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The Complexities of Physician Supply and Demand: Projections From 2021 to 2036

March 2024

Prepared for the AAMC by GlobalData Plc.

Association of American Medical Colleges

AAMC

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EXECUTIVE SUMMARY

Assessing the capacity of the nation's future physician workforce to meet expected demand provides critical information to both the public and the private sectors. Continuously updating and improving workforce projections is necessary because of the pace of change in health care, unexpected events such as the COVID-19 pandemic that exposed vulnerabilities in the health system, and the lead time required to train new physicians. For these reasons, since 2015, the AAMC (Association of American Medical Colleges) has commissioned annual reports of national physician workforce projections prepared by independent experts. Because of the volatility created by the pandemic, it has been two years since the last published report. Changes from the last report to this one reflect a two-year time period. 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 received about previous projections.
- **Present new analyses:** The reports present new and updated research on the physician workforce and the implications of important issues such as the evolving health care system, the changing demographic composition of the workforce, and changing hours-worked and retirement patterns. A section of this year's report discusses and provides estimates of the potential long-term implications of COVID-19 on supply and demand for physicians.
- **Identify future directions for research:** The process of modeling future supply and demand for physicians helps identify areas for future research, improvements to data collection, and refinement of analysis techniques that will strengthen future projections and support improved decision-making to help align the nation's physician workforce with its health care needs.

While some of the data used in this study were collected pre-COVID-19 (most notably health care utilization data from the 2015-2019 Medical Expenditure Panel Survey) or in the early stages of the pandemic, the projections are based on the most recent data available. Revised population projections account for COVID-related deaths in the first year of the pandemic and recent trends in less immigration and declining birth rates. This update uses data from the AAMC 2022 National Sample Survey of Physicians (NSSP). When comparing the findings to the 2019 survey results, it becomes evident that physicians are working approximately the same number of hours per week as they did before the COVID-19 pandemic, but now they are reporting an intention to retire at a younger age than they did in the 2019 survey. A summary of the data sources used in this analysis can be found in Exhibit 31 in Appendix 1.

The pandemic has highlighted many of the deepest disparities in health and access to health care services. The Health Care Utilization Equity scenarios included in this report provide a baseline for understanding inequities in access to care in the context of physician supply and demand. The full impact of COVID-19 on equity in access as it relates to the nation's physician workforce and its broader effects will require further study for future years' reports.

This report uses the same modeling approach and data sources used in previous reports. As in the past, this update projects future physician supply by considering trends in key physician supply determinants and the sensitivity of supply projections to changes in these determinants. The demand projections reflect changing demographics as the population grows and ages, the rapidly growing supply of advanced practice registered nurses (APRNs) and physician associates (PAs), and other important trends in health care, such as a growing emphasis on achieving population health goals. Because it is impossible to predict with certainty the degree to which any scenario will transpire, the projected shortages are presented as a range under the most likely scenarios rather than as a single number.

Key updates reflected in this report include the following:

1. This update extrapolates to 2036 a level of care consistent with that provided in 2021, adjusting for the implications of COVID-19 becoming endemic.
2. The update reflects the federal Health Resources and Services Administration's (HRSA's) revised estimates of the number of additional physicians required to remove Health Professional Shortage Area (HPSA) designations for primary care and mental health specialties; this information is used as a conservative proxy for national gaps between supply and demand in 2021. Published estimates of current shortfalls of physicians in select specialties are also incorporated into the estimate of beginning-year demand.
3. The supply projections include the increase in graduate medical education (GME) positions due to the Consolidated Appropriations Act of 2021. In addition, the supply scenarios are modeled with and without the assumption of 1% annual growth in GME positions from state and health system-funded increases. These scenarios provide a range of supply projections if additional resources continue to be allocated to GME or if these additional resources fail to materialize.
4. Population projections have been revised downward to reflect excess deaths from the COVID-19 pandemic and updated projections that reflect other factors contributing to slower population growth.
5. Starting supply based on the American Medical Association (AMA) Physician Professional Data (PPD) includes physicians whose type of practice is listed by the AMA as "unclassified" when such physicians have a National Provider Identification and linking to Medicare records indicates the physician is providing patient care.

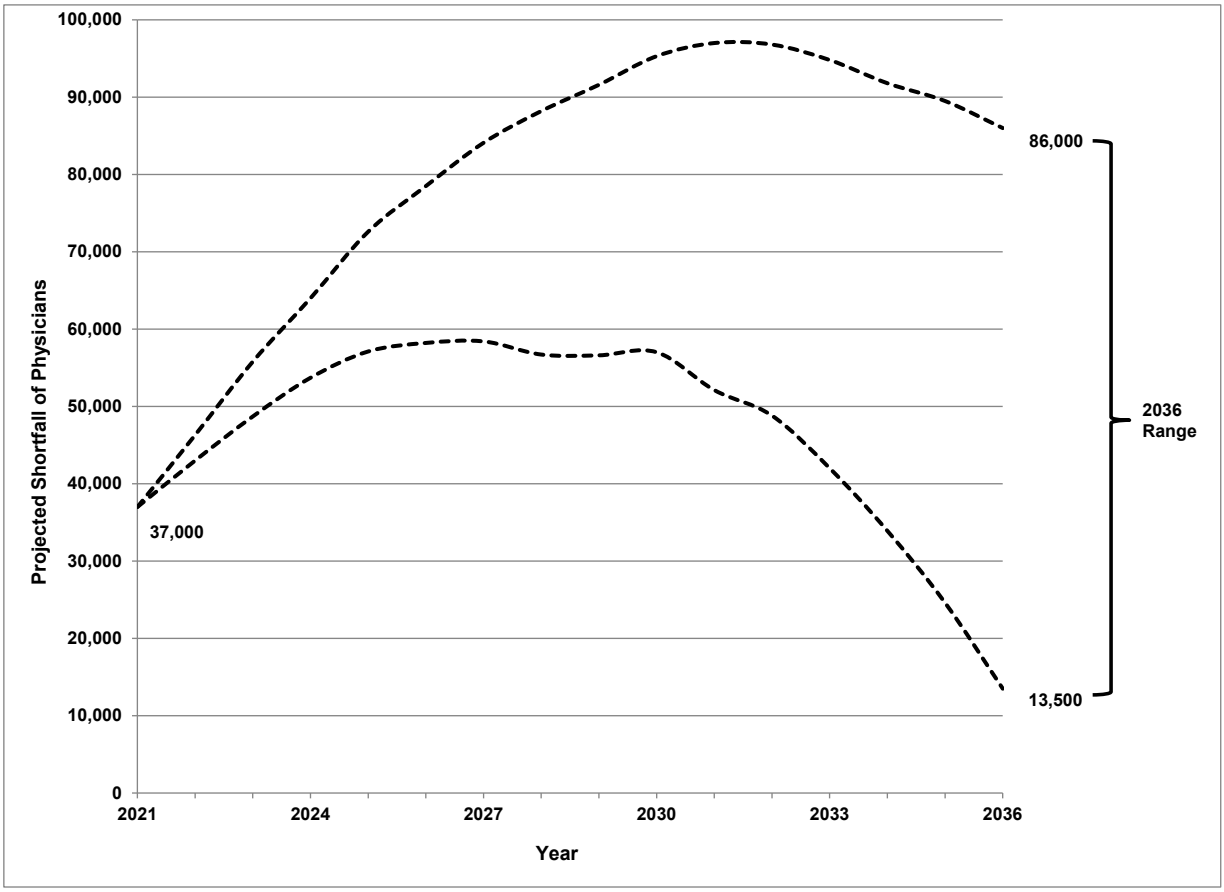
The study findings offer valuable insights into changes expected in the physician workforce by 2036. All supply and demand projections are reported as full-time-equivalent (FTE) physicians, where an FTE is defined for each specialty category as the average weekly patient-care hours for that specialty category. The projections include all active physicians who have completed their graduate medical education.

Key Findings

- Physician demand is projected to continue to grow faster than supply under the most likely scenarios, leading to a total projected shortage of between 13,500 and 86,000 physicians by 2036 (Exhibit ES-1).
- The shortages projected in this report are smaller than in the last report, published in 2021. The difference is due to a new set of scenarios based on hypothetical future growth in the number of medical residency positions nationwide. The new scenarios project the impact on physician supply if investments in GME continue to grow. **In the absence of such funding increases, the projected shortfalls would be much more severe.** Specifically, without support beyond current levels, GME growth will not continue, and future shortages will be much worse than what is presented in this report — closely resembling those presented in the 2021 report, which projected a shortfall of up to 124,000 physicians by 2034.
- From published studies of specialty-specific shortfalls (physiatry, neurology, rheumatology, vascular surgery, and hospitalists), the increase in physician demand attributed to COVID-19, and the number of primary care physicians and psychiatrists required to remove current HPSA designations, we estimate a starting-year shortfall of about 37,100 FTEs. This number, which represents the starting point for this year's projections, is likely conservative because no current shortfall estimates exist for most specialties.

- The estimated starting-year shortage of 20,800 primary care physicians includes the number HRSA estimates is required to remove the primary-care-shortage designation in currently designated shortage areas plus our estimate of COVID-19-induced increased demand. Thus, under certain scenarios (e.g., later retirement, increased support for GME), the shortage of primary care physicians is projected to be about the same in 2036 as in 2021; while under other scenarios (e.g., earlier retirement, growth of managed care), the primary care physician shortage is projected to be almost twice in 2036 what it was in 2021.
- If communities historically underserved by our health care system had fewer access barriers, the nation would have needed approximately 117,100 to 202,800 more physicians as of 2021 to achieve comparable access for all. This is approximately three to six times the magnitude of current shortfall estimates.
- Looking at supply in comparison to demand within physician categories, by 2036, we project:
    - A shortage of between 20,200 and 40,400 primary care physicians.
    - A shortage of most non-primary care specialties, including:
        - For Surgical Specialties, a shortage of between 10,100 and 19,900 physicians.
        - For Medical Specialties, a shortage of 5,500 to a surplus of 3,700 physicians (if surpluses arise in specialties such as critical care/pulmonology and endocrinology).
        - For Other Specialties, a shortage of 19,500 to a surplus of 4,300 physicians (if surpluses in emergency medicine and other specialties, like physical medicine and rehabilitation, materialize).

Exhibit ES-1: Total Projected Physician Shortfall Range, 2021-2036



Note: Because complex systems have internal checks and balances to avoid extremes, the upper and lower bounds of the shortage projections reflect the range of most likely outcomes. The divergence over time represents increasing uncertainty.

- Demographics — specifically, population growth and aging — continue to be the primary driver of increasing demand from 2021 to 2036. During this period, the U.S. population is projected to grow by 8.4%, from about 331.9 million to 359.7 million. The population aged 65 and older is projected to grow by 34.1% — primarily due to the 54.7% growth in size of the population aged 75 and older. This trend portends high growth in demand for physician specialties that predominantly care for older Americans.
- A large portion of the physician workforce is nearing the traditional retirement age of 65. Physicians aged 65 or older were 17% of the active workforce in 2021, and those between age 55 and 64 made up another 25% of the active workforce. Therefore, it is very likely that more than a third of currently active physicians will retire within the next decade.

- COVID-19 has raised awareness of the disparities in health and access to care by minority populations, people living in rural communities, and people without medical insurance. Two hypothetical Health Care Utilization Equity Scenarios around the effects of removing access barriers were updated in this analysis. These estimates, which are excluded from the shortage-projection ranges, help illuminate the magnitude of current barriers to care and provide an additional reference point when gauging the adequacy of the nation's physician workforce supply to achieve national goals. If underserved populations had health care use patterns like populations with fewer access barriers, demand would rise such that the nation would be short by approximately 117,100 (14%) to 202,800 (24%) physicians relative to the current supply, which is approximately three to six times the magnitude of current shortfall estimates. Improved access to care is a national imperative.

COVID-19 has raised awareness of the disparities in health and access to care by minority populations, people living in rural communities, and people without medical insurance. If underserved populations had fewer access barriers, demand would rise such that the nation would be short by approximately 117,100 (14%) to 202,800 (24%) physicians relative to the current supply.

- The disruptions caused by COVID-19 have laid bare many problems and significant disparities in the health care system, including disparities in access, a growing shortage of physicians, and a lack of surge capacity and pandemic planning. This report discusses the COVID-19-related impact contributing to lower population growth projections and the potential implications of long COVID.

Future Directions in Physician Workforce Research

An ever-present challenge in making these workforce projections is the rapid pace of change in the health care system, unexpected events such as the COVID-19 pandemic, and the dearth of data available to quantify the implications of these changes and events for the future workforce. We have identified specific areas where additional data and research could improve health care workforce projections:

- **COVID-19 impact:** The COVID-19 pandemic is likely to have long-term consequences for the nation's physician workforce. Updated population projections incorporate some aspects—such as COVID-related deaths and the impact on immigration. The demand projections include a preliminary estimate of how COVID-19 becoming endemic will increase demand for physicians. The AAMC's 2022 NSSP survey indicates that between 2019 and 2022, physician retirement plans have changed. Physicians now report expectations to retire at an earlier age. Areas for continued research include:
    - The effect of long COVID on the health care needs of the population and the implications for physician demand.
    - Continued high rates of burnout, exacerbated by the pandemic, and workforce exits due to early burnout-induced retirement.
    - Changes in demand due to delayed care.
    - Changes in practice related to COVID-19, such as increased use of telehealth.
    - The workforce policies needed to prepare for the next pandemic.

  All of these issues require in-depth research to better understand their scope and to inform future workforce policy.
- **Workforce diversity, equity, and inclusion:** The physician workforce lacks sufficient diversity and inclusion. The AAMC has identified this as a core strategic priority to address. Extensive long-term

work is needed to collect better data and conduct more extensive and nuanced research on physician workforce diversity and to better elucidate the anti-racist policies that can combat the endemic structural racism that harms our current physician workforce, damages our ability to create a more diverse and inclusive physician workforce, and impedes a diverse population from receiving equitable health care.

- **APRNs and PAs:** This report explores the potential implications of continued rapid growth in the APRN and PA supply. Several questions remain unanswered. How will the health care system continue to deploy this growing supply of health care professionals? What are the implications of this supply on the demand for physicians? 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? Care team integration and modeling approaches are a research area rich with opportunities. More broadly, research is needed to better understand the dynamics of team-based practice and integrated models of care.
- **Current shortages:** The demand projections start with the assumption that physician national supply and demand would have been in equilibrium in 2021 in the absence of the COVID-19 pandemic — except for (a) primary care and psychiatry, where federal government estimates for Health Professional Shortage Areas are used as a conservative proxy for the current shortage of physicians, (b) published studies for select specialties where shortfall estimates exist, and (c) the estimated increase in demand for health care services and providers associated with COVID-19 becoming endemic.[1] To the extent that current national shortages (or surpluses) exist for other specialties, the projections underestimate (or overestimate) supply-demand gaps from 2021 to 2036 by roughly the size of the current national imbalance between supply and demand. The pandemic has highlighted the enormous extent of inequitable access to care at a time when the need for health care has been acutely high. This need raises questions about how best to quantify — through an equity lens — the current imbalances between supply and demand across specialties. Further research is needed to improve the measurement of current shortages across all specialties.
- **Slow growth in surgeon supply**: The projections indicate little growth in the supply of surgeons across many surgical specialties. Future research should explore why surgeon supply numbers are stagnant.
- **Location**: Ultimately, most care-seeking is a place-based phenomenon. Continued and more detailed and nuanced research is needed to understand why physicians of different specialties are practicing where they are.

INTRODUCTION

Since 2015, the AAMC has commissioned annual reports by independent experts to project future supply and demand for physicians.* The primary purpose of these studies is to inform policies and strategies that help ensure the United States trains a sufficient number and specialty mix of physicians to further national goals of increased access to high-quality and affordable care. These studies also continue ongoing discussions of unequal access to health care services and advance the field of health workforce research.

The title of this report, "The Complexities of Physician Supply and Demand: Projections From 2021 to 2036," reflects the data challenges and uncertainties of projecting future workforce supply and demand. As evidenced by the COVID-19 pandemic, unforeseen events can create substantial disruptions to the health care system with potential long-term implications for physician supply and demand. The pandemic has raised awareness of disparities in health and access to health care services,[2] contributed to a rising physical and emotional toll on physicians and other health workers,[3-6] and exposed vulnerabilities in the health care system that led to some health workers being furloughed and some practices closing. At the same time, other health workers were in high demand to care for surging pandemic-induced health care needs.[7,8] Some of the data used in this study were collected either pre-COVID-19 or during the first year of the pandemic, though much of the data are from 2021 or later. While there are still many unknowns about the impacts of COVID-19 on the physician workforce, a chapter in this report discusses the possible long-term implications for physician supply and demand.

Other trends and factors contribute to the complexities of physician workforce modeling. The results of national and state elections over the past decade show that health-related policy and priorities at the federal and state levels can pivot quickly. The supply of advanced practice registered nurses (APRNs) and physician associates (PAs) continues to grow rapidly, along with an improved understanding of their value in delivering care and helping improve access to care for underserved populations.[9–12] The health workforce continues to age. There was growing concern about provider burnout even before the pandemic.[13–17] Concerns over near-term workforce losses to retirement and career change must be considered. Efforts continue to improve health care delivery and control rising medical costs through alternative payment models such as accountable care organizations (ACOs) and value-based reimbursement; through alternative ways to deliver care such as team-based care, integrated care, patient-centered care, and digital care; and through efforts to encourage preventive care and improve population health.[18–21] There continue to be advances in medicine, medical equipment, and information technology that expand and improve prevention and treatment options, allow for faster and more accurate clinical diagnosis, and provide patients and clinicians with more data to inform their decisions.[22,23] The effect of these technologies on physician supply and demand is complex and unclear. Against this backdrop is a U.S. population that is growing, aging, and becoming more racially and ethnically diverse.

Mindful of the magnitude and speed of these changes, the AAMC contracted with GlobalData (formerly IHS Markit) to update physician workforce projections by incorporating the latest available data on trends and factors affecting physician supply and demand. Projecting future adequacy of physician supply is essential to informing whether adjustments are needed in the nation's training capacity. This study models a 15-year time span, 2021 to 2036, given the lead time required to adjust training capacity and produce new physicians.

This update reflects the AAMC's commitment to regularly update projections and 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 of and demand for physician 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): Primary Care, Medical Specialties, Surgical Specialties, and Other Specialties — with

* No report was released in 2022 due to data concerns such as outdated population projections, and continued uncertainty about the long-term implications of COVID-19. A physician survey conducted by AAMC in 2022 collected updated estimates of physician retirement plans and hours worked patterns, and survey results have been incorporated into updated projections of physician supply.

Primary-Care-Trained Hospitalists reported as a fifth category to avoid confounding the Primary Care projections.[a]

Each year, the updated demand projections shift to reflect new levels of care use. The latest available data at the time this study was conducted were from 2021-2022. However, health care use patterns use the latest five years of Medical Expenditure Panel Survey (MEPS) data and exclude 2020 due to data quality issues related to collection during the pandemic, reflecting care use patterns from 2015 through 2019. The data inputs and demand projections in the 2021 report extrapolated a "2019 national average" level of care. This 2023 report extrapolates a 2021 national average level of care that incorporates estimates from the literature on current shortfalls of physicians for some specialties.[24] While in this report we discuss the implications of COVID-19 on physician demand, the demand projections through 2036 assume that patients eventually return to pre-pandemic care use levels. Future levels of care also model COVID-19 becoming endemic and physician demand increasing to provide care to patients experiencing COVID-19 and long-COVID symptoms.

The Status Quo scenarios for demand and supply extrapolate current care use and care delivery patterns to future populations and current labor force participation patterns for physicians. Alternative scenarios model different assumptions about ongoing and future trends in care delivery. The alternative supply and demand scenarios form the basis of the projection ranges for supply and demand.

The remainder of this update is organized similarly to prior reports. The next section compares updated physician supply and demand projections and explores implications for future adequacy of supply. The following section summarizes information about the possible implications of COVID-19 for physician supply and demand. The section after that discusses updates to the Health Care Utilization Equity scenarios. Additional information is then provided on the supply and demand scenarios and results. The final section highlights key findings and conclusions. Appendix 1 presents additional details about modeling data and methods, and Appendix 2 contains additional tables and charts.

UPDATED PROJECTIONS

Projected demand continues to exceed projected supply under the scenarios considered, leading to a projected shortage of between 13,500 and 86,000 physicians by 2036 — lower than the previous projected shortage range for 2034 of between 37,800 and 124,000 (2021 report).[25] The update reflects the following:

1. Graduate medical education (GME) is the supervised hands-on training after medical school that all physicians must complete to be licensed and practice independently. The length of this training varies but generally lasts at least three to five years for initial specialty training; subspecialty training may last up to 11 years after graduation from medical school. Our estimates of the number of new physicians completing GME and entering the workforce (31,493) is higher than the prior estimate (29,627). The projections of new graduates over time include the anticipated increase in GME positions due to the Consolidated Appropriations Act of 2021, which will fund an increase of 200 positions in each of the five years from 2023 to 2027, resulting in an increase of about 250 additional physicians per year after the phase-in. Furthermore, states and hospitals have funded new GME positions beyond those funded by the federal government. The supply projections now model two sets of scenarios — one set with the assumption that GME positions will continue to increase by 1% annually beyond growth from the Consolidated Appropriations Act of 2021, and the other set modeling 0% growth in GME funding. Supply growth is higher than in previous reports, with these projections conditional on realizing the expected growth in GME positions. If this 1% annual growth in GME positions does not materialize, supply growth will be approximately 41,000 FTEs lower in 2036.
2. This study uses population projections through 2036 that are lower than those used in previous reports. National population growth projections by the U.S. Census Bureau, last updated in 2018, have become increasingly inconsistent with population projections from individual states and other organizations that when summed to the national level fall below Census Bureau projections. We used the most recent state population projections. Under the revised projections used in this report, the U.S. population would reach 359.7 million in 2036 (356.4 million in 2034), which compares to the prior report's projections that the U.S. population would reach 363.0 million in 2034.
3. Prior reports modeled the assumption that starting-year demand was equal to starting-year supply at the national level, except for the number of primary care physicians and psychiatrists required to remove the Health Professional Shortage Area (HPSA) designations. While the number of physicians required to remove the HPSA designations increased by about 600 FTEs between 2019 and 2021, there is increasing concern about a shortage of physicians in other specialties. From published studies of specialty-specific shortfalls, analyses described later of the increase in physician demand attributed to COVID-19, and the number of physicians required to remove the HPSA designations, we estimate a starting-year shortfall of about 37,100 FTEs — or approximately a 4.3% shortfall.
4. Supply projections for physicians have been updated using more recent data on physician hours worked and retirement intention patterns based on the AAMC 2022 National Sample Survey of Physicians (NSSP). Physician starting supply is updated with data from the American Medical Association (AMA) Physician Professional Data (PPD) file, including estimates of the number of physicians whose work status in the AMA file is listed as "unclassified" but for whom Medicare billing records indicate the physicians are engaged in patient care.

The updated Primary Care physician shortage range for 2036 is between 20,200 and 40,400, which is similar to the range in the 2021 report. The projected 2036 gaps between supply and demand for non-primary care physicians are lower than in the 2021 report: between 10,100 and 19,900 shortfall for

Surgical Specialties; between an aggregate shortfall of 19,500 and a potential surplus of 4,300 for Other Specialties (if surpluses in emergency medicine and others, like physical medicine and rehabilitation, arise); and between an aggregate shortfall of 5,500 and a potential surplus of 3,700 for Medical Specialties (if surpluses arise in specialties such as critical care/pulmonology and endocrinology).[a] The modeled supply adequacy for Primary-Care-Trained Hospitalists in 2036 is between 1,300 shortfall and 4,900 surplus. As noted elsewhere, with few exceptions these projections all rely on a starting-point assumption of equilibrium. To the extent that any specialties not explicitly accounted for in the starting-point assumption are currently in shortages, these projections underestimate the magnitude of future shortages.

The supply and demand scenarios used to calculate the shortage ranges reflect the uncertainty, complexity, and evolving nature of the environment within which physicians practice. For example, there is limited data on the degree to which the rapidly growing supply of PAs and APRNs will reduce demand for physicians versus expand access to care and increase the comprehensiveness of services provided to patients. One scenario alone is inadequate to convey the associated uncertainty. We examined eight scenarios with different combinations of assumptions about key physician supply determinants and six scenarios with different assumptions about key physician-demand determinants. We compared each supply scenario with each demand scenario to generate 48 sets of projections of future supply adequacy for physicians overall and for each specialty category. The extreme high and low scenarios are least likely to occur since 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 shortage of physicians (including rising wages) might eventually lead some physicians to delay retirement. Given the propensity of such systems-level “checks and balances” to avoid extremes, we exclude the highest and lowest supply-adequacy projection quartiles and use the middle two quartiles to indicate a likely range. The ranges presented throughout this report thus represent the middle-most combinations of the supply and demand scenarios described in the “Supply Modeling” and “Demand Modeling” sections. The growing divergence over time of the highest and lowest projections we present can be interpreted as an increase in uncertainty as we project further and further into the future.

Total Physician Supply and Demand

Under most scenarios projected, the total projected demand for physicians exceeds the total projected supply (Exhibit 1). Comparing each supply to each demand scenario and looking at the 25th-to-75th percentile of supply adequacy for total physicians shows a projected shortage of between 13,500 and 86,000 physicians by 2036 (Exhibit 2).

Exhibit 1: Projected Physician Supply and Demand by Scenario, 2021-2036

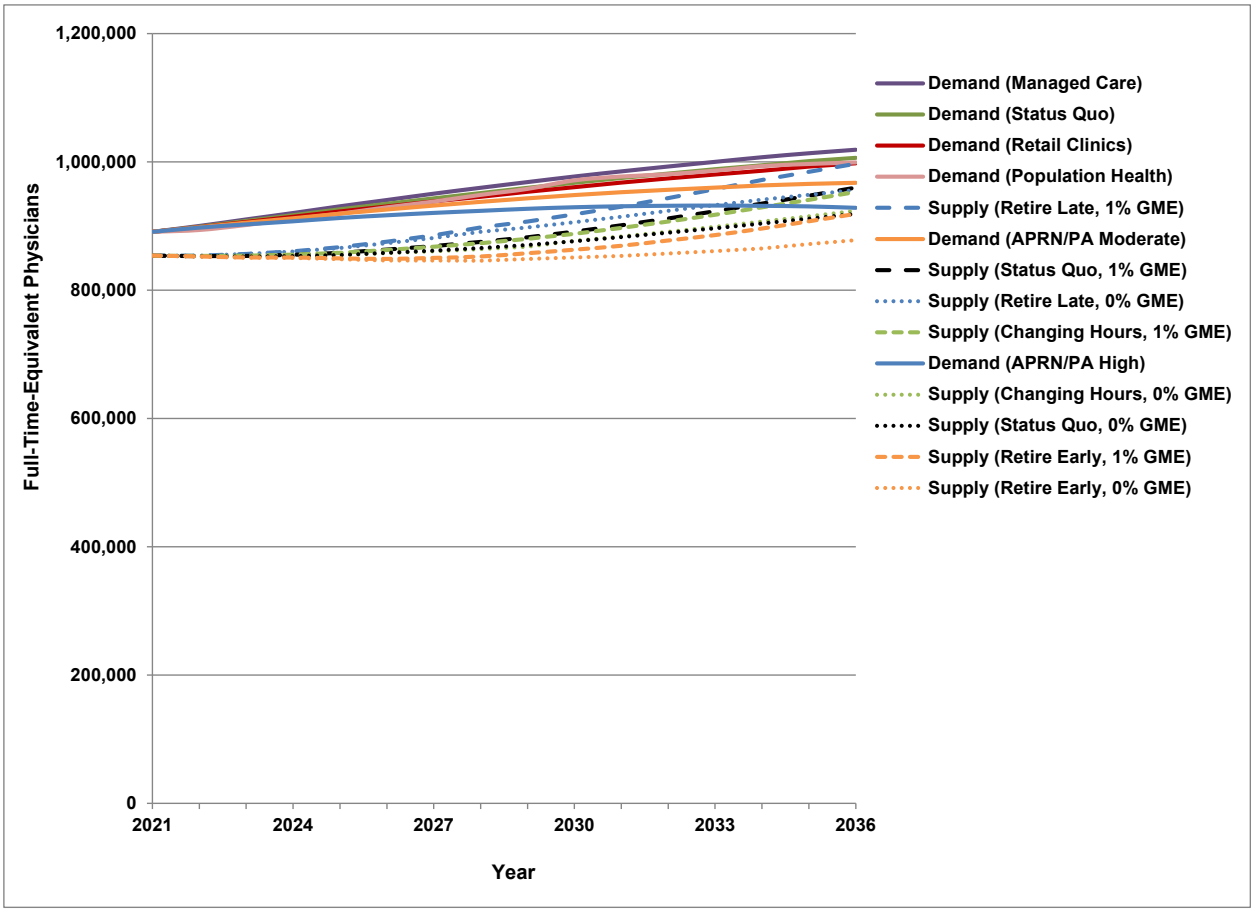
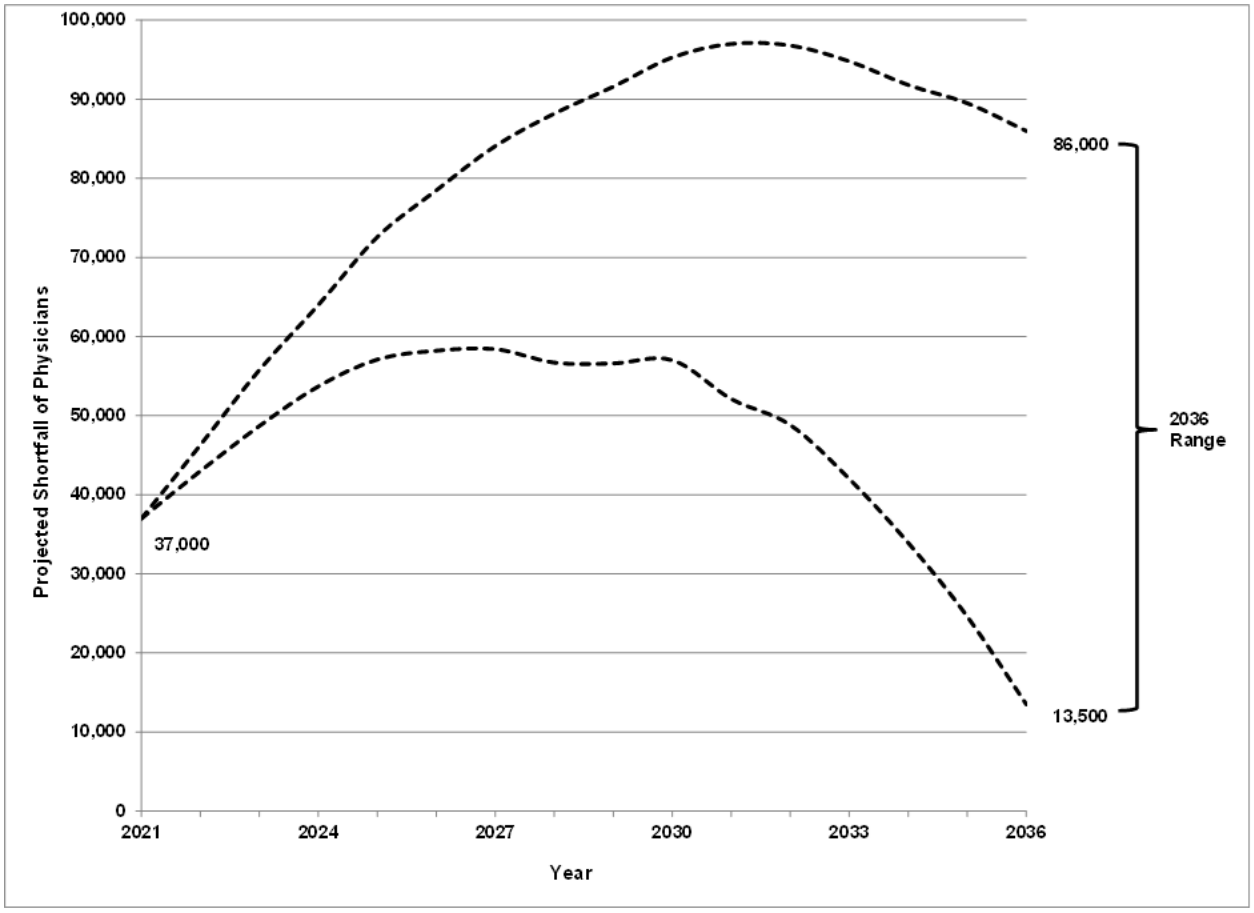


Exhibit 2: Total Projected Physician Shortfall Range, 2021-2036



Primary Care Physician Supply and Demand

Comparison of projected supply and demand for Primary Care physicians (Exhibit 3) predicts a shortage of between 20,200 and 40,400 physicians by 2036 (Exhibit 4). This range for 2036 is similar to the 2021 report shortage projection of between 17,800 and 48,000 Primary Care physicians by 2034.[24] Most of the specialties included in Primary Care are projected to be in shortage by 2036. The exception is General Pediatrics, which is projected to be near equilibrium (assuming growth in GME continues).

The updated projections use higher estimates of the annual number of new Primary Care physicians entering the workforce than were used last year: 8,971 compared with 8,584, plus a portion of new GME positions funded through Consolidated Appropriations Act of 2021 (plus 1% annual growth in four of the eight scenarios). The annual estimate of new primary care physicians adjusts for an estimated 1,222 physicians trained in primary care annually who will become hospitalists and an estimated 643 who will pursue other non-primary care specialties (in addition to the estimated 6,048 annually who pursue internal medicine and pediatric subspecialties).

The estimated starting-year shortage of 20,800 primary care physicians includes 15,184 Primary Care physicians in 2021 that the Health Resources and Services Administration (HRSA) estimates are required to remove the primary-care-shortage designation in currently designated shortage areas (up from 13,758 physicians in 2019) plus our estimate, described later, that COVID-19 has increased demand for primary care providers by about 5,600 primary care physicians.[25] A table providing estimated endemic COVID-19 demand shifts can be found in Appendix 2, Exhibit 42. Thus, under certain scenarios (e.g., later retirement, increased support for GME), the shortage of primary care physicians is projected to be about the same in 2036 as in 2021; while under other scenarios (e.g., earlier retirement, growth of managed care), the primary care physician shortage is projected to be almost twice in 2036 what it was in 2021.Each modeled supply and demand scenario is based on assumptions about the continuation of current trends or changes in care delivery that might happen at a future date, so each scenario has a degree of uncertainty. The projected shortage range widens over time, reflecting (1) that some trends have a compounding effect (such as annually training more APRNs and PAs) and (2) greater uncertainty in supply and demand determinants as we move further into the future. As illustrated in Exhibit 3, projected demand exceeds supply under most scenarios modeled, with the exceptions being the demand scenario in which the rapid growth in supply of APRNs and PAs reduces demand for physicians. The APRN/PA demand scenarios assume (1) that the number of new APRNs and PAs trained each year will continue growing at high rates and the proportion of new entrants choosing primary care will remain at recent levels and (2) that APRNs and PAs will offset demand for physicians at the rates discussed later in this report. Despite large increases over the past decade in the number of APRNs and PAs entering primary care, as well as a large number of primary care physicians trained annually, the demand for primary care providers remains strong.

Exhibit 3: Projected Supply and Demand for Primary Care Physicians, 2021-2036

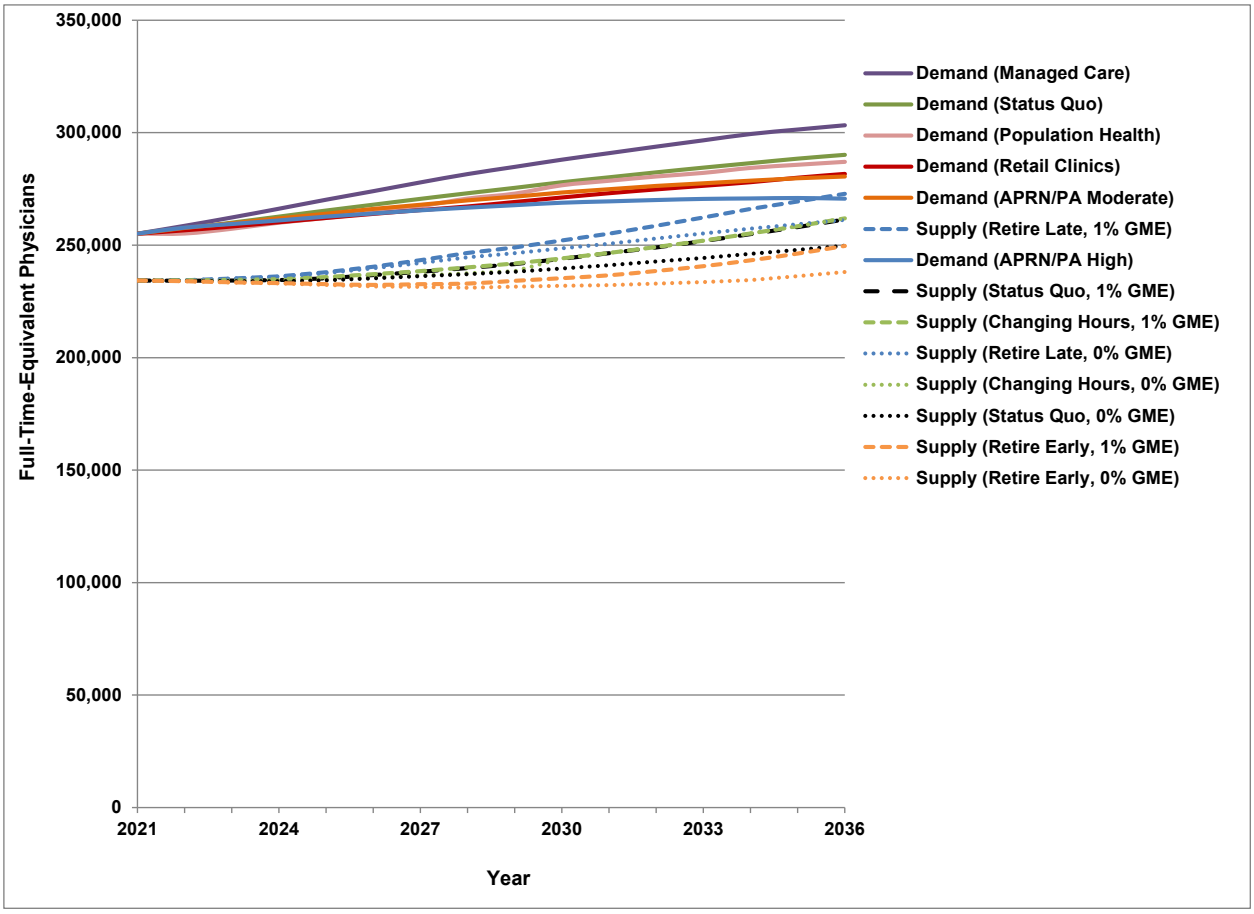
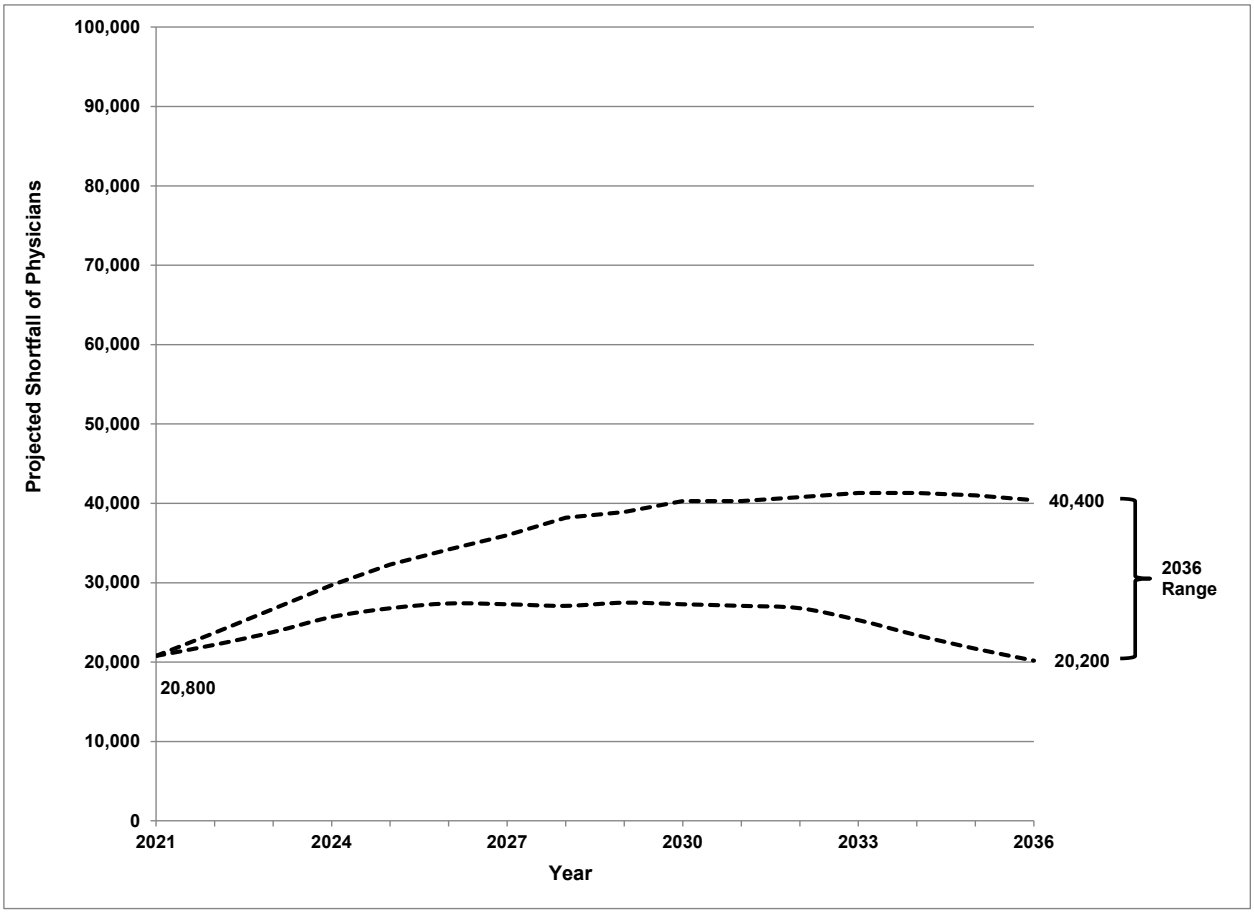


Exhibit 4: Projected Primary Care Physician Shortfall Range, 2021-2036



Non-Primary Care Physician Supply and Demand

Exhibits 5 through 12 depict the overall range of supply and demand growth and projected shortage ranges for non-primary care physicians by specialty category. Most of the non-primary care specialties are projected to be in shortages by 2036, but surpluses projected for a few (e.g., emergency medicine and critical care/pulmonology) have resulted in an overall range that is in surplus under select scenario combinations by 2036. Non-primary care specialties are grouped into four categories: Medical Specialties, Surgical Specialties, Primary-Care-Trained Hospitalists, and Other Specialties.

Medical Specialties

The demand for physicians in internal medicine subspecialties is growing rapidly due to population growth and aging, with slower growth in demand for pediatric subspecialties. The demand projections reflect that an aging population requires more complex care and, thus, greater reliance on specialized care. What is unclear is the degree to which more care might be provided in the future by specialists that historically was

provided by generalists. The supply of specialists is also growing rapidly (Exhibit 5). Under the scenarios modeled, this update projects a gap ranging from an aggregate shortfall of 5,500 to a potential surplus of 3,700 physicians by 2036 (Exhibit 6) if the most extreme scenarios, like physicians retiring two years later, occur — lower than the shortfall of between 3,800 and 13,400 physicians projected in the 2021 report. This lower range primarily reflects higher estimates of the number of new physicians entering the workforce. Projections for specialties included in Medical Specialties are split almost evenly, with just over half projected to be in shortages by 2036 and the rest in surpluses (at least at the lower end of the projection ranges), with the greatest shortages projected for nephrology.

Exhibit 5: Projected Supply and Demand for Medical Specialist Physicians, 2021-2036

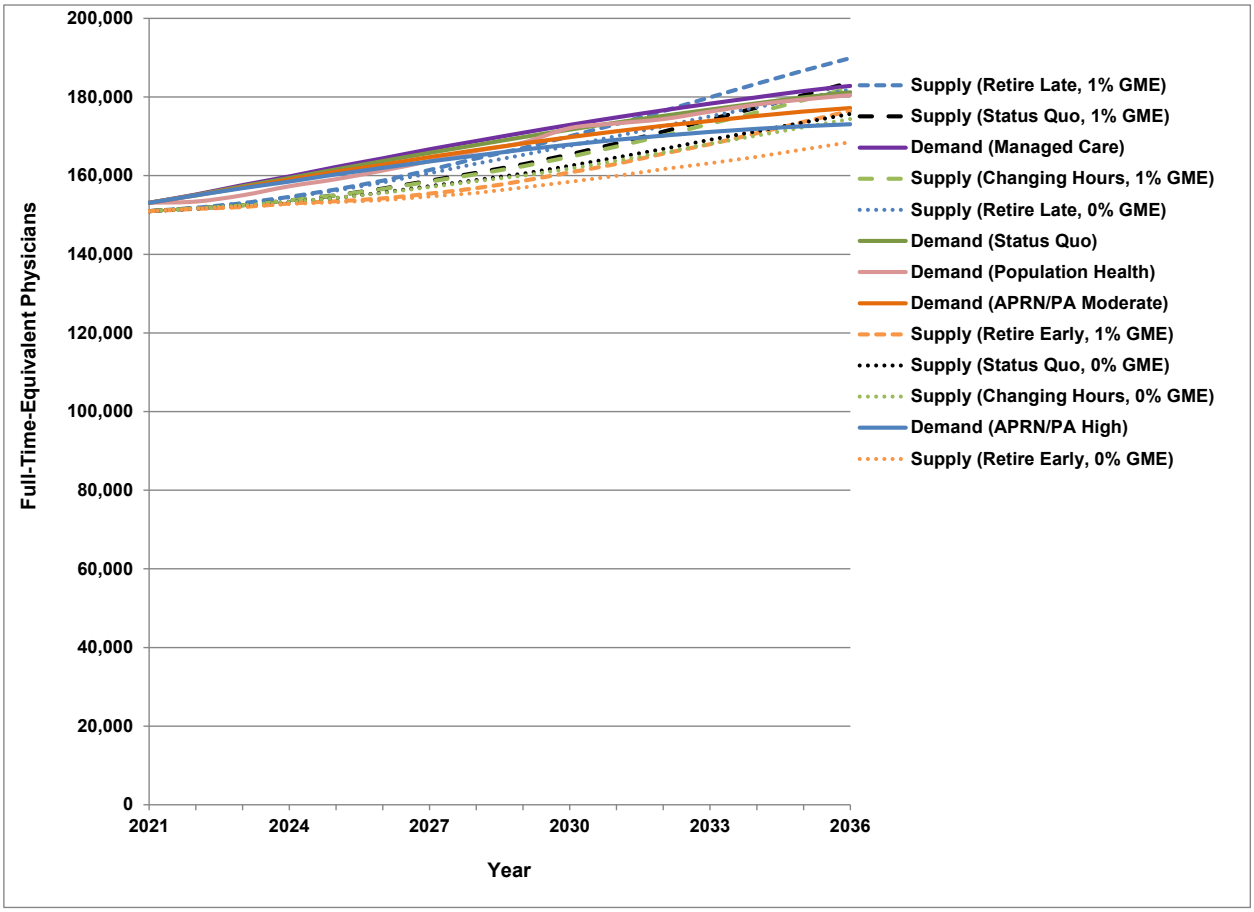
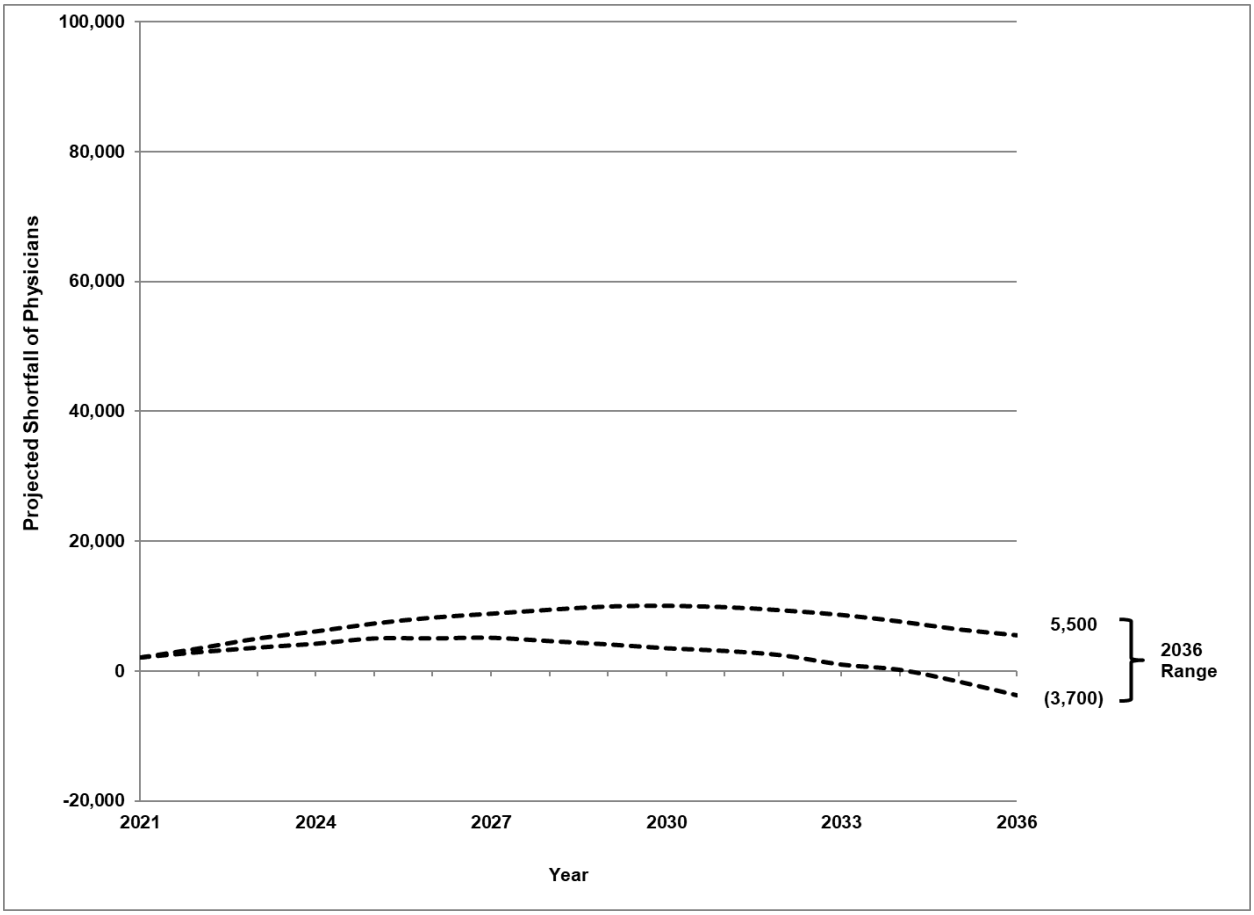


Exhibit 6: Projected Medical Specialist Physician Shortfall Range, 2021-2036



Surgical Specialties

The supply of surgeons is projected to remain relatively unchanged over the next 15 years — despite modeled assumptions of more physicians being trained. Demand continues to grow, with projected demand exceeding projected supply under most scenarios modeled (Exhibit 7). The projected shortage for 2036 is between 10,100 and 19,900 surgeons (Exhibit 8), which is lower than the 15,800 to 30,200 surgeon shortfall for 2034 in our prior report. Shortages are projected for almost all the Surgical Specialties, with projected surpluses in General Surgery offsetting some of the shortages and keeping the overall projected shortage for this group smaller than it would otherwise be.

Exhibit 7: Projected Supply and Demand for Surgeons, 2021-2036

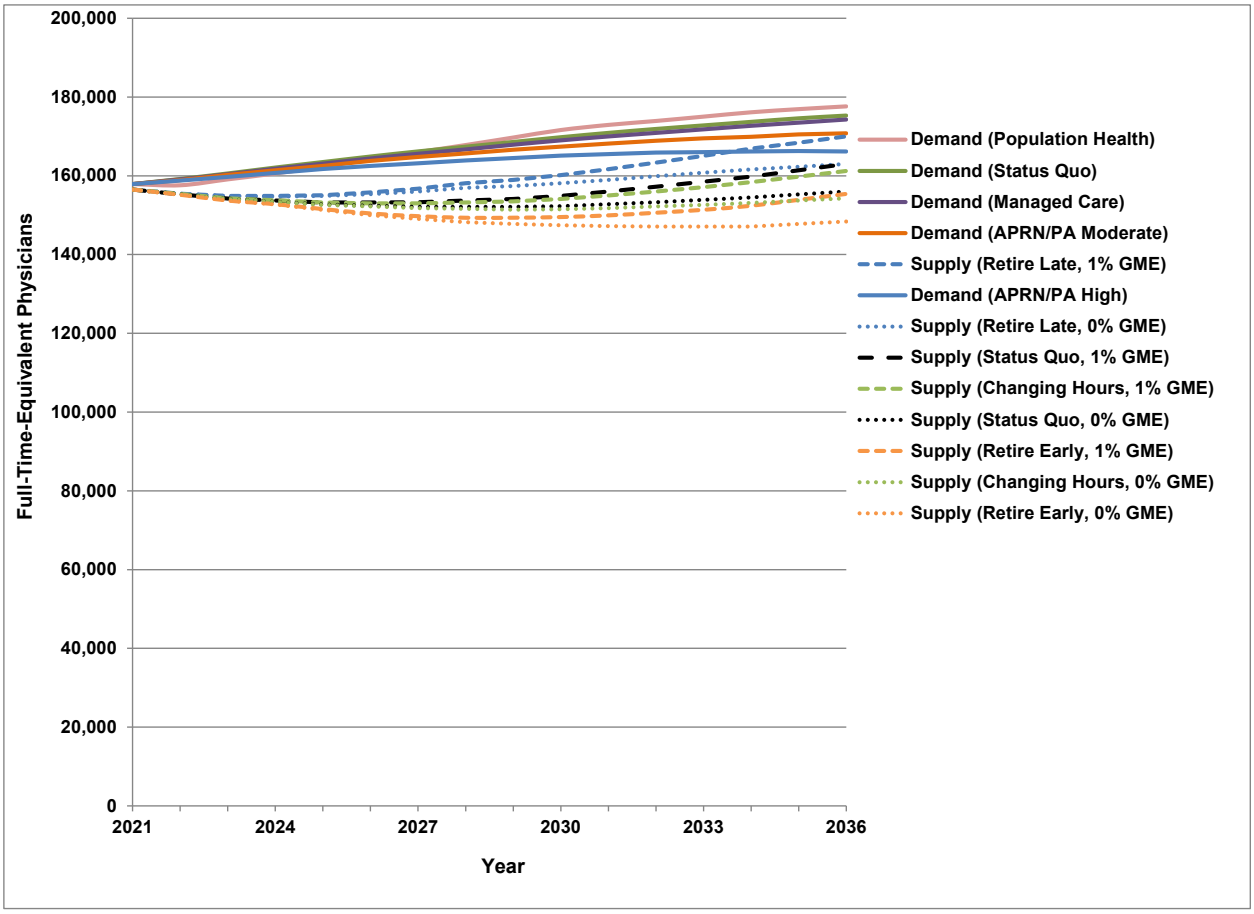
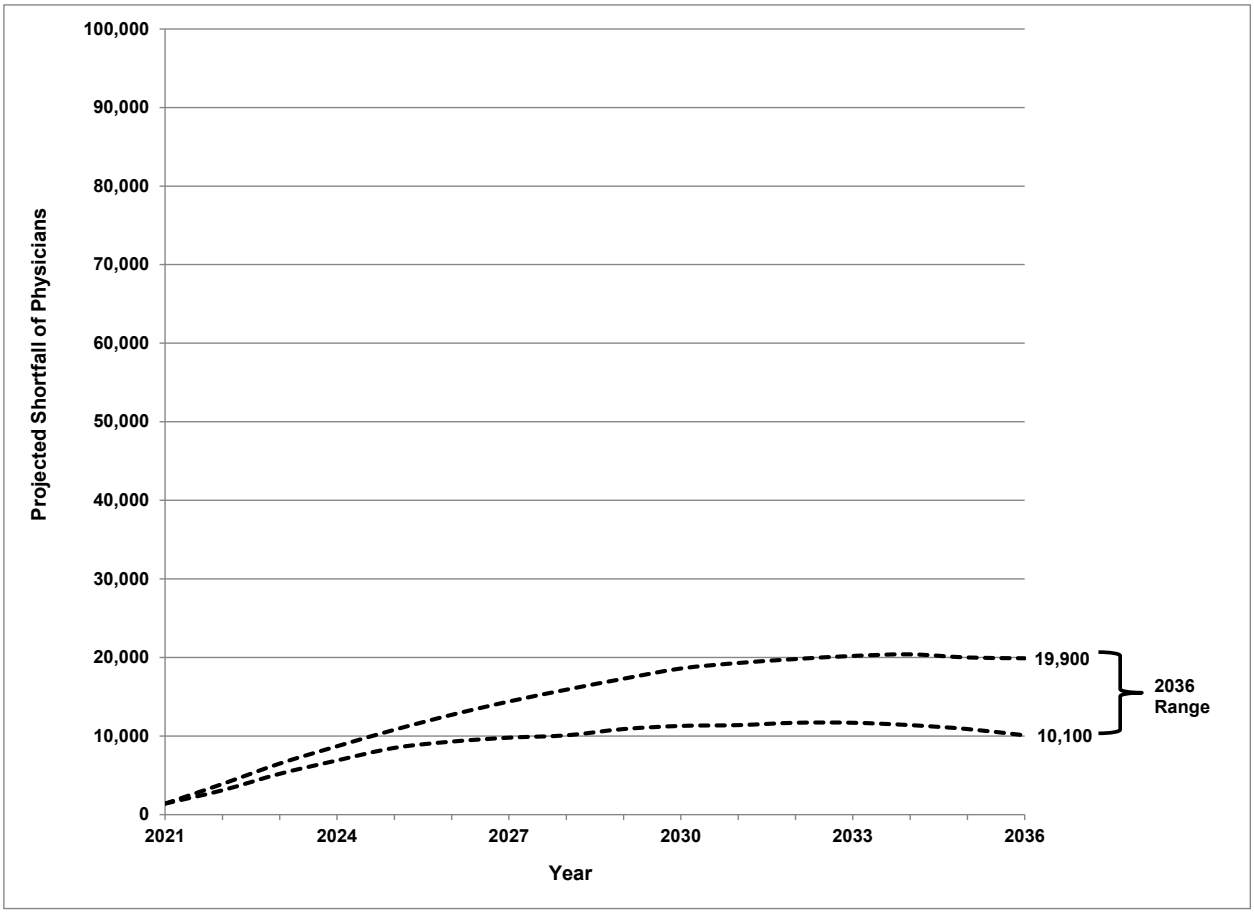


Exhibit 8: Projected Surgeon Shortfall Range, 2021-2036



Primary-Care-Trained Hospitalists

Primary-Care-Trained Hospitalists are analyzed separately from the Primary Care category. The number of physicians working as hospitalists over the past two decades has grown rapidly,[26] reflecting a shift in how care is provided rather than a growing demand for hospital inpatient services (which has declined over this same period[27]). The rapid growth in hospitalist supply has been facilitated by (1) financial considerations that increased the willingness of primary care physicians to turn inpatient care over to hospitalists, (2) the widespread implementation of electronic health records and hospitals' focus on quality and patient safety, and (3) the availability of new generalists trained in hospital settings.[26] It is unclear whether this surge in the growth of hospitalist employment will continue or whether the nation is nearing saturation. At this point, hospitalist demand will grow at roughly the same rate as demand for inpatient services.

Previously, we modeled that national demand was equal to national supply. However, there is a growing indication that demand for hospitalists exceeds current employment levels. A 2020 report (based on 2019 data) indicates that a median of 11% of hospitalist positions are unfilled.[28] The report does not indicate hospitalist vacancy rate by hospital size, and vacancy rates are likely higher in smaller, non-metropolitan

hospitals that typically face more challenges in attracting and retaining physicians. Our analysis of recent trends in hospitalist supply versus growth in inpatient demand suggests a 2021 shortfall of about 5% or about 2,100 FTEs.

The starting supply of hospitalists is based on the AAMC's analysis of Medicare billing records, combined with AMA PPD, which identified physicians with primary care training who billed at least 90% of their revenue through hospitals. The AAMC has updated this analysis annually, though data disruptions caused by COVID-19 have delayed public availability of the Medicare files required to perform this analysis in recent years. Under the assumption that hospitals will attempt to employ the number of hospitalists required to provide the level of services that patients require, we model the number of new hospitalists required to close the current shortfall gap and meet the growing demand for hospital-based care as the population grows and ages. Under these assumptions, supply is projected to grow by about the same rate as demand (Exhibit 9), with supply adequacy projected to be between an aggregate shortage of 1,300 physicians and up to a potential surplus of 4,900 primary care hospitalists by 2036 (Exhibit 10). Under the high APRN/PA scenario, hospitals would actually reduce employment of hospitalist physicians, whereas under the Managed Care and Status Quo scenarios demand increases slowly in line with projected growth in hospital inpatient days.

Exhibit 9: Projected Supply and Demand for Primary-Care-Trained Hospitalists, 2021-2036

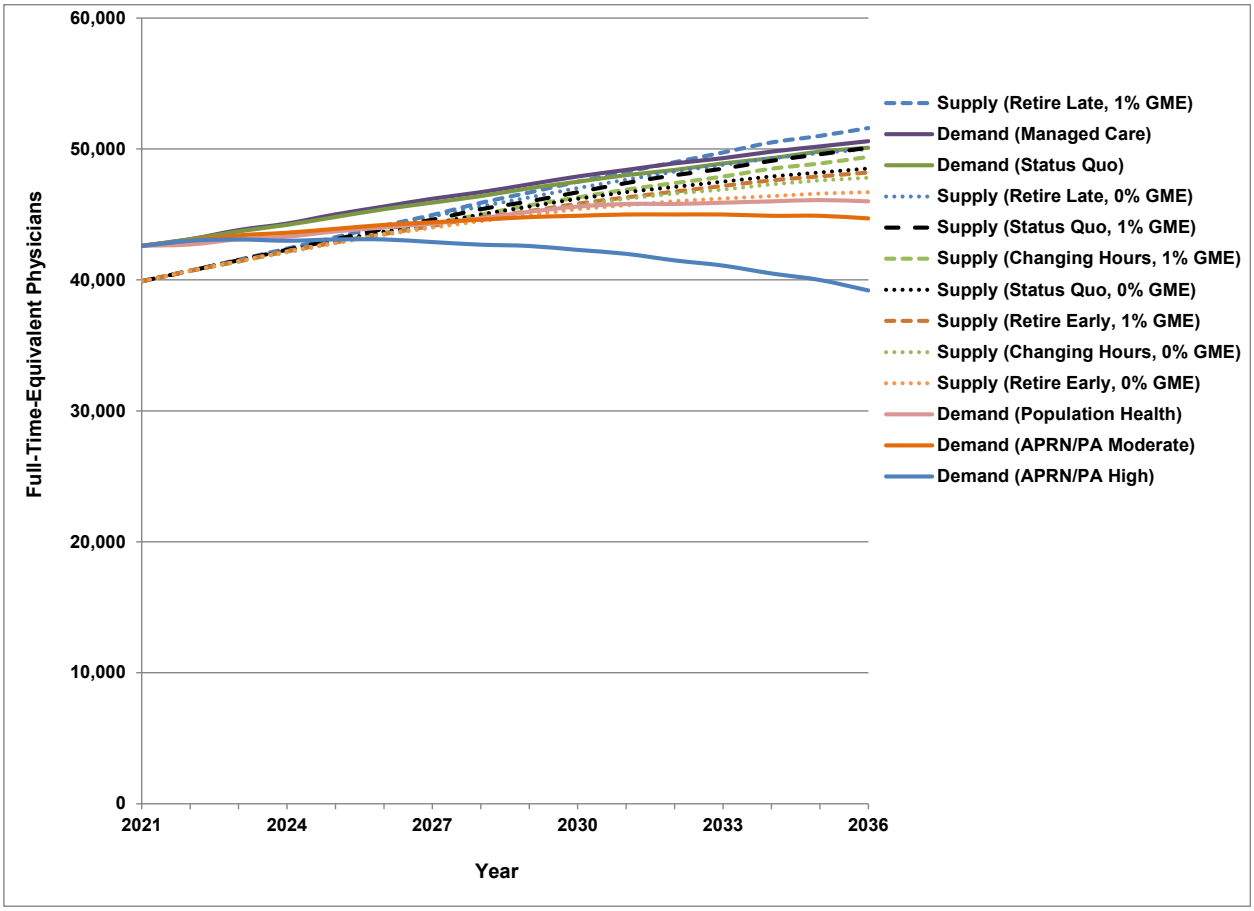
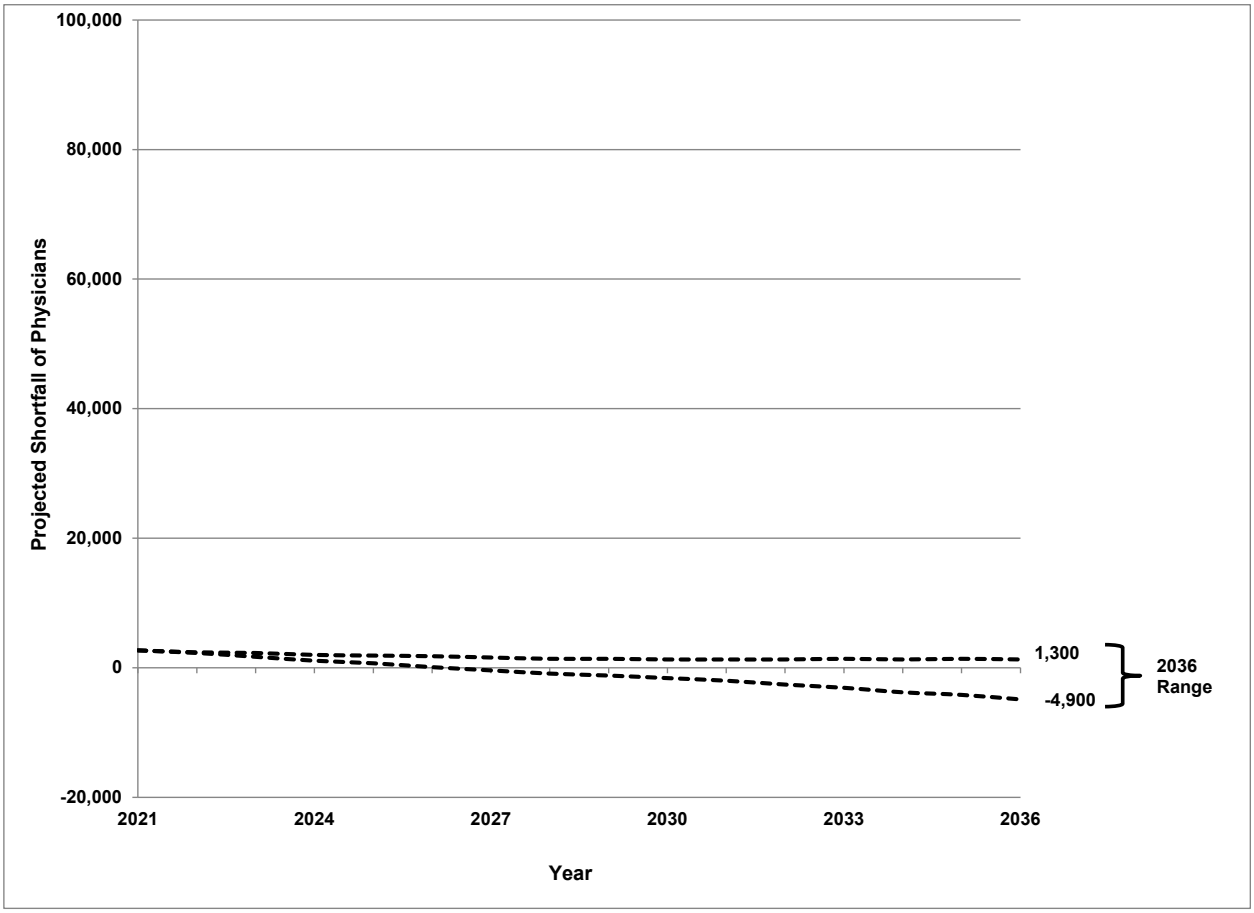


Exhibit 10: Projected Primary-Care-Trained Hospitalists Shortfall Range, 2021-2036



Other Specialties

For the Other Specialties category, projected demand meets or exceeds supply for most scenarios (Exhibit 11). The projected gap for 2036 is between an aggregate shortfall of 19,500 physicians and a potential surplus of 4,300 physicians (Exhibit 12), driven by an excess of a limited number of specialties. Most of the specialties in the Other Specialties (e.g., psychiatry) are projected to be in shortage by 2036, though potential surpluses in a few, such as Emergency Medicine, contributed to the lower end of the overall projection range being in slight surplus by 2036.

Exhibit 11: Projected Supply and Demand for Other Specialties, 2021-2036

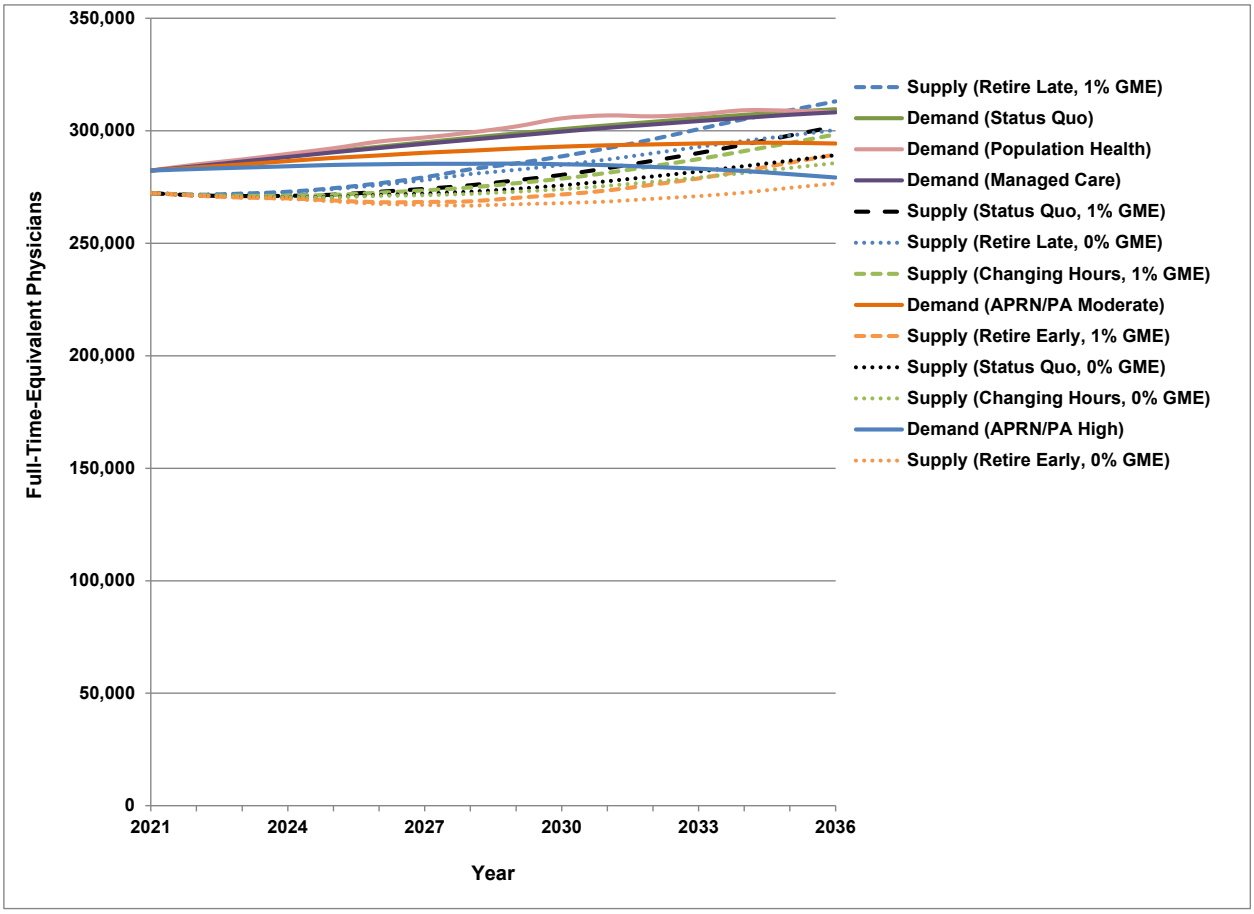
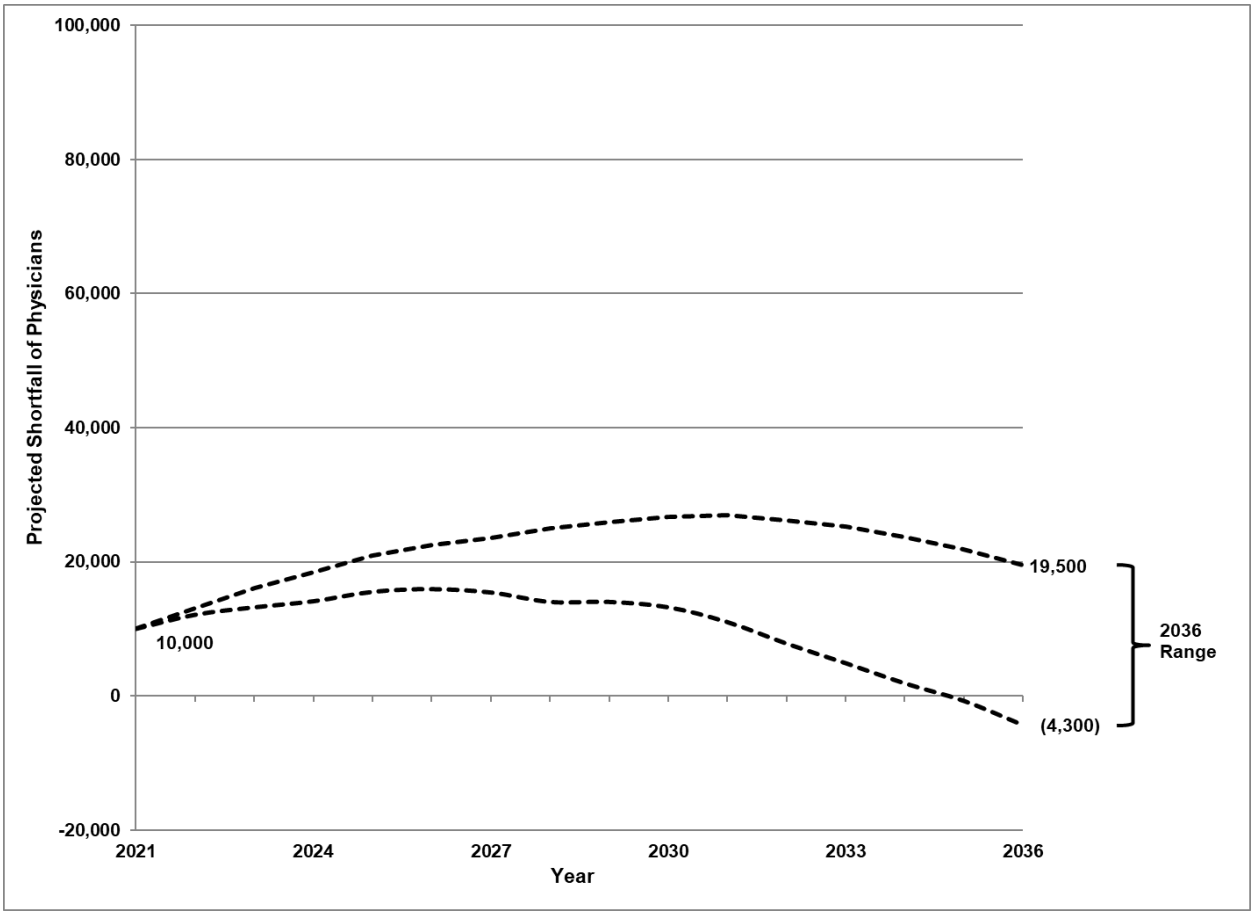


Exhibit 12: Projected Other Specialist Physician Shortfall Range, 2021-2036



COVID-19 PHYSICIAN WORKFORCE IMPLICATIONS

The 2021 report noted that the projections were devised too early in the pandemic to include data-driven corrections or revisions reflecting the impact of COVID-19. It also contained a chapter discussing the observed and possible short- and longer-term impacts of COVID-19 on the demand and supply of physicians. This chapter updates that information as our collective understanding of COVID-19 and its implications slowly grows. Still, there exists a paucity of information on potential long-term workforce implications. The many impacts of the pandemic on the population, the health care system, and social systems and priorities are profound. In this chapter, we focus on four implications for the physician workforce: (1) the COVID-19 impact on population projections and the implications for physician demand, (2) acute COVID-19 implications as COVID-19 shifts from pandemic to endemic, (3) long-COVID implications for demand, and (4) COVID-19 exacerbating physician burnout.

The COVID-19 Impact on Population Projections and the Implications for Physician Demand

Of the 1,136,000 COVID-19-related deaths the Centers for Disease Control and Prevention (CDC) reported through June 24, 2023, COVID-19 is listed as the underlying cause in 87% of cases and as a contributing cause in 13% of cases.[29] Many of these premature deaths were for an older population with chronic health issues — and thus a population that used physician services heavily. The Census Bureau's Net International Migration data showed a downward trend in immigration to the United States before the COVID-19 pandemic.[30] The pandemic led to sharp drops in immigration, but immigration levels are expected to rebound.[31,32] Deaths attributed to COVID-19 and other factors such as the opioid crisis, reduced levels of immigration, and continued declines in the birth rate mean that the national population growth projections by the Census Bureau, last updated in 2018, have become increasingly inconsistent with more recent population projections from individual states that when summed to the national level fall below Census Bureau projections.[33]

This study uses population projections through 2036 that are based on data published for individual states, supplemented by S&P Global population projections for states that have not published recent population projections. Under the revised projections used in this report, the U.S. population would reach 359.7 million in 2036 (356.4 million in 2034), which compares to the prior report's projections that the U.S. population would reach 363.0 million in 2034.

Acute COVID-19 Implications as COVID-19 Shifts From Pandemic to Endemic

There is growing consensus that COVID-19 is shifting from pandemic to endemic, where its presence becomes more predictable, such as with seasonal influenza.[34] A recent report by McKinsey & Company that analyzed the potential long-term implications of COVID-19 on the U.S. health care system predicts 110 million to 220 million COVID-19 cases annually in the future.[35] The study authors estimate that 10-15% of these new cases will require outpatient treatment. The McKinsey study estimates 4,100-6,100 additional non-ICU and 400-900 ICU hospital admissions daily, which equals 1,642,500 additional hospitalizations per year using lower bound estimates. This number appears high, as the CDC reports 428,000 COVID-19 hospitalizations between Dec. 1, 2021, and Nov. 30, 2022.[36] For comparison, between 2010-2016, the annual number of influenza-associated outpatient medical visits ranged from 4.3 million to 16.7 million, and influenza-associated hospitalizations have ranged from 139,000 to 708,000.[37]

Using McKinsey's lower bound estimates of 110 million new COVID-19 cases annually and 10% accessing outpatient treatment, this suggests 11 million outpatient visits per year. Currently, there are approximately 500 million visits per year to primary care providers. If these new cases of COVID-19 were to result in visits to a primary care provider, then we estimate about a 2.2% increase in demand for primary care visits in each future year. When considering how primary care providers split their time between ambulatory and inpatient care, we estimate a 3,476 FTE increase in demand for primary care physicians (as well as an increase in demand for NPs and PAs in primary care).

The average length of stay for a COVID-19-related hospitalization is 5.5 days,[38] which when multiplied by the CDC estimate of 428,000 hospitalizations suggests about 2,354,000 COVID-19 related inpatient days—equivalent to almost 1.5% of the nation's total inpatient days. When considering the type of physicians caring for patients in hospitals, this 1.5% increase in demand for hospital services equates to approximately 591 FTE hospitalists, 224 FTE critical care physicians, and 691 FTE physicians across other specialties (e.g., primary care, cardiology, endocrinology, infectious diseases, pulmonology, nephrology, and other specialties) in 2021. In total, COVID-19 hospitalizations increased physician demand by about 1,507 FTEs in 2021, with similar levels projected in future years.

Long-COVID Implications for Demand

The McKinsey study estimates that 3% of COVID-19 cases will result in long COVID lasting three to 12 months. If 3% of the 110 million new COVID-19 cases develop long COVID, this equates to 3.3 million long-COVID incidences annually. While no organ system is immune to COVID-19 or long COVID, the most common symptoms of long COVID seem to be "systemic (fatigue and poor concentration), neuropsychiatric (sleep abnormalities, chronic headache, 'brain fog', defects in memory, mood impairment and pain syndromes), cardiac (palpitations, syncope, dysrhythmias and postural symptoms) and respiratory (dyspnea and cough)."[39] In addition to lingering or recurring COVID-19, former COVID-19 patients can also require longer-term care from post-intensive care syndrome and other issues resulting from their acute COVID-19 care, as well as organ/system damage and new diseases or conditions to which they are more susceptible after having COVID-19. For example, recent studies have documented an increased risk of developing diabetes after having COVID-19.[40,41] While the examples of such issues are too many to catalog here, a commonly noted phenomenon illustrates how much extra care may be needed. Many COVID-19 patients experience loss of smell and need physician counseling, while a small percentage (of a large absolute number of patients) require ongoing care when the loss is permanent.[42,43] Given the common issues subsequent to COVID-19, demand also may increase for intensivists, physiatrists, endocrinologists, and otolaryngologists for the medium to long term.

We assume, based on a conservative estimate from a study on post pandemic care burden, that patients with long COVID will have two doctor visits per case, or 6.6 million visits annually.[44] If these visits were proportionately distributed across physicians in family medicine, internal medicine, geriatric medicine, neurology, pulmonology, cardiology, infectious diseases, nephrology, and endocrinology, this would suggest about a 1% increase in annual visits to each of these specialties. In 2021, this 1% increase in additional demand associated with long COVID amounts to 2,747 FTE physicians (as well as an increase in demand for NPs and PAs working in these specialties). These estimates of increased demand for physicians might be conservative, as some patients with long COVID experience permanent changes to their health that will require lifetime treatment. There is little information to quantify how COVID-19 delays in receiving care affected patients' underlying health and the future health care demand implications.

Combining the increased demand for physicians to provide ambulatory care to patients with acute COVID-19, office visits for long COVID, and COVID-19-related hospitalizations, we estimate that COVID-19 becoming endemic will increase demand for physicians by about 1% in future years (or 7,730 FTEs in 2021).

COVID-19 Exacerbating Physician Burnout

Physician burnout was already high and well-documented before COVID-19. However, the increase in stresses from higher risks of illness, larger attended losses of life, and seeming indifference of the public to provider safety and well-being have exacerbated the problem.[3–6] While surveys earlier in the pandemic[45,46] have suggested physicians were quitting or planning to quit their jobs at even higher rates during COVID-19, the magnitude of this impact on physician supply is not yet know. Ongoing surveys suggest that the numbers will be striking. The end of February Primary Care Survey from the Larry A. Green Center revealed that 40% of responding primary care physicians were getting new patients because of other practice closures, 62% knew a physician who retired early or quit during the pandemic, and 1 in 4 said they would leave primary care in the next three years.[47] A commentary in *JAMA* characterized the results as signaling "a great clinician resignation lies ahead."[48]

A final consideration is the impact of long COVID on the supply of physicians. Health care workers were disproportionately exposed to COVID-19 and thus more likely to be infected. Some physicians who contracted COVID-19 suffer long COVID themselves,[49] further impacting the nation's physician resources. As more data are generated, collected, and studied regarding COVID-19, our understanding of its impacts will improve, allowing more precise modeling of its implications on the demand for and supply of physicians. Regularly updating physician workforce projections is imperative, given critical provider shortages, an evolving trajectory of the pandemic, and our rapidly developing understanding of the virus and its impact.

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

Achieving health equity is a national goal, with research suggesting substantial room for progress.[50–55] Disparities in mortality and health outcomes associated with COVID-19 have raised awareness of the disparities in health and access to care by minority populations, people living in rural communities, and people without medical insurance.[56–58]

One component of achieving this goal is to improve access to care for populations that have historically faced barriers to receiving care. The Health Care Utilization Equity (HCUE) Scenarios modeled for this report quantify the implications for physician demand if currently underserved populations had similar care use patterns as populations facing fewer barriers to care — controlling for demographics, lifestyle choices, and disease prevalence. *This analysis is not included in the ranges of scenarios that summarize projected gaps between supply and demand across physician specialty categories*. Rather, it is intended as an additional point of consideration when gauging workforce adequacy and to stimulate discussion of how best to address health care utilization inequity. The analysis shows that due to sociodemographic differences, historically underserved populations have received less care beyond utilization differences than can be explained by differences in age distribution, disease prevalence, and other health risk factors.

As shown in Exhibit 13, under current patterns of health care service use, the non-Hispanic White population uses about 306 FTE physicians per 100,000 population. The corresponding FTEs used per 100,000 population are 189 for the Hispanic population, 246 for the non-Hispanic Black population, and 218 for all other minority populations.[b]

We modeled two hypothetical scenarios to estimate the anticipated increase in the use of health care services if underserved populations had use patterns similar to a population not perceived as underserved. The first scenario (HCUE Scenario 1) assumes people without medical insurance and people living outside suburban[c] metropolitan areas had similar care use patterns as their insured peers living in suburban areas. For example, an uninsured male age 50 with diabetes living in a rural area was modeled as having the utilization patterns of an insured male age 50 with diabetes living in a suburban metropolitan area. Under these assumptions, U.S. demand would increase by 79,900 FTE physicians, and when considering the starting-year shortfall, the total gap is 117,100 physicians (Exhibit 14). More APRNs and PAs would also be required to meet the additional demand for services.

The second HCUE scenario (HCUE Scenario 2) models the additional physicians required under a hypothetical scenario in which everyone utilized care as if they had equivalent utilization patterns to non-Hispanic White, insured populations residing in suburban metropolitan areas. For example, an uninsured Black male age 50 with diabetes living in a rural area was modeled as having the utilization rate of an insured non-Hispanic White male age 50 with diabetes living in a suburban metropolitan area. Under these assumptions, we estimated an additional 202,800 FTE physicians would be required relative to supply (Exhibit 15).

Like the previous report, we modeled all people having care use patterns of people living in suburban metropolitan areas (NCHS Classification 2) — who typically have the greatest access to care. These modeled scenarios are not intended to describe what future demand for physicians is likely to be but rather to highlight the large disparities in the use of services between people with and without insurance, among people residing in counties across different levels of rurality, and by race and ethnicity.

Exhibit 13: Current Use of FTE Physician Services per 100,000 Population by Patient Race and Ethnicity, 2021

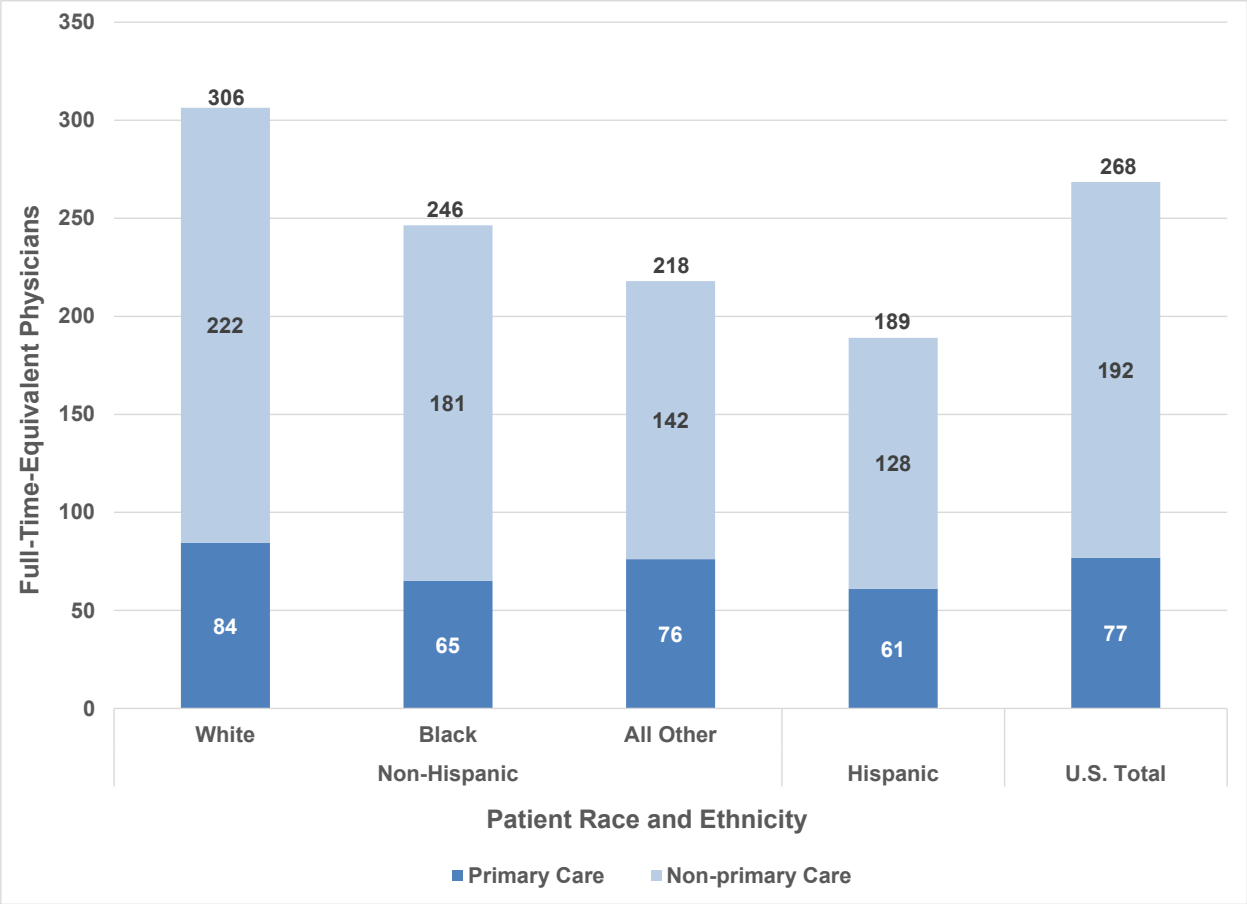


Exhibit 14: Health Care Utilization Equity Scenario 1, 2021

Specialty Group	Current Supply	Physicians Requirements Under Equity Scenario	Current Gap	% Gap	Additional Providers Required: Advanced Practice Nurses	Additional Providers Required: Physician Associates
Total	854,000	971,100	117,100	14%	27,500	11,900
Primary Care	234,300	278,000	43,700	19%	7,800	1,600
Non-Primary Care	619,700	693,100	73,400	12%	19,700	10,300
Medical Specialties	151,000	169,300	18,300	12%	7,500	1,500
Surgical Specialties	156,500	173,700	17,200	11%	1,000	5,100
Other Specialties	272,300	303,800	31,500	12%	6,400	3,200
Hospitalists*	39,900	46,300	6,400	16%	4,800	500

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

Exhibit 15: Health Care Utilization Equity Scenario 2, 2021

Specialty Group	Current Supply	Physicians Requirements Under Equity Scenario	Current Gap	% Gap	Additional Providers Required: Advanced Practice Nurses	Additional Providers Required: Physician Associates
Total	854,000	1,056,800	202,800	24%	52,500	24,800
Primary Care	234,300	293,600	59,300	25%	13,100	3,500
Non-Primary Care	619,700	763,200	143,500	23%	39,400	21,300
Medical Specialties	151,000	176,500	25,500	17%	10,800	2,200
Surgical Specialties	156,500	193,100	36,600	23%	2,300	10,900
Other Specialties	272,300	345,100	72,800	27%	18,600	7,400
Hospitalist*	39,900	48,500	8,600	22%	7,700	800

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

The implications of these hypothetical scenarios vary substantially by patient race and ethnicity, census region, and urban-rural location (Appendix 2, Exhibit 37-46). For most specialties, demand for physician services by underserved populations would rise under the HCUE1 and HCUE2 scenarios. However, for some underserved populations, demand would fall, reflecting a higher prevalence of select chronic conditions among these underserved populations and potential declines in demand for chronic disease services if these patients had improved access to preventive care. Under the HCUE2 scenario, demand for services among minority populations would decline for nephrology and colorectal surgery. These possible declines in demand could be due to access to preventive care diminishing higher prevalence rates among minority populations for obesity, hypertension, diabetes, nonalcoholic fatty liver disease, various types of cancer, and other chronic diseases.[59–64] The decline in the use of hematology services might be overstated to the extent that diseases such as sickle cell disease are more prevalent among minority populations than in the non-Hispanic White population.[65,66]

SUPPLY MODELING

The microsimulation supply model projects future supply based on the number and characteristics of the current physician workforce and new physicians trained each year, hours-worked patterns, and retirement patterns. This section describes the modeled scenarios and projections, with a brief description of the supply model and model inputs and assumptions. Additional information about the supply model and its inputs can be found in Appendix 1; further details are documented elsewhere.[67]

Supply Modeling Inputs, Assumptions, and Scenarios

All supply projections start with approximately 854,000 physicians active in 2021, as estimated from the AMA PPD. Supply is defined as active physicians who have completed their GME and includes physicians involved in patient-care and non-patient-care activities (i.e., teaching, research, and administration). Our supply estimate is higher in this report compared to the prior reports. In part, this is because we now include in active supply a portion of physicians whose type of practice is listed in the AMA PPD as "unclassified" but for whom linked Medicare billing records indicate the physician is active in patient care. The beginning supply estimate includes only physicians under age 75 because past research suggests many physicians age 75 and older in the AMA PPD are no longer practicing medicine. The starting-year supply consists of about 234,300 Primary Care physicians, 151,000 physicians in internal medicine and pediatric subspecialties, 156,500 physicians in Surgical Specialties, 39,900 Primary Care-Trained Hospitalists, and 272,300 physicians working in Other Specialties.

Consistent with previous reports, we modeled Primary-Care-Trained Hospitalists separately from Primary Care physicians. The Hospitalist projections build on AAMC work to identify hospitalists using Medicare fee-for-service billing records linked to the AMA PPD. We defined hospitalists as physicians who generate 90% or more of their billing for hospital-based services.

Our estimate of annual new physicians entering the workforce, 31,493, described in Appendix 1, is higher than the prior report estimate, 29,627. An estimated 8,971 new physicians entered Primary Care, 6,192 entered internal medicine and pediatric subspecialties, 5,343 entered Surgical Specialties, 1,222 Primary Care-Trained Hospitalists, and 9,765 new physicians entering Other Specialties. The scenarios model the continuation of these 31,493 physicians trained each year plus the anticipated increase in GME positions due to the Consolidated Appropriations Act of 2021. The number of GME positions will increase by 200 in each of the five years from 2023 to 2027. Assuming that GME takes an average of four years or four positions to complete, 200 more physicians will be trained each year from 2028 to 2034, except in 2031, when there will be 400 more physicians. These new physicians are distributed proportionally based on the distribution across specialties consistent with the specialty mix of graduates from school year 2020-2021.[68] The projections in prior reports modeled the number of new physicians entering the workforce remaining constant into the future — which reflected the number the system could continue to train without new investment in GME. States and health systems have funded new GME positions, and to reflect scenarios where this growth continues we model the supply scenarios both including and excluding a 1% annual GME growth assumption as a conservative proxy for the average annual percent change in GME growth since 2000. The realization of the supply projections presented here is conditional on continued investment in GME beyond current levels.

Physician weekly-hours-worked patterns and retirement patterns differ by age, sex, and specialty category. The updated projections use data on hours worked and retirement estimated from the AAMC 2019 and 2022 NSSP. The survey analysis is described in Appendix 1. Comparing the 2022 survey

findings to the 2019 survey findings indicates that physician hours declined slightly between 2019 and 2022, and physicians expect to retire at an earlier age than previously indicated.

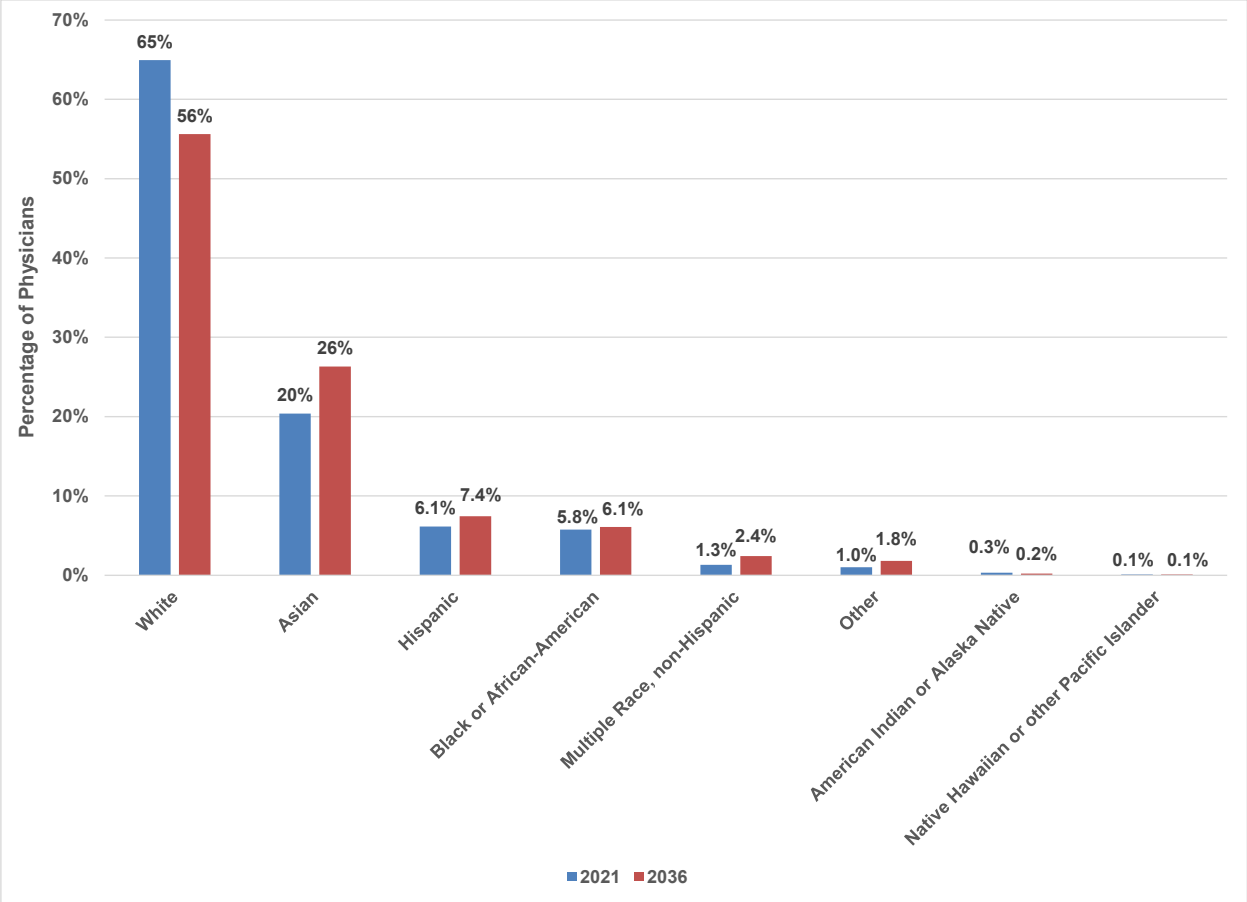
This report includes physician race and ethnicity as a component of the projections. This 2023 report includes physician race and ethnicity as a component of the projections. Projections of the racial and ethnic composition of the physician workforce through 2036 do not affect the other findings of the study. Physician race and ethnicity were added to the AMA PPD by the AAMC and were derived from multiple sources.* The race and ethnicity categories tracked include American Indian or Alaskan Native, Asian, Black or African American, Hispanic, Multiple Race non-Hispanic, Native Hawaiian or Other Pacific Islander, Other, and White.

New entrants to the physician workforce during the projection years of 2021 to 2036 were assigned a race or ethnicity based on the race and ethnicity distributions of physicians who entered the workforce between 2011 and 2021 in the combined AMA-AAMC physician data. This process is similar to how the age and sex of new physicians entering the workforce in the projection years are assigned.

The projections show that Asian, Multiple Race, non-Hispanic, and Other physicians will grow rapidly as a percent of the total physicians, while Hispanic and Black physicians will grow slowly (Exhibit 16). White physicians will decline as a percentage of the total physicians while remaining a majority. Physicians identifying as American Indian or Alaska Native and Native Hawaiian or Other Pacific Islander will continue to remain an extremely small subset of the physician workforce.

* Sources include databases and surveys: DBS, Electronic Residency Application Service (ERAS), Applicant and Matriculant Data File (APP), Medical College Admission Test (MCAT), Summer Health Professions Education Program (SHPEP), Graduation Questionnaire (GQ), Matriculating Student Questionnaire (MSQ), Premedical Student Questionnaire (PMQ), AAMC Faculty Roster (FACULTY), GME Medical Education Survey (GME), and Student Records System (STUDENT), with priority given to the most recent self-reported source.

Exhibit 16: Racial and Ethnic Composition of Physician Supply, 2021 and 2036



As in the previous reports, 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. Also, as in past years, modest GME expansion was modeled separately as a policy-oriented supply scenario but was not included in the shortage projections.

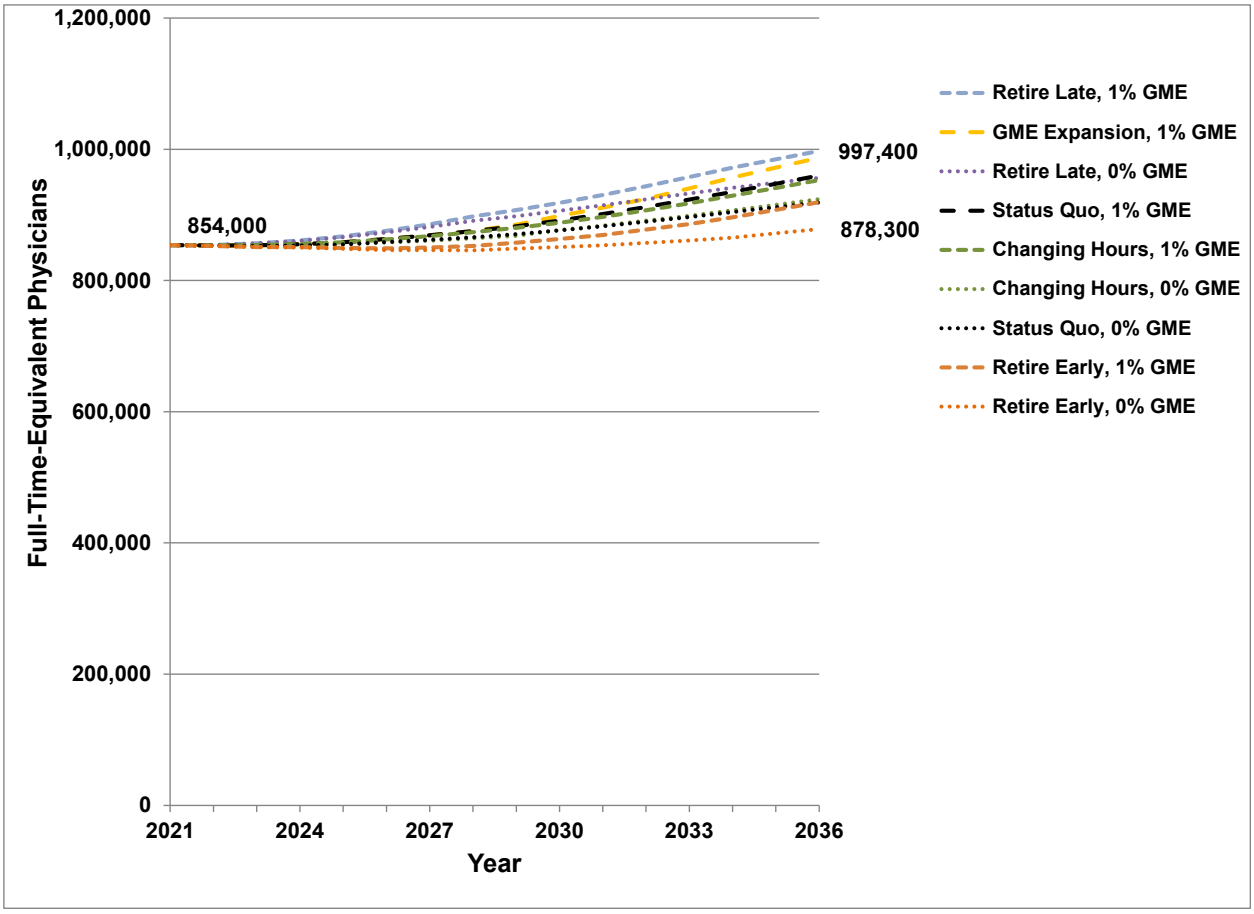
- **Status Quo Scenario**: This scenario models continuation of the status quo in terms of hours worked patterns and retirement patterns. The new graduate numbers include the additional GME positions added by the Consolidated Appropriations Act of 2021. Two versions of this scenario were modeled—with and without assumed 1% annual growth in the number of physicians newly entering the workforce in. This scenario forms the basis for the other modeled supply scenarios.
- **Early- and Delayed-Retirement Scenarios**: Reflecting the uncertainty about future physician-retirement patterns, these scenarios model physicians retiring two years earlier or two years later, on average, than they do now. The scenarios assume physicians might delay or speed up retirement for financial, health, and other reasons. Burnout is one factor contributing to premature retirement, and, as discussed previously, COVID-19 has exacerbated the issue.[3–5,15,70–74]

- **Changing Hours Worked Scenario**: Our previous reports estimated the change in average weekly hours worked by physicians using the American Community Survey (ACS). ACS collects data on physician hours worked using the same format every year and can be used to estimate aggregate trends in physician hours worked. To increase sample size across age groups, we combined 2019-2021 ACS files to get an estimate of physician work-hours in 2020, and we combined 2014-2016, 2009-2011, and 2004-2006 files to estimate work-hours for, respectively, 2015, 2010, and 2005. The trend in recent years suggests that average hours worked has been relatively steady for physicians, with a decrease for males and a small increase for females. This modeled scenario simulates the supply implications if the average annual trend observed in the past fifteen years were to continue. We modeled the change in hours worked by age and sex as a cohort effect.
- **GME Expansion Scenario**: This scenario assumes an increase in federally funded GME support to train an additional 15,000 physicians per year, with 3,000 new residency positions added per year over a five-year period. 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 2027. This scenario is based on the combined effects of the proposed Resident Physician Shortage Reduction Act and the Consolidated Appropriations Act of 2021, though the actual timing of adding new residency positions will likely vary slightly from what was modeled. The distribution of new residency positions across specialties is currently unknown, so for modeling purposes, we assume all specialties' residency positions will increase in proportion to their current distribution. This policy-related scenario was excluded from calculations of physician-shortage ranges.

Supply Projections

Updated annual projections for physician supply across all scenarios modeled are summarized in Exhibit 17. Under the Status Quo Scenario, total physician supply increases from 854,000 in 2021 to 919,000 (0% annual GME growth scenario) and 961,100 (1% annual GME growth scenario) by 2036. This supply growth of 7.6% to 12.4% compares to the projected 8.4% growth in the U.S. population over this period.[33]

Exhibit 17: Projected Supply of Physicians, 2021-2036



As illustrated in Exhibit 18 and Exhibit 19, this year's updated supply projections for 2021 to 2036 show faster growth in supply compared with the 2019 to 2034 projections. The 2021 report projected a 49,300 increase in supply, and this 2023 report projects a 65,100 to 106,100 increase in supply under the Status Quo scenario. The main contributor to the higher projection is the increase in the annual number of new GME graduates (the increase from 2019 to 2021, and the assumption of 1% annual increase in GME funding independent of any federal legislative change). The 2021 report assumed that physician GME would be static outside of federal legislative changes.

Exhibit 18: Projected Change in Physician Supply: 2023 vs. 2021 Report Projections

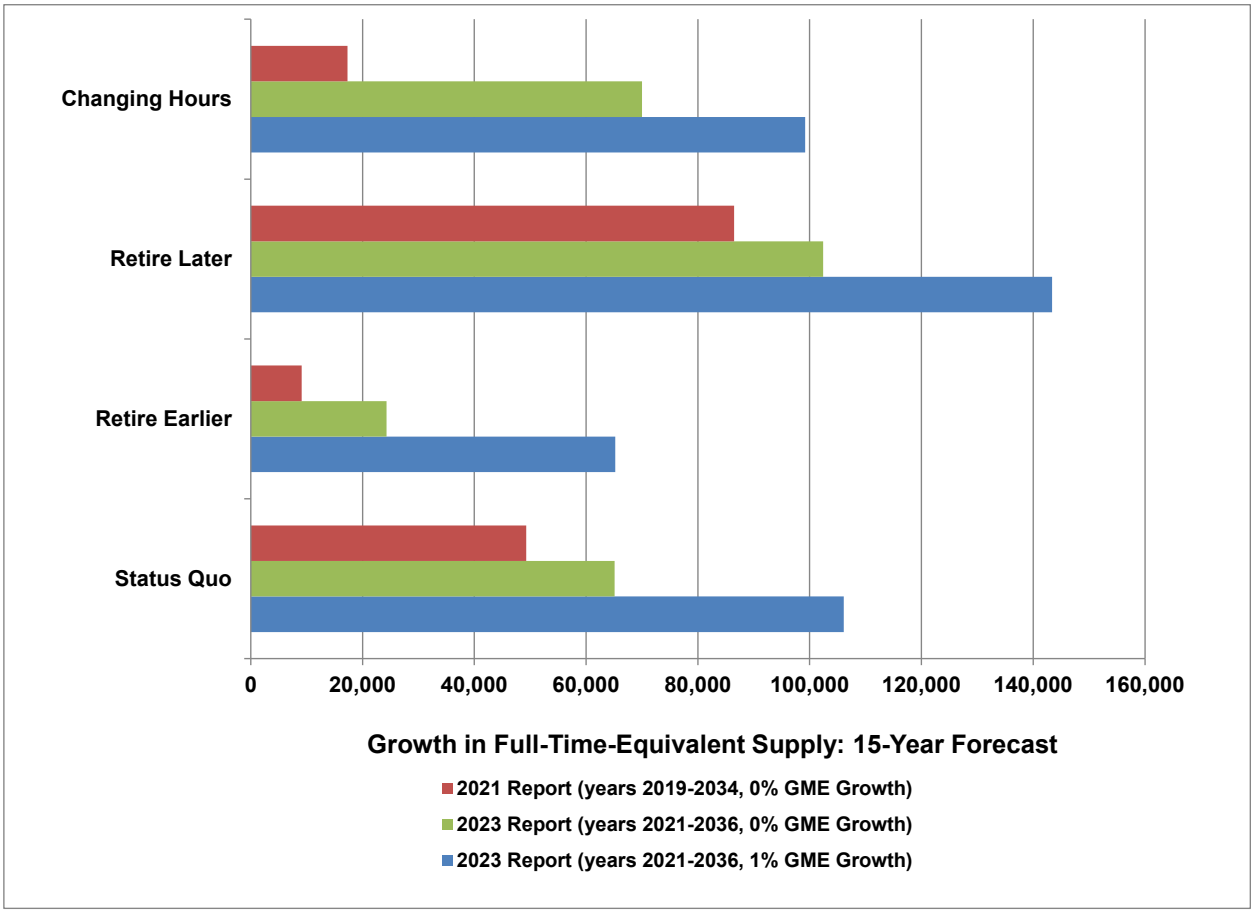
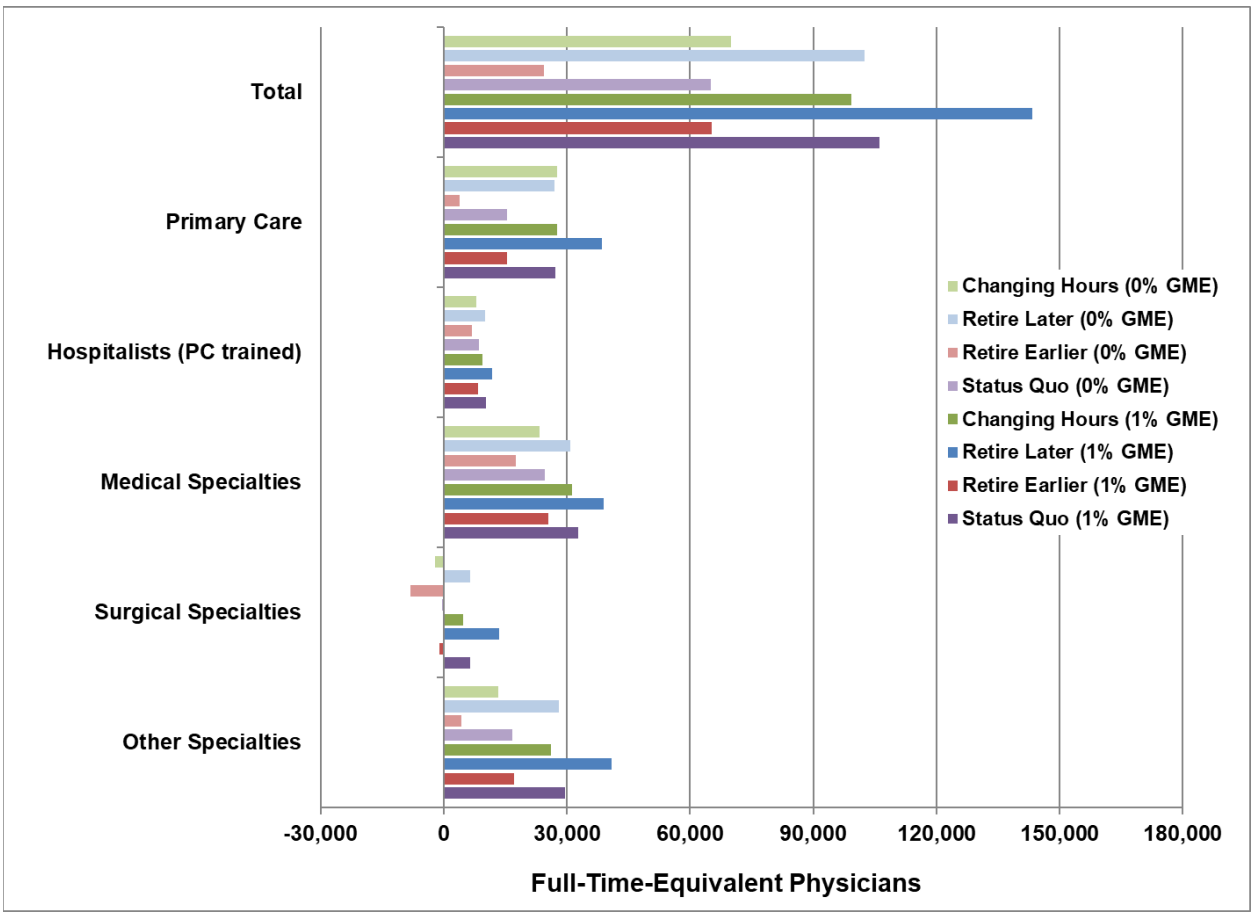


Exhibit 19: Projected Change in Physician Supply by Specialty Category, 2021-2036



Note: The Retire 2 Years Earlier Scenario results in a decrease of 3,400 FTE surgeons.

DEMAND MODELING

Future demand for health care services and the physicians to provide those services is the result of the complex interactions of patients' needs and decisions to seek care, medical and technical considerations of what care is feasible to provide, economic considerations, social norms and policies, and the intricacies of a complex health care system and decisions made by providers and administrators within this health system. While there is significant agreement about improvements needed in the health care system, there is less agreement about how the system should be reformed. There are, however, underlying trends and factors that will affect future demand for health care services and providers regardless of how policy and health system changes might affect how care is used and delivered.

Previous versions of this report highlighted that population growth and aging are the dominant factors affecting future demand for health care services. Other key factors with implications for physician demand include increasing use of APRNs, PAs, and other health care workers in care delivery; efforts to improve population health through preventive care; efforts to enhance the value of care delivery through managed-care principles and a variety of mechanisms such as accountable care organizations (ACOs), patient-centered care, value-based insurance design (VBID), and interventions to divert costly hospital-based care to appropriate ambulatory settings; policy initiatives to advance national goals of increasing equity in health outcomes and improving access to high-quality, affordable care; and less quantifiable trends such as advances in technology and medicine. As discussed previously, it is unclear whether COVID-19 will be completely eradicated or will continue evolving to become endemic. Furthermore, the implications of long COVID on future demand for physicians are not well understood.

While some factors, such as an aging population and national goals to expand access to care, will increase demand for physicians, others could decrease demand, or increases and decreases in demand could offset each other. Increasing longevity by reducing cancer and other preventable deaths means more physicians will be needed in the future to care for the larger population still living — many of whom have chronic conditions to be managed. Thus, many of the above factors affecting care use and delivery might not decrease overall demand for physicians but simply shift demand from one care delivery setting to another (e.g., care by hospitalists shifted to care by community-based providers), shift demand across specialties (e.g., shift from oncology care by reducing cancer incidence to geriatric medicine because people are living longer), or shift demand to the future as increased longevity increases population size.

This section briefly describes the demand model inputs, assumptions, and scenarios and presents the projections. Additional information about the demand model and inputs is included in Appendix 1 and documented elsewhere.[67]

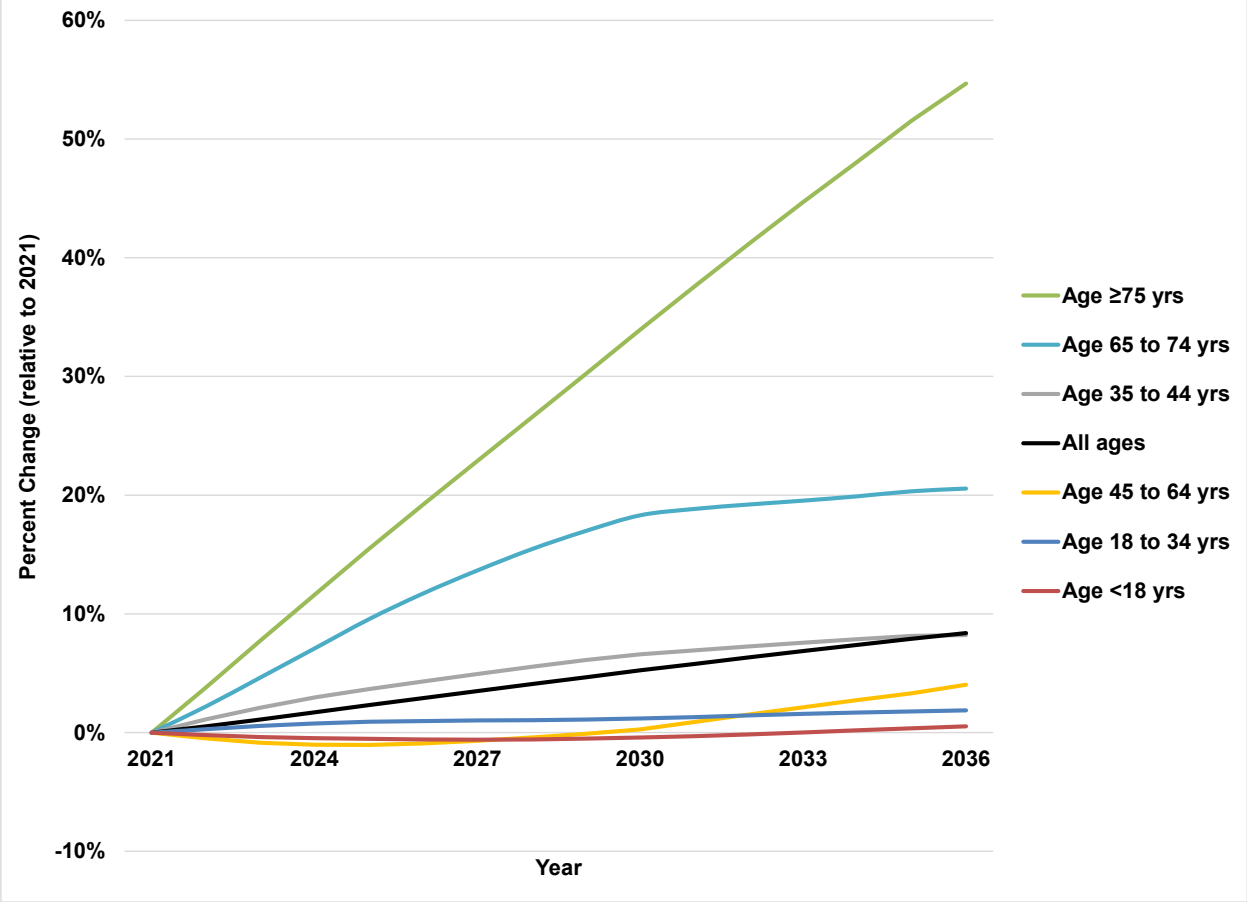
Demand Modeling Inputs, Assumptions, and Scenarios

Population Characteristics and Projections

Between 2021 and 2036, the U.S. population is projected to grow 8.4%, from about 331.9 million to 359.7 million people. The population under age 18 is projected to grow by 0.5%; the population age 65 and older by 34.1% — primarily due to the 54.7% growth in size of the population age 75 and older (Exhibit 20). As a result, the national prevalence and incidence of diseases that disproportionately affect older Americans is projected to grow rapidly. Demand for physicians who treat patients with these diseases is expected to grow as well. For example, the microsimulation demand model finds that between 2021 and 2036, the prevalence of diagnosed diabetes is projected to increase 22% (from 29.4 million to 35.8 million people), and the population with heart disease is projected to increase 23% (from 15.9 million to 19.6 million). High rates of growth are projected for the size of the population with a history of stroke (23% growth), heart

attack (23%), and cancer (20%) associated with an aging population and improved survival rates.[75–77] This increase in disease prevalence will increase demand for most physicians' specialties, especially primary care, endocrinology, cardiology, pulmonology, and oncology.

Exhibit 20: Percent Change in Projected Population, by Age, 2021-2036



Between 2021 and 2036, the non-Hispanic White population is projected to decline by about 2.2%; the non-Hispanic Black population is projected to grow by 11.3%; the Hispanic population is projected to grow by 28.3%, and the non-Hispanic population of all other minority races is projected to grow by 31.4%.[b] Hence, a growing proportion of health care services will be for racial minority and Hispanic patients, underscoring the importance of increasing racial and ethnic diversity among the physician workforce.

The modeling approach involved creating a representative sample of the population in each U.S. county, with county files aggregating to states and states aggregating to a representative sample of the national population. Data sources used to construct the de-identified, representative samples of the population in each geographic location included the 2021 U.S. Census Bureau for data on county demographics; the 2021 American Community Survey (ACS); the 2019-2021 Behavioral Risk Factor Surveillance System (BRFSS); and the 2019 Centers for Medicare and Medicaid Services (CMS), for data on people living in

nursing homes and residential care facilities. Sources of the state- and county-level population projections were individual states and S&P Global. Due to concerns that U.S. Census Bureau projections, last published in 2018, were becoming increasingly unreliable due to declining birth rates, a trend to lower net immigration levels, changing mortality patterns, and excess deaths attributed to the COVID-19 pandemic, we no longer calibrated the state projections to Census Bureau national totals. Under the revised projections used in this report, the U.S. population would reach 359.7 million in 2036 (356.4 million in 2034), which compares to the prior report's projections that the U.S. population would reach 363.0 million in 2034.

Information for each person in the constructed population files consists of demographics (age, sex, race, and ethnicity); medical insurance type; household income; whether the person lives in the community, a residential care facility, or a nursing home; health-related lifestyle indicators of body weight status (normal, overweight, obese) and current smoker status; presence of chronic conditions (arthritis, asthma, cardiovascular disease, diabetes, or hypertension); patient history of cancer, heart attack, or stroke; and county of residence urban-rural classification using the 2013 National Center for Health Statistics (NCHS) Urban-Rural Classification Scheme for Counties.[78]

Demand for Health Care Services

Current patterns of health care use, estimated using the combined 2015-2019 files of the Medical Expenditure Panel Survey (MEPS) and the 2019 National Inpatient Sample (NIS), indicate that annual use of health care services varies substantially by patient characteristics. Although the 2020 MEPS and 2020 NIS files are available, these files were not used because health care use patterns changed substantially from historical patterns during the early part of the COVID-19 pandemic. As described previously, future demand is modeled under the assumption that COVID-19 becomes endemic, like influenza, leading to more ambulatory care for select physician specialties and more hospital care.

The regression approach we used to model health care use patterns is described in Appendix 1. These patterns were then applied to the constructed population files for 2021 through 2036. While regression results varied by specialty and care delivery setting, the findings were largely consistent with expectations. Patient characteristics associated with greater use of health care services include older age, having medical insurance, presence of the chronic conditions modeled, living in a metropolitan area, and being non-Hispanic White. Some characteristics were associated with mixed results — for example, patients in a managed-care plan were associated with greater use of primary care services and lower use of some specialist services.

Patterns of Care Delivery

Current patterns of care delivery were calculated by first estimating the proportion of time physicians in each specialty spend in each care delivery setting (e.g., ambulatory care, emergency care, hospital care) to estimate FTE care in that setting. Then, total national care use (e.g., office, outpatient, and emergency visits and hospital inpatient days by diagnosis category) was divided by the FTE count to create services-to-providers ratios. Many physicians provide services across multiple care delivery settings, including ambulatory visits in physician offices and outpatient clinics, hospital rounds, and emergency department consults. To estimate FTEs by setting, estimates of the proportion of time physicians spend in different care delivery settings were calculated from a variety of sources, including surveys conducted by professional associations and Medical Group Management Association (MGMA) data. For example, among the 2,280 Primary Care physicians in the 2019 NSSP, physicians spent 80% of their direct patient-care time providing ambulatory care, 9% providing inpatient care, 6% providing urgent care, and the remaining 5% providing care in nursing homes and assisted living facilities, emergency departments, and other settings.

For modeling purposes, at the national level, we quantified current demand for health care services (and physicians) as equivalent to the level of health care services the population was expected to use in 2021. Then, we divided national health care use by the number of physicians in 2021 to estimate health care use-to-FTE physicians by specialty and care delivery setting. The Status Quo demand scenario thus extrapolated into the future a "2021 national average level of care," with any imbalances between supply and demand, whether shortages or excesses. Physician demand in 2021 starts with estimated physician supply plus specialty-specific, where available, estimates of shortfall. As discussed earlier, we estimate a starting-year shortfall of approximately 37,100 physicians (or about a 4.3% shortfall). This estimate is likely conservative as many specialties talk about perceived shortfalls in the literature but lack quantified estimates of a shortfall.[79–83]

Advanced Practice Registered Nurses and Physician Associates

An estimated 355,000 nurse practitioners (NPs) are licensed in the United States, with the American Association of Nurse Practitioners reporting that more than 36,000 new NPs completed their academic training in 2020-2021.[84,d] There are 13,524 certified nurse midwives (CNMs) and certified midwives (CMs).[85] There are approximately 69,000 certified registered nurse anesthetists (CRNAs) — including both CRNAs and students.[86] At the end of 2022, there were 168,318 certified PAs, with about 93.7% engaged in clinical practice.[87]

The supply of APRNs and PAs has grown rapidly over the past two decades. The Bureau of Labor Statistics estimates that employment of APRNs and PAs will grow by 40% and 28%, respectively, over the next decade. For modeling, we extrapolate this to 15-year growth rates to be consistent with the projection period in this report (i.e., employment of APRNs would increase by 60% and employment of PAs by 42%).

In this and previous reports, we modeled two scenarios that made different assumptions about the degree to which APRN and PA supply growth, beyond the growth required to maintain current staffing patterns, might reduce demand for physicians. Both scenarios assume no demand effect from any change in the scope of practice for either profession. We modeled a High Use Scenario that assumes 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 (by 60% of an FTE), Primary Care (50%), women's health (40%), Medical Specialties (30%), Other Specialties (30%), and Surgical Specialties (20%). The Moderate Use Scenario assumes the adjustment in physician demand is half the above percentages. These percentages should not be interpreted as substitution ratios or as the value of an APRN or PA relative to a physician. Rather, the percentages are assumptions of the extent to which these providers fill a currently unmet need or reduce demand for physicians. Despite the large increase in the supply of APRNs and PAs over the past two decades, demand for physicians remains strong.

Health care services are usually complex, requiring delivery by teams of people. Without the nurses, lab technicians, administrators, social workers, and many other types of workers who team with physicians to deliver care, the panel of patients each physician could manage would be relatively small. For example, if the patient panel a physician could handle alone is 500, while the patient panel a physician could handle working with a team is 1,000, then working with a team eases the demand for physicians by 50%; working in teams, what would otherwise take 100 physicians would take only half as many. Quantifying the amount of this improved efficiency is challenging with currently available data. Complicating the issue is whether the additional team member provides the same services the physician would have (i.e., they substitute for the physician) or additional services the physician would not have (i.e., they complement the physician).

Older research estimated that patients receiving care from primary care physicians received only 55% of recommended chronic and preventive services.[88] The authors attributed this gap between services recommended and services provided to physicians being overworked, with panel sizes that were too large.

The authors also provided estimates of the work done by primary care physicians that could be delegated to others — specifically, to NPs and PAs. They estimated that 50%-77% of physician time to provide preventive care and 25%-47% to provide chronic care could be delegated to NPs and PAs. A conclusion derived from the study is that primary care physicians working alone had insufficient time to provide all recommended services and address the acute care needs of a panel of 2,500 patients. However, by working with an NP or PA, one FTE primary care physician and one FTE NP or PA could jointly take care of all the acute care needs and recommend preventive and chronic care services for this panel of 2,500. This example raises important questions about what is unknown when modeling the implications of a rapidly growing supply of APRNs and PAs: (1) will patients continue to receive only a portion of recommended services with APRNs and PAs effectively substituting for physicians; (2) will patients start to receive closer to 100% of recommended services with the physician and the APRN or PA complementing one another; or (3) will increased supply of APRNs and PAs increase the total level of services that patients receive, with some substituting and some complementing? Most likely, APRNs and PAs will provide some substitute functions and some complementary functions (improving the level of care received by patients but lowering the percentage by which APRNs and PAs offset physicians).

To better understand the modeled assumptions and the sensitivity of physician-demand projections to greater use of APRNs and PAs, we looked at the following:

- The AAMC analyzed National Hospital Ambulatory Care Survey (NHAMCS) data on the use of PAs and NPs in emergency department (ED) visits and whether the patient was seen by a physician only, PA only, APRN only, or a combination of physician and APRN or PA.[89] Using findings from this analysis, overall, about 72% of ED patients were seen by a physician but not an APRN or PA, and 28% were seen by an APRN or PA (with many of these patients also seen by a physician) with the physician only percentage declining over time. Using study findings as a proxy for the degree to which APRNs, PAs, and physicians might overlap across all specialty areas (rather than using the numbers modeled in the APRN/PA High and APRN/PA Moderate Scenarios), the overall physician-demand projections are almost identical to physician demand under the APRN/PA High Scenario, at 930,500 physicians by 2036. Demand projections differ by specialty category under these two scenarios.
- We modeled a scenario where APRNs and PAs in primary care mainly substitute for physicians rather than providing complementary care or increasing access to care (APRN/PA Moderate + 75% PC). For this scenario, we assumed that each additional APRN or PA, beyond that needed to meet the demands of a growing and aging population, directly reduced demand for physicians by 0.75 FTE. Under this scenario, the demand for Primary Care physicians in 2036, 261,000, would be about the same as the supply (249,800 to 261,400 under the Status Quo 0% and 1% GME growth scenarios). Overall, under this scenario, the total demand for physicians by 2036 is projected at 948,000, which is 58,400 fewer physicians than modeled under the Status Quo demand scenario, APRN/PA Moderate +75% Primary Care [PC]). We think this scenario is unlikely to occur and did not include this scenario to estimate shortfall ranges.

Among the unknowns is whether there is a market saturation point at which APRNs and PAs might have difficulty finding employment. A growing body of literature, both in the United States and internationally, indicates APRNs and PAs provide high-quality care, increase physician productivity, and, in some specialties, perform many of the same functions as physicians; however, there is little information to indicate the extent to which APRNs and PAs displace demand for physicians.[90–93] The supply of these providers has risen rapidly over the past two decades, and they continue to be in high demand, yet there is also continued high demand for physicians.

Scenarios Modeled

We projected physician demand under scenarios that reflect various assumptions about the use of health care services and care delivery. All the scenarios reflect changing demographics from 2021 to 2036. As in previous reports, we modeled the implications of greater use of managed-care, retail clinics staffed primarily by nurse practitioners, rapid growth in the supply of PAs and APRNs, and achieving certain population health goals to illustrate the potential impact of improved preventive care. Modeled scenarios used to estimate future adequacy of physician supply are the following:

- **Changing demographics (Status Quo Scenario):** This scenario extrapolates current health care use and delivery patterns to future populations using projected demographic shifts (age, gender, and race/ethnicity) from 2021 to 2036. Within each demographic group, the prevalence of disease and health risk factors is assumed to remain unchanged over time. Demand estimates by region and by urban-rural location apply national-average patterns of care to the population in each county — controlling for local demographics, lifestyle choices, disease prevalence, insurance coverage, household income, and level of rurality. The demand scenarios summarized below all build on this scenario.
- **Managed care as a proxy for accountable care organizations (ACOs) and value-based payment models (Managed Care Scenario):** Over the past several decades, the U.S. health care system has explored different types of value-based and outcome-based payment and integrated care delivery models for both publicly and privately insured populations. This scenario models implications for physician demand if 100% of the insured U.S. population being enrolled in risk-based entities like an ACO. The key modeled impacts, based on an analysis of MEPS data, are a 4.5% increase in national demand for Primary Care physicians, a 0.9% increase in demand for internal medicine and pediatric subspecialty physicians, a 0.6% decrease in demand for surgeons, a 1.0% increase in demand for Primary Care-Trained Hospitalists, and a 0.4% decrease in demand for physicians in Other Specialties category — with findings differing by individual specialty.
- **Expanded use of retail clinics (Retail Clinics Scenario):** Retail clinics provide a convenient, cost-effective option for patients with minor acute conditions, and the care is covered by many insurance plans.[94] There are about 2,000 retail clinics in the United States, with most located in metropolitan areas.[95] Ashwood et al. estimated that about 39% of clinic visits replace physician visits, 3% replace emergency department visits, and 58% are new visits that would not otherwise have occurred.[96] 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.[97,98] It assumes the following:
    - Patients with chronic conditions will be seen by their regular primary care provider even for noncomplex health issues that could be treated in a retail clinic.
    - Care in retail clinics will primarily be provided by NPs (only about 0.2% of PAs practiced in retail clinics in 2022).[87]
    - For care provided in Primary Care physician offices, 83% of visits to a pediatrician's office are handled primarily by a physician (reflecting that between APRNs and physicians, 83% of the pediatric workforce are physicians), and 71% of adult primary care office visits are handled primarily by a physician.
    - We used the Medical Group Management Association estimates for mean annual ambulatory patient encounters for general pediatricians and family physicians to translate the reduction in office visits to the reduction in demand for physicians.[99]

These assumptions suggest that about 4,550 visits by children to a retail clinic rather than a pediatrician's office reduce demand for pediatricians by one physician, and about 5,430 retail clinic visits by an adult reduce demand for an adult Primary Care physician by one physician. This scenario suggests that noncomplex health care services provided by 8,500 FTE Primary Care physicians could be diverted to retail clinics.

- **Increased use of APRNs and PAs under "moderate use" and "high use" assumptions (APRN/PA Moderate and High Scenarios):** These scenarios reflect the rapid growth in the supply of APRNs and PAs and the assumptions described in the previous section, "Advanced Practice Registered Nurses and Physician Associates." For modeling purposes, the APRN/PA High Scenario assumes 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% of an FTE; Primary Care, 50%; women's health, 40%; Medical Specialties, 30%; Other Specialties, 30%; and Surgical Specialties, 20%. The APRN/PA Moderate Scenario assumes the adjustment in physician demand is half the above percentages. The percentages imply nothing about the value of services APRNs and PAs provide relative to physicians, but rather, they simply estimate the extent to which these providers fill a currently unmet need or reduce demand for physicians.
- **Achieving select population health goals (Population Health Scenario):** Key risk factors and lifestyle behaviors that population health policies and programs target for disease prevention are obesity, hypertension, dyslipidemia, hyperglycemia, and smoking.[100–102] The goal of reducing the prevalence of those conditions is consistent with Healthy People goals and objectives of the Centers for Disease Control and Prevention.[103] To assess the physician shortage under a Population Health Scenario, we used the Disease Prevention Microsimulation Model (DPMM).[104–107] We simulated the implications for health care demand of (1) a modest 5% sustained reduction in excess body weight among adults who are overweight or obese; (2) reductions in blood pressure, cholesterol, and blood glucose levels among adults who have elevated levels, with the magnitude of reductions determined by published reports of clinical trials about what can be achieved through appropriate medication and counseling[108–110]; and (3) 25% of smokers quit smoking — though with high recidivism. The mechanisms by which this hypothetical scenario could be achieved included increased use of medical homes, value-based insurance design, and increased emphasis on preventive care to provide patients with testing and counseling and to improve patient adherence to treatment regimens.[111–117] The model assumes greater use of APRNs, PAs, and other health professions to provide the additional counseling and monitoring required to achieve the goals. This scenario illustrates the potential impact on demand for physicians associated with improved population health and reduced disease prevalence and mortality. Modeling assumptions, methods, and the source of data for key parameters are described in more detail in the 2017 report[118] and include:
    - **Sustained 5% body weight loss for overweight and obese adults:** Numerous lifestyle interventions have achieved 5% or more body weight loss, on average. Although sustaining weight loss is challenging for many patients, a patient-centered medical home model with long-term counseling and pharmacotherapy will presumably help patients maintain weight loss. Reducing excess body weight lowers risk for cardiovascular disease, diabetes, various cancers, and other conditions.
    - **Improved blood pressure, cholesterol, and blood glucose levels for adults with elevated levels:** These goals can be achieved by appropriate screening and pharmacotherapy, as well as by weight loss. Clinical trials indicate that patients with hypercholesterolemia can reduce total blood cholesterol by 34.42 mg/dL (CI, 22.04-46.40) by using statins[108]; patients with uncontrolled hypertension can reduce systolic blood pressure by

14.5 mm Hg (CI, 14.2-14.8) and diastolic blood pressure by 10.7 mm Hg (CI, 10.5-10.8) by using antihypertensives[109]; and patients with elevated hemoglobin A1c levels can reduce A1c by one percentage point (CI, 0.5-1.25), with appropriate screening and pharmacotherapy, gradually reducing the level to where diabetes control is reached, at an A1c of 7.5%.[110]

- **Smoking cessation:** Patients who stop smoking can lower their risk for various cancers, diabetes, cardiovascular disease, and other diseases.[119–121] Researchers report that compared with a similar population that continues to smoke, cessation at age 25 to 34 extends life by about 10 years, on average.[120] Cessation at ages 35 to 44 extends life by nine years and at ages 45 to 54, by six years, on average.

This Population Health Scenario is a component of the Evolving Care Delivery System Scenario (described in the "Evolving Care Delivery System Demand Implications" section), which explores the implications for physician demand of several changes in care delivery as the nation strives to achieve national objectives of improving access to high-quality, cost-effective care. This scenario produces three main impacts on physician demand: (1) In the early years after achieving the modeled population health goals, the demand for physicians falls due to the improved health of the population. (2) Over time, as mortality rates fall, demand for physicians rises relative to the Status Quo Scenario because a larger population is still living. (3) Demand shifts between specialties — for example, to a lower demand for endocrinologists but a higher demand for geriatricians.

Demand Projections

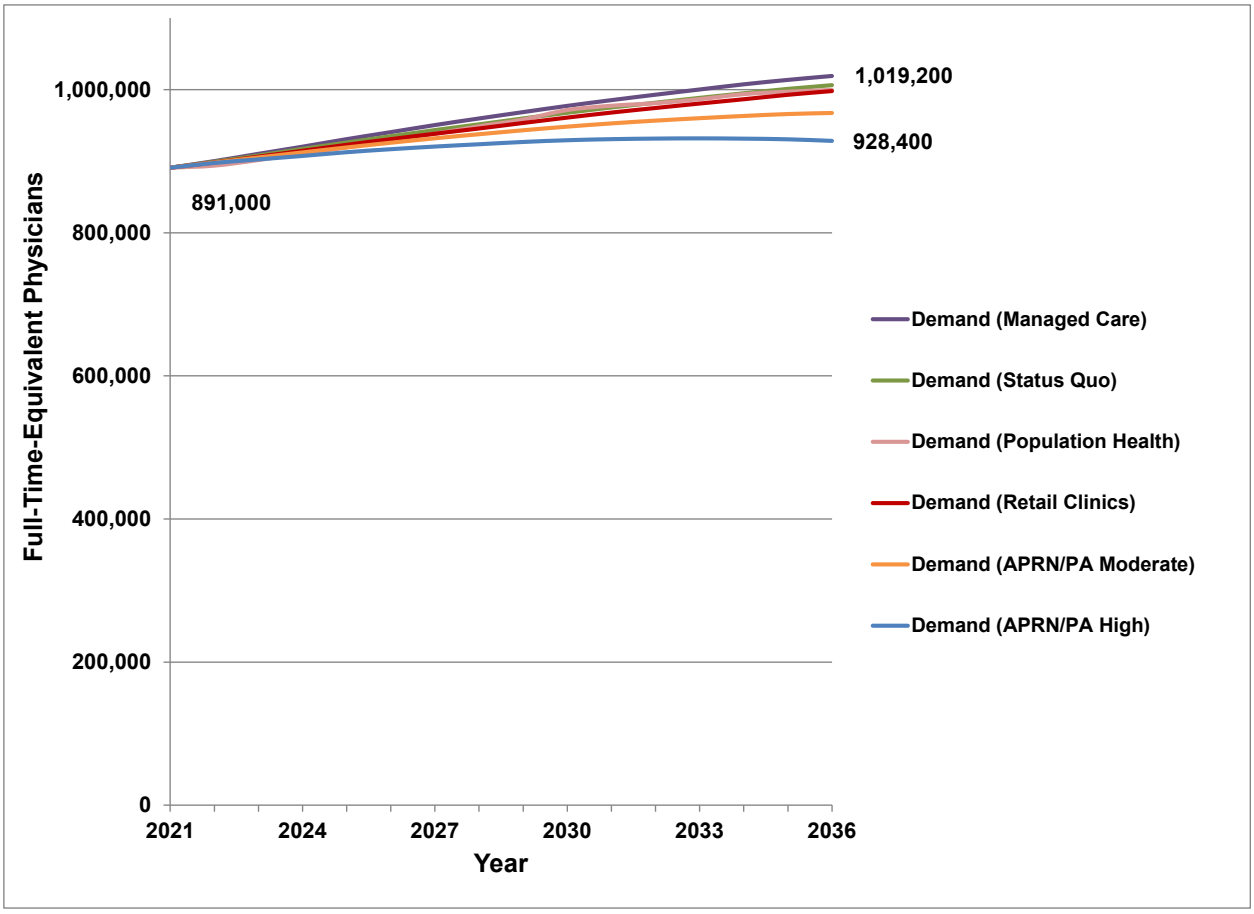
This section presents projected growth in demand for physicians at the national level and by population demographics (age and race/ethnicity). (Growth in demand is presented by census region and urban-rural geographic area in the "Geographic Distribution of Physician Supply and Demand" section.)

National Demand

Demand for physicians is projected to grow under all scenarios modeled, though under the high APRN/PA scenario FTE physician demand growth is low as this scenario models rapid growth in APRN and PA supply and a high degree to which APRNs and PAs complement and support the work of physicians (Exhibit 21). Population growth and aging are the largest contributors to changing the demand for physician services. Between 2021 and 2036, changing demographics alone are projected to increase national demand for physicians by about 115,400 FTEs (13.0%). Demand for Primary Care physicians is projected to grow by 35,100 FTEs (13.8%). Higher growth rates are expected for Primary-Care-Trained Hospitalists (7,500 FTEs, 17.6%) and Medical Specialists (28,100 FTEs, 18.4%); lower growth rates are expected for Surgical Specialties (17,400 FTEs, 11.0%) and Other Specialties (27,300 FTEs, 9.7%).

Analysis of MEPS data finds that, controlling for demographics and health risk factors, patients who report being in a health maintenance organization (HMO) have more touch points with the health care system than patients not in an HMO. The modeled Managed Care Scenario indicates that if all insured patients were moved into managed-care plans that were more like HMOs in terms of how patients use care, there would be a small net increase in physician demand, with the increase coming largely from higher demand for primary care providers. By 2036, according to that scenario, national demand would be about 12,700 physicians higher than it would be according to the Status Quo Scenario, with the additional demand for 13,000 Primary Care physicians, 1,600 physicians in internal medicine and pediatric Specialists, and 500 Primary-Care-Trained Hospitalists partially offset by the reduced demand for 1,100 Surgeons and 1,300 physicians in the Other Specialties category.

Exhibit 21: Projected Demand for Physicians, 2021-2036



The simulated increase in the use of retail clinics modeled demand only for primary care, with demand for Primary Care physicians declining by 8,500 physicians by 2036 relative to the Status Quo Scenario. The Retail Clinics Scenario used conservative assumptions about which type of primary care visits would be provided in a retail clinic because it assumes people with severe chronic disease continue to receive care from their normal primary care provider even for services often provided in retail clinics.

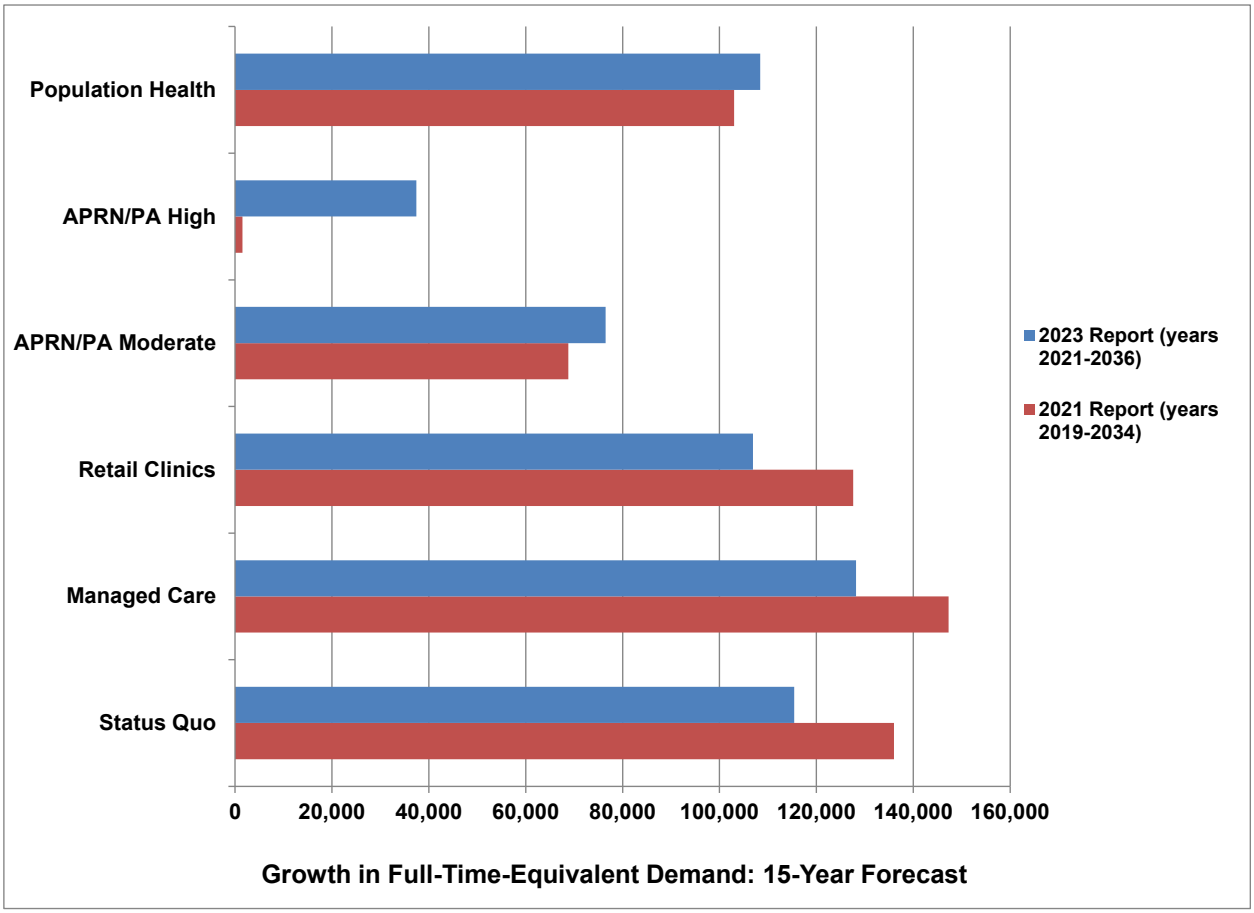
The impacts of increased use of APRNs and PAs are substantial and will vary by physician specialty and assumptions about the future level and scope of care delivery these professions provide. Relative to the Status Quo Scenario projections for 2036, under the APRN/PA Moderate Scenario, projected physician demand is lower by 38,900 physicians with increased use of APRNs and PAs, and under the APRN/PA High Scenario, by 78,000 physicians.

Under the Population Health Scenario, about 18 million more people would be alive by 2036 than projected by the Status Quo Scenario, and the care required by this still-living population will be more than offset by the reduction in care from people being healthier, on average. This scenario would increase demand by 28,800 FTEs relative to the Status Quo Scenario. The Population Health Scenario includes the APRN/PA Moderate Scenario, under the assumption that achieving the modeled population health goals

would happen through greater use of APRNs and PAs for counseling and follow-up care beyond levels currently provided to help patients achieve desired health outcomes. Furthermore, the additional 18 million people alive by 2036 under this scenario would require more APRN and PA services, so there would be fewer available APRNs and PAs to offset projected physician shortages. The net impact is that physician demand under this scenario is 7,000 FTEs lower than the Status Quo Scenario projections for 2036.

Exhibit 22 compares updated projections of growth in physician demand to projections in our 2021 report, with both reports covering a 15-year period (2021-2036 versus 2019-2034). Under the Managed Care, Status Quo, and Retail Clinics scenarios the updated demand growth is lower, while under the APRN/PA scenarios and Population Health scenarios updated demand growth is higher. Key differences from the prior projections are lower population growth projections that affect all scenarios and slower growth in PA and APRN employment, which affects selected physician demand scenarios.

Exhibit 22: Projected Change in Physician Demand: 2023 vs. 2021 Report Projections



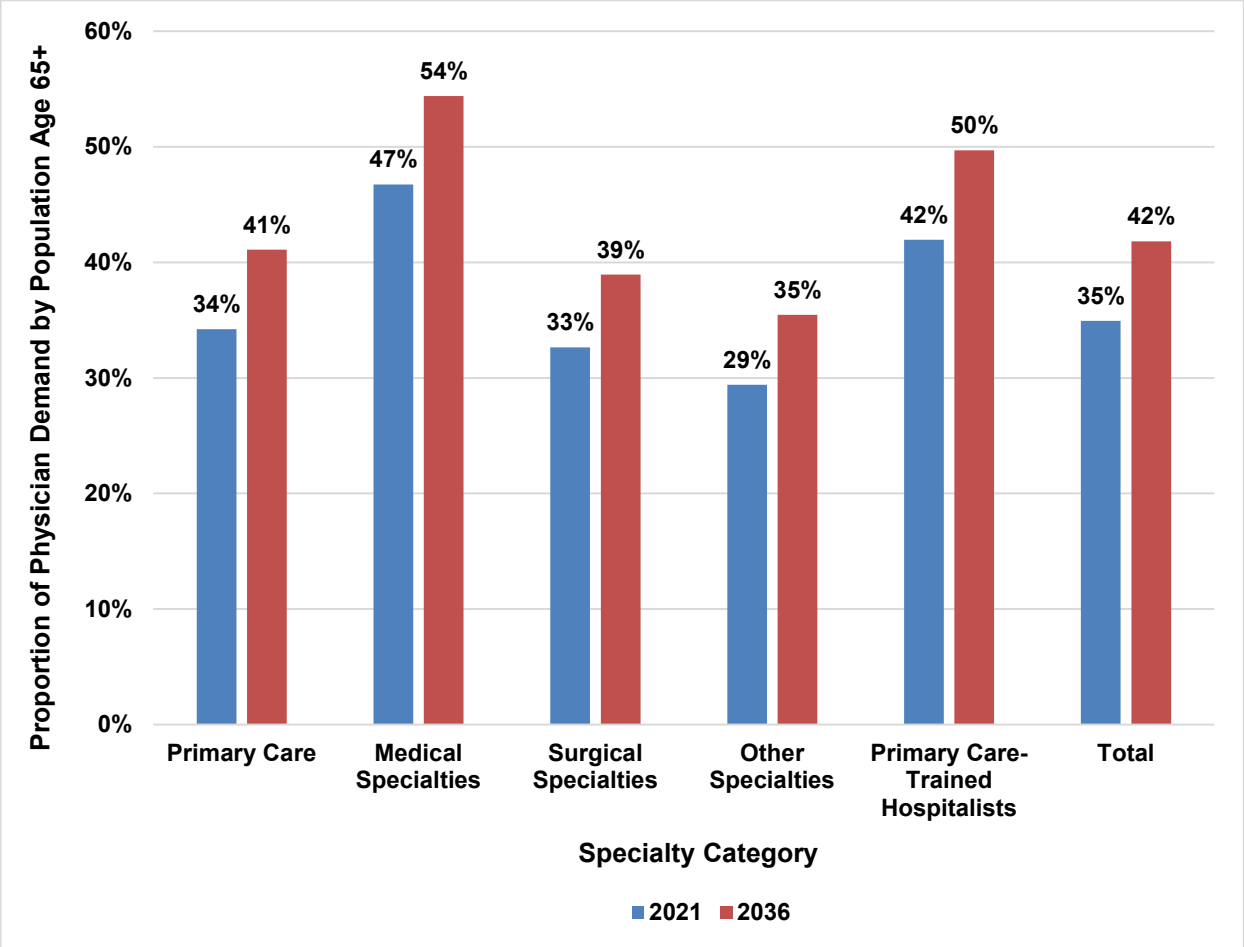
Note: The 2023 report value for the APRN/PA High Scenario is 37,400 FTEs, compared to 1,500 FTEs in the 2021 report. This reflects lower forecasts of growth in APRN employment using estimates derived from the Bureau of Labor Statistics.

Demand by Population Demographics

Current and projected growth in demand for physician services reflects, in large part, the aging of the population and growth in size of racial and ethnic minority populations.

Physician Demand by Patient Age (Exhibit 23): Currently, about a third (35%) of FTE physician demand is from patients age 65 and older, equivalent to 311,300 FTE physicians to care for the population age 65 and older. By 2036, 42% of demand (equivalent to 420,800 FTE physicians) will be for the care of the population age 65 and older. These projections underscore the growing importance of the Medicare program in future years because an increasing proportion of patient care will be provided to Medicare enrollees.

Exhibit 23: Proportion of Physician Demand by Population Aged 65+, 2021 and 2036

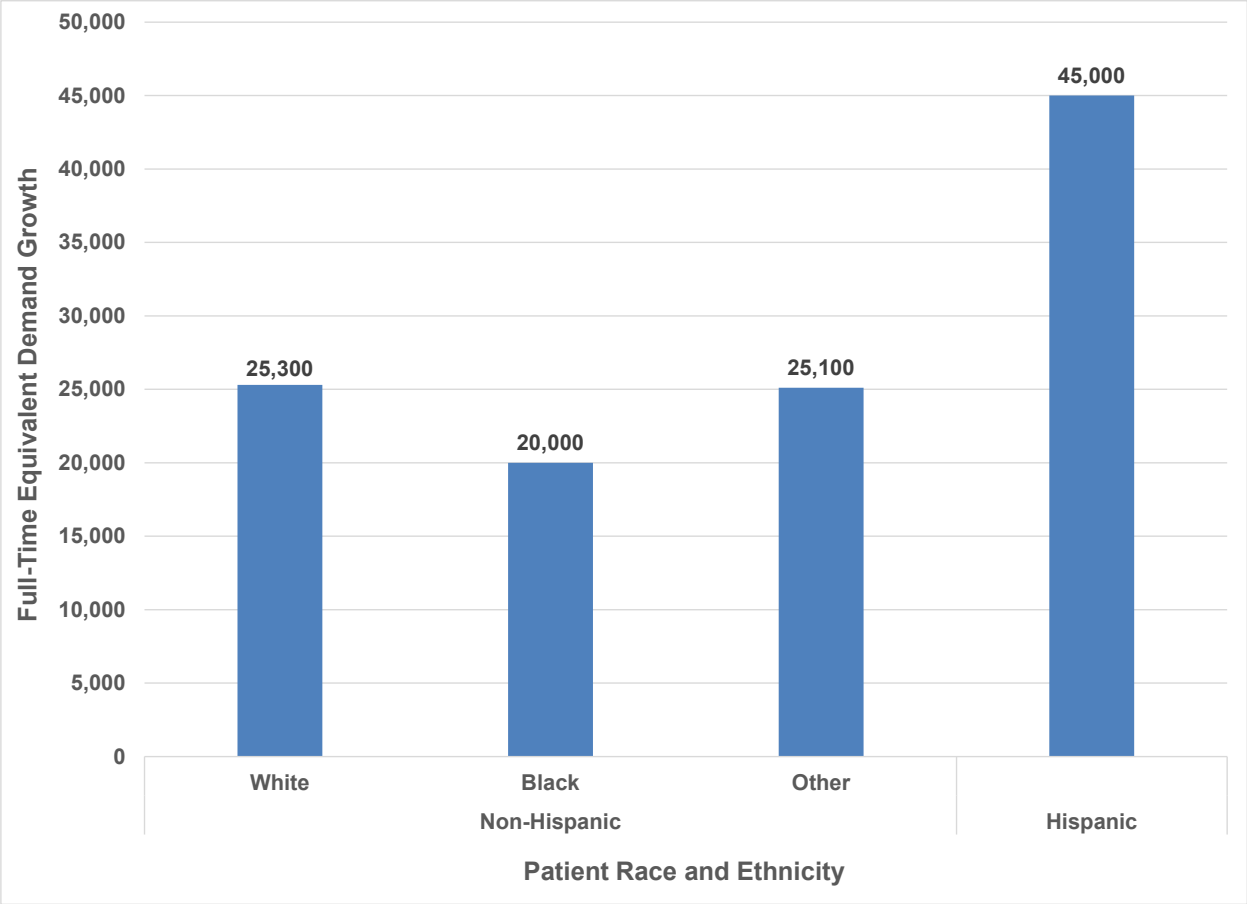


Physician Demand by Patient Race and Ethnicity (Exhibit 24): Patterns of health care use and delivery differ systematically by patient race and ethnicity, reflecting underlying differences in age distribution, disease prevalence (e.g., cardiovascular disease, diabetes), and health-related behaviors (e.g., obesity, smoking); economic factors (e.g., medical insurance coverage, household income); possibly cultural differences in care utilization; and other factors affecting access. For modeling purposes, we categorized patients into one of four mutually exclusive categories: non-Hispanic White, non-Hispanic Black, non-Hispanic all other, and Hispanic.[b]

In 2021, an estimated 59.3% of the U.S. population was non-Hispanic White, but this population accounted for about 67.6% (602,700 FTEs) of total physician demand. The Hispanic population, however, represented 18.9% of the U.S. population but accounted for about 13.3% (118,500 FTEs) of physician demand. Between 2021 and 2036, the non-Hispanic "all other population" is projected to grow the most rapidly in percentage terms (31.4% growth), followed by the Hispanic (28.3%), non-Hispanic Black (11.3%), and non-Hispanic White (-2.2%) populations. Based on changing demographics, demand for physician services is projected to grow by 115,400 FTEs from 2021 to 2036. This growth includes an additional 25,300 FTEs (4.2% growth) associated with an aging non-Hispanic White population, 45,000 FTEs (38.0% growth) associated with growth and aging of the Hispanic population, 25,100 FTEs (37.7% growth) associated with growth and aging of the non-Hispanic all other population, and 20,000 FTEs (19.4% growth) associated with growth and aging of the non-Hispanic Black population (Exhibit 24).

In 2021, an estimated 64.8% of physicians were non-Hispanic White; 20.5% were Asian; 5.7% were Black or African American; 0.3% were American Indian or Alaska Native; 0.1% were Native Hawaiian or Other Pacific Islander; 6.2% were Hispanic, Latino, or of Spanish origin; 1.0% were another race; and 1.3% were multiple race/ethnicities. The demographics of U.S. medical school matriculants in 2021 consisted of 51.5% White; 26.5% Asian; 12.7% Hispanic, Latino, or of Spanish origin; 11.3% Black or African American; 1.0% American Indian or Alaska Native; 0.4% Native Hawaiian or other Pacific Islander; 3.9% other race/ethnicity; and 3.5% unknown race/ethnicity — with the sum of these percentages exceeding 100% because some matriculants self-reported in multiple race/ethnicity categories.[122] These findings highlight that some minorities (Black and African American, Hispanic/Latino, Native American and American Indian, and Native Hawaiian and Pacific Islander) are underrepresented among physicians relative to both U.S. and patient demographics. Furthermore, based on national demographic trends, demand for physician services is projected to grow proportionately faster for minority populations.

Exhibit 24: Projected Physician Demand Growth by Patient Race and Ethnicity, 2021-2036



Evolving Care Delivery System Demand Implications

The U.S. health care system continually evolves to reflect changes in the nation's goals and priorities, changes in medicine and technology, changes in societal and patient expectations, and the economic realities of care delivery. Utilization-based health workforce demand projections have been criticized for assuming a perpetuation of the current health care system, which is represented by the demand Status Quo Scenario, rather than modeling the workforce needed for a future system. The Health Care Utilization Equity scenarios, discussed in the preceding section of this report, estimate total demand for physicians if the nation could achieve goals of reducing barriers to accessing care. While recognizing that the contemporary health care system is based on current health policy, infrastructure, and technology that will not transform overnight, the research presented in this section of the report explores trends in system transformation and their potential implications for the physician workforce. The projections combine elements of modeling scenarios described earlier in this report and information from the literature on other emerging trends. ***Because this work is an amalgamation of demand scenarios included in the shortage projections, this scenario is not included in calculating those projections.***

A goal of ACA and subsequent legislation was to incentivize and reward health care providers for promoting quality and value, whereas the fee-for-service model creates incentives that rewarded the quantity of services provided.[123–125] Changes encouraged by legislation and payment reform include strengthening the nation's primary care foundation,[126] promoting and achieving population health goals to improve disease prevention,[127–130] improving coordination of care to manage high-risk patients across the care continuum,[131,132] and making care more affordable by eliminating unnecessary spending and discouraging low-value care.[133] Only a few early ACA policies specifically targeted physician supply, with modest changes to graduate medical education funding and increased funding for health centers and the National Health Service Corps. Most recent changes in legislation and business practices primarily affect physician demand indirectly through changes in care use and care delivery patterns.

Responses to changing financial incentives have led to changes in the organization of the health care industry. Payers and providers are consolidating horizontally and vertically and restructuring internal operations to increase efficiency, with a growing proportion of physicians being employees rather than practice owners.[134,135], There is some evidence that employee physicians work fewer hours per week in direct patient care than self-employed physicians, partly because they spend more time on administrative and indirect patient-care activities and they have less financial incentive to extend already long hours worked per week.

Key mechanisms for producing value specifically promoted by the ACA or incentivized through payment reform include patient-centered care, team-based care, value-based insurance design (VBID), risk sharing, disease management, rewarding quality, and greater use of technology such as electronic medical records and telemedicine. These mechanisms are not mutually exclusive; multiple mechanisms often contribute to the same goals. For example, improved medication adherence to control hypertension, hyperlipidemia, and hyperglycemia helps reduce the risk for cardiovascular disease, stroke, and diabetes and sequelae.[139,140] There is strong evidence that medication adherence is improved through VBID,[115,116] patient-centered medical homes (PCMH),[112,114] disease management programs and counseling,[141,142] team-based care,[115,143,144] and increased use of technology.[145,146]

The challenges of modeling the implications of evolving care delivery on future demand for physicians include (1) the paucity of evidence about effects of evolving care delivery, and the evidence that has been generated focuses on the earliest and, so far, most successful trials of the innovation; (2) much of the published literature evaluating interventions to change patient health and utilization outcomes pertains to a specific population or disease, so it cannot be generalized to the U.S. population; (3) multiple factors often influence patient outcomes, so the impact of specific interventions or trends cannot be isolated (e.g., using technology in conjunction with PCMH); and (4) the mechanisms for achieving health system goals continue to evolve over time. Because of these challenges, rather than model a set of interventions such as VBID and PCMH, we modeled five major components of an improved health system:

1. **Improving population health:** This component of the Evolving Care Delivery System Scenario is the Population Health Scenario described previously and used to develop the physician-shortage ranges. This scenario modeled the national goals of making progress toward reducing excess body weight; reducing the prevalence of hypertension, hypercholesterolemia, and hyperglycemia; and smoking cessation; these are only a subset of targeted patient health outcomes. Achieving these goals, however, would (1) prevent or delay disease onset and disease severity, leading to lower demand for physician services, and (2) reduce mortality, with more people living to an older age, leading to increased demand for physician services. Model outcomes suggest that by 2036, there would be a net increase in physician demand of 28,800 FTEs to service a larger population due to reduced mortality. This scenario assumes APRNs and PAs would be a key workforce

component, providing the additional counseling and follow-up required to meet the modeled population goals and helping care for the larger living population.

2. **Managing care and risk-bearing organizations:** As discussed in the "Demand Modeling" section, one demand scenario modeled differences in health care use patterns of patients in a managed-care plan compared with patients not in a managed-care plan as a proxy for differences in care use and care delivery patterns associated with applying managed-care principles. While accountable care organizations (ACOs) differ in many ways from traditional managed-care plans, they share many of the same goals around disease prevention, shifting care to appropriate lower-cost settings and providers, care coordination, and improving care quality and efficiency. This component of the Evolving Care Delivery System Scenario incorporates the Managed Care Scenario modeled to forecast the range of physician shortages. The projected outcome of this scenario is a net 12,800 FTE increase in physician demand, due primarily to increased demand for primary care physicians, with decreased demand for physicians in many other specialties.
3. **Addressing unmet behavioral health needs:** The shortage of behavioral health providers and the unmet behavioral health needs in the United States have been well documented. This provider shortage extends beyond the 6,851 psychiatrists required in 2021 to de-designate the federally designated Mental Health Professional Shortage Areas.[25] Nearly one in five adults with mental illness reports they were unable to obtain treatment because of barriers to getting the help they need, and the prevalence of undiagnosed needs is high.[147,148] Approaches to addressing unmet behavioral health needs include improving access to behavioral health services and training primary care providers and others to screen patients for behavioral health needs. While psychiatry is the only specialty focused on addressing patient mental health needs, primary care is essential for addressing and screening for patient behavioral health needs because it is the main point of entry into the health care system.[149] This is especially true in rural areas and underserved communities.[150] There is insufficient information to quantify how addressing unmet behavioral health needs will affect demand for Primary Care physicians, so, for this scenario, we model only the potential impact on demand for psychiatrists.

   Analysis of MEPS data finds that people without medical insurance, people living in underserved areas, and racial and ethnic minority populations have fewer annual visits to psychiatrists compared with their counterparts who are insured, living in suburban areas, and non-Hispanic White. We model a scenario where these disparities in access to psychiatrist services are cut in half, which raises demand for psychiatrists by close to 7,500 higher than the baseline demand (Status Quo) scenario by 2036.
4. **Organizing care across care delivery settings and coordinating multidisciplinary care:** Efforts to improve the quality of care and better coordinate multidisciplinary care across delivery settings, as well as incentives through the Hospital Readmissions Reduction Program, have contributed to declines in the proportion of patients readmitted to the hospital following discharge.[151–154] Efforts continue to prevent avoidable hospitalizations and emergency visits through increased access to primary care and preventive services and to divert emergency visits to appropriate lower-cost settings such as physician offices, retail clinics, urgent care centers, and crisis centers for behavioral health conditions.[155–158] In some instances, efforts to reduce demand for hospital services will reduce overall demand for physicians. In other instances, these efforts will shift demand from hospital-based physicians to physicians practicing in ambulatory settings. For this analysis, we modeled the following assumptions:

a. We modeled a gradual 5% reduction in hospital inpatient utilization, relative to the Status Quo demand projections, with a corresponding reduction in demand for Primary-Care-Trained Hospitalists. We assumed that reduced hospital demand for other physicians (e.g., in Medical and Surgery Specialties) would be offset by increased demand for these physician services in ambulatory or outpatient settings. This 5%-reduction assumption is likely conservative. Studies report that participation in a PCMH team-based intervention reduced hospitalizations for PCMH-targeted conditions by 13.9% and for all other conditions, by 3.8%,[159] and it reduced rehospitalization rates from 18.8% to 7.7%.[160]

   We modeled a 16.7% decline in emergency visits relative to the Status Quo demand projections, with a corresponding decrease in demand for emergency physicians. The modeled decline starts with estimates by UnitedHealth that about two-thirds of emergency visits by the commercially insured population are potentially avoidable.[161] Another study reports that the number of potential emergency department visits is correlated with social determinants of care, with lower-income and more vulnerable patients experiencing a higher propensity for avoidable emergency visits.[162] Hence, when factoring in Medicaid, Medicare, and uninsured patients, the UnitedHealth estimate might be conservative when applied to the U.S. population. Not all potentially avoidable emergency visits can be prevented or diverted, and we modeled a 25% reduction in these visits. Thus, the 16.7% decline assumption reflects a 25% reduction of the approximately 66.7% of potentially avoidable emergency visits. We assume each averted emergency visit would be replaced by an ambulatory visit to a physician office or outpatient or clinic setting, with ambulatory visits prorated across Primary Care and Medical Specialists (with about two-thirds of redirected visits being patients seen by a Primary Care provider and one-third seen by a Medical Specialist).

The impact by 2036 of this scenario component is a 9,600 FTE decrease in demand for emergency physicians and a 2,600 FTE decrease in demand for Primary-Care-Trained Hospitalists, offset by an increase in demand for 5,900 FTE Primary Care physicians and 3,700 FTE physicians in internal medicine and pediatric subspecialties. The net effect is a decrease in demand for 2,600 FTE physicians.

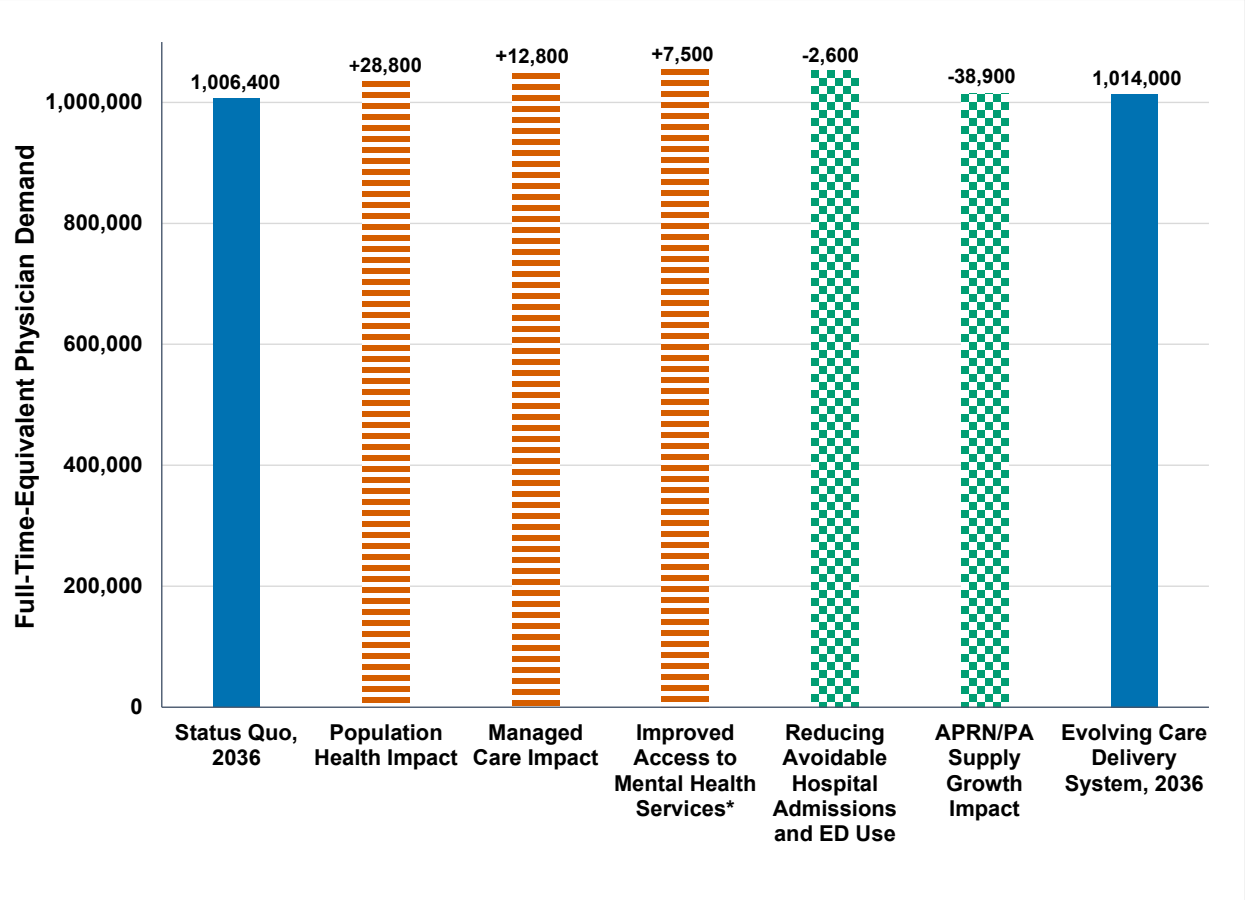
5. **Increased supply and expanding role of APRNs and PAs:** For this Evolving Care Delivery System Scenario, we include the APRN/PA Moderate Scenario under the assumption that to achieve national goals around improvements in population health and improved access to care, APRNs and PAs will help address many unmet patient needs and efforts to improve patient health outcomes.

   Other trends beyond the five modeled components of this Evolving Care Delivery System Scenario could change future demand for physician services, though we do not have enough information to quantify the magnitude of increases or decreases in demand these other factors could cause or which specialties each factor might apply to. Factors not modeled include potential advances in medicine and technology and increased use of existing technologies such as telemedicine.

   The Status Quo Demand Scenario modeled that between 2021 and 2036, total demand for physicians would increase by 115,400 FTEs if care delivery is relatively unchanged, with this increase coming from a growing and aging population. Many changes in care delivery could increase demand for physicians by expanding access to care, addressing unmet needs, or reducing mortality. Other changes might shift care across care delivery settings or across provider types. The largest modeled impact on physician demand is the 38,900 FTE decrease in physician

demand associated with continued rapid growth in APRN and PA supply over the next 15 years if the APRN and PA training pipeline continues to expand (Exhibit 25). By 2036, demand would be about 1,014,000 FTE physicians — 7,600 FTEs (1%) higher than the 1,006,400 FTE estimate from the Status Quo Scenario.

Exhibit 25: Physician Demand Implications of Evolving Care Delivery System Components by 2036

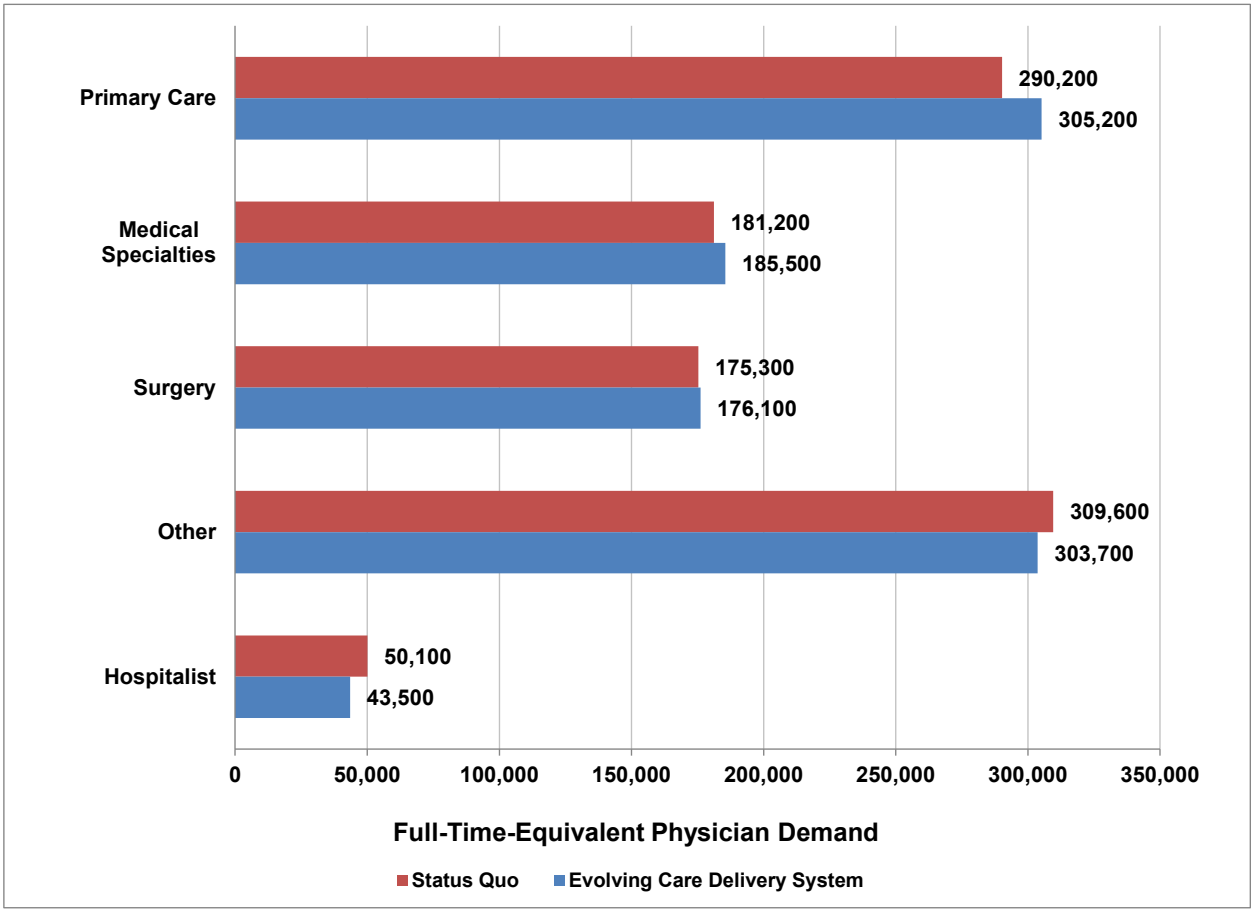


*The estimate for improving access to mental health services likely understates the total impact on physician demand because it reflects only the impact on demand for psychiatrists. The impact on demand for primary care physicians and specialist physicians who provide mental health services to their patients is unknown.

Note: The blue lines represent total demand by 2036 under the Status Quo and Evolving Care Delivery System Scenarios; the orange and green lines show the estimated magnitude of trends or factors that will potentially increase or decrease demand, respectively, relative to the Status Quo Scenario.

Modeling results suggest that by 2036, demand for Primary Care physicians under the Evolving Care Delivery System Scenario would be 15,000 FTEs higher than projected under the Status Quo Demand Scenario (Exhibit 26). Demand would be higher by 4,300 FTEs for Medical Specialties and by 800 FTEs for Surgery Specialties. Declines in demand include 6,600 FTEs hospitalists and 5,900 FTEs for Other Specialties, with much of this drop due to a decline in demand for emergency physicians and the impact on physician demand associated with the projected large growth in the supply of certified registered nurse anesthetists (CRNAs) and psychiatric nurse practitioners (NPs).

Exhibit 26: Projected Growth in Physician Demand Under Status Quo and Evolving Care Delivery System Scenarios, 2021-2036



Demand projections under the Evolving Care Delivery System Scenario fall within the range of the demand scenarios used to develop the physician-shortage ranges. This is not surprising because this scenario combines elements of other modeled scenarios.

While additional research will improve understanding of how care delivery — and its workforce implications — might evolve, the findings presented here suggest that changes in care delivery that decrease demand for physicians will be partially offset by changes in care delivery that increase demand for services. This is not surprising because the national priorities of expanding access to care, providing more comprehensive care, and reducing mortality will increase demand for health care services and providers. System changes to reduce the growth of health care expenditures will likely decrease physician demand in some specialties and care delivery settings by shifting care from specialists to generalists, from physicians to nonphysicians, and from hospital-based physicians to community-based physicians.

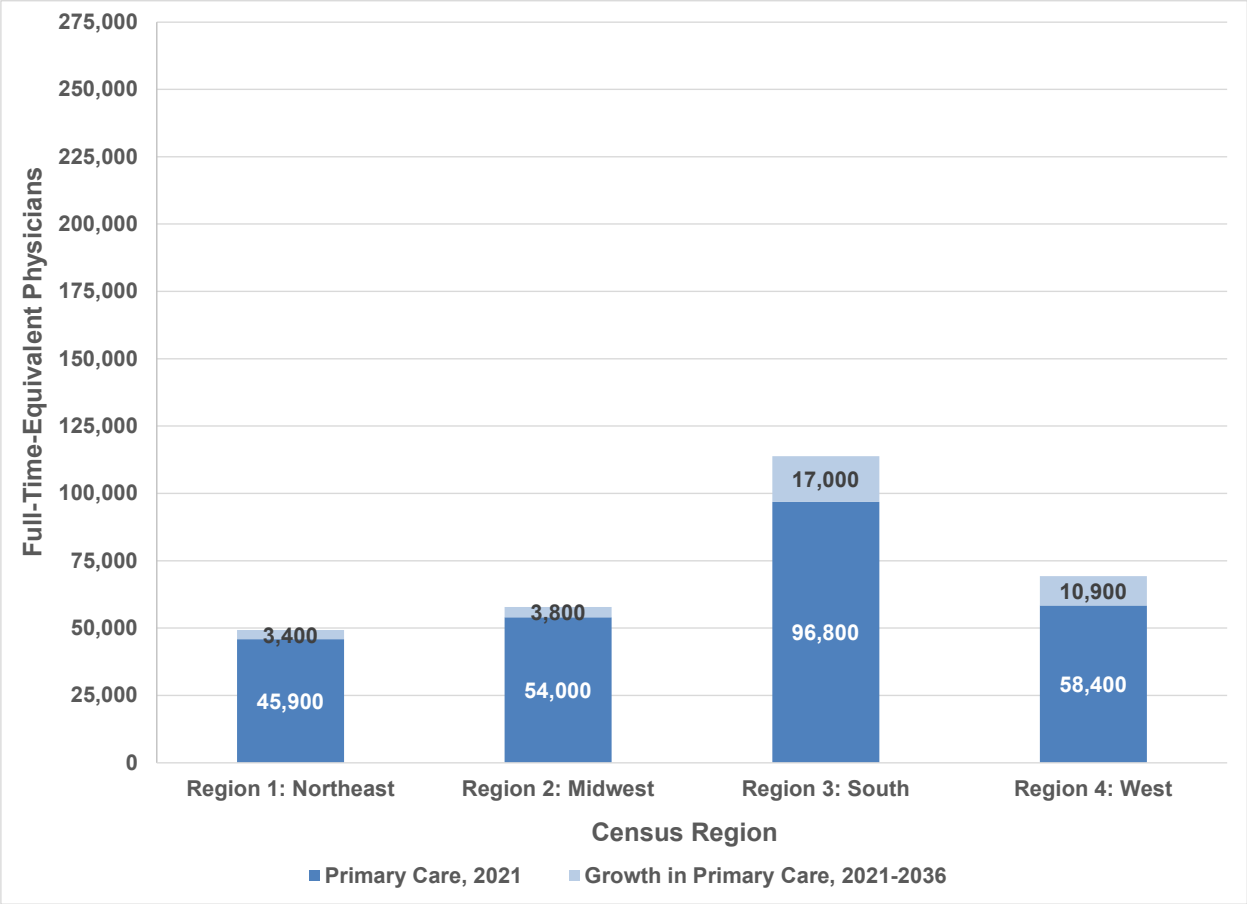
Geographic Distribution of Physician Demand

Current supply and demand for physicians and projected growth in demand vary geographically by region and by urban-rural location.

Physician Demand by Census Region

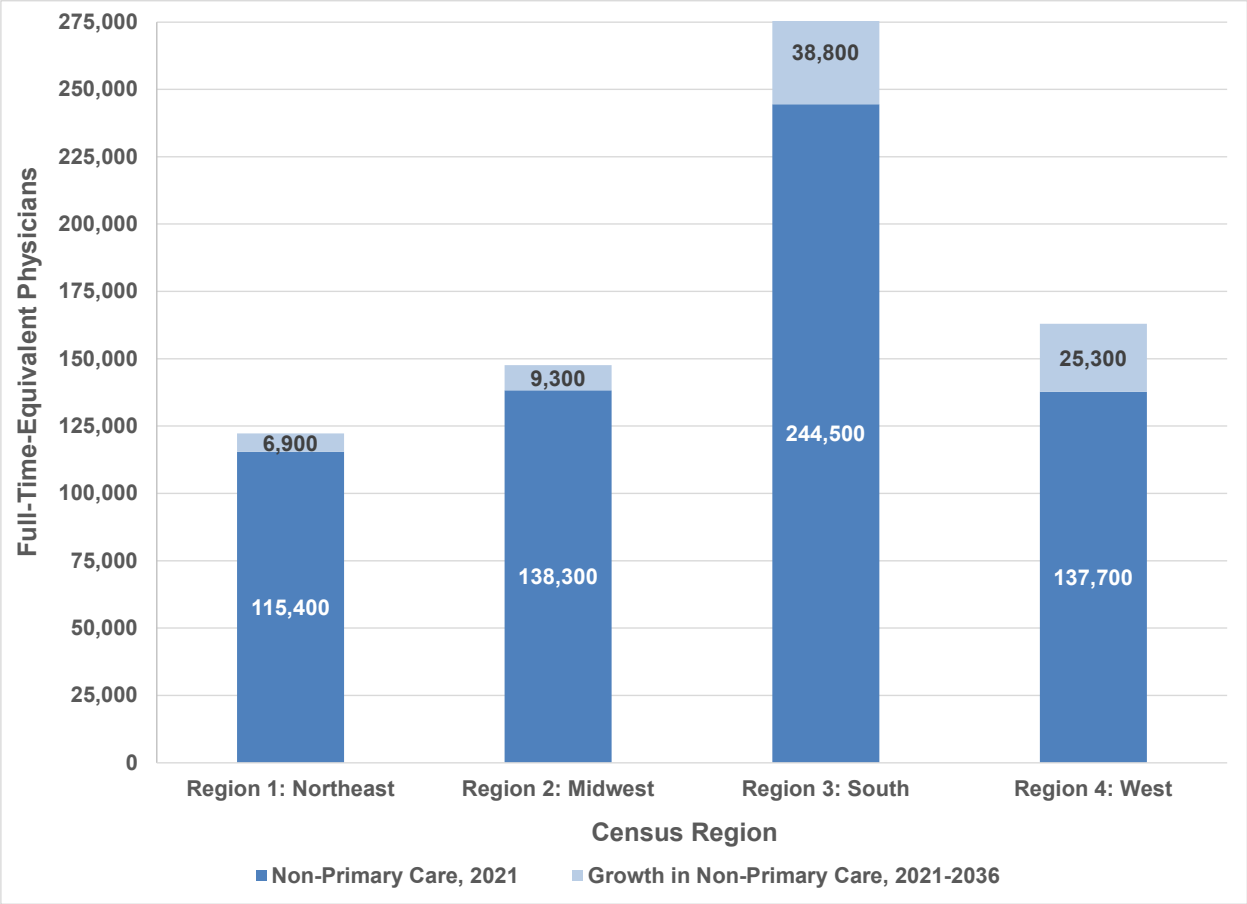
Utilization of physician services and projected growth in demand vary by census region due to differences in demographics and projected population growth, insurance coverage, the prevalence of health risk factors and disease, economic conditions, and care-access barriers. If care were evenly distributed across the United States after adjusting for demographics, socioeconomic factors, and prevalence of disease and health risk factors, physician demand in 2021 would be distributed as follows across census regions: 341,300 FTEs (38.3%) in the South Region, 196,100 FTEs (22.0%) in the West Region, 192,300 FTEs (21.6%) in the Midwest Region, and 161,300 FTEs (18.1%) in the Northeast Region. Demand growth from 2021 to 2036 is projected to be largest in the South (55,800 FTEs) and West (36,200 FTEs) and smallest in the Midwest (13,100 FTEs) and Northeast (10,300 FTEs) (see Appendix 2, Exhibit 33). The geographic distributions of primary and non-primary care are similar to the distribution for total physician demand (Exhibit 27 and Exhibit 28).

Exhibit 27: Physician Primary Care Demand and Demand Growth by Census Region, 2021-2036



Note: Demand is defined as the number of FTE physicians required to provide a national-average level of care given the demographics, the prevalence of disease and health risk factors, insurance coverage, household income levels, and health care use patterns of the population residing in each region.

Exhibit 28: Physician Non-Primary Care Demand and Demand Growth by Census Region, 2021-2036



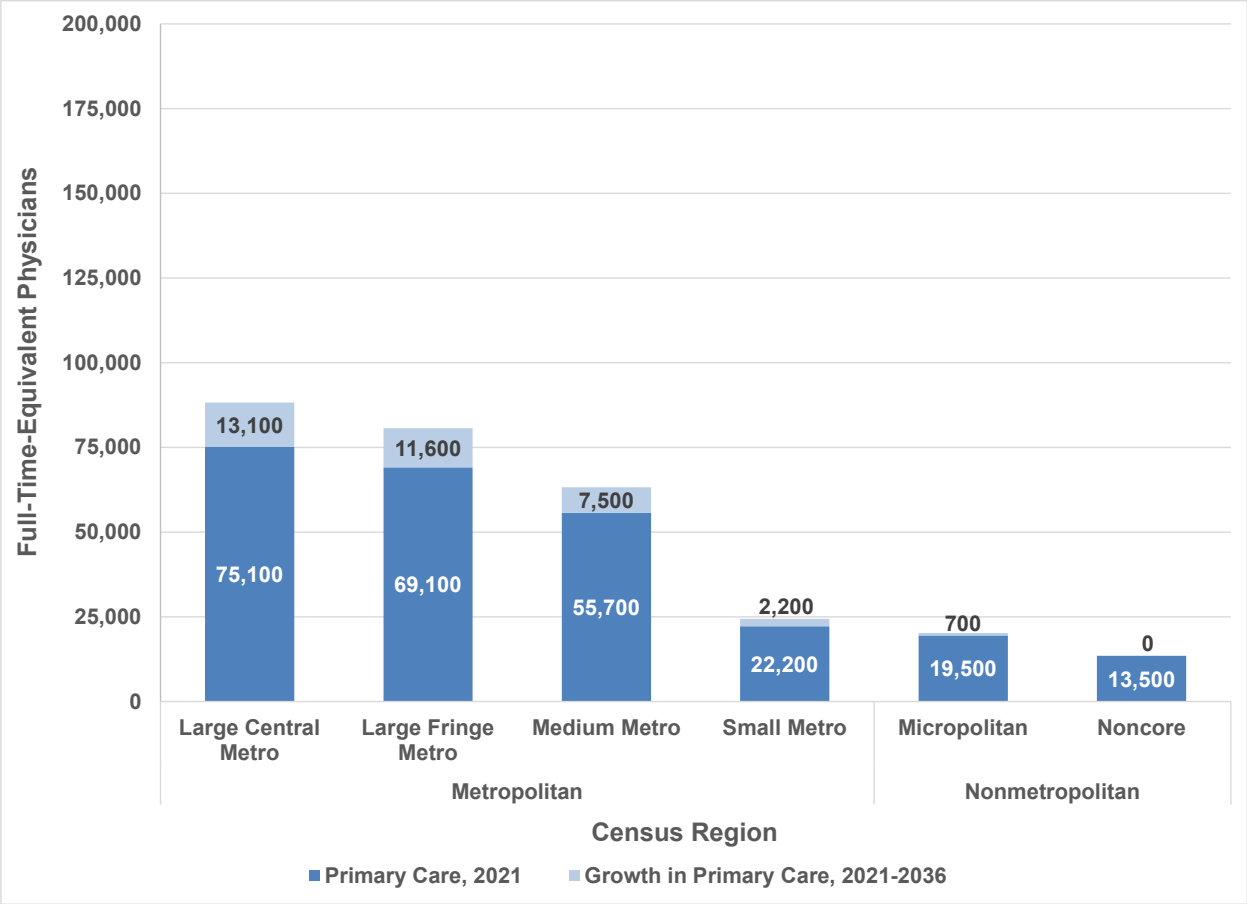
Note: Demand is defined as the number of FTE physicians required to provide a national-average level of care given the demographics, the prevalence of disease and health risk factors, insurance coverage, household income levels, and health care use patterns of the population residing in each region.

Physician Demand by Urban-Rural Location

We estimated physician demand and demand growth across type of location, from urban to rural, as defined by the 2013 National Center for Health Statistics (NCHS) Urban-Rural Classification Scheme for Counties (Exhibit 29 and Exhibit 30; Appendix 2, Exhibit 34).[78] Demand is defined by population residency location type controlling for geographic variation in population characteristics (demographics, disease prevalence, medical insurance coverage, lifestyle choices, and household income).

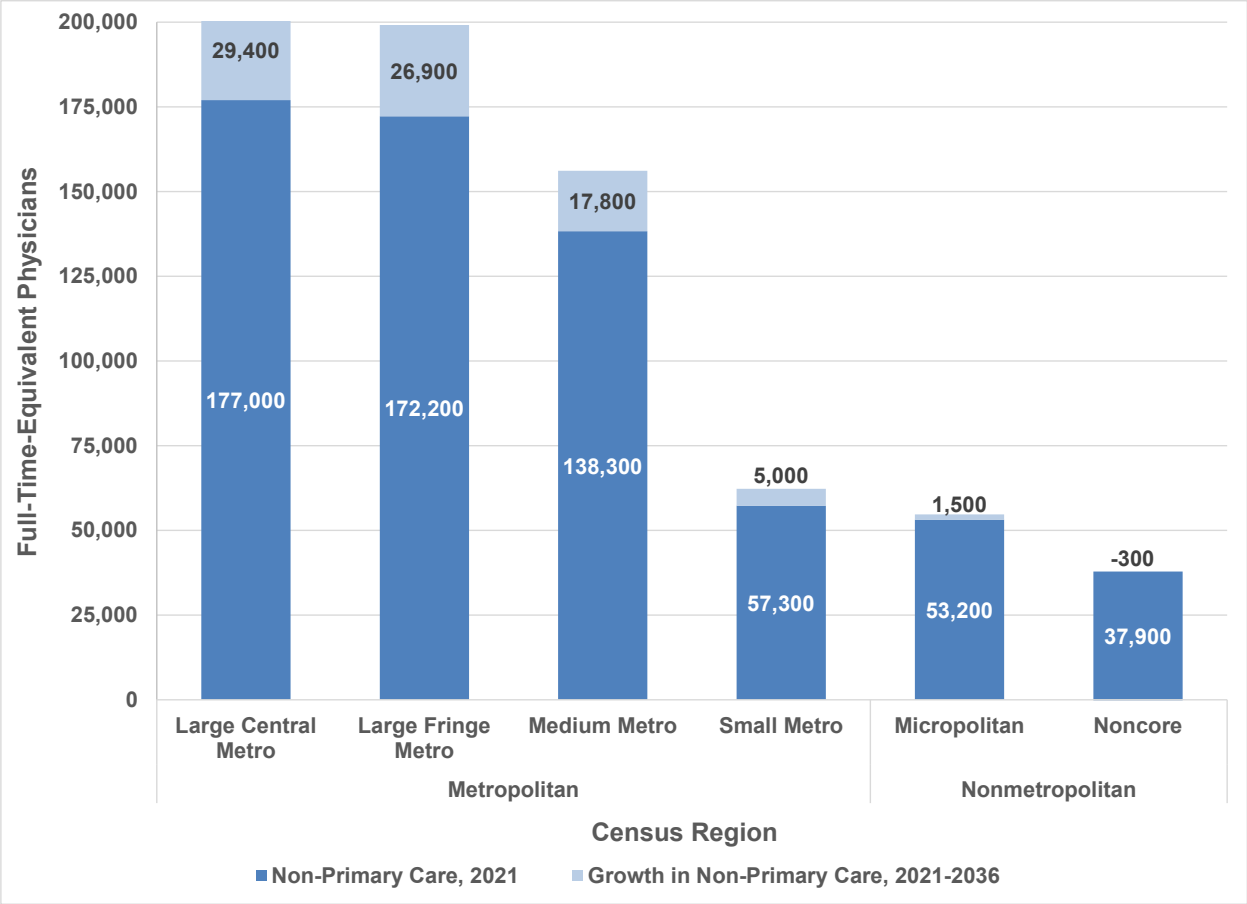
U.S. Census Bureau data show that before the COVID-19 pandemic, the percentage of Americans changing residence each year had reached an all-time low.[30] Analysis by the Federal Reserve Bank of Cleveland found that the COVID-19 pandemic and a shift to more work-from-home arrangements contributed to a population shift from large metropolitan areas to mid-size and smaller metropolitan areas.[163] Between 2021 and 2036, almost all (98%) projected growth in physician demand will be in metropolitan areas.

Exhibit 29: Physician Primary Care Demand and Demand Growth by Metropolitan Designation, 2021-2036



Note: Demand is defined as the number of FTE physicians required to provide a national-average level of care given the demographics, the prevalence of disease and health risk factors, insurance coverage, household income levels, and health care use patterns of the population residing in counties with each urban-rural designation using the 2013 NCHS Urban-Rural Classification Scheme for Counties.

Exhibit 30: Physician Non-Primary Care Demand and Demand Growth by Metropolitan Designation, 2021-2036



Note: Demand is defined as the number of FTE physicians required to provide a national-average level of care given the demographics, the prevalence of disease and health risk factors, insurance coverage, household income levels, and health care use patterns of the population residing in counties with each urban-rural designation using the 2013 NCHS Urban-Rural Classification Scheme for Counties.

CONCLUSIONS

Once again, this year's projections show a shortage of physicians in the next 10-15 years, but this shortfall is smaller than previously reported. The primary driver of this change is the addition of four new scenarios, each of which asks, "What if GME capacity continues to grow?" These new scenarios model the impact of funding increases from health systems, states, and the federal government to sustain growth in the nation's GME capacity (such as the critical investments in additional medical residency positions in the Consolidated Appropriations Act of 2021 and the Consolidated Appropriations Act of 2023). **In the absence of such funding increases, the projected shortfalls would be much more severe.** This year's projections thus show that if continued investment in training new physicians is realized, then the projected gap or shortage of physicians needed to meet the health care demands of our country will be mitigated relative to earlier projections. But if this continued investment fails to materialize, then projected shortfalls will be larger than presented here — closely resembling those presented in the 2021 report, which projected a shortfall of up to 124,000 physicians by 2034.

Of note, the modeled Health Care Utilization Equity scenarios presented in this report demonstrate that even while the shortages are being ameliorated by a combination of slower population growth, state and private sector investments in GME, and rapidly increasing numbers of PAs and APRNs, inequity in health care continues to worsen. The numbers of physicians and other health care professionals needed to address these inequities are, in fact, greater than the projected shortages if we continue on our current course, i.e., maintain the status quo.

The COVID-19 pandemic illustrated how quickly conditions within the health care system and national priorities and programs related to health care delivery can change. While there are still many unknowns about the long-term implications of the COVID-19 pandemic for physician supply and demand, COVID-19 has become an endemic condition that will persist as a factor requiring workforce resources to treat and manage. We estimate that COVID-19 becoming endemic has increased future demand for physicians by about 1%.

Although there continue to be highly polarized debates around the organization, regulation, finance, and technological evolution of health care delivery, the essential drivers of physician supply and demand are changing much less dramatically. We continue to project physician demand will grow faster than supply under most of the scenarios modeled, leading to a projected shortfall of between 13,500 physicians and 86,000 physicians in 2036, including a shortage of between 20,200 and 40,400 primary care physicians.

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. Detailed technical documentation of the supply and demand models is available elsewhere.[67]

Synopsis of Study Methods

Consistent with the previous physician workforce reports, this update used a microsimulation approach to project the future supply of and demand for health care services and physicians. The workforce models have been used to model supply and demand for physicians and other health occupations for federal and state governments, trade and professional associations, and health systems.[164–167]

The supply model simulates career decisions of physicians given the number, specialty mix, and demographics of the current workforce and new physicians trained each year, as well as weekly-hours-worked patterns and projected retirement rates that differ by specialty category and physician age and sex. As described in the report, modeled scenarios to develop the projections range include (1) the Status Quo scenario, both with and without a 1% annual increase in the training pipeline, as well as an increase in number of GME positions from the Consolidated Appropriations Act of 2021, and continuation of current hours worked and retirement patterns as indicated by physicians participating in the AAMC 2022 NSSP; (2) the Retire 2 Years Earlier or Retire 2 Years Later scenarios for changing physician-retirement patterns relative to current patterns of retirement intention; and (3) a Changing Hours Worked Scenario, in which the downward trend in hours worked observed over the past decade continues over time, where today's physicians work slightly fewer hours per week compared with older cohorts — though the decline in hours worked appears to have slowed in recent years. A modest expansion of GME programs is modeled as a policy scenario but not included in the projections ranges.

The demand projections start with the Status Quo scenario that extrapolates pre-pandemic patterns of health care use and delivery into the future as the population grows and ages. This scenario assumes that the prevalence of disease and health risk factors remains unchanged within demographic groups. A Managed Care scenario models the entire insured population shifted into managed-care plans that more closely resemble health maintenance organizations. A Retail Clinics scenario models shifting noncomplex care for people without chronic conditions from primary care physician offices to retail clinics where care is predominantly provided by nurse practitioners. APRN/PA High Use and APRN/PA Moderate Use scenarios model the projected growth in employment of APRNs and PAs and assumptions of the degree to which these additional providers will reduce demand for physicians. A Population Heath scenario models improving population health with modest improvements in body weight, smoking cessation, and control of blood pressure, cholesterol, and blood glucose levels.

To convey the uncertainty associated with factors and trends that have implications for physician supply and demand, we modeled eight supply scenarios and six demand scenarios used to develop the physician adequacy ranges. Comparing each supply scenario with each demand scenario produces 48 paired projections of future supply adequacy for each of the five physician specialty groupings. The extreme high and low pairings of supply and demand scenarios are least likely to occur because multiple factors tend to mitigate highs and lows. Given the propensity of such systems-level "checks and balances" to avoid extremes, we used the 25th-to-75th percentile of the paired projections to reflect a likely range. Ranking the 48 supply-demand combinations from largest surplus to largest shortage, the midpoint of the 12th and 13th supply-demand combinations forms the lower bound (25th percentile) of any projected shortage, while the midpoint of the 36th and 37th supply-demand combinations forms the upper bound (75th percentile) of the projected shortage.

Supply Model Overview and Updates

Current Physician Workforce

Supply modeling started with using the 2021 AMA PPD to identify the size and characteristics of the current workforce. In 2021, there were about 854,000 physicians under age 75 in active practice who had completed their GME. The approximately 234,300 active Primary Care physicians were 27% of the workforce, and another 39,900 (5% of the workforce) were Primary-Care-Trained Physicians Practicing as Hospitalists. About 151,000 (18%) physicians are in Medical Specialties, 156,500 (18%) in Surgical Specialties, and 272,300 (32%) in the Other Specialties category. Women constituted a little more than a third (38%) of the physician workforce. Among physicians under age 45, though, almost half (49%) are female. Physicians within the traditional retirement age of 65 or older were 20% of the active, patient care workforce, and those between the ages of 55 and 64 made up 22% of the active, patient care workforce. Therefore, it is possible that more than a third of currently active physicians might retire within the next decade.

New Entrants

Estimates of the number of physicians completing GME came from published information on programs accredited by the Accreditation Council for Graduate Medical Education (ACGME).[68] The age and sex distribution of new physicians was derived from analysis of the 2021 AMA PPD. We estimate about 31,493 physicians completed GME between 2021 and 2022 (higher than the 29,627 estimate in the 2021 report). In total, about 8,971 physicians (28.5% of new graduates) entered the workforce as Primary Care providers; 1,222 (3.9%) entered as new Primary Care-Trained Hospitalists; 6,192 (19.7%) entered internal medicine and pediatric subspecialties; 5,343 (17.0%) entered in Surgical Specialties; and 9,765 (31.0%) entered in Other Specialties.

Hours-Worked Patterns

Supply projections consider differences in average hours per week spent in patient care by physician age, sex, and specialty group. This component of the model is based on ordinary least squares regression analysis of the 2019 NSSP (n = 6,000) and 2022 NSSP (n = 5,917). The dependent variable was weekly hours worked, and explanatory variables were physician age group (<35, 35-44, 45-54, 55-59, 60-69, 70-74, and 75+ years), sex, age-by-sex-interaction term, and an indicator for which survey year the data are from. Separate regressions were estimated by specialty category (Primary Care, Medical Specialties, Surgical Specialties, and Other Specialties). Younger male and female physicians start off working about the same number of hours each week, but by age 35 and beyond, female physicians work about 4-6 fewer hours per week than their male peers in the same specialty category. Surgeons tend to work slightly more hours per week, followed by the Medical Specialties, Primary Care, and Other Specialties. Physicians in the oldest age group modeled (age 75+) work about 11-18 fewer hours per week than their peers under age 35 in the same specialty category, with the drop in hours largest for Surgeons and smallest for Other Specialties.

Retirement Patterns

Retirement patterns by physician age, sex, and specialty category were estimated from the 2022 NSSP. Compared to the 2019 NSSP, the updated survey indicates that physicians plan to retire earlier than previously reported.

Demand Model Overview and Updates

Demand for physicians is calculated based on 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.

For modeling purposes, at the national level, we estimate demand for health care services in 2021 using care utilization patterns in the 2015-2019 Medical Expenditure Panel Survey (MEPS) applied to the population in 2021. We add to this demand estimates of COVID-19-related care in the form of ambulatory care for new COVID-19 cases, long-COVID care, and hospital-based care.

Using estimates of how physicians distribute their time across care delivery settings from the NSSP and published literature, we use 2021 physician supply to estimate health care utilization-to-provider ratios that are then extrapolated to the current and future population. Demand projections are thus extrapolating a "2021 level of care" with any imbalances between supply and demand, whether shortages or excesses, extrapolated into the future. Exceptions to the assumption that physician supply and demand are roughly in equilibrium at the national level include the following: (1) As with prior studies, we include as a starting-year shortfall federal government estimates that the nation required about 15,184 primary care physicians and 6,851 psychiatrists in 2021 to de-designate the federally designated Primary Care and Mental Health Professional Shortage Areas (HPSAs).[25] These numbers represent the additional providers required in these shortage areas to raise supply to a minimal level of adequacy. While many published studies suggest that many physician specialties are experiencing a shortage, only a handful of studies provide estimates to quantify starting-year shortages. Based on this literature, we assume a 10% (1,000 FTE) shortage of physiatrists, 11% (1,978 FTE) shortage of neurologists, 13% (850 FTE) shortage of rheumatologists, 29% (1,386 FTE) shortage of vascular surgeons, and 5% (2,100 FTE) shortage of hospitalists.[28,79,168–170] As discussed previously, we estimate that COVID-19 transitioning from pandemic to endemic has permanently increased demand for select physician specialties by approximately 7,730 FTEs. Together, these numbers suggest a starting-year (2021) shortfall of about 37,100 FTEs—or approximately a 4.3% shortfall. Our starting-point shortfall assumption may be conservative to the extent that shortages already exist in specialties or that the shortfalls in primary care and psychiatry are larger than the above estimates.[79–83]

The microsimulation approach simulates demand for health care services for a representative sample of the 2021 U.S. population projected to 2036. Modeling is done at the county level, which is then aggregated to the state level and by the urban-rural designation of the counties where people reside. The population files for each county were constructed to create a representative sample of the population in each county by statistically combining de-identified data for individuals participating in the U.S. Census Bureau, American Community Survey, Behavioral Risk Factor Surveillance System, Medicare Beneficiary Survey, and CMS Minimum Dataset for Nursing Home Residents. The resulting constructed database for each county contains a health profile for a representative sample of the population that includes demographics (age, sex, race/ethnicity), health risk factors (obesity, smoking), insurance type, household income, and presence or history of various chronic diseases. County-level population projections by demographic were then used to reweight the population file to reflect population growth, aging, and greater racial and ethnic diversity in future years.

Prediction equations in the demand model come from regression analysis of the MEPS and the National Inpatient Sample (NIS). They were used to quantify the relationship between patient characteristics available in these data sets and in the constructed population database and patient annual use of health

care services. Negative binomial regression was used to quantify the relationship between patient characteristics and annual office and outpatient visits to a physician by specialty type. The use of negative binomial regression reflects that many patients had no annual visits to a particular physician specialty, and other patients had one or more visits during the year, which produces a skewed distribution for annual visits. Logistic regression was used to model the relationship between patient characteristics and hospital admission and emergency department visits for about two dozen diagnosis categories. Poisson regression with NIS data was used to model hospital length of stay by admission diagnosis category as a function of patient characteristics available in NIS (demographics, insurance type, presence of diabetes). Separate regressions were estimated for adults and children. The estimated coefficients from these regressions were applied to the constructed population files to forecast future demand for health care services by physician specialty, care delivery setting, and geographic location.

Current staffing patterns, measured as FTE physicians per unit of health care used (e.g., office or outpatient visits, emergency visits, home health visits, inpatient days, residents) based on national averages, were then applied to the projected demand for health care services by care delivery setting and physician specialty.

Exhibit 31 summarizes, by demand model component, the data sources incorporated into this 2021 workforce projections update.

Exhibit 31: Summary of Demand Modeling Data Sources

Model Component	Data Sources
Population file	2021 American Community Survey https://www.census.gov/programs-surveys/acs 2019-2021 Behavioral Risk Factor Surveillance System https://www.cdc.gov/brfss/ 2019 CMS Minimum Dataset for Nursing Home Residents https://www.cdc.gov/nchs/nnhs/ 2019 Medicare Beneficiary Survey, Residential Care https://www.cms.gov/Research-Statistics-Data-and-Systems/Downloadable-Public-Use-Files/MCBS-Public-Use-File Census Bureau 2021 county population estimates https://www.census.gov/data/datasets/2020/demo/saipe/2020-state-and-county.html
Weights for population projections	County-level population projections published by individual states and S&P Global
Health care use equations	2015-2019 Medical Expenditure Panel Survey (Pooled) https://www.meps.ahrq.gov/mepsweb/

Hospital inpatient day equations	2019 National Inpatient Sample https://www.hcup-us.ahrq.gov/db/nation/nis/NIS_Introduction_2018.jsp
Health care use calibration and validation	2019 National Inpatient Sample https://www.hcup-us.ahrq.gov/db/nation/nis/NIS_Introduction_2018.jsp 2018 and 2019 National Hospital Ambulatory Medical Care Survey https://www.cdc.gov/nchs/ahcd/about_ahcd.htm#NHAMCS
Physician staffing ratios	2021 AMA PPD File https://www.ama-assn.org/practice-management/masterfile/ama-physician-masterfile
Urban-rural classification	2013 National Center for Health Statistics (NCHS) Urban-Rural Classification Scheme for Counties https://www.cdc.gov/nchs/nnhs/index.htm
Population health scenario (person-level data on health risk factors)	2017-2018 National Health and Nutrition Examination Survey https://wwwn.cdc.gov/nchs/nhanes/continuousnhanes/default.aspx?BeginYear=2017

APPENDIX 2: ADDITIONAL TABLES AND CHARTS

Exhibit 32: Projected Physician Demand by Patient Race and Ethnicity, 2021-2036

Specialty Group and Year	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic Other	Hispanic	Total
2021					
Total	602,700	103,200	66,600	118,500	891,000
Primary Care	166,200	27,300	23,300	38,300	255,100
Non-Primary Care	436,500	75,900	43,300	80,200	635,900
Medical Specialties	103,500	19,900	10,500	19,200	153,100
Surgical Specialties	111,100	16,500	10,400	19,900	157,900
Other	194,400	33,300	19,100	35,500	282,300
Hospitalist*	27,500	6,200	3,300	5,600	42,600
2036					
Total	628,000	123,200	91,700	163,500	1,006,400
Primary Care	173,600	32,900	32,000	51,700	290,200
Non-Primary Care	454,400	90,300	59,700	111,800	716,200
Medical Specialties	112,800	25,100	15,000	28,300	181,200
Surgical Specialties	114,200	19,200	14,200	27,700	175,300
Other	197,600	38,400	25,900	47,700	309,600
Hospitalist*	29,800	7,600	4,600	8,100	50,100
Growth 2021 to 2036					
Total	25,300	20,000	25,100	45,000	115,400
Primary Care	7,400	5,600	8,700	13,400	35,100
Non-Primary Care	17,900	14,400	16,400	31,600	80,300
Medical Specialties	9,300	5,200	4,500	9,100	28,100
Surgical Specialties	3,100	2,700	3,800	7,800	17,400
Other	3,200	5,100	6,800	12,200	27,300
Hospitalist*	2,300	1,400	1,300	2,500	7,500

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

Exhibit 33: Projected Physician Demand by Census Region, 2021-2036

Specialty Group and Year	Region 1: Northeast	Region 2: Midwest	Region 3: South	Region 4: West	Total
2021					
Total	161,300	192,300	341,300	196,100	891,000
Primary Care	45,900	54,000	96,800	58,400	255,100
Non-Primary Care	115,400	138,300	244,500	137,700	635,900
Medical Specialties	27,700	32,800	60,200	32,400	153,100
Surgical Specialties	28,900	34,500	59,800	34,700	157,900
Other	51,200	61,900	107,500	61,700	282,300
Hospitalist*	7,600	9,100	17,000	8,900	42,600
2036					
Total	171,600	205,400	397,100	232,300	1,006,400
Primary Care	49,300	57,800	113,800	69,300	290,200
Non-Primary Care	122,300	147,600	283,300	163,000	716,200
Medical Specialties	30,900	36,500	73,000	40,800	181,200
Surgical Specialties	30,000	36,300	68,500	40,500	175,300
Other	52,900	64,700	121,500	70,500	309,600
Hospitalist*	8,500	10,100	20,300	11,200	50,100
Growth 2021 to 2036					
Total	10,300	13,100	55,800	36,200	115,400
Primary Care	3,400	3,800	17,000	10,900	35,100
Non-Primary Care	6,900	9,300	38,800	25,300	80,300
Medical Specialties	3,200	3,700	12,600	8,400	27,900
Surgical Specialties	1,100	1,800	8,600	5,800	17,300
Other	1,700	2,800	14,100	8,800	27,400
Hospitalist*	900	1,000	3,500	2,300	7,700

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

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

Exhibit 34: Projected Physician Demand by Urban-Rural Location, 2021-2036

Specialty Group and Year	Metropolitan				Nonmetropolitan		Total
	Large Central	Large Fringe	Medium	Small	Micropolitan	Noncore	
2021							
Total	252,100	241,300	194,000	79,500	72,700	51,400	891,000
Primary Care	75,100	69,100	55,700	22,200	19,500	13,500	255,100
Non-Primary Care	177,000	172,200	138,300	57,300	53,200	37,900	635,900
Medical Specialties	41,800	42,200	33,500	14,600	11,600	9,400	153,100
Surgical Specialties	42,300	43,300	34,600	14,600	13,600	9,500	157,900
Other	81,600	75,400	60,600	24,100	24,500	16,100	282,300
Hospitalist*	11,300	11,300	9,600	4,000	3,500	2,900	42,600
2036							
Total	294,600	279,800	219,300	86,700	74,900	51,100	1,006,400
Primary Care	88,200	80,700	63,200	24,400	20,200	13,500	290,200
Non-Primary Care	206,400	199,100	156,100	62,300	54,700	37,600	716,200
Medical Specialties	52,000	51,100	39,500	16,500	12,400	9,700	181,200
Surgical Specialties	48,600	49,400	38,500	15,600	13,900	9,300	175,300
Other	92,100	84,800	66,700	25,700	24,700	15,600	309,600
Hospitalist*	13,700	13,800	11,400	4,500	3,700	3,000	50,100
Growth 2021 to 2036							
Total	42,500	38,500	25,300	7,200	2,200	-300	115,400
Primary Care	13,100	11,600	7,500	2,200	700	0	35,100
Non-Primary Care	29,400	26,900	17,800	5,000	1,500	-300	80,300
Medical Specialties	10,200	8,900	6,000	1,900	800	300	28,100
Surgical Specialties	6,300	6,100	3,900	1,000	300	-200	17,400
Other	10,500	9,400	6,100	1,600	200	-500	27,300
Hospitalist*	2,400	2,500	1,800	500	200	100	7,500

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

Note: Demand location is defined by population residency location using the 2013 NCHS Urban-Rural Classification Scheme for Counties (cdc.gov/nchs/data_access/urban_rural.htm#2013_Urban-Rural_Classification_Scheme_for_Counties). Category totals might not sum to totals because of rounding.

Exhibit 35: Summary of Projected Gap Between Physician Supply and Demand, 2021-2036

Specialty Group	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Total Physicians																
75th Percentile	37,000	46,300	55,800	64,000	72,600	78,600	84,100	88,200	90,500	95,800	97,000	96,300	94,700	91,900	89,500	86,000
25th Percentile	37,000	43,000	48,700	53,700	57,100	58,200	58,400	56,700	56,600	57,000	52,100	48,800	42,000	33,900	24,600	13,500
Primary Care																
75th Percentile	20,800	23,700	26,700	29,700	32,300	34,200	36,000	38,200	38,900	40,300	40,300	40,800	41,300	41,300	41,000	40,400
25th Percentile	20,800	22,200	23,800	25,700	26,800	27,400	27,300	27,100	27,500	27,300	27,100	26,800	25,300	23,400	21,700	20,200
Non-Primary Care																
75th Percentile	16,200	22,500	28,800	33,600	38,200	41,200	43,500	45,100	46,200	47,200	44,500	41,600	38,500	34,500	29,900	24,700
25th Percentile	16,200	20,800	25,200	29,200	31,500	31,600	30,300	27,100	26,000	23,300	19,500	14,500	8,700	2,500	-3,000	-11,700
Medical Specialties																
75th Percentile	2,100	3,500	5,000	6,100	7,300	8,200	8,800	9,500	9,800	10,300	9,800	9,300	8,600	7,600	6,400	5,500
25th Percentile	2,100	2,900	3,600	4,300	4,800	5,000	5,000	4,600	4,100	3,800	3,100	2,300	1,100	200	-1,600	-3,700
Surgical Specialties																
75th Percentile	1,400	3,900	6,500	8,700	10,800	12,700	14,400	15,900	17,300	18,600	19,300	19,800	20,200	20,400	20,000	19,900
25th Percentile	1,400	3,100	5,200	6,900	8,500	9,300	9,800	10,100	10,900	11,300	11,400	11,700	11,700	11,400	10,900	10,100
Other Specialties																
75th Percentile	10,000	13,100	16,100	18,400	20,700	22,800	23,600	25,000	25,900	26,700	26,900	26,200	25,200	23,700	21,800	19,500
25th Percentile	10,000	12,100	13,200	14,100	15,400	16,000	15,400	14,000	14,000	13,200	11,000	7,800	4,900	1,900	-700	-4,300
Hospitalist*																
75th Percentile	2,700	2,400	2,300	2,000	1,900	1,800	1,600	1,400	1,400	1,300	1,300	1,300	1,400	1,300	1,400	1,300
25th Percentile	2,700	2,300	1,700	1,100	700	100	-400	-900	-1,200	-1,600	-2,000	-2,600	-3,100	-3,800	-4,200	-4,900

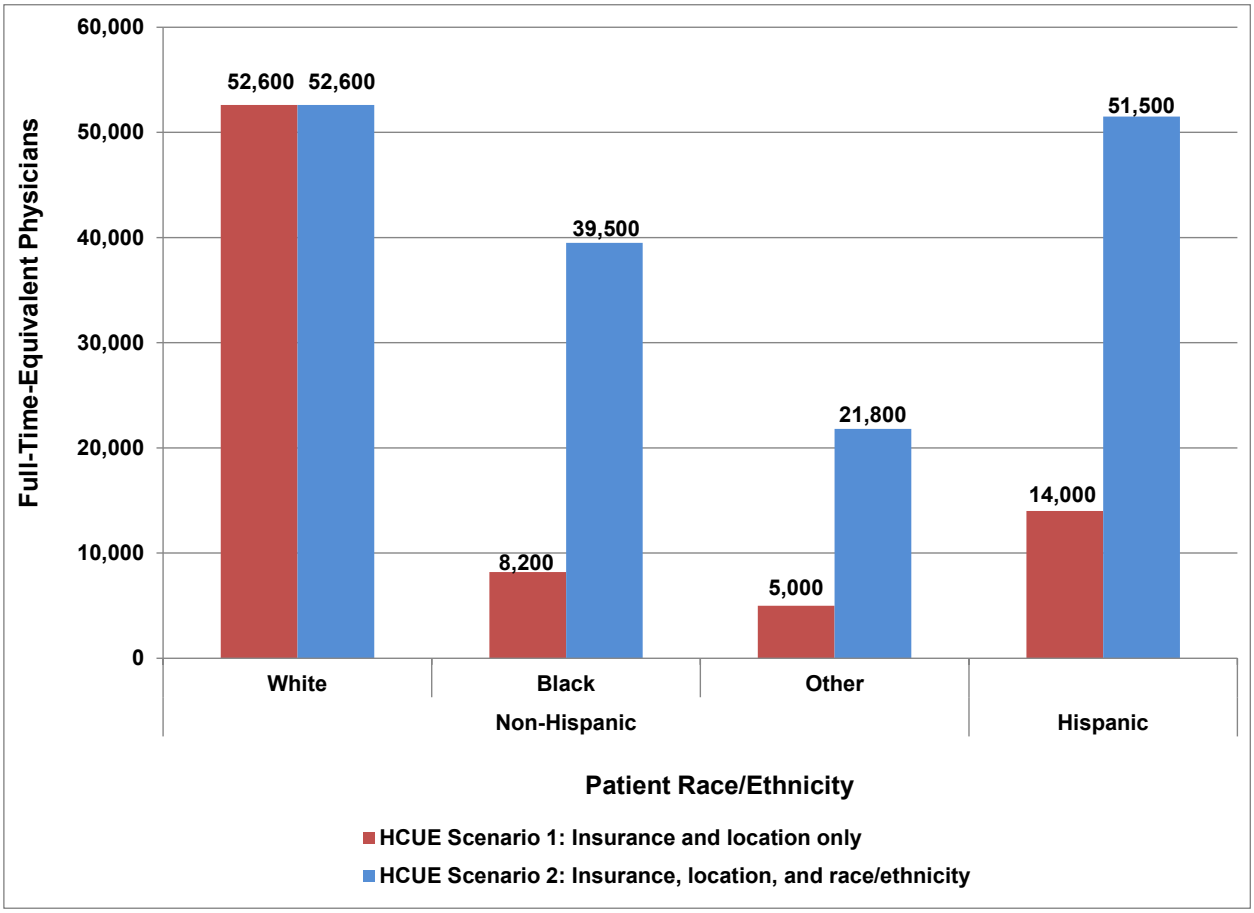
*Includes only hospitalists trained in primary care; hospitalists in non-primary care specialties are included with their individual specialty.

Note: The shortage range for total physicians can differ from the sum of the ranges 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 range for total non-primary care can differ from the sum of the ranges for the specialty categories. The negative numbers are projected excess supply, and the positive numbers are projected shortages.

Exhibit 36: Projected Physician Supply, 2021-2036

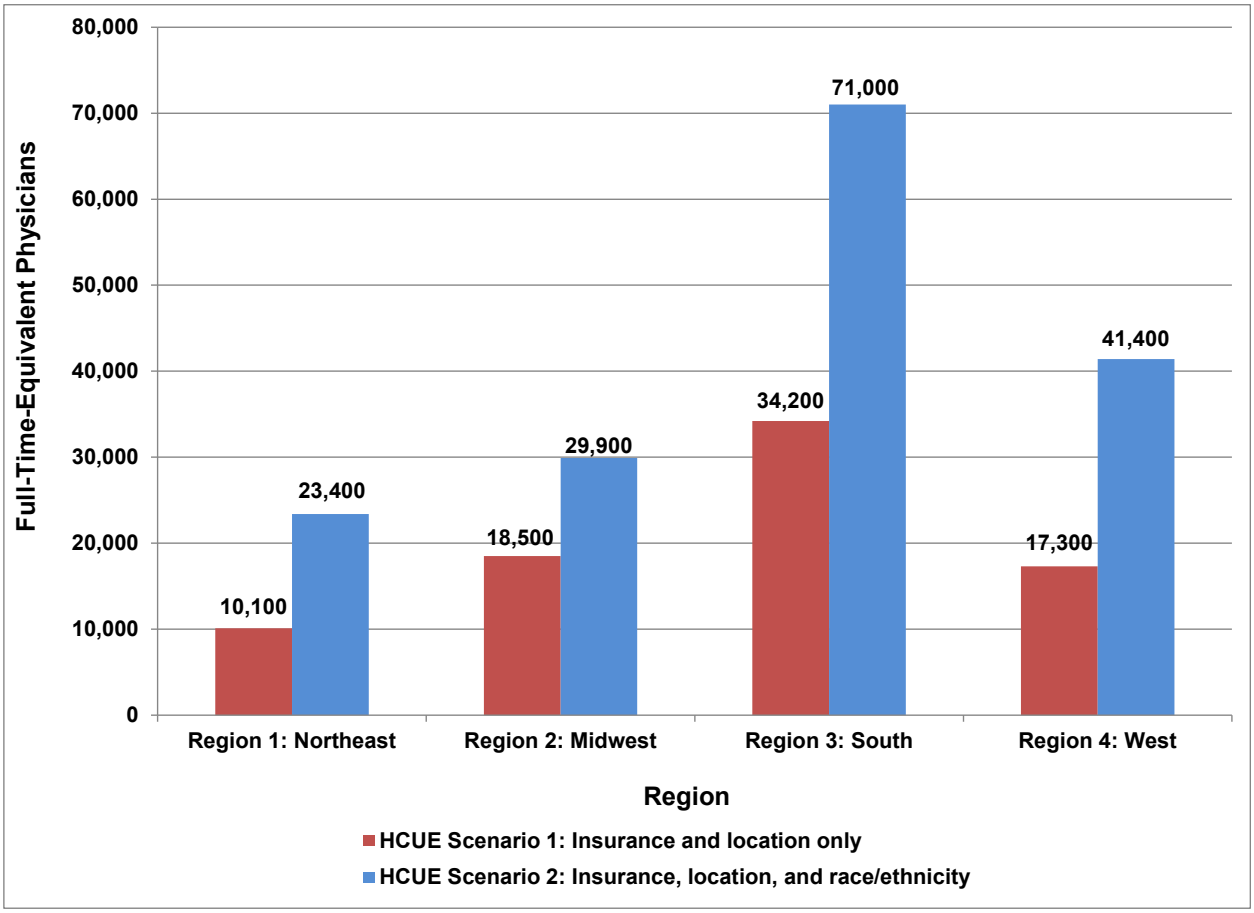
Year	*Workforce Participation Scenarios, 1% GME Growth*				*Workforce Participation Scenarios, 0% GME Growth*				Policy Scenario
	Status Quo	Retire 2 Years Earlier	Retire 2 Years Later	Changing Hours Worked	Status Quo	Retire 2 Years Earlier	Retire 2 Years Later	Changing Hours Worked	GME Expansion
2021	854,000	854,000	854,000	854,000	854,000	854,000	854,000	854,000	854,000
2022	853,200	852,630	853,960	853,600	852,900	852,600	853,930	853,300	853,200
2023	853,500	851,040	856,680	853,900	852,600	850,840	856,480	853,000	853,500
2024	855,300	851,040	860,880	855,700	853,400	850,440	860,280	853,700	855,300
2025	858,200	849,680	867,320	858,400	855,000	848,360	865,960	854,900	858,200
2026	863,400	848,800	875,700	862,800	858,500	846,300	873,200	858,000	863,400
2027	869,000	850,400	885,800	867,800	861,900	846,260	881,600	860,800	869,000
2028	875,400	852,580	897,800	873,500	866,000	846,000	891,010	864,300	875,400
2029	882,600	857,700	907,200	880,200	870,600	848,625	897,975	868,000	884,900
2030	891,300	863,220	918,420	888,000	876,300	851,060	906,180	877,100	898,300
2031	901,400	869,355	930,470	897,100	882,800	853,630	914,575	883,800	911,100
2032	912,100	877,630	943,600	907,100	889,600	857,470	923,710	891,200	924,300
2033	923,200	886,055	957,780	917,600	896,600	860,975	932,700	898,800	940,400
2034	935,000	896,300	972,100	929,200	904,200	865,300	941,200	907,100	957,000
2035	947,400	907,600	984,600	940,900	911,600	871,900	948,900	915,500	971,900
2036	960,100	919,200	997,400	953,200	919,100	878,300	956,400	924,000	987,000
% Growth, 2021-2036	12%	8%	17%	12%	8%	3%	12%	8%	16%

Exhibit 37: Additional Physician Demand to Achieve Health Care Utilization Equity in 2021 by Patient Race/Ethnicity



Note: This chart compared physician demand under the health care utilization equity scenarios to demand under the status quo scenario.

Exhibit 38: Increase in Physician Demand to Achieve Health Care Utilization Equity in 2021 by Region



Note: This chart compared physician demand under the health care utilization equity scenarios to demand under the status quo scenario.

Exhibit 39: Physician Demand by Health Care Utilization Equity Scenario and Region in 2021

Specialty Group and Demand	Region 1: Northeast	Region 2: Midwest	Region 3: South	Region 4: West	U.S. Total
Baseline Demand (applying national average patterns of care use to the characteristics of the population in each region)					
Total	161,300	192,300	341,300	196,100	891,000
Primary Care	45,900	54,000	96,800	58,400	255,100
Non-Primary Care	115,400	138,300	244,500	137,700	635,900
Medical Specialties	27,700	32,800	60,200	32,400	153,100
Surgery	28,900	34,500	59,800	34,700	157,900
Other	51,200	61,900	107,500	61,700	282,300
Hospitalist*	7,600	9,100	17,000	8,900	42,600
Additional Demand from HCUE1 Scenario					
Total	10,100	18,500	34,200	17,300	80,100
Primary Care	2,600	5,600	10,100	4,600	22,900
Non-Primary Care	7,500	12,900	24,100	12,700	57,200
Medical Specialties	2,200	3,700	6,500	3,800	16,200
Surgery	2,200	3,100	6,600	3,900	15,800
Other	2,500	5,300	9,700	4,000	21,500
Hospitalist*	600	800	1,300	1,000	3,700
Additional Demand from HCUE2 Scenario					
Total	23,400	29,900	71,000	41,400	165,700
Primary Care	4,900	7,800	17,800	7,900	38,400
Non-Primary Care	18,500	22,100	53,200	33,500	127,300
Medical Specialties	3,300	4,500	9,300	6,300	23,400
Surgery	5,300	5,700	14,800	9,500	35,300
Other	9,000	10,800	26,900	16,100	62,800
Hospitalist*	900	1,100	2,200	1,600	5,800

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

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

Exhibit 40: Increase in Physician Demand to Achieve Health Care Utilization Equity in 2021 by Urban/Rural Area

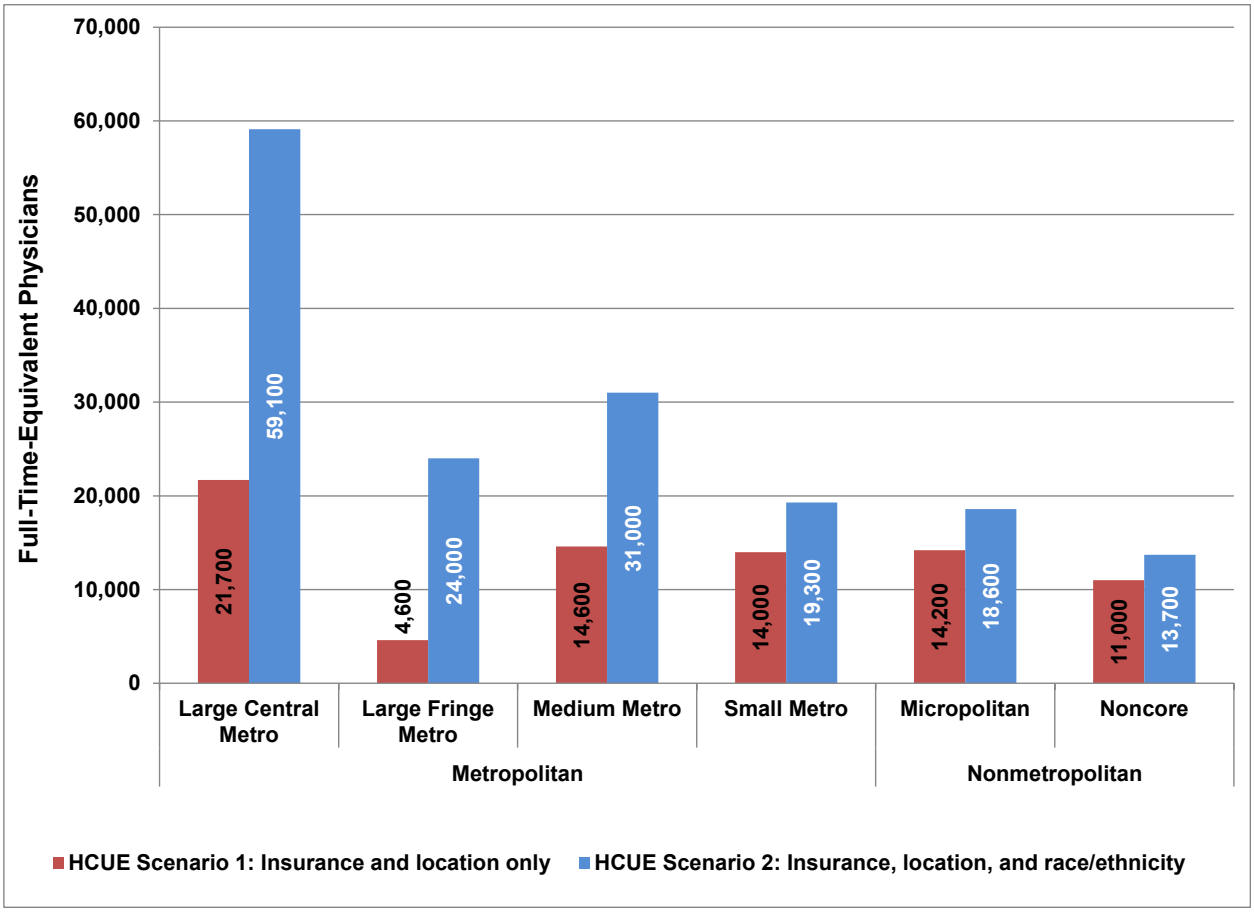


Exhibit 41: Physician Demand by Health Care Utilization Equity Scenario and Urban/Rural Area in 2021

Specialty Group and Demand	Metropolitan				Nonmetropolitan	
	Large Central Metro	Large Fringe Metro	Medium Metro	Small Metro	Micropolitan	Noncore
Baseline Demand						
Total	252,100	241,300	194,000	79,500	72,700	51,400
Primary Care	75,100	69,100	55,700	22,200	19,500	13,500
Non-Primary Care	177,000	172,200	138,300	57,300	53,200	37,900
Medical Specialties	41,800	42,200	33,500	14,600	11,600	9,400
Surgery	42,300	43,300	34,600	14,600	13,600	9,500
Other	81,600	75,400	60,600	24,100	24,500	16,100
Hospitalist*	11,300	11,300	9,600	4,000	3,500	2,900
Additional Demand from HCUE1 Scenario						
Total	21,700	4,600	14,600	14,000	14,200	11,000
Primary Care	4,000	1,500	3,900	4,300	5,100	4,100
Non-Primary Care	17,700	3,100	10,700	9,700	9,100	6,900
Medical Specialties	5,900	600	3,100	1,800	3,300	1,500
Surgery	7,000	1000	2,900	2,200	1500	1200
Other	2,800	1300	4,500	5300	3,600	4,000
Hospitalist*	2,000	200	200	400	700	200
Additional Demand from HCUE2 Scenario						
Total	59,100	24,000	31,000	19,300	18,600	13,700
Primary Care	10,600	5,100	6,900	5,300	5,900	4,600
Non-Primary Care	48,500	18,900	24,100	14,000	12,700	9,100
Medical Specialties	9,200	2300	4,400	2,200	3,600	1,700
Surgery	15,700	5,500	6,500	3,400	2,400	1800
Other	20,700	10,600	12,500	7,900	5,800	5,300
Hospitalist*	2,900	500	700	500	900	300

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

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

Exhibit 42: Modeled COVID-19 Demand Impact by Specialty

Specialty	Office Visits for COVID-19 [a]	Office Visits for Long COVID [b]	Hospitalization [c]	Total FTE Impact
Family Medicine	2,091	1,007	36	3,134
Internal Medicine	1,304	779	265	2,348
Geriatric Medicine	81	50	18	149
Neurology		186	35	220
Cardiology		322	97	419
Infectious Disease Specialists		114	148	263
Nephrologists		127	20	147
Endocrinologists		103	31	134
Hospitalists			591	591
Critical Care/Pulmonology		59	266	325
Total	**3,476**	**2,747**	**1,507**	**7,730**

Notes: [a] Assumes 110 million cases of COVID-19 annually, with 10% requiring outpatient treatment.[35] [b] Assumes a 1.48% increase in demand for hospital inpatient care due to COVID-19 hospitalizations, based on post-vaccine levels of hospitalizations and 5.5 average days per hospitalization.[36,38] [c] Assumes 3% of new COVID-19 cases result in long COVID, and that each new cases of long COVID will result in 2 outpatient visits.[35,44] The distribution of care across specialties is based on an assessment of the literature of which specialties treat patients for acute COVID-19 and long-COVID conditions.

NOTES

a. **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.

b. The "all other minority population" category includes American Indian and Alaska Native (14.8% growth between 2021 and 2036), Asian (32.8% growth), Native Hawaiian and Other Pacific Islander (17.8% growth), and some other race and two or more races (50.6% growth). Sample sizes in files used to develop physician demand projections, such as the Medical Expenditure Panel Survey, are too small to model these minority populations separately. https://www.census.gov/data/tables/2017/demo/popproj/2017-summary-tables.html

c. This geographic designation is for large fringe metropolitan counties in metropolitan statistical areas (MSAs) of 1 million or more population that do not qualify as large central medium metro counties in MSAs of 250,000-999,999 population based on the 2013 NCHS Urban-Rural Classification Scheme for Counties. https://www.cdc.gov/nchs/data_access/urban_rural.htm#2013_Urban-Rural_Classification_Scheme_for_Counties

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

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