved populations utilized care at a rate similar to populations facing fewer barriers to care. This analysis is not included in the ranges of scenarios that summarize projected gaps between supply and demand across physician specialty categories at the 25th and 75th percentile of projected shortages. Rather it is intended as an additional point of consideration when gauging workforce adequacy. This stand-alone scenario illustrates that sociodemographic and geographic imbalances in the supply of physicians and other barriers to accessing care result in historically underserved populations receiving lower levels of care than other groups. This scenario indicates that differences in disease prevalence and other health risk factors are not the only influences on differences in health care utilization. These estimates are intended to stimulate discussion of how best to address inequity in health care utilization.

Similar to the previous years' analyses, two scenarios were modeled to estimate the anticipated increase in the use of health care services if the use patterns of underserved populations were similar to those of a population not perceived as underserved (see Exhibit 16 through Exhibit 21 and Exhibit 32 and Exhibit 33).

The first scenario (HCUE Scenario 1) assumed people without medical insurance and people living in non-metropolitan areas had care utilization patterns equivalent to those of their insured peers living in metropolitan areas with similar demographics and health risk factors. (For example, an uninsured person with heart disease living in a rural area was modeled as having the utilization patterns of an insured person with heart disease living in a metropolitan area.) Under these assumptions, demand would shift up by about 4% (equivalent to an additional 31,600 physicians). This estimate for physicians is in addition to the extra PAs and APRNs that would be needed based on current national delivery patterns. Adding in the estimated 13,300 additional primary care physicians and 5,000 additional psychiatrists required to remove the current HPSA shortage designations, an additional 50,900 physicians would be required to fill this gap.

In the second HCUE scenario (HCUE Scenario 2) we modeled everyone utilizing care as if they had utilization patterns equivalent to non-Hispanic white, insured populations residing in metropolitan areas. (For example, an uninsured black person with heart disease living in a rural area was modeled as having the utilization rate of an insured white person with heart disease living in a metropolitan area.) Under these assumptions, we estimated a 12% increase in physician demand in 2016—or approximately 95,100 physicians.

Exhibit 16: Additional Physician Demand to Achieve Health Care Utilization Equity, 2016



The implications of these hypothetical scenarios vary substantially by race and ethnicity (Exhibit 17), region of the country (Exhibit 18 and Exhibit 19), and location—whether the population is in a metropolitan area (and Exhibit 21). Under HCUE Scenario 1, demand for physicians increases by approximately 31,600 FTEs for all race and ethnicity categories. Demand among the Hispanic population is projected to rise by 5,900 FTEs to reflect higher rates of uninsured among this population.

Under HCUE Scenario 2, the Hispanic population would use services requiring an additional 33,800 FTE physicians, which is a 40% increase from the current level of care used by the Hispanic population. The black population would use services requiring an additional 25,900 FTE physicians. Demand for services would increase for the black population in all specialty categories except for medical specialties: Demand would fall for those specialties where black patients use disproportionately more services than white patients, such as nephrology, hematology/oncology, and endocrinology. With better access to care, demand for these specialties might fall for the black population to the extent that improved preventive care and screening can reduce the prevalence of hypertension, diabetes, cancers, and other preventable conditions.

Under both HCUE scenarios, the increase in demand would be greatest in the South Region and lowest in the Northeast Region (Exhibit 18). Under the HCUE 1 scenario, the increase in demand would be split almost evenly between metropolitan and non-metropolitan areas (Exhibit 20). Under the HCUE 2 scenario, most of the demand growth (80%) would be in metropolitan areas.

Exhibit 17: Additional Physician Demand if U.S. Had Achieved Health Care Utilization Equity in 2016, by Race and Ethnicity

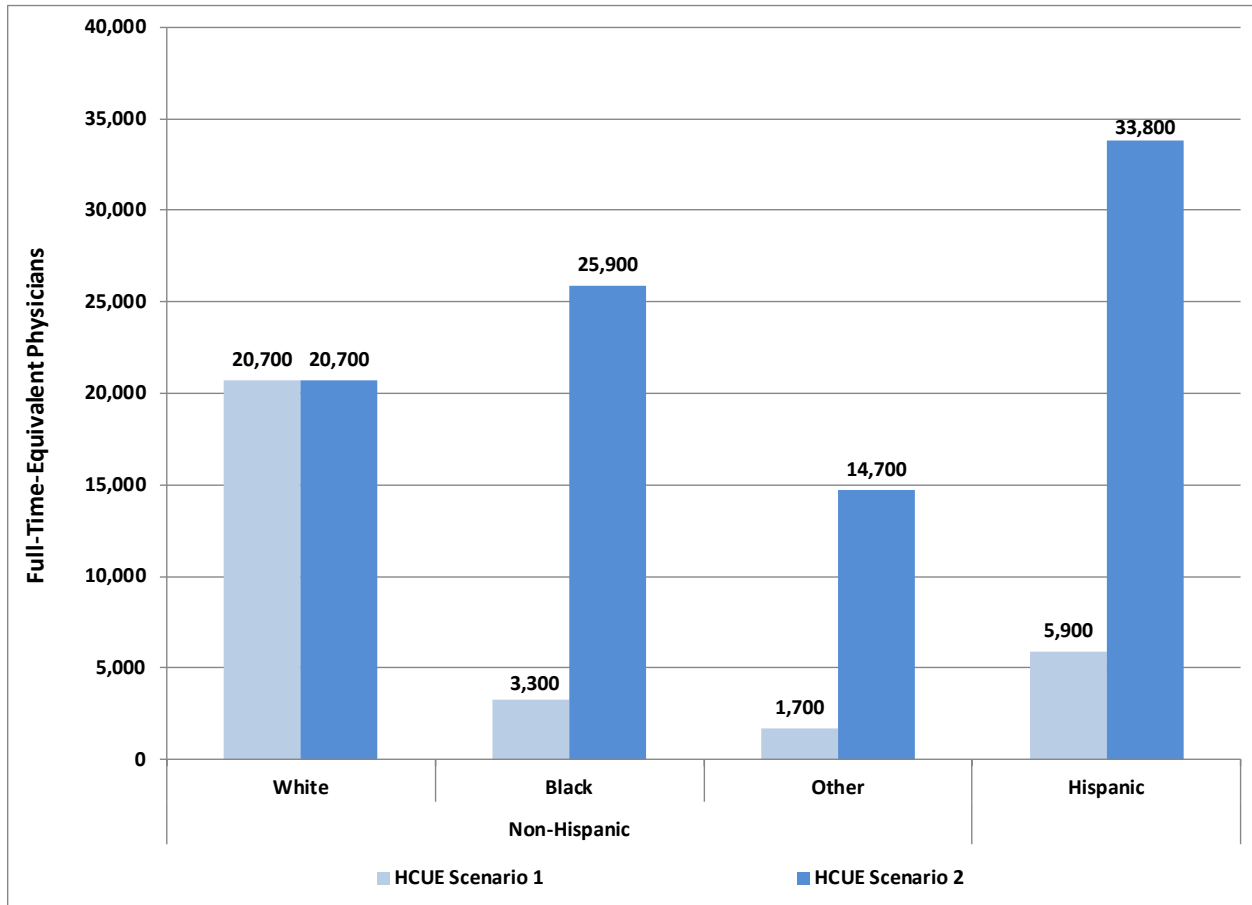


Exhibit 18: Additional Physician Demand if U.S. Had Achieved Health Care Utilization Equity in 2016, by Region (Table)

Scenario	Region 1: Northeast	Region 2: Midwest	Region 3: South	Region 4: West	Total
<i>HCUE Scenario 1</i>					
Total	4,000	6,700	15,300	5,600	31,600
Primary Care	1,200	2,000	4,800	1,800	9,800
Non-Primary Care	2,800	4,700	10,500	3,800	21,800
Medical Specialties	700	1,100	2,300	900	5,000
Surgery	700	1,100	3,000	1,100	5,900
Other	1,300	2,400	5,000	1,700	10,400
Hospitalist	100	100	200	100	500
<i>HCUE Scenario 2</i>					
Total	14,000	15,200	41,800	24,100	95,100
Primary Care	2,800	3,600	10,300	4,000	20,700
Non-Primary Care	11,200	11,600	31,500	20,100	74,400
Medical Specialties	1,300	1,500	3,700	2,700	9,200
Surgery	3,600	3,500	10,600	6,500	24,200
Other	5,900	6,200	16,100	10,100	38,300
Hospitalist	400	400	1,100	800	2,700

Exhibit 19: Additional Physician Demand if U.S. Had Achieved Health Care Utilization Equity in 2016, by Region (Graph)

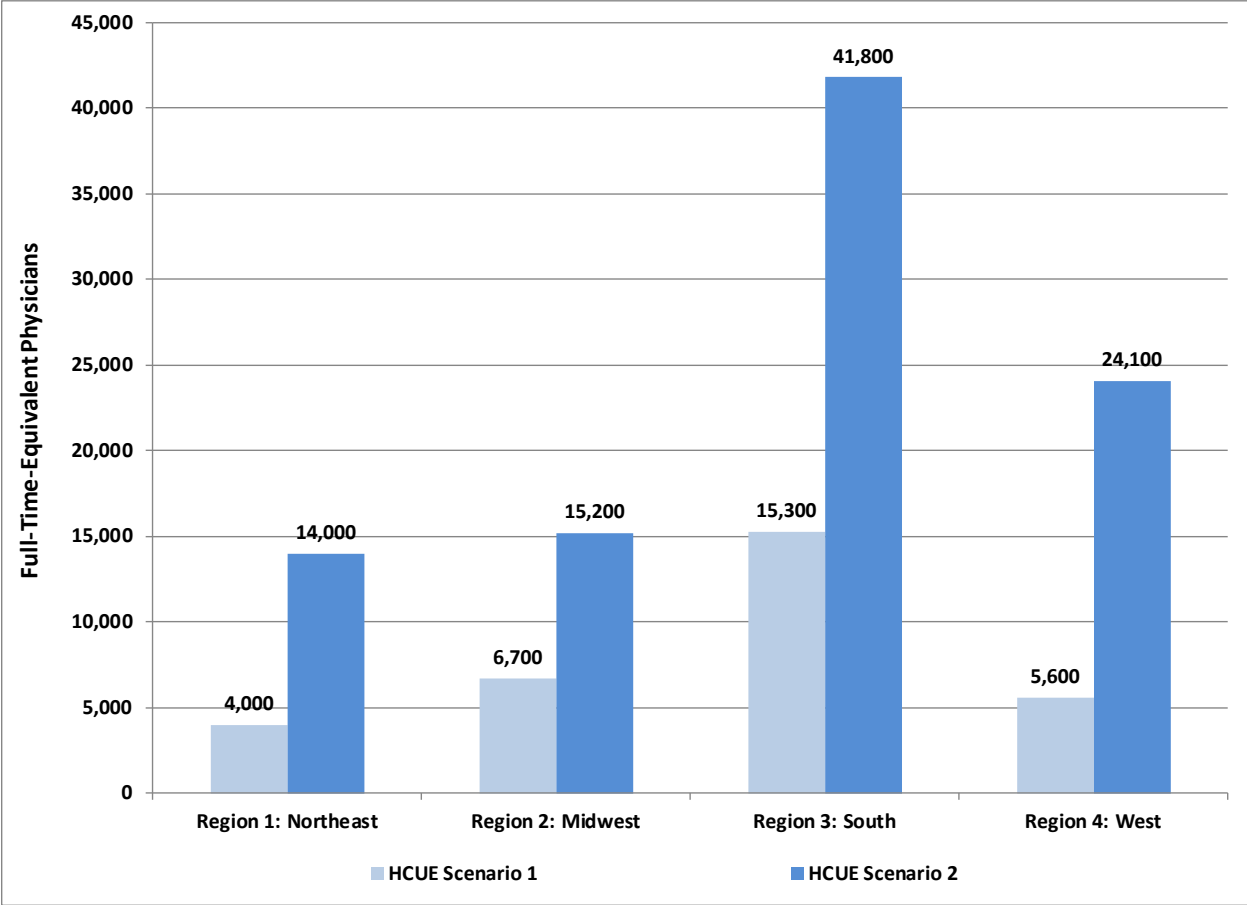
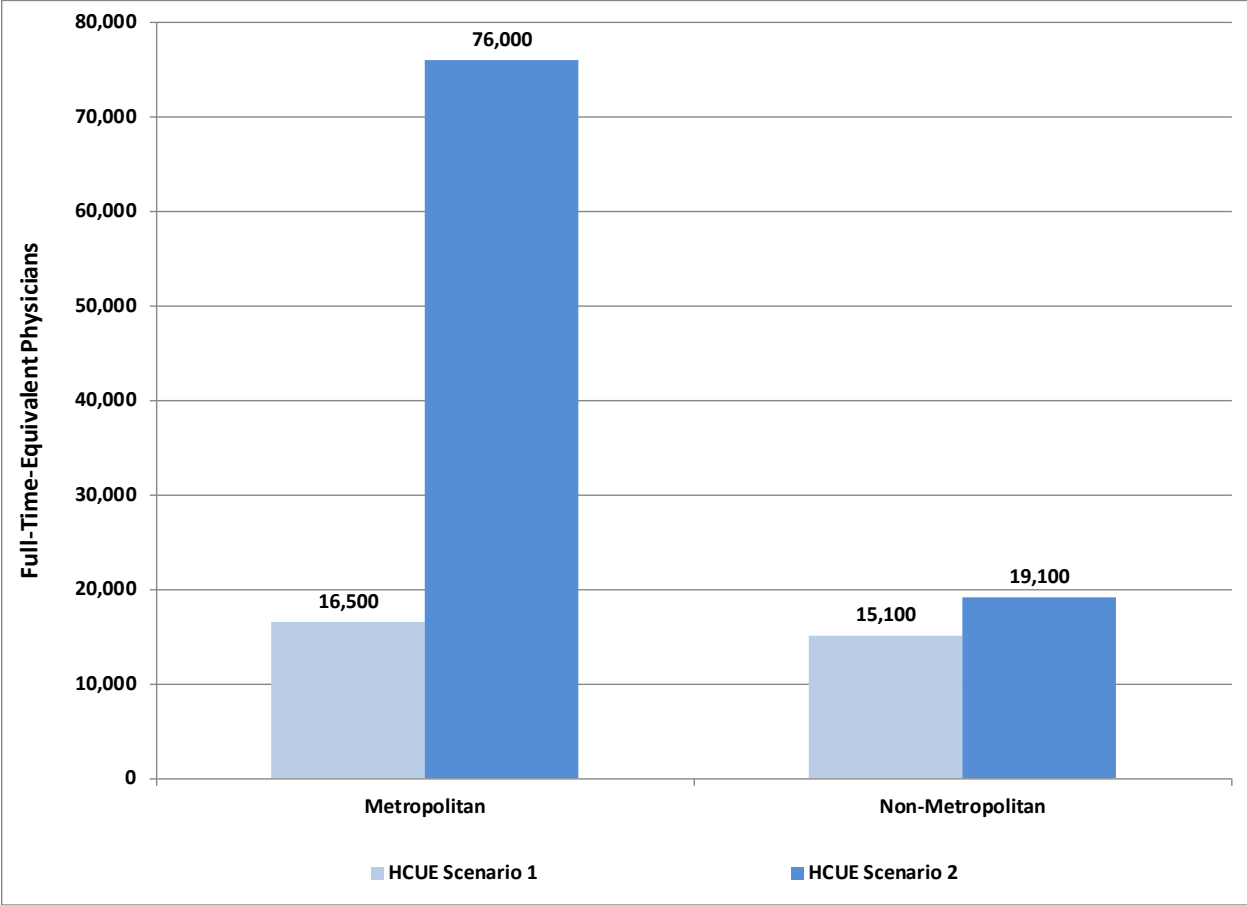


Exhibit 20: Additional Physician Demand if U.S. Had Achieved Health Care Utilization Equity in 2016, by Metropolitan vs Non-Metropolitan Area (Table)

Scenario	Metropolitan	Non-Metropolitan	Total
<i>HCUE Scenario 1</i>			
Total	16,500	15,100	31,600
Primary Care	5,300	4,500	9,800
Non-Primary Care	11,200	10,600	21,800
Medical Specialties	2,400	2,700	5,000
Surgery	4,300	1,600	5,900
Other	4,200	6,200	10,400
Hospitalist	400	100	500
<i>HCUE Scenario 2</i>			
Total	76,000	19,100	95,100
Primary Care	15,500	5,200	20,700
Non-Primary Care	60,500	13,900	74,400
Medical Specialties	6,300	2,900	9,200
Surgery	21,400	2,800	24,200
Other	30,300	8,000	38,300
Hospitalist	2,500	200	2,700

Exhibit 21: Additional Physician Demand if U.S. Had Achieved Health Care Utilization Equity in 2016, by Metropolitan vs Non-Metropolitan Area (Graph)



VI. KEY FINDINGS AND CONCLUSIONS

The need to assess the capacity of the nation’s future health care workforce in general—and the physician workforce in particular—is more important now than ever. The public and private sectors rely on this information to make well-informed investments in a health care system that provides high-quality, cost-efficient health care and to develop the physicians needed to transform the current system and to maximize population health. The pace of change in the world of health care delivery and finance requires almost constant updates of and improvements to workforce projections and projection models. This is why the AAMC made a commitment to commission an annual update of national physician workforce projections. The purpose is threefold:

- **Update and improve workforce projections:** The AAMC is committed to supporting ongoing efforts to use the most recent and best-quality data to update projections and to respond to constructive feedback received about previous projections.
- **Present new analyses:** The reports present new research on the physician workforce implications of important issues such as an evolving health care system and health care utilization inequities.
- **Identify future directions for research:** The process of modeling future supply and demand for physicians helps identify areas for future research, data collection, and analysis that will strengthen future projections and support decision making to help align the nation’s physician workforce with its health needs.

Through these efforts, the AAMC intends to invite discussion to advance our collective capacity for developing continually improved health workforce projections with data-based analysis.

Key study findings and conclusions include:

- **We continue to project that physician demand will grow faster than supply, leading to a projected total physician shortfall of between 42,600 and 121,300 physicians by 2030.** The projected shortfall is higher than in last year’s report (40,800 to 104,900). These estimates reflect updates to demand inputs and larger estimates for the starting year shortfall based on upwardly revised HPSA designations for primary care and mental health.
 - **A primary care physician shortage of 14,800 to 49,300 physicians is projected by 2030.** The shortfall range reflects different assumptions about the projected rapid growth in supply of NPs and PAs and their role in care delivery, trends in supply and demand for primary care physicians, and an estimate by the Health Resources and Services Administration that nearly 13,800 primary care physicians are currently needed to remove the primary care shortage designation in currently designated shortage areas.
 - **Projected shortfalls in non-primary care specialty categories of 33,800 to 72,700 physicians,** including a 20,700 to 30,500 shortfall in 2030 for surgical specialties. Major drivers of these projected trends continue to be an aging population requiring increasingly complex care concomitant with an aging physician workforce. The range reflects different assumptions

about shifting workforce patterns for physicians and other professionals. In the surgical specialties, a largely stagnant projected supply also contributes to projected shortages.

- **Demographics—specifically, population growth and aging—continue to be the primary driver of increasing demand from 2016 to 2030.** During this period, the U.S. population is projected to grow by close to 11%, from about 324 million to 359 million. The population under age 18 is projected to grow by only 3%, while the population aged 65 and over is projected to grow by 50%. Because seniors have much higher per capita consumption of health care than younger populations, the percentage growth in demand for services used by seniors is projected to be much higher than the percentage growth in demand for pediatric services.
- **Achieving population health goals may raise demand for physicians in the long term.** In this report, we update last year’s research on the implications for physician demand associated with achieving select population health goals such as reducing excess body weight; improving control of blood pressure, cholesterol, and blood glucose levels; and reducing smoking prevalence. Under this scenario, short-term demand for physicians would decline slightly with improvements in population health. However, the longevity associated with improved population health would result in greater demand for services by 2030. The demand for physicians would thus be 17,300 FTEs higher in 2030 relative to demand levels in the absence of achieving these goals. This finding suggests that although prevention efforts will probably reduce demand for some specialties, such as endocrinology, demand for other specialties, such as geriatric medicine, will increase.
- **If underserved populations had care utilization patterns similar to populations with fewer access barriers, demand for physicians could rise substantially.** Improved access to care is a national goal. We updated two scenarios that model the effects of removing access barriers. The HCUE scenarios model the implications for physician demand if currently underserved populations utilized health care at similar rates of populations facing fewer sociodemographic, economic, and geographic barriers to care. These estimates, which are excluded from the shortfall projection ranges, help illuminate the magnitude of current barriers to care and provide an additional reference point when gauging workforce adequacy.
- **Changes in physician-retirement decisions could have the greatest impact on supply, and over one-third of all currently active physicians will be 65 or older within the next decade.** Physicians between ages 65 and older account for 13.5% of the active workforce, and those between ages 55 and 64 make up nearly 27.2% of the active workforce.
- **The supply of surgical specialists is projected to either grow slowly or possibly decline slightly by 2030 under all modeled supply scenarios.**
- **The trend toward fewer weekly hours worked is reducing FTE physician supply.** Between 2002 and 2016 there was a trend toward physicians of all ages working fewer hours, with the decline in hours worked particularly large for younger physicians. If this trend continues, then by 2030 the national supply will have 32,500 fewer FTE physicians than if physician work hours remain similar to current patterns. This scenario has been modified from the scenario modeled previously to reflect new data that show declines in physician hours working across all age groups and not just millennials.

VII. FUTURE DIRECTIONS IN HEALTH WORKFORCE RESEARCH

Workforce projections are constantly challenged by the reality that health care is changing at a tremendous pace and in often unpredictable ways. The projected ranges reflect uncertainties about how emerging care-delivery and financing models might change health care use and delivery patterns, as well as uncertainties about participation patterns in the physician labor force. This high level of uncertainty, combined with the need to incorporate new research and updated data on physician supply and demand, underscores the importance of continually monitoring the projected future adequacy of supply.

Given the ongoing changes in how health care services are offered and financed, the nation may never arrive at a definitively appropriate mix of providers.¹⁶ Uncertainties continue to abound about whether, how, and how quickly emerging payment and care-delivery models might affect physician supply and demand. Uncertainty has increased with the new administration's goal to replace portions of ACA—though both political parties have signaled an intention to maintain or increase the proportion of the population with medical insurance coverage. Still, evidence to date has not demonstrated that changes in payment or care-delivery models substantially change physician workforce supply or demand.

Uncertainties continue to abound about whether, how, and how quickly emerging payment and care-delivery models might affect physician supply and demand. Still, evidence to date has not demonstrated that changes in payment or care-delivery models substantially change physician workforce supply or demand.

Examples of directions for future research to improve analytic capabilities and advance the field of health workforce modeling, as better data become available, include:

- **Physician workforce participation:** Comprehensive, up-to-date data on physician work hours and retirement patterns could help improve supply forecasts. What are the drivers of, and shifts in, physician well-being and their implications for the future physician workforce? Similarly, how will clinicians and care settings respond to economic and other trends, through retirement and other decisions?
- **Market saturation and displacement of occupations and select specialties:** Although this report explores the implications of continued rapid growth in APRN and PA supply, more information is needed. To what extent can the health care system continue to absorb this new supply? Will a saturation point be reached and if so, when? What are the implications on demand for physicians? Moreover, APRN and PA supplies have grown rapidly over the past decade, and these clinicians fill important roles in care delivery. To what extent have APRNs and PAs reduced demand for physicians in some specialties, and to what extent are APRNs and PAs providing previously unfilled services and expanding access to care? Similarly, growth in hospitalist supply has been particularly strong over

16. Daschle T. Creating a workforce for the new health care world. Health Affairs [blog]. March 7, 2013. Available online at <http://healthaffairs.org/blog/2013/03/07/creating-a-workforce-for-the-new-health-care-world/>.

the past decade. Might market saturation be reached for hospitalists? If so, at what point will employment growth slow to a level to keep pace with growth trends in hospital inpatient care?

- **Geographic imbalances in provider supply:** The growth in demand for health care services is projected to exceed the growth of physician supply. How might a growing shortfall at the national level exacerbate geographic imbalances in supply, thus aggravating extant disparities in geographic distribution?
- **Broad categories versus individual physician specialties:** It is important to look more closely at certain specialties that may experience or portend future shortages or address current crises. Given how much research and analysis is devoted to studying the physician workforce, we need to understand the role that local studies and qualitative analysis can play in helping analysts develop better inputs and assumptions on which to build projections.
- **Current shortages and inefficiencies:** The demand projections start with the assumption that physician supply and demand were in equilibrium in 2016—except for primary care and psychiatry where federal government estimates for HPSAs are used as a proxy for the current shortfall of physicians. This modeling assumption extrapolates a “2016 level of care” to future years based on current care use and delivery patterns. How might we better measure current shortages? Likewise, can we better quantify inefficiencies in care delivery—as the modeling extrapolates such inefficiencies into the future? To the extent that current national shortages exist for other specialties, then the demand projections are underestimated from 2016 through 2030 by roughly the size of the current national shortage.
- **New care-delivery and financing models:** Care-delivery models continue to evolve in response to new financing models, policies, better understanding of best practices, new technologies, and economic factors. How will the evolution in care delivery affect demand for health care services and staffing patterns? An aging population will put increasing financial pressure on government programs such as Medicare, Medicaid, and Social Security. What are the implications for reimbursement of health care services and the physician workforce? Similarly, how will emerging technologies and payment reform that better enable telemedicine and new digital technologies affect demand for physician services, physician productivity, physician career satisfaction, patient access to care, patient-care utilization, and outcomes?

These knowledge deficits present opportunities for ongoing research on the workforce implications of the evolving health care system and underscore the need for timely updates to projections.

APPENDIX 1: DATA AND METHODS

This appendix provides a brief overview of the workforce microsimulation models used, the data and assumptions, and information on select model inputs. Extensive technical documentation of the supply and demand models is available elsewhere.^{17,18}

Synopsis of Study Methods

Consistent with the previous three physician workforce reports, this 2018 update used a microsimulation approach to project the supply of and demand for health care services and physicians. These supply and demand projection models have been used for health workforce modeling for federal and state governments and for trade and professional associations for physicians and other health occupations.

The supply model, under a status quo scenario, simulated the likely career decisions of physicians, given the current numbers, specialty mix and demographics of new entrants to the physician workforce, retirement and mortality patterns, and patterns of patient-care hours worked. The supply model begins with the 2016 American Medical Association (AMA) Physician Masterfile, adds new physicians based on reported numbers of physicians completing their graduate medical education, subtracts estimates of physicians retiring, and accounts for projected differences in average patient-care hours worked as the demographics of the physician workforce change. Additional supply scenarios modeled included (1) the implications of changing physician-retirement patterns—including delaying retirement or retiring earlier by two years, on average; (2) a declining-hours scenario under which the downward trend in hours worked observed between 2000 and 2002 and 2015 and 2016 continues over time such that today's physicians work slightly fewer patient-care hours than older cohorts; and (3) a modest expansion of graduate medical education (GME) programs.

The demand projections start by extrapolating current levels of care into the future as the population grows and ages, taking into consideration projected changes in disease prevalence and other health risk factors in the population if health care use and delivery patterns remained unchanged. The implications of continued expansion of medical insurance coverage associated with the Affordable Care Act (ACA) were modeled—although its future direction is somewhat uncertain. To the extent that ACA is replaced with policies and programs that revert to pre-ACA rates of insurance coverage, the projections in this report might overstate future demand by 6,000 to 10,000 full-time equivalent (FTE) physicians.

17. U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis. *Technical Documentation for HRSA's Health Workforce Simulation Model*. Rockville, MD: U.S. Department of Health and Human Services; 2015.

<https://bhw.hrsa.gov/sites/default/files/bhw/nchwa/projections/simulationmodeldocumentation.pdf>.

18. Dall TM, West T, Chakrabarti R, Iacobucci W, Semilla AP, Hansari A. *Health Workforce Model Documentation, 2016*. Washington, DC: IHS Inc.; 2016. <https://cdn.ihs.com/www/pdf/IHS-HDMM-DocumentationApr2016.pdf>.

As in previous reports, we updated scenarios to reflect the possibilities of increased reliance on managed care and retail clinics and rapid growth in the supply of advanced practice registered nurses (APRNs) and physician assistants (PAs) as well as the implications of achieving certain population health goals around improved body weight, smoking cessation, and improved control of blood pressure, cholesterol, and blood glucose levels.

Supply Model Overview and Updates

Current Physician Workforce: Supply modeling starts with the 2016 AMA Physician Masterfile to identify the size and characteristics of the current workforce. In 2016 there were approximately 791,400 physicians under age 75 in active practice who had completed their graduate medical education (compared with about 784,600 in 2016).¹⁹ The approximately 224,300 active primary care physicians were 28% of the workforce, with another 131,700 (17%) in medical specialties, 155,200 (20%) in surgical specialties, 28,900 (4%) primary care-trained hospitalists, and 251,300 (32%) in the remaining specialties. Women constituted about a third of the workforce. Physicians within the traditional retirement age between 65 and older were 13.5% of the active workforce, and those between age 55 and 64 made up nearly 27.2% of the active workforce. Therefore, it is possible that about a third of all currently active physicians might retire within the next decade.

New Entrants: Under the status quo supply scenario, estimates of the number of physicians completing their GME in individual specialties came from published information on programs accredited by the Accreditation Council for Graduate Medical Education (ACGME) and the American Osteopathic Association (AOA), considering that some programs are dually accredited.²⁰ The age and sex distribution of new physicians was derived from analysis of the 2016 AMA Physician Masterfile. We estimated that approximately 28,836 physicians completed GME between 2016 and 2017 (similar to the 28,698 estimate in last year's report).

In total, approximately 7,705 physicians (27% of new graduates) entered the workforce as primary care providers; 1,572 (5%) entered as primary care-trained new hospitalists; 5,518 (19%) entered in internal medicine and pediatric subspecialties; 5,138 (18%) entered in surgical specialties; and 8,903 (31%) entered in other specialties. Compared with the 2017 report, our estimates of annual new entrants to the workforce are slightly higher for primary care (+30), medical specialties (+42), surgery (+87), and the "all other" category (+54) and lower for primary care-trained hospitalists (-75).

19. Both the supply and demand models measure full-time equivalents based on the number of physicians who have completed their graduate medical education. To the extent that some physicians-in-training also provide direct patient care, both demand and supply would be adjusted upward by the same amount so any gap between supply and demand would be unchanged.

20. Estimates for graduates from ACGME-accredited programs came from Brotherton SE, Etzel SI. Graduate medical education, 2016–2017. *JAMA*. 2017;318(23):2368-2387. Estimates for graduates from AOA-accredited programs were unavailable, so information on new entrants to these programs were used. (National Matching Services, Inc. Summary of Positions Offered and Filled by Program Type. Toronto, Ont.: National Matching Services, Inc.; 2018.

<https://natmatch.com/aoairp/stats/2017prgstats.html>.)

Hours-Worked Patterns: Supply projections take into consideration differences in average hours per week spent in patient care by physician age, sex, and specialty. This component of the model is based on regression analysis of combined data from three states: (1) biannual 2012–2013 survey data (n = 17,782) of physicians in Florida who renewed their license and who work at least eight hours per week in professional activities; (2) 2013 survey data from physicians in South Carolina (n = 9,252); and (3) 2013 survey data from physicians in New York (n = 44,181). The analysis found that, controlling for specialty, hours worked per week were relatively constant through age 59 for men but decreased beyond age 60. Female physicians worked about four to five fewer hours per week than their male counterparts through age 54, but females aged 55 and older, worked only about one to three fewer hours per week than males of similar age and specialty.

Retirement Patterns: For the previous reports and this update, the supply model used annual attrition probabilities for each combination of age, sex, and specialty to simulate providers leaving the workforce. Publicly available sources of data for modeling specialty-specific retirement patterns are unavailable. These supply projections use retirement patterns estimated from data collected through Florida’s mandated biannual physician licensure survey (2012–2013 data), which asks about intention to retire in the upcoming five years. The Florida physician survey is currently among the timeliest sources of information available about physician-retirement patterns.

Calculated retirement rates from the Florida survey are generally consistent with estimates derived from analysis of the AAMC’s 2006 Survey of Physicians over Age 50 (which collected information on age at retirement or age expecting to retire). The 2006 AAMC survey data were collected before the economic downturn (which occurred from approximately 2008 to 2010), while the Florida survey data were collected during a period of economic recovery. Mortality rates from the Centers for Disease Control and Prevention (CDC), which are specific to each age-gender combination, were combined with rates of intention to retire to calculate overall attrition rates.²¹ Johnson et al. found that age-adjusted mortality rates for occupational and technical specialties are approximately 25% lower than national rates for men and 15% lower for women through age 65, so mortality rates for physicians under age 65 were adjusted downward accordingly.²²

Demand Model Overview and Updates

Demand for physicians is calculated based on the projected demand for health care services and staffing patterns for care delivery. Demand for health care services is defined as the level of care likely to be sought by consumers given their needs, care use patterns, and economic considerations such as level of health insurance coverage and cost of care. Demand differs from “need,” which is based on clinical and epidemiological considerations.

21. Arias E. United States life tables, 2008. *National Vital Statistics Reports*. 2012;61(3).

22. Johnson NJ, Sorlie PD, Backlund E. The impact of specific occupation on mortality in the U.S. National Longitudinal Mortality Study. *Demography*. 1999;36:355-367.

For modeling purposes, at the national level we quantify current demand for health care services (and physicians) as equivalent to the level of health care services utilized (and current physician supply). Demand projections are thus extrapolating a “2016 level of care,” with any imbalances between supply and demand (whether shortfalls or excesses) extrapolated into the future. An exception pertains to federal government estimates that the nation requires approximately 13,782 additional primary care physicians and 5,506 psychiatrists to de-designate the federally designated primary care and mental health professional shortage areas (HPSAs). For modeling purposes, we assume these 19,288 physicians reflect national shortfalls.²³ To the extent that other shortages already exist in specialties other than primary care and psychiatry, our starting point assumption may be a moderate one.

The microsimulation approach simulates demand for health care services for a nationally representative sample of the current U.S. population projected to 2030. Then, demand for physicians, APRNs, and PAs is modeled to meet the projected demand for services. Exhibit 22 summarizes, by demand model component, the data sources incorporated in 2017 and in this 2018 update of workforce projections.

Exhibit 22: Summary of 2017 and 2018 Demand Modeling Data Sources

Model Component	2017 Projections	2018 Projections
National and state population files	2015 ACS 2014 and 2015 BRFSS 2004 NNHS (reweighted to CMS 2014 estimates by demographic) 2013 MCBS	2016 ACS 2015 and 2016 BRFSS 2015 CMS Minimum Dataset for Nursing Home Residents
Weights for population projections	2014 U.S. Census Bureau population projections; state population projections to estimate demand by region and metro vs nonmetro area	2015 U.S. Census Bureau population projections
Health care use equations	2010–2014 Pooled MEPS	2011–2015 Pooled MEPS
Hospital inpatient-day equations	2014 NIS	2014 NIS
Health care use calibration and validation	2014 NIS 2013 NAMCS 2012 NHAMCS	2014 NIS 2013 NAMCS 2012 NHAMCS
Physician staffing ratios	2015 AMA Masterfile	2016 AMA Masterfile

Notes: ACS = American Community Survey; BRFSS = Behavioral Risk Factor Surveillance System; CMS = Centers for Medicare and Medicaid Services; NNHS = National Nursing Home Survey; MCBS = Medicare Beneficiary Survey; MEPS = Medical Expenditure Panel Survey; NIS = Nationwide Inpatient Sample; NHAMCS = National Hospital Ambulatory Medical Care Survey; AMA = American Medical Association.

23. For information on HPSA designation, see Health Resources and Services Administration. Health Professional Shortage Areas. Rockville, MD: HRSA; 2016. <https://bhwh.hrsa.gov/shortage-designation/hpsas>.

APPENDIX 2: DETAILED TABLES

Below we provide detailed updated demand projections for physicians by patient race and ethnicity, region of the country, and metropolitan vs non-metropolitan areas. These detailed projections were first reported in the 2017 report and the results of this year's update are similar to those modeled last year.

Demand by Patient Race and Hispanic Ethnicity

Patterns of health care use differ systematically by patient race and ethnicity, reflecting underlying differences in age distribution; disease prevalence; health-related factors such as obesity and smoking; economic factors, including medical insurance coverage and household income; possibly cultural approaches to care utilization; and supply-related access barriers.

For modeling purposes, we categorize patients in one of four mutually exclusive categories: non-Hispanic white, non-Hispanic black, non-Hispanic all other, and Hispanic.²⁴ In 2016, an estimated 62% of the population was non-Hispanic white, but this population accounted for approximately 70% (567,600 FTEs) of total physician demand. The Hispanic population, however, represented 18% of the U.S. population but accounted for about 12% (96,400 FTEs) of physician demand (Exhibit 23).

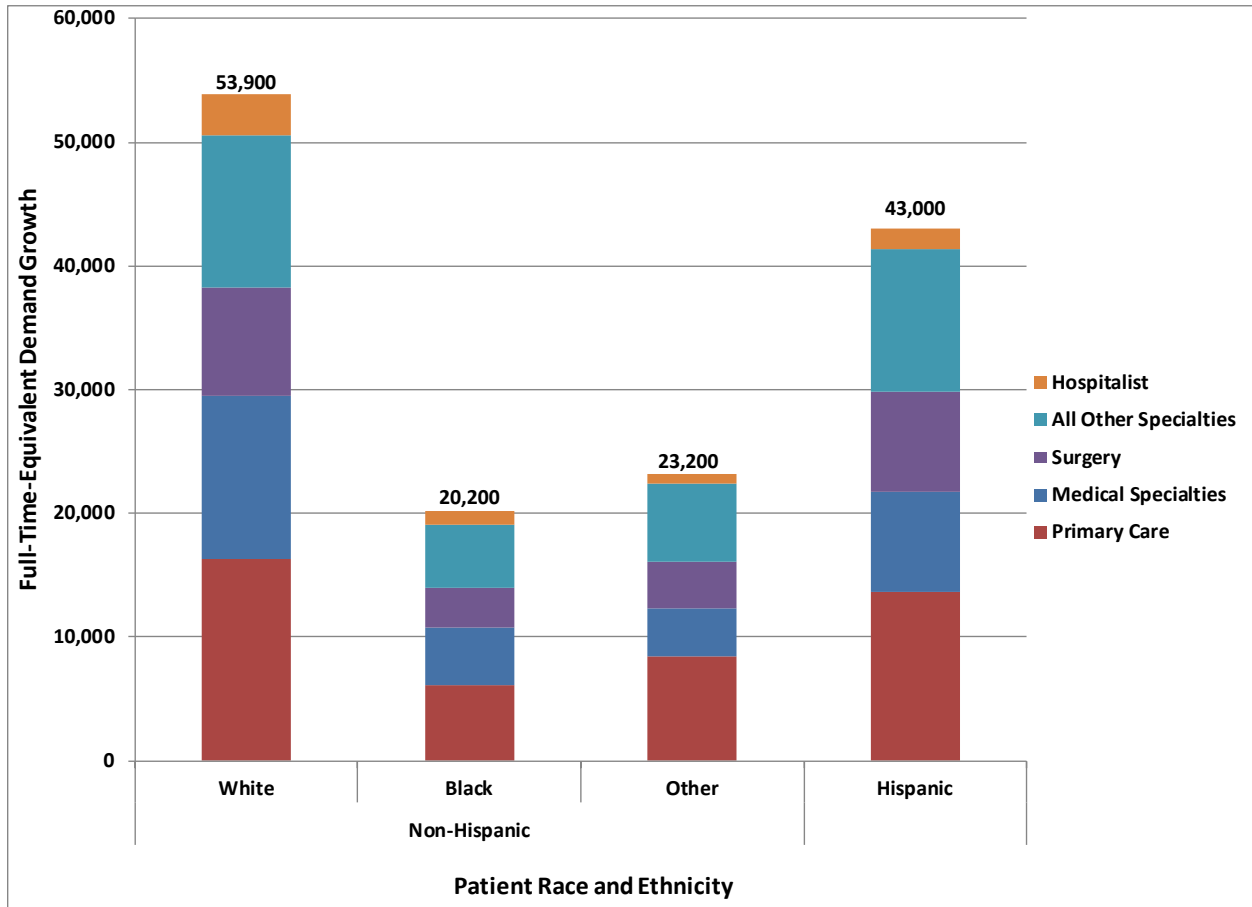
Between 2016 and 2030 the Hispanic population is projected to grow the most rapidly in percentage terms (26%), followed by the non-Hispanic other (19%), black (11%), and white (9%) populations. Based on changing demographics alone (independent of any health care reform initiatives that increase access to care), demand for physician services is projected to grow by 140,300 FTEs from 2016 to 2030 (Exhibit 24). This growth includes an additional 53,900 FTEs associated with growth in the non-Hispanic white population, 43,000 FTEs associated with growth in the Hispanic population, 23,200 FTEs associated with growth in the non-Hispanic other population, and 20,200 FTEs associated with growth in the non-Hispanic black population. Improved medical insurance coverage or removing other barriers to care likely will increase demand from minority populations at a higher rate than demand from non-Hispanic whites.

24. In many of the databases analyzed, such as the Medical Expenditure Panel Size and the Behavioral Risk Factor Surveillance System, the sample sizes are too small to model other ethnicities of interest (e.g., Native Americans, Pacific Islanders, Alaskan Natives)—especially when subsetting by state, age group, and gender.

Exhibit 23: Projected Physician Demand by Patient Race and Ethnicity, 2016–2030

Year(s)	Non-Hispanic			Hispanic	Total
	White	Black	Other		
2016					
Total	567,600	89,100	57,800	96,400	810,900
Primary Care	158,700	25,100	20,800	33,500	238,100
Non-Primary Care	408,900	64,000	37,000	62,900	572,800
Medical Specialties	90,600	17,400	8,500	15,200	131,700
Surgery	110,300	16,500	10,300	18,100	155,200
Other	188,000	26,100	16,300	26,500	256,900
Hospitalist	20,000	4,000	1,900	3,100	29,000
2030					
Total	621,500	109,300	81,000	139,400	951,200
Primary Care	175,000	31,200	29,200	47,100	282,500
Non-Primary Care	446,500	78,100	51,800	92,300	668,700
Medical Specialties	103,800	22,100	12,400	23,300	161,600
Surgery	119,100	19,700	14,100	26,200	179,100
Other	200,200	31,200	22,600	38,100	292,100
Hospitalist	23,400	5,100	2,700	4,700	35,900
Growth 2016 to 2030					
Total	53,900	20,200	23,200	43,000	140,300
Primary Care	16,300	6,100	8,400	13,600	44,400
Non-Primary Care	37,600	14,100	14,800	29,400	95,900
Medical Specialties	13,200	4,700	3,900	8,100	29,900
Surgery	8,800	3,200	3,800	8,100	23,900
Other	12,200	5,100	6,300	11,600	35,200
Hospitalist	3,400	1,100	800	1,600	6,900

Exhibit 24: Projected Physician Demand Growth by Patient Race and Ethnicity, 2016–2030



Demand by Census Region and Metropolitan vs Non-Metropolitan Area

Utilization of physician services and the projected growth in demand vary by geographic region due to differences in demographics and projected population growth, insurance coverage, and other financial considerations such as household income, health-related behavior and disease prevalence, and care-access barriers. For this analysis, we projected national demand to the census region level accounting for differences in demographics and other variables in the model (disease prevalence, obesity and smoking prevalence, insurance status, etc.).

If each person in the United States had a level of care identical to the national average for a similar person (same demographics, insurance status, disease presence, etc.) then in 2016, demand for physicians would be distributed as follows: 305,100 FTEs (38%) in the South Region, 183,200 FTEs (23%) in the West Region, 176,800 FTEs (22%) in the Midwest Region, and 145,700 FTEs (18%) in the Northeast Region (Exhibit 25 and Exhibit 26). Demand growth is projected to be largest in the South Region (65,900 FTEs) and lowest in the Northeast (11,600 FTEs).

Exhibit 25: Physician Supply and Demand by Census Region, 2016

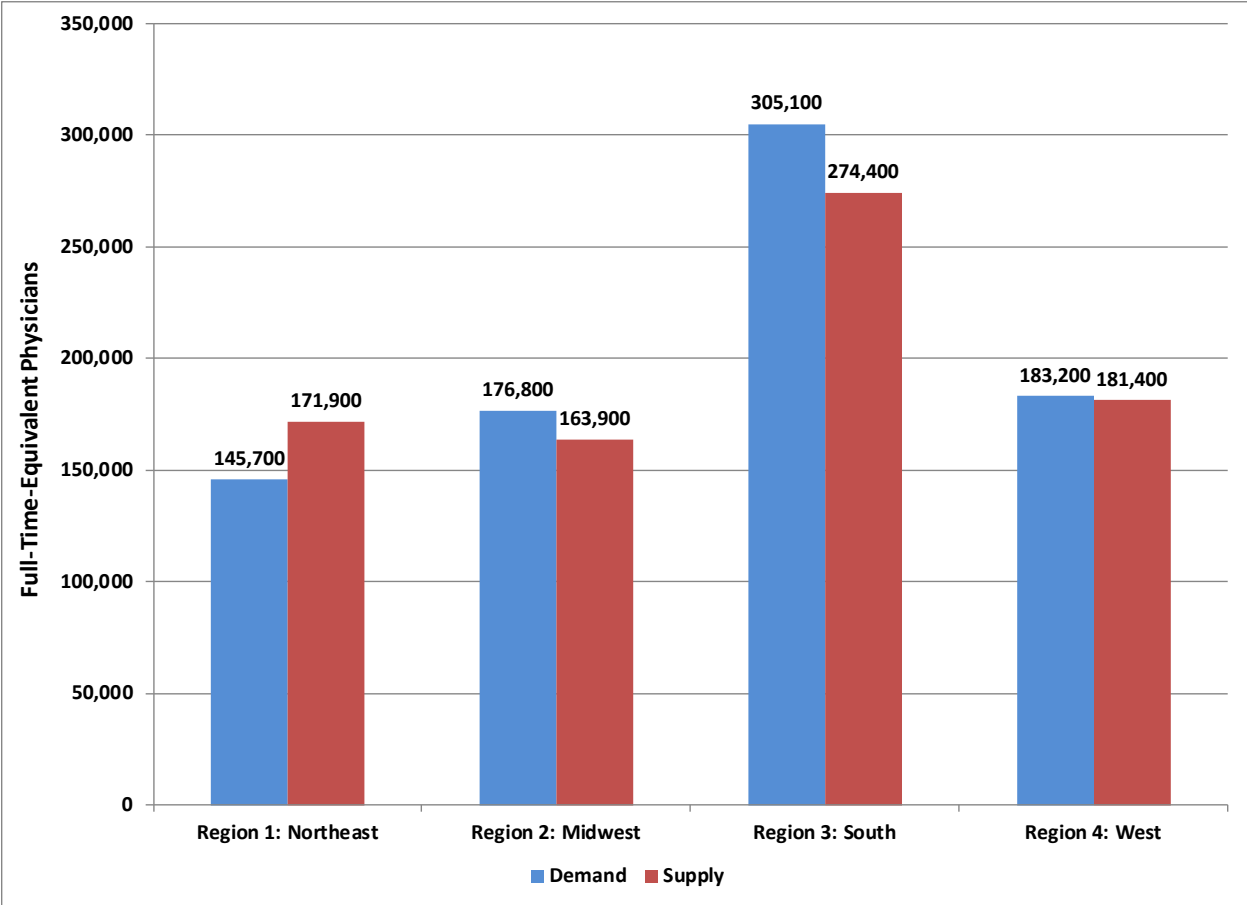


Exhibit 26: Projected Physician Demand by Census Region, 2016–2030

Year(s)	Region 1: Northeast	Region 2: Midwest	Region 3: South	Region 4: West	Total
2016					
Total	145,700	176,800	305,100	183,200	810,800
Primary Care	42,300	51,300	89,300	55,200	238,100
Non-Primary Care	103,400	125,500	215,800	128,000	572,700
Medical Specialties	23,400	28,200	50,900	29,200	131,700
Surgery	28,200	34,200	57,900	35,000	155,300
Other	46,700	56,700	95,800	57,600	256,800
Hospitalist	5,100	6,400	11,200	6,200	28,900
2030					
Total	157,300	188,900	371,000	234,000	951,200
Primary Care	46,000	55,200	109,900	71,400	282,500
Non-Primary Care	111,300	133,700	261,100	162,600	668,700
Medical Specialties	26,300	31,500	64,300	39,500	161,600
Surgery	30,000	35,900	69,600	43,600	179,100
Other	49,200	59,000	112,800	71,100	292,100
Hospitalist	5,800	7,300	14,400	8,400	35,900
Growth 2016 to 2030					
Total	11,600	12,100	65,900	50,800	140,400
Primary Care	3,700	3,900	20,600	16,200	44,400
Non-Primary Care	7,900	8,200	45,300	34,600	96,000
Medical Specialties	2,900	3,300	13,400	10,300	29,900
Surgery	1,800	1,700	11,700	8,600	23,800
Other	2,500	2,300	17,000	13,500	35,300
Hospitalist	700	900	3,200	2,200	7,000

Projected utilization of physician services by metropolitan versus non-metropolitan area suggests that approximately 89% of total utilization of FTE physicians comes from the population in metropolitan areas (Exhibit 27). Approximately 86% of the U.S. population resides in metropolitan counties—suggesting that after controlling for demographics, disease prevalence, medical insurance coverage, and other patient factors, per capita utilization of physician services is slightly higher in metropolitan areas than in non-metropolitan areas (possibly reflecting care-access barriers in non-metropolitan areas).

Exhibit 27: Projected Physician Demand by Metropolitan vs Non-Metropolitan Location, 2016

	Metropolitan	Non-Metropolitan
Total	722,800	88,000
Primary Care	212,000	26,100
Non-Primary Care	510,800	61,900
Medical Specialties	115,800	15,900
Surgery	138,100	17,100
Other	232,000	24,900
Hospitalist	24,900	4,000

Supply, Demand, and Shortfall Tables

The following tables provide more detailed projections of supply, demand, and imbalances between supply and demand across years, scenarios, and specialty categories.

Exhibit 28: Summary of Projected Gap Between Physician Supply and Demand

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total Physicians															
75th Percentile	19,300	30,400	37,800	44,200	51,300	59,100	67,900	75,900	82,500	90,700	98,200	105,400	111,700	117,200	121,300
25th Percentile	19,300	26,400	29,500	32,100	32,500	32,600	34,700	35,400	37,600	39,500	40,900	42,100	42,600	42,100	42,600
Primary Care															
75th Percentile	13,800	16,400	18,400	20,500	22,700	24,800	27,900	30,800	33,600	36,400	39,300	42,000	44,600	46,900	49,300
25th Percentile	13,800	15,100	14,800	13,000	12,300	11,200	10,200	10,100	11,500	12,900	14,500	14,700	14,900	14,700	14,800
Non-Primary Care															
75th Percentile	5,500	13,400	19,300	25,300	30,600	35,400	41,800	47,700	52,900	56,800	60,100	64,400	67,800	70,000	72,700
25th Percentile	5,500	11,500	14,100	15,000	15,900	16,700	19,300	21,500	23,800	26,300	28,300	30,400	32,000	33,100	33,800
Medical Specialties															
75th Percentile	—	1,300	1,800	2,200	2,800	3,000	4,200	5,100	5,900	6,900	7,600	8,300	8,900	9,100	9,600
25th Percentile	—	1,000	600	100	(300)	(500)	(500)	(100)	400	800	600	300	(200)	(300)	(700)
Surgical Specialties															
75th Percentile	—	4,300	7,700	10,300	13,100	15,600	18,300	20,600	22,500	24,100	25,500	27,000	28,300	29,500	30,500
25th Percentile	—	3,000	5,500	7,800	9,500	11,200	12,700	13,800	14,900	16,000	16,800	17,900	19,100	20,100	20,700
Other Specialties															
75th Percentile	5,500	9,000	11,600	14,400	17,000	19,400	22,400	25,400	28,100	30,500	32,200	34,200	35,600	36,200	36,800
25th Percentile	5,500	8,300	9,400	10,700	11,300	11,900	13,200	14,500	15,800	16,800	17,800	18,800	19,400	20,000	20,300
Hospitalists* (adult, primary care-trained)															
75th Percentile	—	(600)	(1,300)	(2,100)	(2,700)	(3,400)	(3,900)	(4,400)	(4,900)	(5,500)	(5,900)	(6,400)	(6,700)	(7,100)	(7,500)
25th Percentile	—	(700)	(1,500)	(2,300)	(3,200)	(4,000)	(4,600)	(5,300)	(6,000)	(6,600)	(7,200)	(7,700)	(8,300)	(8,900)	(9,400)

Note: The shortage figures for total physicians are smaller than the sum of the figures for the specialty categories. The demand scenarios modeled project future demand for physician services, but scenarios can differ in terms of whether future demand will be provided by primary care or non-primary care physicians. Likewise, the projections figures for total non-primary care are smaller than the sum of the figures for the specialty categories. Numbers in parentheses reflect projected excess supply, with numbers not in parentheses reflecting projected shortfalls.

*Includes only hospitalists trained in adult primary care. Hospitalists in non-primary care specialties are included with their individual specialty.

Exhibit 29: Projected Physician Supply, 2016–2030

Year	Workforce Participation Scenarios				Policy Scenario: GME Expansion
	Status Quo	Retire 2 Years Earlier	Retire 2 Years Later	Declining Hours	
2016	791,400	791,400	791,400	791,400	791,400
2017	796,000	791,300	800,500	793,300	796,000
2018	800,500	791,800	809,100	796,700	800,500
2019	804,700	792,300	817,100	799,600	804,700
2020	809,000	793,300	825,100	802,200	809,000
2021	813,200	794,700	832,600	804,700	813,200
2022	815,500	794,700	837,500	804,900	815,500
2023	818,200	795,400	842,600	805,500	821,900
2024	821,400	796,700	847,900	806,200	828,800
2025	824,900	799,000	853,200	807,100	836,200
2026	828,700	801,700	858,300	808,200	843,800
2027	832,600	804,500	863,300	809,200	851,300
2028	837,100	808,100	868,500	810,700	859,300
2029	841,700	812,100	873,900	812,300	867,700
2030	846,700	816,500	879,400	814,000	876,300
Percent Growth from 2016 to 2030	7%	3%	11%	3%	11%

Exhibit 30: Physician Supply Projection Summary by Specialty Category, 2016–2030

Year(s)	Workforce Participation Scenarios				Policy Scenario: GME Expansion
	Status Quo	Retire 2 Years Earlier	Retire 2 Years Later	Declining Hours	
2016					
Total	791,400				
Primary Care	224,300				
Non-Primary Care	567,100				
Medical Specialties	131,700				
Surgical Specialties	155,200				
Other Specialties	251,300				
Hospitalists*	28,900				
2030					
Total	846,700	816,500	879,400	814,000	876,300
Primary Care	235,200	226,100	245,000	227,400	243,100
Non-Primary Care	611,400	590,400	634,500	586,700	633,100
Medical Specialties	152,100	147,000	157,400	146,700	157,900
Surgical Specialties	154,100	148,700	159,900	146,100	159,100
Other Specialties	260,800	251,300	271,700	251,200	270,000
Hospitalists*	44,400	43,400	45,500	42,700	46,100
Growth 2016 to 2030					
Total	55,300	25,100	88,000	22,600	84,900
Primary Care	10,900	1,800	20,700	3,100	18,800
Non-Primary Care	44,300	23,300	67,400	19,600	66,000
Medical Specialties	20,400	15,300	25,700	15,000	26,200
Surgical Specialties	-1,100	-6,500	4,700	-9,100	3,900
Other Specialties	9,500	0	20,400	-100	18,700
Hospitalists*	15,500	14,500	16,600	13,800	17,200

Note: Category totals might not sum to totals because of rounding.

*Includes only hospitalists trained in adult primary care. Hospitalists in non-primary care specialties are included with their individual specialty.

Exhibit 31: Projected Physician Demand Summary by Scenarios Modeled, 2016–2030

Scenario	2016	2030	Growth from 2016 to 2030	Percent Growth from 2016 to 2030
Scenario 1: Changing Demographics				
Total	810,700	946,400	135,700	17%
Primary Care	238,100	281,100	43,000	18%
Non-Primary Care	572,600	665,300	92,700	16%
Medical Specialties	131,700	160,900	29,200	22%
Surgery	155,200	177,700	22,500	14%
Other Specialties	256,800	290,900	34,100	13%
Hospitalists*	28,900	35,800	6,900	24%
Scenario 2: Changing Demographics + ACA Medical Insurance Expansion				
Total	810,700	951,200	140,500	17%
Primary Care	238,100	282,500	44,400	19%
Non-Primary Care	572,600	668,700	96,100	17%
Medical Specialties	131,700	161,600	29,900	23%
Surgery	155,200	179,100	23,900	15%
Other Specialties	256,800	292,100	35,300	14%
Hospitalists*	28,900	35,900	7,000	24%
Scenario 3: Changing Demographics + ACA + Managed Care				
Total	810,700	967,300	156,600	19%
Primary Care	238,100	300,200	62,100	26%
Non-Primary Care	572,600	667,100	94,500	17%
Medical Specialties	131,700	156,700	25,000	19%
Surgery	155,200	181,300	26,100	17%
Other Specialties	256,800	293,000	36,200	14%
Hospitalists*	28,900	36,100	7,200	25%
Scenario 4: Changing Demographics + ACA + Increased Use of Retail Clinics				
Total	810,700	938,400	127,700	16%
Primary Care	238,100	269,700	31,600	13%
Non-Primary Care	572,600	668,700	96,100	17%
Medical Specialties	131,700	161,600	29,900	23%
Surgery	155,200	179,100	23,900	15%
Other Specialties	256,800	292,100	35,300	14%
Hospitalists*	28,900	35,900	7,000	24%
Scenario 5: Changing Demographics + ACA + Increased Use of APRNs and PAs (“moderate use” level)				
Total	810,700	896,900	86,200	11%
Primary Care	238,100	251,100	13,000	5%
Non-Primary Care	572,600	645,800	73,200	13%
Medical Specialties	131,700	153,800	22,100	17%
Surgery	155,200	175,200	20,000	13%
Other Specialties	256,800	281,600	24,800	10%
Hospitalists*	28,900	35,200	6,300	22%
Scenario 6: Changing Demographics + ACA + Increased Use of Advanced Practice Nurses and PAs (“high use” level)				
Total	810,700	842,600	31,900	4%
Primary Care	238,100	219,700	-18,400	-8%
Non-Primary Care	572,600	622,900	50,300	9%
Medical Specialties	131,700	146,000	14,300	11%
Surgery	155,200	171,300	16,100	10%
Other Specialties	256,800	271,000	14,200	6%
Hospitalists*	28,900	34,600	5,700	20%

Scenario	2016	2030	Growth from 2016 to 2030	Percent Growth from 2016 to 2030
Scenario 7: Changing Demographics + ACA + Increased Use of Advanced Practice Nurses (moderate practice level) + population health goals achieved				
Total	810,700	914,300	103,600	13%
Primary Care	238,100	256,300	18,200	8%
Non-Primary Care	131,700	155,900	24,200	18%
Medical Specialties	155,200	179,500	24,300	16%
Surgery	256,800	286,600	29,800	12%
Other Specialties	28,900	36,000	7,100	25%
Hospitalists*	572,600	658,000	85,400	15%

Note: Category totals might not sum to totals because of rounding.

*Includes only hospitalists trained in adult primary care. Hospitalists in non-primary care specialties are included with their individual specialty.

Exhibit 32: Health Care Utilization Equity Scenario 1, 2016

	Physicians				Additional Providers Required	
	Current Supply	Requirements under Equity Scenario	Current Gap	% Gap	APRNs	PPAs
Total	791,400	823,000	31,600	4%	10,400	4,600
Primary Care	224,300	234,100	9,800	4%	6,000	1,700
Non-Primary Care	567,100	588,900	21,800	4%	4,400	2,900
Medical Specialties	131,700	136,700	5,000	4%	1,000	700
Surgery	155,200	161,100	5,900	4%	1,200	1,000
Other Specialties	251,300	261,700	10,400	4%	2,100	1,100
Hospitalists*	28,900	29,400	500	2%	100	100

Note: Category totals might not sum to totals because of rounding.

*Includes only hospitalists trained in adult primary care. Hospitalists in non-primary care specialties are included with their individual specialty.

Exhibit 33: Health Care Utilization Equity Scenario 2, 2016

	Physicians				Additional Providers Required	
	Current Supply	Requirements under Equity Scenario	Current Gap	% Gap	APRNs	PAs
Total	791,400	886,500	95,100	12%	30,300	13,300
Primary Care	224,300	245,000	20,700	9%	15,100	3,500
Non-Primary Care	567,100	641,500	74,400	13%	15,200	9,800
Medical Specialties	131,700	140,900	9,200	7%	1,900	1,300
Surgery	155,200	179,400	24,200	16%	4,900	4,200
Other Specialties	251,300	289,600	38,300	15%	7,800	4,000
Hospitalists*	28,900	31,600	2,700	9%	600	300

Note: Category totals might not sum to totals because of rounding.

*Includes only hospitalists trained in adult primary care. Hospitalists in non-primary care specialties are included with their individual specialty.