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Physician Workforce Assessment Report

For the South Carolina Department of Health and Human Services

March 18, 2025

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About HMA

Health Management Associates, Inc. (HMA), is an independent, national research and consulting firm specializing in publicly funded healthcare and human services policy, programs, financing, and evaluation. We serve government, public and private providers, health systems, health plans, community-based organizations, institutional investors, foundations, and associations. Every client matters. Every client gets our best. With offices in more than 30 locations across the country and over 700 multidisciplinary consultants coast to coast, HMA's expertise, services, and team are always within client reach.

BACKGROUND

The US healthcare system faces a potential shortage of up to 86,000 physicians by 2036, according to projections from the Association of American Medical Colleges (AAMC). This projected shortage is driven by several factors, including population growth, which is expected to rise by 8.4 percent between 2021 and 2036, and a growing elderly population, with the 65+ age group projected to increase by 34.1 percent.[1]

In South Carolina, healthcare workforce shortages have already been evident. The state ranks 37th in healthcare system performance among US states,[2] with lower physician supply compared with the national average. Rural regions struggle to recruit and retain healthcare professionals, further exacerbating disparities in access to care. For primary care, many of these areas are designated health professional shortage areas (HPSAs), with 11 rural counties entirely designated HPSAs and 15 other counties with census tracts, which are also rural, being designated HPSAs for low-income populations.[3] South Carolina's physician-to-patient ratio is 23 percent less than the national average.[4]

South Carolina has taken significant action over the past two decades to respond to projections of physician shortages that the Council on Graduate Medical Education (COGME) published in 2005, including the opening of two new medical schools.[5] Total medical school graduates increased from a little over 200 in 2005 to approximately 500 currently, increasing the pipeline for the physician workforce by nearly 150 percent during a period when the population grew by 28 percent. First-year residency positions increased similarly, from 260 in 2005 to 568 in 2023, a 118 percent increase.

To further characterize these trends and project future physician workforce needs, the South Carolina Department of Health and Human Services (SCDHHS) engaged Health Management Associates, Inc. (HMA), to conduct a comprehensive workforce assessment of the supply, demand, and distribution of physicians throughout South Carolina. The objective of this project is to identify the gaps between the current and projected supply of physicians and the evolving needs of the population. The assessment focuses on quantifying the availability of physicians, evaluating healthcare service utilization through demographic trends, and projecting future workforce requirements across specialties. The results provide actionable insights to guide the SCDHHS's support of graduate medical education (GME) across South Carolina to meet residents' needs over the coming decade and serve as a resource for

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[1] GlobalData Plc. The Complexities of Physician Supply and Demand: Projections From 2021 to 2036. Association of American Medical Colleges. 2024. Available at: https://www.aamc.org/media/75236/download.

[2] Radley DC, Baumgartner JC, Collins SR, Zephyrin LC. The Commonwealth Fund 2023 Scorecard on State Health System Performance: Americans' Health Declines and Access to Reproductive Care Shrinks, But States Have Options. Commonwealth Fund. June 2023. Available at: https://www.commonwealthfund.org/publications/scorecard/2023/jun/2023-scorecard-state-health-system-performance.

[3] Live Healthy South Carolina. South Carolina State Health Assessment. December 2023. Available at: https://dph.sc.gov/sites/scdph/files/media/document/New%20PDFs/SHA-Report-20240521.pdf.

[4] Cicero Institute. South Carolina Physician Shortage Facts. 2024. Available at: https://ciceroinstitute.org/wp-content/uploads/2024/01/SC-Physician-Shortage-Facts-one-pager-1-31-2024.pdf.

[5] South Carolina Office for Healthcare Workforce. Trends of Available PGY-1 Residency Positions and Practicing Physicians in South Carolina, 2004-2023. September 2024. Available at: https://www.scahec.net/scohw/data/reports/143-SC-Trends-in-PGY1-Residency-Positions-2004-2023-Brief.pdf.

policymakers, healthcare leaders, and educators as they collaborate to address workforce gaps and build a sustainable, responsive healthcare system.

Process

Stakeholder Engagement Process

Engaging stakeholders was essential to collecting certain data, validating findings, and ensuring useful output to guide policies. Over the course of HMA's engagement, we conducted a series of three stakeholder meetings. Meetings were organized virtually to accommodate schedules, with optional in-person participation. Stakeholders included:

- Healthcare providers and provider organizations (e.g., hospitals, physician networks)
- GME program leaders and academic medical centers
- Policymakers, public health officials, and workforce development groups

The purpose of these meetings was to:

- Introduce the project scope and gather input on methods and use of findings (Meeting 1)
- Present detailed methodology and interim findings (Meeting 2)
- Share study results and ensure data experts from stakeholder organizations agreed with the accuracy of the quantitative findings (Meeting 3)

The iterative engagement process improved data accuracy and analytic rigor.

Data Sources Accessed

Data sources included:

- **National Provider Identifier (NPI) Registry and SCDHHS Credentialing Data**: Used to identify and categorize healthcare providers across the state, with cross-validation to ensure accuracy.
- **Medicare and Medicaid Claims Data**: Source of utilization data for South Carolina residents and used to categorize physicians as within or outside of South Carolina.
- **Residency Matching Data and Accreditation Council for Graduate Medical Education (ACGME) Program Data**: Used to understand the change over time in the number of trainees per specialty in regions of South Carolina.
- **US Census Data**: Informed demographic projections to assess future healthcare demand.
- **Medical Group Management Association (MGMA) Benchmarks**: Determined the expected output per specialist to derive the utilization of payers other than Medicare and Medicaid.

Assumptions Made in Discussion with Stakeholders

Some important assumptions we made include:

- The percentage of care per specialty performed outside the state in Medicare and Medicaid (calculated for each specialty) is assumed to be the same proportion of care delivered out of state for all other pay sources.
- Regional designation of individual physicians does not change from year to year, but rather is based on all years.
- The methodology assumes that on average physicians are producing the mean number of relative value units in the benchmark and that part time status is already accounted for in the benchmark.
- Actual utilization of services is assumed to be less than the demand if physician supply was higher. Demand is assumed to be the average utilization in the three counties with the highest utilization.

SURVEY RESULTS OF TRAINEES IN GME

SCDHHS GME Survey Report Section

The stakeholders identified in the prior section reviewed the survey questions and assisted in the communication about and dissemination of the survey. The survey was primarily administered to gain data that could influence supply projections of physicians in South Carolina.

Survey Overview

A Qualtrics survey was designed to capture the intentions of residents and fellows to remain in South Carolina after completing their residency or fellowship programs and to examine some of the variables that may influence their intentions. The survey was brief and distributed to GME residency and fellowship program participants across South Carolina, during the last week of August 2024.

The survey was divided into three sections. The purpose of the first section was to obtain basic respondent demographic information. The second section focused on the respondents' intent to remain in South Carolina post-training and gathered information on respondents' future practice plans after training. Section three questions delved into variables found in the national literature on life situational factors residents and fellows may be coping with and have been shown to influence postgraduate practice decisions made by students and trainees.[6] Section three questions were optional, which

[6] van Vendeloo SN, Prins DJ, Verheyen CCPM, Prins JT, van den Heijkant, van der Heijden FMMA, Brand PLP. The Learning Environment and Resident Burnout: A National Study. *Perspect Med Educ.* 2018;7(2):120-125. doi: 10.1007/s40037-018-0405-1

means respondents were able to submit their survey as completed without answering any or all the optional questions. Table 1 below outlines the question topics in each survey section.

Table 1. GME Questionnaire Topics

GME Survey: Question Topic by Section		
Section 1. Demographic Information	**Section 2.** Post-Training Intent to Remain in South Carolina	**Section 3.** Optional Questions
Training specialty	Anticipate remaining in SC post-training?	Unmet needs as resident/fellow
Training time remaining	If no, why not?	Student debt amount
Training location	What could SC offer to reconsider staying in SC?	Level of confidence in ability to repay debt
Next training sought if any, and where?	SC attributes	Dissatisfied with current training experience?
Location of medical school attended	Future preferred practice type	Rethinking medicine as a profession?
Name of medical school	Top three areas of importance for future practice	

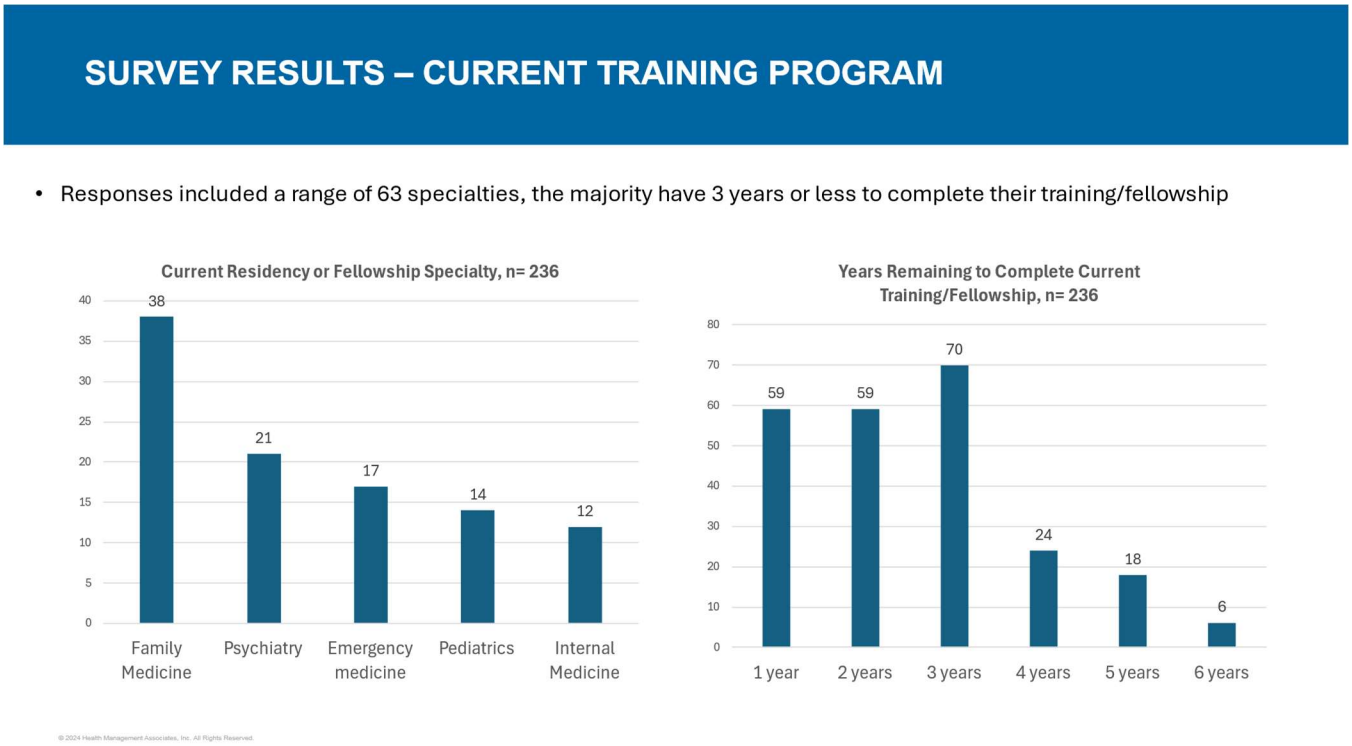
The survey was distributed to 1,557 recipients. 256 recipients (16.4%) responded to at least one survey question. 228 fully answered all questions in section one and two. 184 responded to at least one question in section three containing the optional questions.

Section 1. Demographic Information

The largest proportion of respondents (n=66) attended medical school in South Carolina. Of those individuals, the two South Carolina medical schools represented most frequently in our survey respondents were the Charleston campus of Medical University of South Carolina (MUSC) and the University of South Carolina School of Medicine, all campuses combined. In total, 30 respondents attended medical school internationally, representing graduates from 19 countries.

Respondents were enrolled in a range of 63 specialties. The top five specialty training programs were family medicine, psychiatry, emergency medicine, pediatrics, and internal medicine (n=102). Most respondents reported that they will complete their current residency or fellowship within the next three years (n=188).

Figure 1. Top Training Specialties and Years of Training Remaining



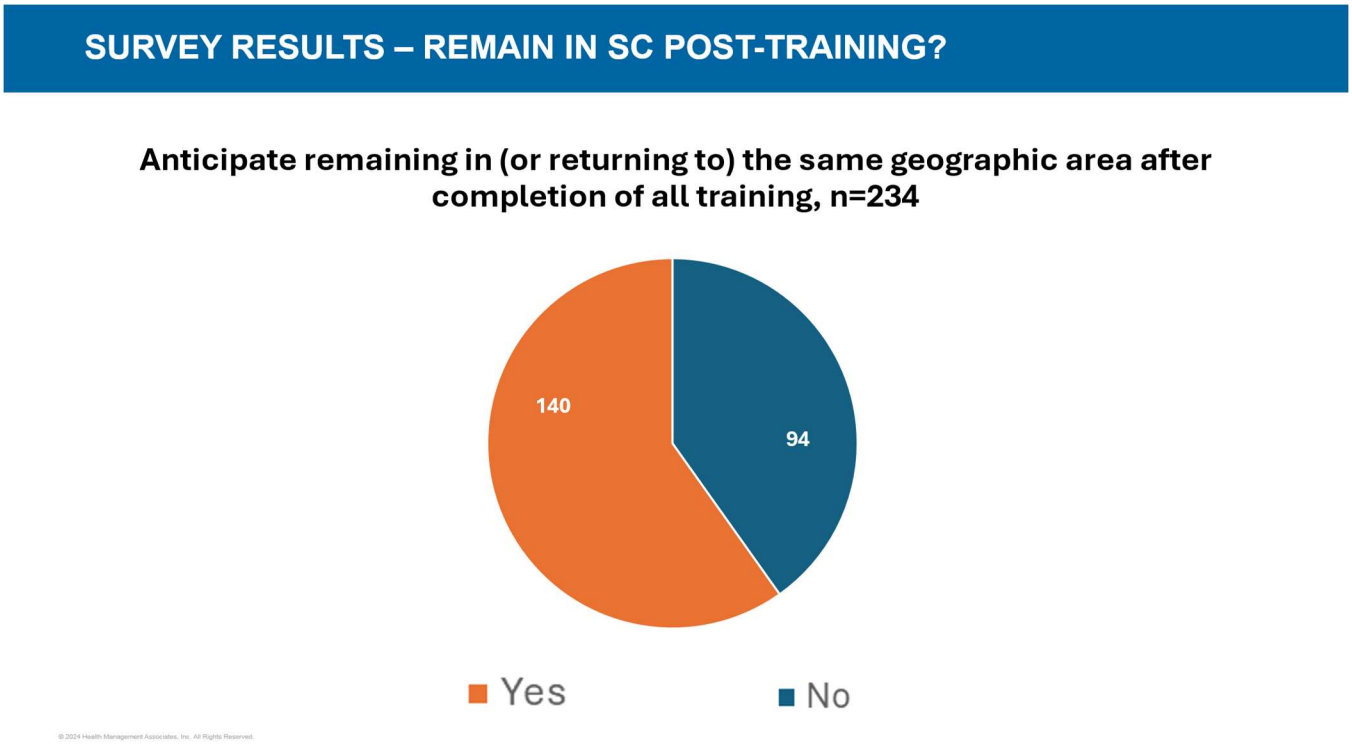
Five South Carolina training locations were most frequently reported. The largest number of respondents (n=84) reported training at the MUSC. Prisma Health in Greenville and Upstate combined accounted for 43 respondents. A total of 34 respondents reported training at Prisma Health Columbia. Spartanburg Regional was identified by 15 respondents and McLeod Regional Medical Center in Florence was identified by nine respondents as their training location.

Most respondents plan to enter practice at the end of their residency or fellowship (n=201) training, with 35 intending to seek additional training opportunities. Of these respondents, 26 reported plans to seek a fellowship, one plans to pursue another residency, and eight are unsure or did not specify the type of additional training they plan to seek.

Section 2. Intention to Remain in South Carolina Post-Training

Approximately 60 percent of responding trainees anticipate remaining in or returning to the same geographical area as their current training program upon completion of all training (n=140).

Figure 2. Trainees Remaining or Returning to Same Geographic Area



We asked respondents what they viewed as South Carolina's strengths for retaining physician trainees who complete their residency or fellowship in the state. The query was an open, free text format item; therefore, responses were categorized during analysis. We received 228 responses to the item. The top five categories of South Carolina's strengths were identified as:

- Climate or weather (n=46)
- Affordable cost of living (n=46)
- The outdoor environment: coastal lands and beaches, access to mountains and beaches (n=45)
- Location, mentioned without further explanation (n=42)
- Communities: family-focused; diverse, friendly, southern hospitality, reasonable cost of living (n=33)

Respondents who said they plan to leave the geographic area of their training program cited several reasons from wanting to relocate, including to be near family or military obligations, concerns regarding the political environment, and salary considerations, among others. Later in the survey, respondents were directly asked to identify their top factors for relocating outside of South Carolina post-training. The four most cited categories for relocation were (n=88):

- 58 percent indicated family or significant other considerations
- 54 percent indicated plans to move back to their home state/country outside of South Carolina
- 39 percent indicated salary considerations
- 31 percent indicated the political or healthcare policy environment in South Carolina

When respondents who replied with clear intent to leave South Carolina post-training were asked, "What could a South Carolina practice offer that would allow you to reconsider staying in SC?", the top responses were categorized as (1) competitive salary and (2) work-life balance.

Though the cost of living in South Carolina is seen as favorable, several respondents noted salaries seemed too low to support a comfortable lifestyle, purchase a home, raise a family, and pay off educational debt. A competitive salary and loan repayment or forgiveness was frequently raised by respondents as a motivator to reconsider staying in South Carolina post-training.

Finally, in this section we queried respondents on their vision of their future practice via two survey items. The first item focused respondents' attention on selecting their top three areas of importance when considering **where to enter practice** post-training.

Reflecting responses received in response to previous questions, the responses strongly focused on two areas of importance, garnering over 80 percent of respondent's selection when considering ***where to enter practice*** (n=228):

- 88 percent indicated "Schedule Flexibility (On-Call Schedules, Work-Life Balance, PTO, etc.)" as a top area of importance (n=201)
- 84 percent indicated "Compensation & Benefits Package" as a top area of importance (n=192)

The next two highest areas of importance indicated by respondents were having a "community of providers (which includes consultation connections)," identified by 38 percent (n=87) of respondents; and "well-being and recognition," which was identified by 32 percent (n=74) of respondents.

The second item asked the trainees **which particular practice types** they were considering for their future practice. A list of options was provided, and respondents were asked to indicate all that was under their consideration. Table 2 below illustrates the resulting tallies.

Table 2. Preferred Practice by Trainees

Preferred Practice Types (n=228)		
Practice Type	***Percentage (%)***	***Count (n)***
Employment in Health System	66%	150
Academic Setting	54%	123
Independent Physician Group	48%	109
Community Health Center	28%	64
Solo Practice	16%	36
Other	5%	12

Section 3. Optional Questions

The third and final section of the Qualtrics survey included questions exploring situational factors residents and fellows may be coping with and have been shown to influence postgraduate decisions by students and trainees across several professions and disciplines. In addition, a medicine-specific phenomenon in recent literature is resident attrition during or toward the end of their residency training (Agarwal et al., 2019; Lu et al., 2019). [7,8] Therefore, we added a query to this section of the survey to learn if responding South Carolina residents may be contemplating reconsideration of medicine as their career; 81 percent of respondents (n=184) agreed to respond to the optional questions.

The first question was about "unmet needs." The total number of responses to the question of unmet needs was 286, with 110 respondents selecting "none of the above" with no additional data under "Other."

A total of 88 respondents identified the inability to find childcare, care for other dependents, or adult family members as problematic. In all, 24 residents and/or fellows reported being unable to find work for their partner, spouse, or significant other. Some respondents reported being unable to find adequate or stable housing. Inadequate transportation options were also cited by a few respondents as problematic. Also of note, six of these respondents reported struggling with food insecurity. Several respondents

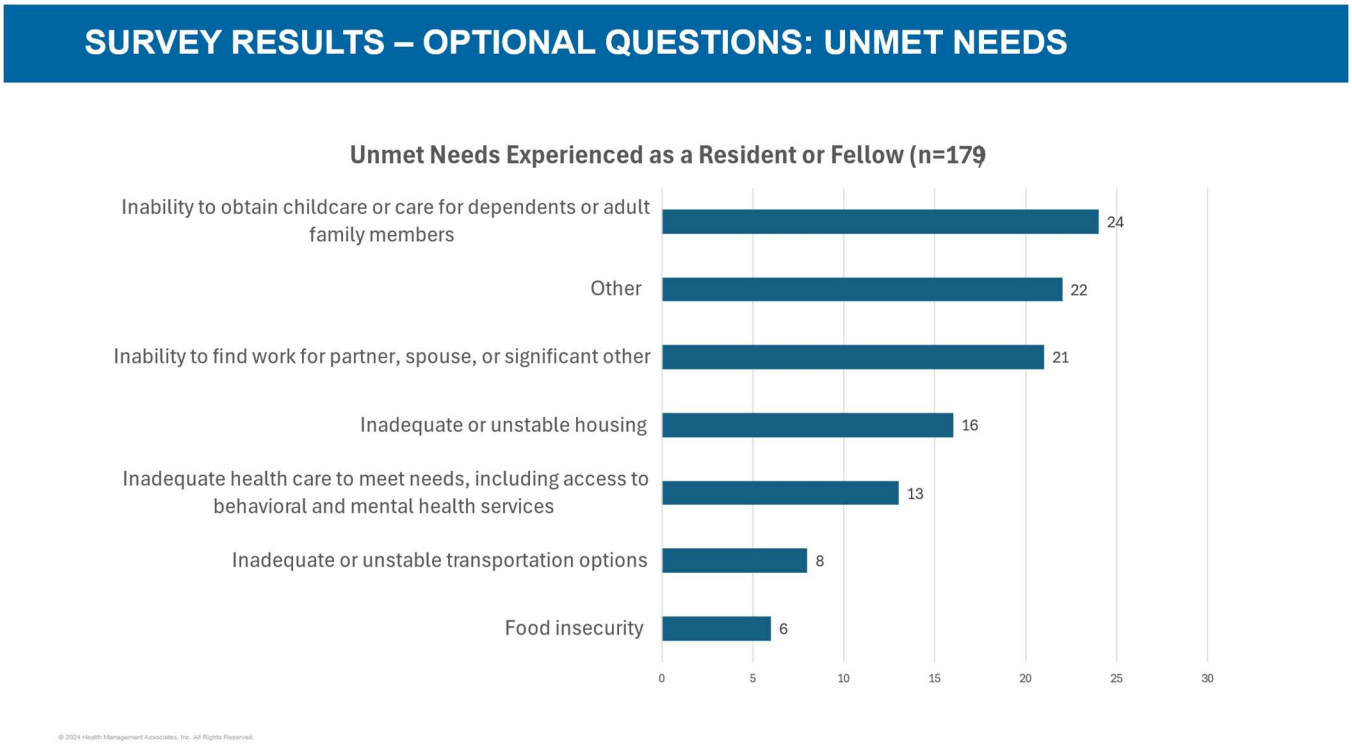
[7] Lu DW, Hartman ND, Druck J, Mitzman J, Strout TD. Why Residents Quit: National Rates of and Reasons for Attrition Among Emergency Medicine Physicians in Training. *West J Emerg Med.* 2019;20(2):351–356. doi: 10.5811/westjem.2018.11.40449.

[8] Agarwal N, White PD, Pannullo SC, Chambless LB. Analysis of National Trends in Neurosurgical Resident Attrition. *J Neurosurg*. 2018;131(5):1668–1673. doi: 10.3171/2018.5.JNS18519

(n=13) reported inadequate healthcare access to meet needs, which may include access to behavioral or mental health services.

Of the respondents, 22 provided additional information under the answer option “other” with the ability to provide short answers. The short answers provided include financial concerns (cost of living, salary), childcare (with a focus on cost of care and lack of emergency childcare options), housing expenses (Charleston was specifically mentioned), student debt, the inability to obtain personal doctor appointments, and difficulty finding an eligible dating pool for those wanting to find a partner and settle down.

Figure 3. Unmet Needs Amongst Trainees



*Additionally, 110 respondents selected “None of the above” and did not provide data under “Other”.

Next, we explored student loans and education-related debt, asking respondents about the amount of student debt they carry and their confidence in their ability to pay back student loans or education-related debt. Education-related debt can be found on credit cards, personal loans, other private funding obligations, etc., and differs from student loans. Of the 170 who responded to the “amount of student debt” question, 144 respondents reported having student debt. More than 118 of these respondents are responsible for student debt over $200,000, with 21 responsible for student debt over double that amount. Only 59 percent of respondents with student loans or education-related debt (n=154) are “confident” or “very confident” in their ability to repay their student loans/educational debt. Of note, 29 respondents indicated they do not have student or educational debt.

Physician supply literature has started to recognize a concerning phenomenon in the current generation of residents. Trainees are rethinking entering the medical profession during their residency program. To explore the possibility of postgraduate trainee attrition, we asked if respondents were rethinking medicine as a profession. A total of 32 (17%) responding South Carolina residents and fellows (n=184) reported they are rethinking medicine as a profession.

Lastly, we asked the residents about their satisfaction with their current residency or fellowship program. Overall, 87 percent of South Carolina's responding residents and fellows are satisfied with their training program.

Several limitations of the survey introduce caution in generalizing the results and limiting its value predicting future physician supply in South Carolina. The response rate was low ($\leq$ 17%) likely secondary to a limited response time. The survey was emailed to 1,557 recipients with a one week (seven day) open period. Approximately 16.7 percent responded to at least one required survey question.

The information gathered highlights some of the advantages South Carolina has in recruiting and retaining physicians, including current residents and fellows, and those completing their current residency or fellowship programs. However, further study is needed to better understand and effectively respond to the unmet needs identified that may influence residents' and fellows' decisions to practice in South Carolina post-training. Lastly, while the survey response rate is small, further exploration is warranted to better understand both the reported high satisfaction with current residency and fellowship programs, alongside the fact that over 17 percent of respondents are reconsidering medicine as their chosen profession.

PHYSICIAN WORKFORCE ANALYSIS (METHODOLOGIES & OUTCOMES)

The analysis of the physician workforce in South Carolina was based primarily on a set of national scale databases: Medicare claims in the virtual research data center (VRDC), the Transformed Medicaid Statistical Information System (T-MSIS), and the National Plan and Provider Enumeration System (NPPES). Other data sources included the Centers for Medicare & Medicaid Services (CMS) tables for matching claims codes to wRVUs[9] and MGMA 2023 Southern Section RVUs per full-time equivalent (FTE) for each specialty.[10]

Specialties Analyzed

The specialties analyzed were based on an initial list from the South Carolina Department of Health and Human Services plus additions recommended by HMA (e.g., internal medicine subspecialties) and subtractions that were unlikely to produce useful results (e.g., transitional year). The stakeholder group reviewed and endorsed the list of 27 specialties in the first section of Table 3. Other specialties were added from a list of specialties that the stakeholder group identified as the next tier of importance. Most on the primary list were subject to all aspects of the analysis. Medicaid benchmark data was not available for anesthesia, interventional radiology and pathology and so were not part of the Medicaid analysis. Some other specialties were subject to limited aspects of the analysis, identified in the second section of Table 3.

Table 3. Per Specialty Components Analyzed

Specialty	Components of Analysis
Anesthesiology	All except Medicaid analysis
Cardiology	All
Dermatology	All
Emergency Medicine	All
Endocrinology	All
Family Medicine	All
Gastroenterology	All
General Surgery	All
Hematology and Oncology	All

[9] Centers for Medicare & Medicaid Services. PFS Relative Value Files. 2024. Available at: https://www.cms.gov/medicare/payment/fee-schedules/physician/pfs-relative-value-files.

[10] Medical Group Management Association. Data Report: Provider Pay and the Dawn of a New Era of Productivity. May 2024. Available at: https://www.mgma.com/getkaiasset/252744ee-c63b-4a96-9211-8a5d6b908b39/MGMA-2024-Provider-Compensation-Data-Report.pdf.

Specialty	Components of Analysis
Internal Medicine	All
Internal Medicine/Pediatrics	Not categorized in Medicare/Medicaid claims
Interventional Radiology	All except Medicaid analysis
Neurology	All
Obstetrics and Gynecology	All
Orthopedics	All
Otolaryngology	All
Pathology	All except Medicaid analysis
Pediatric Neurology	All
Pediatric Psychiatry	All
Pediatrics	All
Plastic Surgery	All
Psychiatry	All
Radiology	All
Rheumatology	All
Thoracic Surgery	All
Urology	All
Vascular Surgery	All
Other specialties subject to components of the analysis	
Infectious Disease	All except no categorization beyond NPPES data
Nephrology	All except no categorization beyond NPPES data
Neurosurgery	No Medicaid analysis, no categorization beyond NPPES data
Ophthalmology	All except no categorization beyond NPPES data
Pulmonary	All except no categorization beyond NPPES data
Combinations of specialties	

Specialty	Components of Analysis
Primary Care	All: a combination of internal medicine, family medicine, and pediatrics

NPI Categorization

Along with the Centers for Medicare & Medicaid Services (CMS) Medicare Provider and Supplier Taxonomy Crosswalk, the NPPES were used to accurately link NPIs found in claims data to their respective specialties. For Medicare data, both taxonomy and Medicare specialty codes were used in the matching process, while Medicaid data relied on a simpler method, as most NPIs were mapped to a single specialty through the NPPES. When multiple specialties were associated with an NPI, the specialty with the highest claim count was assigned. Additionally, for NPIs lacking a specialty designation, a specialized categorization process based on claim history was employed, described further below.

The first exercise assessed the accuracy of the NPPES categorization of specialties. HMA randomly selected up to 55 NPIs from each of the 27 specialties. This number was chosen because if the whole set were correct for a specialty, there would be an 80 percent likelihood that the rate of accuracy for the rest of the NPIs for that specialty would be above 97 percent. Some specialties had less than 55 NPIs in South Carolina (interventional radiology, pediatric neurology, pediatric psychiatry, and thoracic surgery). Table 2 shows the result of the manual review of 1,319 NPIs. In addition, 30 other NPIs were not categorizable, mostly because of a deactivated NPI with scant information upon search.

Table 4. Manual Confirmation of Randomly Selected Physicians in Each Specialty

Specialty	Number of NPIs Confirmed Concordant	Number of NPIs Confirmed Not Correct Specialty	Accuracy
Anesthesiology	55	0	100%
Cardiology	50	2	96%
Dermatology	53	0	100%
Emergency Medicine	52	0	100%
Endocrinology	55	0	100%
Family Medicine	51	2	96%
Gastroenterology	55	0	100%
General Surgery	45	10	82%
Hematology and Oncology	50	5	91%

Specialty	Number of NPIs Confirmed Concordant	Number of NPIs Confirmed Not Correct Specialty	Accuracy
Internal Medicine	48	7	87%
Internal Medicine/Pediatrics	46	5	90%
Interventional Radiology	15	0	100%
Neurology	52	2	96%
Obstetrics and Gynecology	54	0	100%
Orthopedics	54	0	100%
Otolaryngology	54	0	100%
Pathology	52	2	96%
Pediatric Neurology	7	2	78%
Pediatric Psychiatry	40	2	95%
Pediatrics	51	2	96%
Plastic Surgery	50	3	94%
Psychiatry	55	0	100%
Radiology	44	11	80%
Rheumatology	55	0	100%
Thoracic Surgery	23	0	100%
Urology	54	0	100%
Vascular Surgery	43	1	98%

Predictive models for NPI specialty categorization were developed using the 1,270 verified NPIs. Despite testing multiple standalone predictive models to improve categorization, none surpassed the accuracy of NPPES data. The multiple iterations of machine learning models were applied to uncategorized NPIs, further refining specialty mapping above the baseline of 95.8 percent. We examined claim data by extracting the top 50 ICD-10 and HCPCS/CPT codes most frequently billed for each of the verified NPI and specialty. This approach highlighted codes uniquely tied to each specialty, enabling the calculation of mean and standard deviation proportions for each NPI's claim distribution across specialties. For uncategorized NPIs, specialty assignment was made if their proportions exceeded specific thresholds based on mean and standard deviation calculations.

The Medicaid specialty mapping approach was largely similar. For NPIs without mapped specialties, we used the Medicare rules-based model, incorporating the top 50 unique codes from Medicare's training data and the same statistical thresholding process for specialty assignment if claims met the required thresholds.

The models developed through this categorization exercise effectively addressed NPIs with absent or ambiguous specialty categorizations, encompassing approximately 8 percent of physician NPIs in the Medicare dataset and less than one percent of physicians in the Medicaid dataset. Using this method, we successfully categorized 62 percent of these NPIs to one of the 27 specialties.

Supply

In this instance, supply is defined as the number of specialists in a region with service activity in Medicare fee-for-service (FFS) or Medicaid. This definition of supply omits some specialists that have opted out of Medicare, but for non-pediatric physicians, less than 1 percent in South Carolina have opted out (Ochieng & Schwartz, 2020).[11] The number may be higher for pediatric specialties; however, Medicaid data were accessed, which will likely cover most pediatricians and specialists. Psychiatry has the highest opt-out rates for Medicare, and an even higher opt-out rate for pediatric psychiatry would be expected.

Supply was defined as the sum of NPIs that had 50 percent or more of their Medicare FFS patients plus Medicaid patients from South Carolina from 2016 to 2022. An NPI was considered as part of the supply in any given year if the provider met the following criteria:

- The NPI had billing activity in the year, with a threshold of 250 RVUs for NPIs that had graduated within the 10 years prior (to reduce the NPIs that had not yet graduated from their training but that were doing modest moonlighting)
- If the NPI had no billing activity in a year but had billing activity greater than the threshold when less than ten years from graduation before and after the year in which no billing activity occurred.

The advantage of this methodology is that physicians are not counted in the supply in the year after the billing activity ceases, whereas the Masterfile may take some time to reflect the cessation of clinical activity (Kletke, 2004).[12] In addition, the claims methodology defines a physician as part of the supply by the location of the patients served, rather than the physician address in the Masterfile, which may have a delay in being updated. The supply of NPIs in 2020 by the above methodology was compared with the master file by accessing the AAMC report titled, 'South Carolina Physician Workforce Profile.' The comparisons are shown in Table 5.

[11] Ochieng N, Schwartz K. (2020, October 22). How Many Physicians Have Opted-Out of the Medicare Program? KFF. October 22, 2020. Available at: https://www.kff.org/medicare/issue-brief/how-many-physicians-have-opted-out-of-the-medicare-program/.

[12] Kletke PR. (2004). Physician Workforce Data: When the Best Is Not Good Enough. Health Services Research. October 2024;39(5):1251–1256. doi: 10.1111/j.1475-6773.2004.00288.x

Table 5. Ratio of Specialists by Claims to Specialists in the AMA Masterfile

Specialty	VRDC Method for Identifying Specialists for year 2020	AAMC Analysis Using AMA Physician Masterfile 12/31/2020	Ratio of Medicare plus Medicaid NPIs (VRDC) to Physicians in AMA Masterfile
Anesthesiology	497	523	0.95
Cardiology	364	365	1.00
Dermatology	165	145	1.14
Emergency Medicine	789	768	1.03
Endocrinology	39	91	0.43
Family Medicine	1,841	1,943	0.95
Gastroenterology	194	203	0.96
General Surgery	343	363	0.94
Hematology and Oncology	145	165	0.88
Internal Medicine	1,223	1,314	0.93
Internal Medicine/Pediatrics	0	88	n/a
Interventional Radiology	28	59	0.47
Neurology	204	154	1.32
Obstetrics and Gynecology	513	615	0.83
Orthopedics	424	279	1.52
Otolaryngology	145	139	1.04
Pathology	150	149	1.01
Pediatric Neurology	0	0	n/a
Pediatric Psychiatry	40	0	n/a
Pediatrics	633	812	0.78

Specialty	VRDC Method for Identifying Specialists for year 2020	AAMC Analysis Using AMA Physician Masterfile 12/31/2020	Ratio of Medicare plus Medicaid NPIs (VRDC) to Physicians in AMA Masterfile
Plastic Surgery	93	93	1.00
Psychiatry	335	457	0.73
Radiology	350	370	0.95
Rheumatology	81	89	0.91
Thoracic Surgery	35	68	0.51
Urology	140	154	0.91
Vascular Surgery	66	56	1.18
Other specialties subject to components of the analysis			
Infectious Disease	89	98	0.91
Nephrology	132	156	0.85
Neurosurgery	72	0	n/a
Ophthalmology	242	261	0.93
Pulmonary	141	72	1.96

Most specialties align with the American Medical Association (AMA) Masterfile. The Medicare and Medicaid claims method is a more robust estimate of supply because it reflects actual billing activity; however, some mis-categorization is likely to occur. For example, endocrinologists may be identified in NPPES as internal medicine and be billing as internal medicine physicians, therefore being categorized as internal medicine in this analysis, whereas the AMA Masterfile could have them correctly—or potentially incorrectly—categorized as endocrinology. If this underestimated the supply of endocrinologists, it would cause a parallel demand underestimation, making the supply-demand gap rate accurate in slope but underestimated in magnitude.

Demand

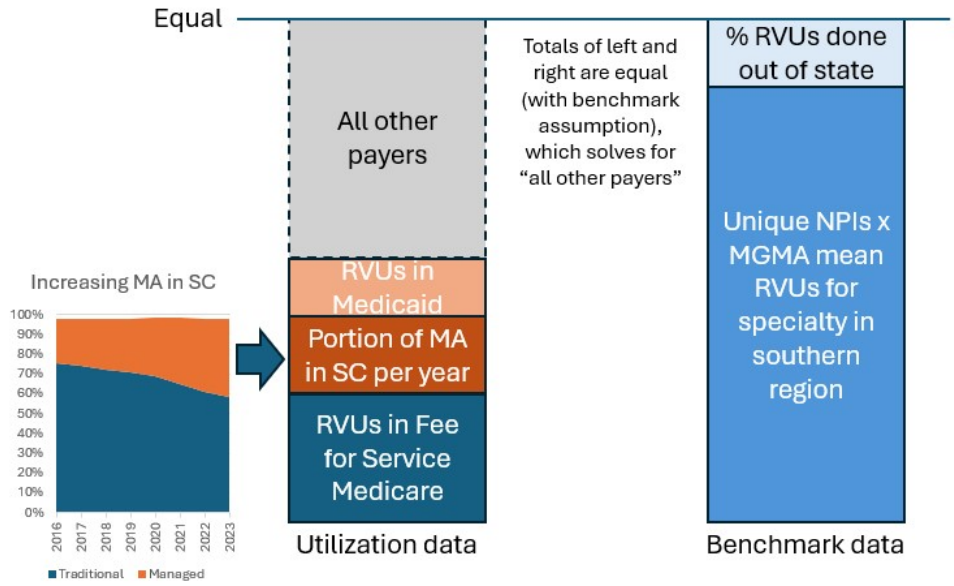
Due to demographic shifts, population growth, and evolving care needs, the demand for healthcare services across South Carolina is increasing. As one of the fastest-growing states in the country, South Carolina faces mounting pressure to meet demands for immediate and long-term healthcare needs.

According to US Census survey data, South Carolina's population grew by 10.5 percent between 2016 and 2024, and is projected to grow another 13.8 percent by 2035 (from 4.9 million in 2016 to 5.4 million in 2024 to 6.2 million in 2035). The aging population (individuals aged 65 and older) will have risen 86 percent between 2016 and 2035, and the 75+ population will have risen by 132 percent (from 300,000 to 700,000). These demographic trends are driving demand for specialties that address chronic conditions, geriatric care, and preventive services, creating new challenges for healthcare access and physician workforce capacity.

Methodology for Assessing Demand

To quantify healthcare demand, the analysis used Medicare and Medicaid claims data and population statistics from the US Census. Demand was measured using relative value units (RVUs), a standardized metric that reflects the work of physicians and other healthcare providers. Population demand was calculated for each specialty from 2016 through 2023 for each of the four regions of South Carolina (Lowcountry, Midlands, Pee Dee, and Upstate). RVUs in Medicare FFS were adjusted each year by the proportion of managed Medicare in South Carolina. Medicaid RVUs were then added to the total Medicare RVUs. The RVUs for all other payers were derived through MGMA benchmark data for the southern region for each specialty.[10] Each unique NPI defined through the supply methods described earlier was assumed to be performing, on average, the mean RVUs in this benchmark data. These RVUs of South Carolina specialists were adjusted up by the percentage of Medicare FFS and Medicaid activity occurring external to South Carolina. All other payers RVUs equaled the total RVUs expected for the individual specialists identified adjusted up to account for care outside of South Carolina, minus the Medicare and Medicaid RVUs. These steps are shown visually in Figure 4 seen below.

Figure 4. Steps to Determine Demand in All Other Payers



RVUs per payer were then divided by a segment of the population that best reflects the payer class, creating an RVU per person in each region for each payer type and in each county for Medicare and Medicaid. For Medicare, the population aged 65 and over was used. For Medicaid, the enrolled population was used as supplied by SC DHHS (see Appendix B). For all other payers, the population younger than age 65 minus the number of Medicaid enrollees was used.

Table 6 below shows the RVUs per specialty per region in 2022. For Medicare and Medicaid, the demand projections used the average of the RVUs per population from the three highest counties (excluding Marion, Marlboro and McCormick due to aberrant numerator and denominator data). Appendix D shows the RVUs per person for the three highest counties. For all other payers, the demand projections applied the RVUs from the region with the highest demand. The highest region or the three highest counties were used with the assumption that those regions or counties with lower demand were being inhibited by physician supply constraints, a reasonable assumption given South Carolina's relatively low number of physicians as compared with the rest of the United States.

Table 6. Demand in RVUs per Population per Specialty

Specialty	RVUs per Population in 2022: Medicare | Medicaid | All other payers			
	Lowcountry	Midlands	Pee Dee	Upstate
Anesthesiology	0.15 | 0.02 | 1.77	0.13 | 0.01 | 0.67	0.19 | 0.02 | 1	0.2 | 0.02 | 1.08
Cardiology	1.68 | 0.13 | 0.89	2.5 | 0.17 | 0.55	2.06 | 0.17 | 0.62	1.93 | 0.13 | 0.6
Dermatology	0.91 | 0.05 | 0.57	0.8 | 0.02 | 0.31	0.67 | 0.01 | 0.1	0.71 | 0.03 | 0.22
Emergency Medicine	1.66 | 1.25 | 1.25	1.73 | 1.05 | 0.69	1.63 | 0.91 | 1.01	1.74 | 0.92 | 1.27
Endocrinology	0.08 | 0.02 | 0.11	0.1 | 0.01 | 0.06	0.07 | 0.01 | 0.1	0.06 | 0.01 | 0.03
Family Medicine	2.15 | 0.58 | 2.05	2.12 | 0.78 | 1.94	2.58 | 0.73 | 3.29	2.66 | 1.12 | 3.4
Gastroenterology	0.77 | 0.08 | 0.4	0.71 | 0.06 | 0.15	0.68 | 0.06 | 0.38	0.67 | 0.07 | 0.4
General Surgery	0.66 | 0.23 | 0.86	0.8 | 0.27 | 0.41	0.93 | 0.25 | 0.75	0.82 | 0.18 | 0.78
Hematology and Oncology	0.35 | 0.03 | 0.33	0.31 | 0.03 | 0.07	0.3 | 0.03 | 0.24	0.37 | 0.03 | 0.25
Internal Medicine	2.21 | 0.3 | 1.98	2.33 | 0.28 | 1.45	2.14 | 0.33 | 2.08	2.42 | 0.34 | 1.91
Internal Medicine / Pediatrics	No data	No data	No data	No data
Interventional Radiology	0.08 | 0.02 | 0.05	0.17 | 0.02 | 0.02	0.09 | 0.01 | 0.03	0.1 | 0.02 | 0.05
Neurology	0.47 | 0.08 | 0.42	0.41 | 0.08 | 0.19	0.46 | 0.08 | 0.08	0.48 | 0.11 | 0.3

Specialty	RVUs per Population in 2022: Medicare | Medicaid | All other payers			
	Lowcountry	Midlands	Pee Dee	Upstate
Obstetrics and Gynecology	0.23 | 0.77 | 1.35	0.26 | 0.66 | 1.02	0.21 | 0.63 | 0.97	0.19 | 0.61 | 1.11
Orthopedics	1.71 | 0.2 | 1.05	1.59 | 0.2 | 0.65	1.74 | 0.19 | 0.84	1.51 | 0.21 | 1.01
Otolaryngology	0.4 | 0.17 | 0.44	0.41 | 0.16 | 0.26	0.36 | 0.14 | 0.09	0.29 | 0.13 | 0.28
Pathology	0.25 | 0.05 | 0.38	0.26 | 0.04 | 0.19	0.25 | 0.04 | 0.3	0.21 | 0.03 | 0.22
Pediatric Neurology	0 | 0.01 | 0.02	0 | 0.01 | 0.01	0 | 0.01 | 0	0 | 0 | 0
Pediatric Psychiatry	0.01 | 0 | 0.01	0.02 | 0.02 | 0.07	0.01 | 0.01 | 0.06	0.01 | 0.02 | 0.04
Pediatrics	0 | 1.27 | 0.97	0.02 | 1 | 0.63	0.03 | 0.99 | 0.5	0.01 | 1.03 | 1.09
Plastic Surgery	0.08 | 0.03 | 0.28	0.12 | 0.03 | 0.18	0.12 | 0.02 | 0.28	0.06 | 0.03 | 0.19
Psychiatry	0.13 | 0.08 | 0.58	0.17 | 0.07 | 0.41	0.1 | 0.06 | 0.34	0.16 | 0.08 | 0.43
Radiology	1.66 | 0.37 | 1.32	1.61 | 0.33 | 0.4	1.79 | 0.36 | 0.45	1.55 | 0.31 | 0.77
Rheumatology	0.12 | 0.01 | 0.2	0.13 | 0.01 | 0.11	0.1 | 0.01 | 0.13	0.13 | 0.01 | 0.13
Thoracic Surgery	0.12 | 0.01 | 0.09	0.11 | 0.01 | 0.04	0.13 | 0.01 | 0.08	0.09 | 0.01 | 0.06
Urology	0.67 | 0.06 | 0.31	0.58 | 0.06 | 0.14	0.73 | 0.06 | 0.2	0.52 | 0.05 | 0.27
Vascular Surgery	0.34 | 0.02 | 0.25	0.15 | 0.01 | 0.01	0.28 | 0.02 | 0.17	0.32 | 0.03 | 0.17
Infectious Disease	0.09 | 0.02 | 0.23	0.1 | 0.02 | 0.15	0.12 | 0.03 | 0.18	0.08 | 0.02 | 0.11
Nephrology	0.36 | 0.04 | 0.37	0.45 | 0.03 | 0.22	0.47 | 0.05 | 0.21	0.34 | 0.03 | 0.17
Neurosurgery	0.25 | 0.05 | 0.26	0.26 | 0.04 | 0.14	0.26 | 0.05 | 0.08	0.17 | 0.04 | 0.14
Ophthalmology	1.33 | 0.1 | 0.57	1.33 | 0.07 | 0.24	1.13 | 0.08 | -0.01	1.29 | 0.09 | 0.22
Pulmonary	0.31 | 0.03 | 0.22	0.38 | 0.04 | 0.19	0.42 | 0.04 | 0.24	0.39 | 0.05 | 0.25
Primary Care	10.27 | 4.26 | 11.21	15.09 | 6.91 | 10.84	14.21 | 5.91 | 12.07	9.26 | 5.46 | 11.1

Regional Variations in Demand

Lowcountry demand is the highest for most specialties, likely reflective of a greater number of specialists because of the MUSC's main campus presence and the urban setting retaining more trainees. It is also important to note that the "all other payer" category is derived from the supply multiplied by MGMA minus Medicare. If Lowcountry specialists, on average, have lower productivity because some are in academic practice, this circumstance would tend to inflate the "all other payer" category. Although the highest demand utilization is used to project future utilization, regional variation in population growth as well as variations in the rate of growth of aged populations, make the projections different for each region. Somewhat more urban regions such as the Midlands and Lowcountry are projected to see higher population growth than Upstate or Pee Dee. In contrast, rural regions, particularly Pee Dee, will experience increasing demand despite a somewhat slower rate of population growth due to the rising healthcare needs of aging residents, reflected in the generally higher RVUs per population in Medicare.

Gaps and Projections

For purposes of analysis and communication, the demand in RVUs is translated to FTEs of specialists by dividing the expected RVUs per year by the MGMA RVUs per specialist (RVUs per year per specialist source: MGMA southern region 2022). The resultant demand is subtracted from the supply, recalling that the supply is the individual NPIs with 50 percent or more of their patients in South Carolina with regional assignment by the highest number of RVUs done with patients in a region. This defines the gap in each year. A positive gap means more NPIs are available than needed to meet the needs of the population, whereas a negative number means supply is insufficient to meet the demand.

From 2016 to 2022, supply was the actual supply (unique NPIs categorized to a specialty) and demand was the per population RVUs in the highest demand region in 2022 multiplied by the population estimated or projected by the US Census. Demand is subtracted from supply to define the gap in each historical year. In the region with the highest demand, the supply will be closely matched to the demand in the year 2022, but there will be a gap that is reflective of the current percentage of care that is done by specialists assumed to be outside of South Carolina (defined as specialists with less than 50 percent of their patients from South Carolina). Per this analysis, this is considered a gap in the supply being covered by non-South Carolina physicians, though it is understood that some care can and will be covered externally. Table 7 shows the percentage of overall RVUs in each specialty that was completed out of state in 2022.

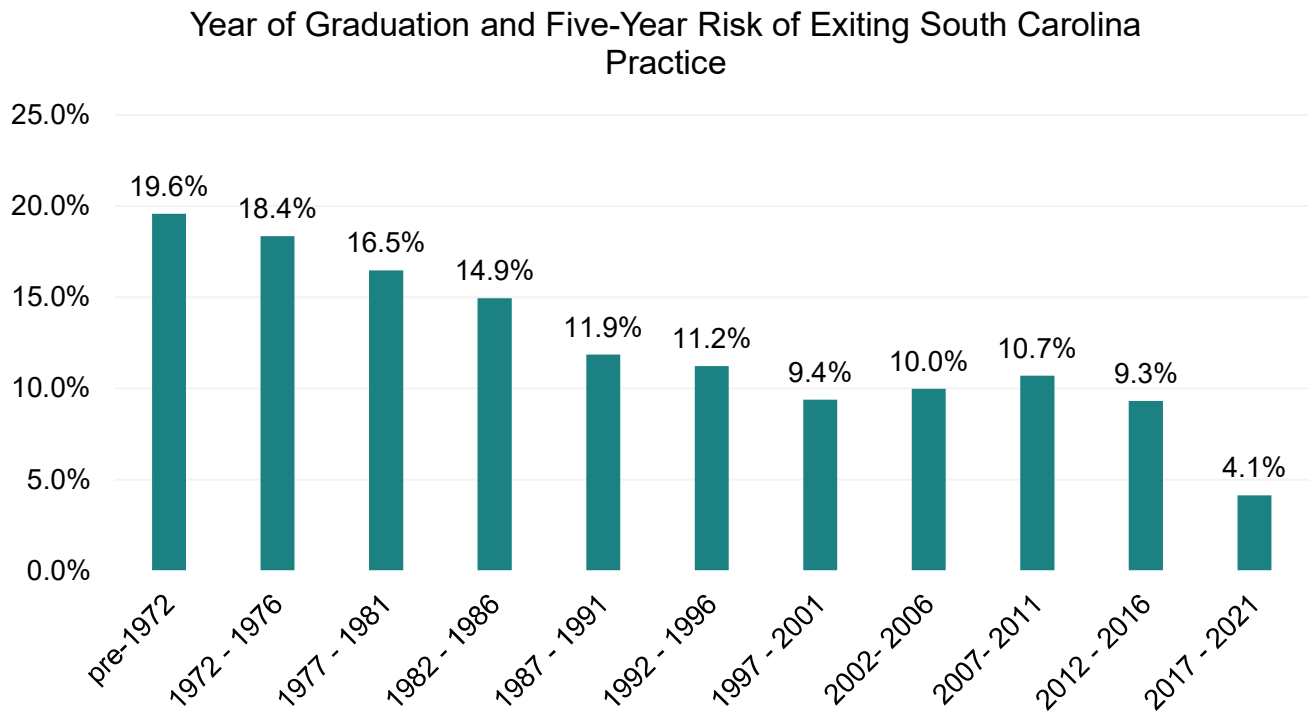
Table 7. Percent of Out of State Care Provided per Specialty

Specialty	Percent of Out of State Care
Anesthesiology	12.5%
Cardiology	10.4%
Dermatology	11.6%
Emergency Medicine	9.8%
Endocrinology	16.9%
Family Medicine	4.3%
Gastroenterology	10.0%
General Surgery	11.6%
Hematology and Oncology	10.9%
Internal Medicine	11.2%
Internal Medicine/Pediatrics	No Data
Interventional Radiology	11.8%
Neurology	14.8%
Obstetrics and Gynecology	6.0%
Orthopedics	10.9%
Otolaryngology	8.8%
Pathology	25.5%
Pediatric Neurology	22.2%
Pediatric Psychiatry	11.9%
Pediatrics	3.1%
Plastic Surgery	19.8%

Specialty	Percent of Out of State Care
Psychiatry	10.7%
Radiology	15.6%
Rheumatology	10.9%
Thoracic Surgery	18.2%
Urology	9.1%
Vascular Surgery	13.2%
Infectious disease	14.2%
Nephrology	9.3%
Neurosurgery	16.5%
Ophthalmology	10.6%
Pulmonary	11.2%

In the years 2023 through 2035, the supply is projected by continuing the rate of entrants that occurred in the last five years of the dataset (2018−2022), with exits modeled at the level of individual NPIs, except for new entrants which were assumed to be 10 years after graduation on average. The exit model used the year of graduation reported in NPPES for each NPI. Risk of exit in the years 2018 (the second year of potential exits) through 2022 was ascertained using RVU activity. An NPI was counted as an exit if the NPI had RVU activity in a prior year and no activity for the remaining years. For NPIs within 10 years of graduation, an RVUs threshold of 250 was set for the NPI to be counted to decrease the effect of trainees with small amount of activity that were not true entrants or exits. For NPIs without a year of graduation (38%, n=7,811), 158 NPIs from the specialty categorization exercise without a graduation year and 100 additional random NPIs without a graduation year (total of 258) were manually searched to identify their most likely year of graduation from medical school. The distribution of graduation dates from this manual search was used to distribute the remaining 7,811 NPIs across graduation years. This created a risk for exit for each year, which was lumped into five-year windows. The risk of exit in five years for each five-year graduation period is shown in Figure 5.

Figure 5. Risk of Exiting Practice in South Carolina by Year of Graduation



For graduation years before 1967, the risk of exit was modeled to increase at an exponential rate that reduced the remaining NPIs to zero at 80 years post graduation.

Projections

With the base year NPIs per specialty, the entrant rate from prior five years, and the exit model at the NPI level, future year supplies were projected out to 2035. Table 8 shows the supply and the gaps in 2025 and 2035 (Appendix B has all regional gaps 2016 to 2035 displayed graphically).

Table 8. Gap (Supply Minus Demand) and Supply, 2025 and 2035, by Region and Throughout in All South Carolina *(note: L = Lowcountry, M = Midlands, PD = Pee Dee, U = Upstate)*

		2025					2035				
SPECIALTY		L	M	PD	U	All SC	L	M	PD	U	All SC
Anesthesiology	Gap	-16	-179	-69	-128	-391	57	-162	-42	-99	-247
	Supply	221	107	84	163	576	313	149	115	205	783
Cardiology	Gap	-62	-77	-59	-95	-293	-79	-100	-78	-114	-370
	Supply	104	108	76	103	392	122	117	92	110	441
Dermatology	Gap	-11	-39	-41	-56	-147	-5	-36	-51	-63	-155
	Supply	68	52	20	40	180	89	68	22	42	220
Emergency Medicine	Gap	-76	-156	-104	-99	-436	-55	-142	-109	-51	-357
	Supply	245	214	157	299	915	322	287	203	397	1,209
Endocrinology	Gap	-10	-15	-7	-20	-52	-12	-14	-3	-17	-46
	Supply	15	14	13	10	52	18	19	20	17	73
Family Medicine	Gap	-323	-371	-123	-129	-946	-355	-376	-100	-70	-900
	Supply	377	447	400	732	1,955	444	549	501	871	2,365
Gastroenterology	Gap	-12	-38	-13	-19	-83	-12	-40	-13	-19	-85
	Supply	54	38	39	61	192	67	47	50	70	233
General Surgery	Gap	-60	-99	-48	-72	-279	-65	-90	-46	-54	-254
	Supply	104	91	81	129	405	127	128	108	170	533
Hematology and Oncology	Gap	-11	-51	-18	-28	-108	-5	-55	-18	-31	-109
	Supply	55	24	30	52	160	70	30	38	55	194
Internal Medicine	Gap	-72	-184	-71	-119	-446	36	-148	-19	-47	-178
	Supply	391	351	277	444	1,463	572	460	390	570	1,991
Interventional Radiology	Gap	-3	-6	-6	-6	-21	1	-6	-6	-4	-15
	Supply	11	9	5	11	36	18	12	9	15	54
Neurology	Gap	-20	-65	-47	-45	-177	-2	-61	-47	-32	-142
	Supply	84	54	31	80	249	118	74	46	107	345
Obstetrics and Gynecology	Gap	-9	-63	-42	-62	-175	35	-57	-21	-42	-85
	Supply	169	153	87	164	572	231	182	116	201	731
Orthopedics	Gap	-28	-66	-31	-44	-168	-29	-66	-26	-40	-161
	Supply	123	107	85	139	454	148	132	113	162	554
Otolaryngology	Gap	-12	-29	-28	-33	-103	-15	-26	-28	-30	-100
	Supply	51	46	20	45	161	57	58	27	56	198

		2025					2035				
SPECIALTY		L	M	PD	U	All SC	L	M	PD	U	All SC
Pathology	Gap	-20	-51	-22	-48	-140	-12	-52	-21	-37	-122
	Supply	55	37	31	44	166	71	46	38	61	218
Pediatric Neurology	Gap	-1	-3	-3	-6	-13	1	-3	-3	-6	-11
	Supply	4	2	0	0	6	6	3	0	0	10
Pediatric Psychiatry	Gap	-17	-7	-7	-13	-43	-17	-11	-7	-9	-44
	Supply	4	18	8	13	42	6	16	9	18	50
Pediatrics	Gap	-23	-91	-62	-29	-205	-11	-88	-51	-18	-168
	Supply	176	153	86	229	643	206	184	104	262	756
Plastic Surgery	Gap	-7	-18	-6	-22	-54	-4	-15	-3	-23	-46
	Supply	28	23	18	21	89	35	30	23	22	110
Psychiatry	Gap	-12	-42	-34	-38	-126	12	-20	-16	-2	-26
	Supply	106	99	46	107	358	142	135	70	152	499
Radiology	Gap	-43	-138	-79	-101	-361	-23	-161	-91	-74	-350
	Supply	141	73	63	122	398	192	80	80	173	525
Rheumatology	Gap	-8	-20	-12	-13	-51	-9	-18	-13	2	-38
	Supply	28	22	14	30	94	31	29	15	48	124
Thoracic Surgery	Gap	-5	-10	-2	-8	-26	-5	-9	1	-8	-21
	Supply	10	7	9	10	37	13	11	16	13	52
Urology	Gap	-14	-30	-14	-23	-82	-18	-30	-16	-19	-84
	Supply	43	34	31	46	154	51	44	41	58	193
Infectious Disease	Gap	-8	-18	-9	-27	-62	-3	-17	-10	-26	-56
	Supply	29	25	17	18	89	38	32	20	22	112
Nephrology	Gap	-19	-35	-24	-47	-125	-20	-40	-33	-53	-146
	Supply	47	39	26	31	143	57	45	28	34	164
Ophthalmology	Gap	-25	-56	-56	-62	-199	-39	-56	-75	-61	-230
	Supply	86	69	32	72	259	94	90	34	88	306
Pulmonary	Gap	-18	-18	-11	-18	-64	-21	-16	-12	-23	-73
	Supply	33	39	28	43	144	38	50	35	44	168
Primary Care	Gap	-418	-647	-257	-276	-1,597	-329	-612	-170	-136	-1,247
	Supply	943	951	763	1,404	4,061	1,222	1,193	995	1,702	5,112

Other Evidence of Supply and Demand Gaps

AAMC Data

The AAMC data analyzed in the supply section can also be used to assess gaps. This data was retrieved from the AMA Masterfile and contains the specialists per population across the United States, giving a nationwide average to compare with South Carolina's physicians per population.

Compared with national averages, the specialties have varying degrees of under-resourcing in South Carolina as seen in Table 9 below.

Table 9: Ratios of South Carolina Specialists per Population to United States Average Specialists per Population

Range	Specialties in Range
90 to 104%	Emergency Medicine, Family Medicine, General Surgery, Internal Medicine/Pediatrics, Orthopedic Surgery, Pulmonology, Thoracic Surgery, Urology, Interventional Radiology
80 – 90%	Gastroenterology, Nephrology, Obstetrics and Gynecology, Ophthalmology, Otolaryngology, Rheumatology, Vascular Surgery
70 – 80%	Pathology, Anesthesiology, Cardiology, Dermatology, Plastic Surgery, Psychiatry, Radiology
60 – 70%	Endocrinology, Hematology/Oncology, Infectious Disease, Internal Medicine, Neurology
<30%	Child and Adolescent Psychiatry, Pediatrics

No specialties had more that 104 percent of the national average.

The average number of physician specialists in the AMA Master File for South Carolina versus the United States does not necessarily translate to a service gap. Differences of less than 20 percent in the number of NPIs may in some part be made up through higher productivity in a region. For instance, RVUs per general obstetrics/gynecology specialist is 15 percent higher in the southern region than the wider US (8,178 mean in southern section vs. 7,111 all of US) and 17 percent higher in rheumatology (6,016 mean in southern region vs. 5,161 in all of US). However, these higher productivity numbers are not universal and certainly are not mitigating physician to population rates that are 30 percent lower or more.

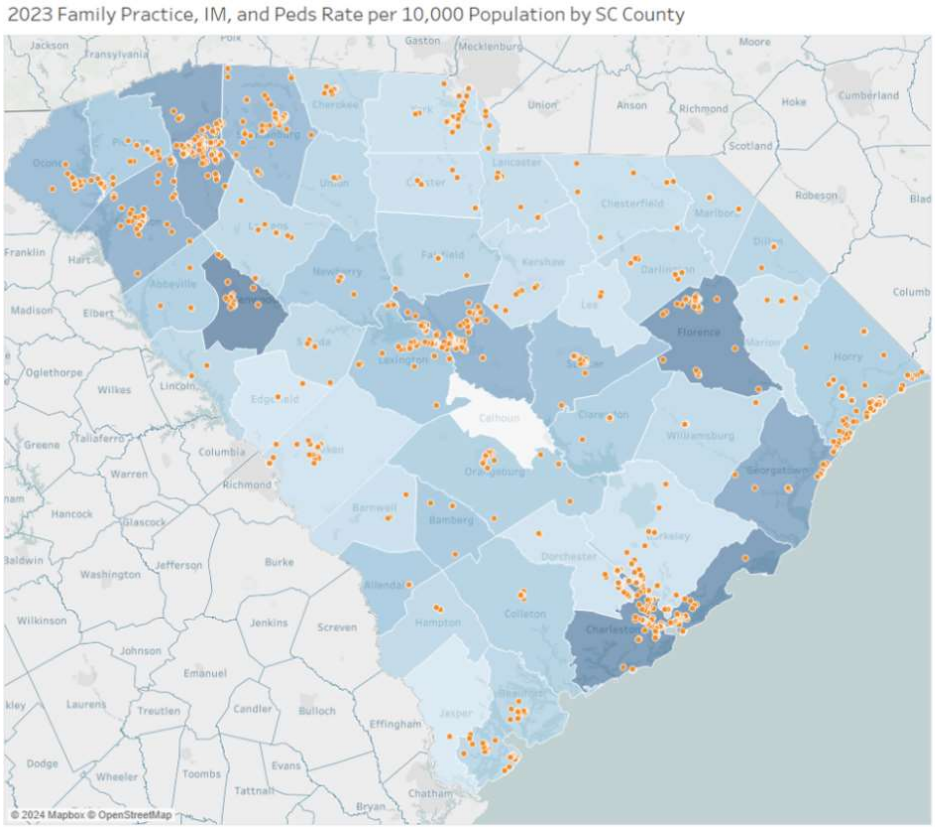
The above analysis of physician to population rate in South Carolina versus the wider United States reinforces that some specialties are likely under access stress throughout the state and therefore the region with the highest utilization is very likely to be closest to the right amount but still could possibly be over or underutilized. On the other hand, some specialties are near national averages and so average regional utilization, or within-region utilization, may be better to use in assessing the current and projected gaps. This is true for emergency medicine. For primary care, four specialties have different levels of under-resourcing: pediatrics is extremely low (under 30% of national average), internal medicine is very low, and family medicine is near the national average. Overall, primary care has low resourcing, making it reasonable to use the highest regional utilization for projections.

County Level Variation in Utilization

In addition, it should be noted that there are significant variations at the county level for primary care, as well as many other specialties, when using the count of specialist per population. See Figure 6 below showing primary care physicians (PCPs) per 10,000 population in South Carolina counties and the locations of practices (each of which may have more than one PCP).

As a result, residents in low-resourced counties may have to drive significant distances to access primary care and/or utilize less primary care than they would have otherwise.

Figure 6. County-Level Variation in Number of Primary Care Physicians per 10,000 Population

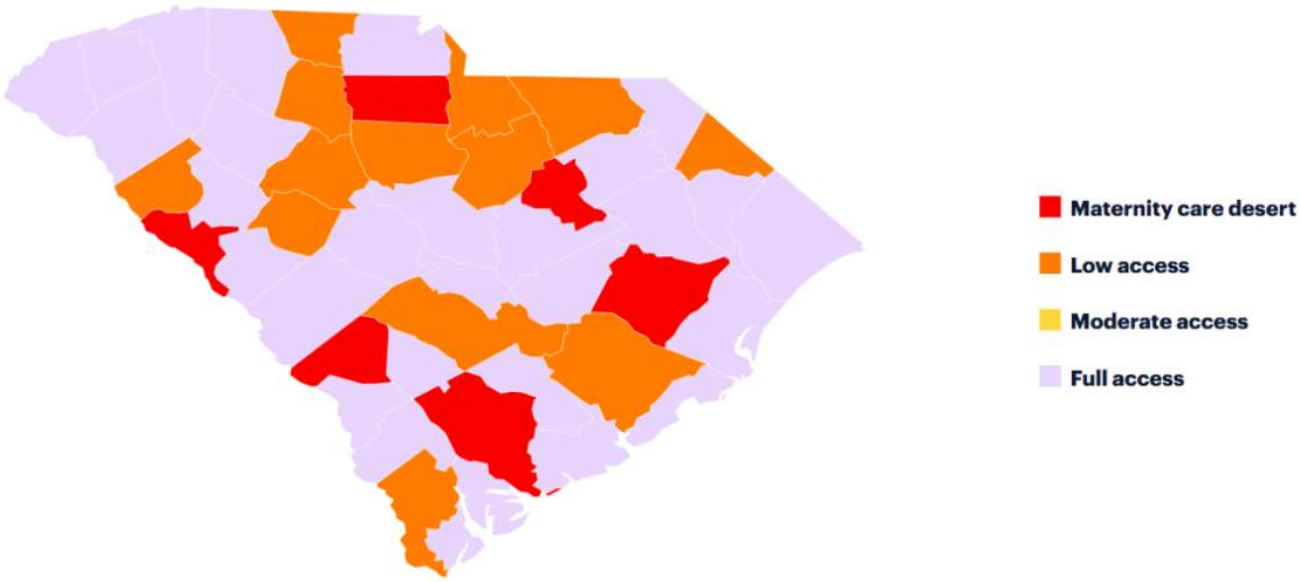


Rate per 10,000 by County

County		County	
Abbeville	4.6	Greenwood	12.3
Aiken	2.1	Hampton	3.3
Allendale	5.0	Horry	4.8
Anderson	8.0	Jasper	1.3
Bamberg	5.4	Kershaw	2.6
Barnwell	2.5	Lancaster	2.9
Beaufort	3.6	Laurens	3.3
Berkeley	2.1	Lee	1.9
Calhoun		Lexington	5.3
Charleston	11.3	Marion	2.3
Cherokee	3.5	Marlboro	3.2
Chester	2.5	McCormick	3.4
Chesterfield	2.7	Newberry	5.3
Clarendon	4.6	Oconee	6.9
Colleton	4.3	Orangeburg	4.4
Darlington	3.4	Pickens	4.9
Dillon	4.0	Richland	8.0
Dorchester	2.1	Saluda	3.4
Edgefield	1.5	Spartanburg	6.8
Fairfield	3.7	Sumter	6.1
Florence	11.4	Union	3.7
Georgetown	9.0	Williamsburg	3.2
Greenville	9.5	York	2.2

The map below in Figure 7 displays counties in the state that have few (low access) or no obstetric providers (Maternity care deserts).[13]

Figure 7. March of Dimes Map of Maternity Care Desert Counties in South Carolina



This situation is costly for the healthcare system as primary care access has been demonstrated to reduce emergency department visits and avoidable hospitalizations, particularly for those with a continuity relationship with a primary care provider, and obstetric care reduces costly neonatal intensive care unit expenditures by lowering risk for low birth weight and other negative birth and maternal outcomes.

Medicaid Utilization

Access challenges are often greater for Medicaid beneficiaries. Underutilization of specialty services can be an indicator of supply and demand mismatches. This was assessed for 13 specialties that were identified for focus by SCDHHS. The non-primary care expected utilization rates were derived from the last 15 years of HMA's experience in the safety net, with rates combined from a combination of well-managed populations (such as Medicaid in a closed and integrated health system), other Medicaid utilization rates, and public systems of healthcare delivery. Because HMA's utilization rates include

[13] Fontenot, J, Lucas, R, Stoneburner, A, Brigance, C, Hubbard, K, Jones, E, Mishkin, K. Where You Live Matters: Maternity Care Access in South Carolina. March of Dimes. 2023. Available at: https://www.marchofdimes.org/peristats/reports/south-carolina/maternity-care-deserts.

well-managed populations, as well as uninsured populations that tend to have low utilization, the rates may be below the expectation of a mostly FFS population. The primary care rates were created by defining the necessary well-care visits for age groups and adding visits for chronic care and episodic events. Total expected visits for the population were then divided by the MGMA visits per specialist. Expected utilization rates for obstetrics and gynecology used the birth rate in South Carolina and expert opinion on the proportion of practices that would be devoted to obstetrics. Some rates, particularly for pediatric specialties, were derived from literature. Table 10 has the expected utilization rates, expressed in FTEs per 100,000 population.

Table 10. Medicaid Expected Utilization in FTEs per 100,000 Enrollees

Specialty	Age Zero through 18	Age 19 through 64
Pediatrics	50	---
Family Medicine	25	30
Internal Medicine	---	30
Obstetrics and Gynecology	32	
Dermatology	2.80	2.23
Emergency Medicine	18.2	20.0
General Surgery	3.41	
Neurology	---	1.74
Ophthalmology	3.17	4.74
Orthopedics	4.31	
Otolaryngology	2.50	
Pediatric Neurology	2.24	---
Plastic Surgery	0.78	
Psychiatry	---	12.2
Radiology	8.0	12.0
Vascular Surgery	0.46	
Urology	2.06	

Specialty	Age Zero through 18	Age 19 through 64
Specialties Trained through Fellowships		
Cardiology	**2.25**	
Endocrinology	**1.05**	
Gastroenterology	**2.52**	
Hematology and Oncology	**1.64**	**1.86**
Infectious Disease	**0.67**	
Nephrology	**0.74**	**0.89**
Pediatric Psychiatry	**7.16**	**---**
Pulmonary	**2.00**	
Rheumatology	**0.47**	

With the expected rates in Table 10, the gap was defined as the difference between expected utilization and actual utilization in 2022. These are shown in Table 11.

Table 11. Medicaid Expected to Actual Utilization Gap in FTEs

	2022 Medicaid Mismatch Expected Versus Actual Utilization									
	Lowcountry		Midlands		Pee Dee		Upstate		South Carolina	
Specialty	Gap	%	Gap	%	Gap	%	Gap	%	Gap	%
Pediatrics	27	-32%	47	-46%	40	-47%	53	-45	167	-43
Family Medicine	48	-65%	48	-53%	43	-55%	35	-33%	174	-55%
Internal Medicine	14	-43%	19	-47%	14	-40%	19	-41%	66	-43%
Non-OB/Gyn Primary Care Combined	89	-47%	114	-49%	97	-49%	106	-39%	407	-46%
Obstetrics/ Gynecology	62	-71%	81	-75%	69	-76%	96	-77%	307	-75%
Dermatology	6	-81%	8	-90%	7	-94%	9	-89%	29	-89%
Emergency Medicine	3	-6%	14	-21%	17	-31%	23	-31%	56	-23%
General Surgery	1	-6%	-1	+7%	1	-5%	3	-26%	4	-9%
Neurology	-3	+177%	-3	+139%	-3	+131%	-6	+207%	15	+166%
Ophthalmology	7	-70%	10	-77%	8	-75%	10	-70%	36	-73%
Orthopedics	6	-55%	8	-53%	7	-56%	9	-52%	30	-54%
Otolaryngology	1	-22%	2	-27%	3	-36%	4	-39%	10	-32%
Pediatric Neurology	3	-83%	4	-91%	3	-90%	5	-98%	16	-91%

	2022 Medicaid Mismatch Expected Versus Actual Utilization									
	Lowcountry		Midlands		Pee Dee		Upstate		South Carolina	
Specialty	Gap	%	Gap	%	Gap	%	Gap	%	Gap	%
Plastic Surgery	1	-50%	1	-53%	1	-61%	2	-55%	5	-55%
Psychiatry	9	-65%	12	-70%	10	-73%	12	-64%	43	-68%
Radiology	17	-65%	22	-69%	18	-65%	26	-70%	83	-67%
Vascular Surgery	<1	-22%	1	-32%	<1	-31%	1	-33%	2	-30%
Specialties Trained through Fellowships										
Cardiology	3	-44%	2	-27%	2	-26%	4	-43%	10	-35%
Endocrinology	2	-70%	3	-79%	2	-73%	3	-80%	10	-76%
Gastroenterology	5	-67%	6	-75%	5	-73%	7	-71%	23	-72%
Hematology/ Oncology	3	-68%	4	-75%	4	-74%	5	-71%	16	-72%
Infectious Disease	1	-50%	1	-46%	1	-45%	1	-52%	4	-48%
Nephrology	2	-96%	3	-97%	2	-98%	3	-97%	10	-97%
Pediatric Psychiatry	11	-97%	13	-88%	12	-95%	14	-87%	50	-91%
Pulmonary	4	-81%	5	-73%	4	-72%	5	-69%	19	-73%
Rheumatology	1	-55%	1	-59%	1	-58%	1	-50%	3	-55%

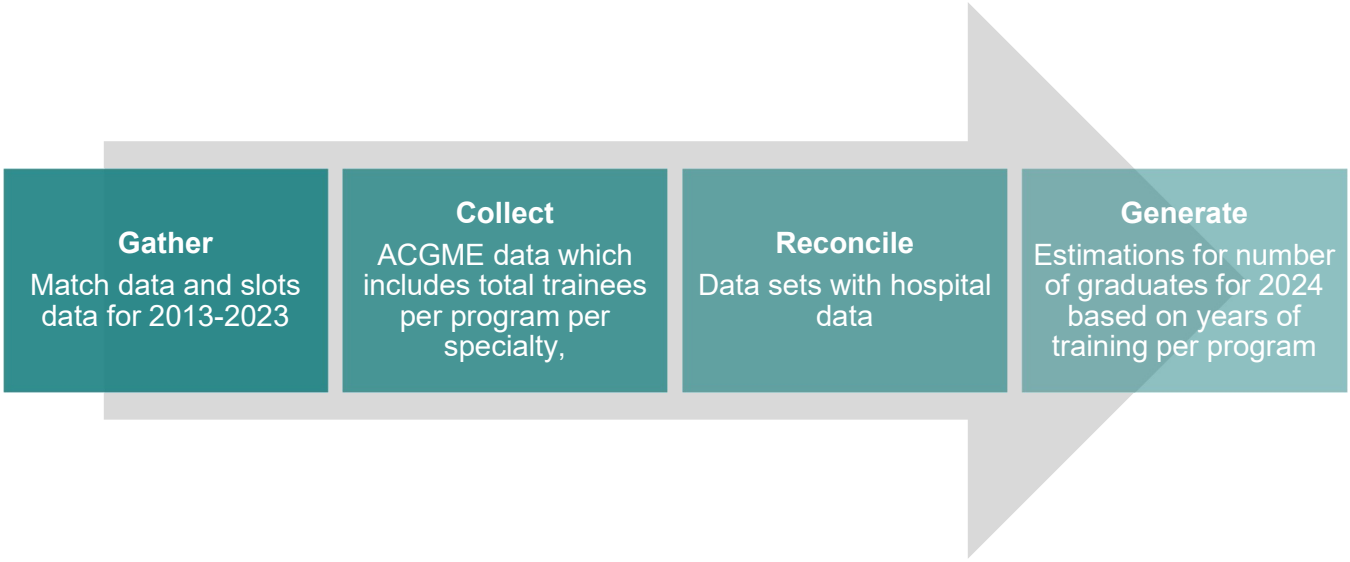
GME TRAINING DATA

GME programs are essential to physician workforce development in South Carolina because many physicians remain in South Carolina after they have completed their training. In South Carolina 46 percent of GME trainees remain in the state (slightly above the percentages in other states), and for those trainees who also had undergraduate medical education in South Carolina, the retention rate was 76 percent, significantly outranking other states, which, on average, were 70 percent.[14]

This high retention rate is an opportunity to further bolster the physician workforce by concentrating on recruiting South Carolina medical school graduates to South Carolina GME programs. These programs encompass a variety of specialties through structured residency and fellowship programs that equip trainees with the clinical experience and knowledge necessary to practice in their specialty.

This section centers on the process and methodology employed to ascertain that the physician training outputs were fully cataloged and, to the extent possible, understood in terms of growth over time. The objective was to assess how these programs contribute to the healthcare workforce pipeline, with multiple sources of data: the National Resident Matching Program, the ACGME-accredited programs, and the hospital systems across the state. This analysis sought to provide a granular understanding of how well efforts align with South Carolina residents' specialty needs by tracking trends from 2015 to 2024 and estimating the number of graduates from each specialty in each region. This section describes the step-by-step processes used for data collection, regional mapping, and comparison with workforce projections (see Figure 8).

Figure 8. Process and Methodology



[14] Association of American Medical Colleges. State Physician Workforce Data Report. 2025. Available at: https://www.aamc.org/data-reports/workforce/report/state-physician-workforce-data-report.

The fully reconciled data include three programs that were not readily searchable in the AAMC dashboard. AAMC was the only public source of information on fellowship programs, and match data were the only source for trends in training. Including fellows, the reconciled data showed 2,198 physicians in South Carolina training programs in 2024. Table 12 below counts only the specialty training, not in training programs for further sub-specialization. For instance, the “anesthesia” row includes the programs that graduate anesthesiologists who are eligible for board certification and/or for further training but not the graduates of the fellowship in regional anesthesiology and acute pain medicine. Internal medicine is shown in full, as is the sub-specializations in endocrinology, for instance, because it is an analyzed specialty.

Table 12. Programs, Trainees, and Graduates per Specialty

Specialty	Number of Programs	Total Trainees Based on 2024 Hospital Data	Expected Graduates per Year (on Average) Based on AAMC Data, Reconciled with Hospital Data
Family Medicine	**17**	**404**	**132.3**
Internal Medicine	**7**	**262**	**86**
Emergency Medicine	**5**	**165**	**55.7**
Pediatrics	**3**	**125**	**44**
Psychiatry	**5**	**145**	**35.3**
General Surgery	**6**	**163**	**32.4**
Anesthesiology	**2**	**94**	**23.3**
Neurology (including Neuro/Psych)	**3**	**83**	**20.5**
Obstetrics and Gynecology	**4**	**79**	**19**
Orthopedics	**3**	**64**	**12.8**
Radiology	**1**	**44**	**11**
Pulmonary	**3**	**32**	**10.7**
Pediatric Psychiatry	**3**	**21**	**10.5**
Cardiology	**2**	**28**	**9.3**
Internal Medicine/Pediatrics	**2**	**37**	**9.25**
Ophthalmology	**2**	**21**	**7**
Gastroenterology	**2**	**18**	**6**

Specialty	Number of Programs	Total Trainees Based on 2024 Hospital Data	Expected Graduates per Year (on Average) Based on AAMC Data, Reconciled with Hospital Data
Nephrology	1	12	6
Infectious Disease	3	10	5.5
Pathology	1	21	5.25
Endocrinology	3	10	5
Rheumatology	2	10	5
Dermatology	1	14	4.7
Hematology and Oncology	1	12	4
Otolaryngology	1	20	4
Plastic Surgery	3	19	3.8
Vascular Surgery	2	13	3.5
Interventional Radiology	2	12	3
Urology	1	15	3
Internal Medicine/Psychiatry	1	10	2
Neurosurgery	1	14	2
Thoracic Surgery	1	11	1.8
Pediatric Neurology	1	3	1
Neurology/Psychiatry	1	5	1

The hospital data and AAMC data do not reveal the growth in specialty training in South Carolina over the past decade. To understand and view this growth, we queried the match data over years. Table 13 below shows an overall growth in training of 48 percent from 2015 to 2024. A delay of three to seven years occurs, depending on the training program, before the increase in graduates is seen as an increase in physician supply. Therefore, all growth from 2016 to 2017 would be reflected but no growth after 2019 would be apparent in the supply analysis, given that the last year of complete data was 2022.

Table 13. Filled Match Slots per Year, 2015–2024

Specialty	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Change (First 2 Years to Last 2 Years)
Pathology	5	6	5	6	5	5	5	5	5	5	-9%
Radiology	12	12	10	12	12	11	11	11	11	11	-8%
Pediatrics	39	39	38	39	36	36	41	40	41	37	0%
Otolaryngology	4	4	4	4	4	4	4	4	4	4	0%
Neurosurgery	2	2	2	2	2	2	2	2	2	2	0%
Vascular Surgery	1	1	1	1	1	2	2	2	1	1	0%
Radiation Oncology	1	2	1	2	2	1	0	0	1	2	0%
General Surgery	37	29	36	33	30	30	26	46	40	34	12%
Internal Medicine	68	67	62	67	74	70	73	71	72	85	16%
Ophthalmology							2	4	3	4	17%
Internal Med / Pediatrics	7	7	6	9	8	9	9	9	9	9	29%

Specialty	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Change (First 2 Years to Last 2 Years)
Orthopedics	10	10	10	10	11	11	11	12	13	13	30%
OB-GYN	16	16	16	16	16	16	16	16	21	21	31%
Psychiatry	25	26	28	28	30	38	38	37	38	38	49%
Dermatology	3	3	4	3	5	6	4	5	4	6	67%
Plastic surgery			1	2	2	2	2	2	2	3	67%
Family Medicine	57	62	70	79	75	95	86	98	93	106	67%
Anesthesiology	15	15	15	15	22	21	21	21	27	24	70%
Pediatric Neurology	0	1	1	1	0	1	1	0	1	1	100%
Interventional Radiology				2	2	2	4	4	4	4	100%
Thoracic Surgery	1	1	1	1	1	1	1	2	2	2	100%
Neurology	9	9	9	11	12	20	20	20	20	20	122%
Other (e.g., transitional)	9	21	21	24	24	24	22	22	35	38	143%
Emergency Medicine	19	19	41	41	45	45	55	55	51	52	171%
Total	**340**	**352**	**382**	**408**	**419**	**452**	**456**	**488**	**500**	**522**	**48%**

Some discrepancies between the match data and the hospital-reconciled AAMC data were evident. Match data does not include fellowship-based training programs that do not participate in the match. In addition, 26 graduates of family medicine training programs appeared to be omitted from the match

data. Depending on when the training program started, the growth in family medicine training may have been as low as 47 percent, if medical school graduates were already entering training in 2015 (unlikely) or as high as 111 percent if residency slots first became available in 2023 (more likely). Table 14 below shows all programs in South Carolina and the expected graduates in 2024, which may differ from the average anticipated future graduates. For example, anesthesia training slots have increased over the years and the average future graduates per year is expected to be 23.3, yet the 2024 graduates are expected to total 22, reflecting rising matches and residents.

Table 14. Number of Graduating Trainees in 2024

Specialty	Lowcountry	Midlands	Pee Dee	Upstate	Grand Total	Match Data
Family medicine	14	25	42	51	132	106
Internal medicine	36	22	16	13	86	85
Emergency medicine	20	13	13	10	56	52
Pediatrics	20	13		11	44	37
General Surgery*	16	5	4	12	37	34
Psychiatry	18	8		8	34	38
Anesthesiology	17		5		22	24
Neurology	8	6		6	21	20
OB/GYN	8	5		6	19	21
Orthopedics	5	4		4	13	13
Radiology	11				11	11
Pulmonary	5	3		2	11	n/a
Child Psychiatry	5	3		3	11	n/a
Cardiology	7	2			9	n/a
Internal Medicine/Pediatrics	4			5	9	n/a
Ophthalmology	4	3			7	4
Palliative Care	2	3	1	1	7	n/a
Gastroenterology	4			2	6	n/a
Nephrology	6				6	n/a
Infectious Disease	3	2		1	6	n/a
Pathology	5				5	5
Endocrinology	3	2	1		5	n/a
Rheumatology	3	2			5	n/a
Dermatology	5				5	6

Specialty	Lowcountry	Midlands	Pee Dee	Upstate	Grand Total	Match Data
Otolaryngology	4				4	4
Hematology and Medical Oncology	4				4	n/a
Plastic Surgery	3	1			4	3
Vascular Surgery	2			2	4	1
Critical Care	2	1			3	n/a
Interventional Radiology	3				3	4
Neonatology	3				3	n/a
Pediatric Cardiovascular	3				3	n/a
Urology	3			0	3	n/a
Neurosurgery	2				2	2
Thoracic Surgery	2				2	n/a
Radiation Oncology	1				1	2
Colorectal Surgery				1	1	n/a
Pediatric Hematology and Oncology	1				1	n/a
Pediatric Neurology	1				1	1
Pediatric Rheumatology	1				1	n/a
Pediatric Gastroenterology	0.7				0.7	n/a
Pediatric Nephrology	0.7				0.7	n/a
Genetics				0.5	0.5	n/a
Nuclear Medicine	0.3				0.3	n/a
Physical Medicine & Rehabilitation	0.3				0.3	n/a
Grand Total	**266**	**123**	**81**	**138**	**608**	**522**

*Includes some fellowship graduates in critical care surgery

These tables show a complete picture of South Carolina physician postgraduate training and reflect a robust pipeline for some specialties and relatively small numbers for other specialties. The relationship between graduates per year and the gaps from earlier sections will be described next.

SOUTH CAROLINA GAPS COMPARED TO TRAINEES

For most specialties, the trainees in SC alone would be too few to fill the gaps, with the notable exception of emergency medicine; however, the percentage of the gap that trainees could fill is a useful measure of comparative need for the training slots. For some specialties, such as internal medicine and general surgery, a significant number of trainees go on to other subspecialties that are also analyzed, such as endocrinology after internal medicine or vascular surgery, which can be done after general surgery for some. Therefore, only a portion of the graduates would become available to fill gaps. This finding is most important when estimating the primary care workforce. The following percentages of residents going on to further subspecialize were used to analyze gaps:

- Internal medicine: 80 percent
- Family medicine: 10 percent
- Pediatrics: 50 percent
- General surgery: 50 percent

Table 15 shows the gap in 2025 and 2035, entrants expected over an 11-year period, the number of specialists needed yearly to fulfill the expectations for newly trained physicians entering the workforce and closing the gap, the anticipated number of graduates from South Carolina in that specialty, and the percentage of the need that would be filled if all South Carolina trainees were retained. The last column translates the various data points to a quantitative score that expresses the relative importance of the training. The variables for this formula were as follows:

- **2025Gap** = The 2025 gap between supply and demand
- **2035Gap** = The 2035 gap between supply and demand
- **YNSupply** = The supply needed yearly to meet projections plus fill supply
- **Grads** = Graduates per year

With these variables so defined, the formula is:

$$-1 + Log10\left(\frac{\frac{YNS - Grads}{\frac{Grads}{YNS}}}{\frac{2025Gap - 2035Gap}{2025Gap}}\right)$$

The minimum value for the denominator was set to 10 percent, meaning gap closures smaller than 10 percent were counted as 10 percent. Negative scores are simply scored as zero.

Table 15. Gaps in 2025 and 2035, Entrants Expected, Yearly Needed Supply, Graduates Available, Graduates as a Percent of Yearly Need, and Quantitative Score

Specialty	2025 Gap (negative indicates need)	2035 Gap	Entrants Expected 2025–2035	Yearly Need for Supply to Match Demand*	Estimated Graduates Available per Year	Percent of Need That Could Be Filled by SC Graduates	Quantitative Score Before Qualitative Considerations
Pediatrics	-205	-168	400	52	22	43%	1.6
Family Medicine	-946	-900	1173	188	106	56%	2.2
Internal Medicine	-446	-178	1,153	121	11	9%	2.3
All Primary Care	-1,597	-1,247	2,726	361	139	38%	2.4
OB/GYN	-175	-85	392	43	19	44%	1.0
Anesthesiology	-391	-247	447	63	23	37%	1.5
Dermatology	-147	-155	100	24	5	20%	2.0
Emergency Medicine	-436	-357	680	94	56	59%	1.6
General Surgery	-279	-254	297	50	16	32%	2.0
Interventional Radiology	-21	-15	33	4	3	68%	<0
Neurology	-177	-142	202	31	21	66%	0.9
Ophthalmology	-199	-230	145	34	7	21%	2.1
Orthopedics	-168	-161	275	40	13	32%	1.9
Otolaryngology	-103	-100	99	18	4	22%	1.8
Pathology	-140	-122	121	22	5	24%	1.7
Pediatric Neurology	-13	-11	7	2	1	63%	0**

Specialty	2025 Gap (negative indicates need)	2035 Gap	Entrants Expected 2025–2035	Yearly Need for Supply to Match Demand*	Estimated Graduates Available per Year	Percent of Need That Could Be Filled by SC Graduates	Quantitative Score Before Qualitative Considerations
Plastic Surgery	-54	-46	57	9	4	41%	1.0
Psychiatry	-126	-26	301	30	35	119%	<0
Radiology	-361	-350	290	58	11	19%	2.4
Urology	-82	-84	101	17	3	18%	1.9
Vascular Surgery	-80	-70	68	13	4	28%	1.4
Specialties Trained through Fellowships							
Cardiology	-293	-370	191	51	9	18%	2.4
Endocrinology	-52	-46	44	8	5	61%	0.7
Gastroenterology	-83	-85	114	18	6	33%	1.6
Hematology / Oncology	-108	-109	95	19	4	22%	1.8
Infectious disease	-62	-56	57	10	6	53%	1.0
Nephrology	-125	-146	73	20	6	30%	1.7
Pediatric Psychiatry	-43	-44	24	6	11	169%	0**
Pulmonary	-64	-73	77	14	11	133%	2.4
Rheumatology	-51	-38	68	10	5	67%	0.5
Thoracic Surgery	-26	-21	31	5	2	38%	0.6

*"Needed" includes both the entrants projected plus the additional to close the statewide gap.

**Small number of specialists affects this score (see Medicaid analysis).

Strategies Other than Physician Training to Narrow Gaps

Most gaps will remain, even after training more physicians. Other strategies for addressing physician supply gaps are already being put in place in South Carolina and throughout the country, including the use of nonphysician providers, such as recruiting and retaining advance practice practitioners. Another important way to close projected gaps is to decrease the percentage of physicians that will exit service delivery in the next decade. Addressing physician burnout for those already in practice could help close the gap in specialty supply.

MEDICAID BENEFICIARY ANALYSIS

Medicaid beneficiaries may experience more access challenges than people with medical coverage of other payer types, even when the supply of specialists is adequate. In South Carolina, where the present analysis shows significant shortfalls in physician supply, the experience Medicaid beneficiaries are more likely to experience the negative impacts. HMA undertook a separate analysis of supply-demand mismatch.

Methodology for Medicaid

For Medicaid, utilization in the final year of data (2022) divided by MGMA RVUs per specialist was defined as the current supply. Supply defined as number of FTEs was then compared with the utilization expected in other similar populations as shown in Table 9 above.

For projected supply in 2035, the net gain in the number of specialists projected in South Carolina was multiplied by proportion of care that a new specialist would be expected to devote to Medicaid beneficiaries. This proportion was defined as the expected Medicaid demand (utilization rate multiplied by population) divided by the all-payer demand. The demand in 2035 used Milliman actuarial projections of Medicaid enrollment in 2035 multiplied by the utilization rate.

The training data from prior sections were then considered and a formula applied to describe the access and training environment for Medicaid. The variables were as follows:

- **2022MM** = The 2022 mismatch (MM) percentage, defined as the actual demand divided by the expected demand
- **TPYP** = Trainees per year divided by the 2022 mismatch number (i.e., the difference between the actual FTEs of demand and the expected utilization in FTEs in 2022), with a 1 percent minimum (as in the case of no trainees in the specialty)
- **2035MMP** = As above, except for 2035
- **WorstCounty** = The 2022MM value from the county with the lowest result (lowest actual demand divided by expected demand)

With these variables so defined, the formula is:

$$1 + Log10(\frac{\left(\frac{2022MMP}{TPYP}\right) * 2035MMP}{WorstCounty})$$

Negative scores are scored as zero.

Results

Table 16 shows the results of the methodology applied.

Table 16. Access and Training Score with Input Variables

Specialty	2022 Medicaid Mismatch	2022 Medicaid Mismatch Percentage	Trainees per Year*	Percent of Mismatch Trainees per Year	Projected 2035 Medicaid Mismatch	2035 Medicaid Mismatch Percentage	Medicaid Access and Training Score
Pediatrics	167	-43%	22	13%	106	-27%	1.4
Family Medicine	174	-55%	119	68%	108	-30%	1.3
Internal Medicine	66	-43%	17	26%	6	-4%	0.8
Non-OB/GYN Primary Care Combined	407	-46%	158	39%	220	-24%	0.8
OB/GYN	307	-75%	19	6%	188	-45%	2.5
Dermatology	29	-89%	5	16%	24	-72%	3.6
Emergency Medicine	56	-23%	56	99%	-18	+5%	< 0
General Surgery**	4	-9%	19	498%	-15	+17%	< 0
Neurology	-15	+166%	21	n/a	-35	+193%	< 0
Nephrology	10	-97%	6	60%	9	-86%	4.0
Ophthalmology	36	-73%	7	20%	29	-59%	2.3
Orthopedics	30	-54%	13	43%	17	-31%	1.7
Otolaryngology	10	-32%	4	39%	4	-13%	1.1
Pediatric Neurology	16	-91%	1	6%	11	-64%	5.0

Specialty	2022 Medicaid Mismatch	2022 Medicaid Mismatch Percentage	Trainees per Year*	Percent of Mismatch Trainees per Year	Projected 2035 Medicaid Mismatch	2035 Medicaid Mismatch Percentage	Medicaid Access and Training Score
Plastic Surgery	5	-55%	4	70%	3	-34%	1.4
Psychiatry	43	-68%	38	90%	17	-26%	1.5
Radiology	83	-67%	11	13%	56	-45%	2.4
Urology	19	-72%	3	16%	13	-47%	3.1
Vascular Surgery	2	-30%	4	196%	0	-1%	<0
Specialties Trained through Fellowships							
Cardiology	10	-35%	9	91%	8	-26%	0.8
Endocrinology	10	-76%	5	49%	6	-45%	2.5
Gastroenterology	23	-72%	6	26%	17	-50%	2.4
Hematology/ Oncology	16	-72%	4	25%	12	-55%	2.3
Infectious Disease	4	-48%	6	132%	3	-29%	1.7
Nephrology	10	-97%	6	60%	9	-86%	4.0
Pediatric Psychiatry	50	-91%	11	21%	43	-78%	3.3
Pulmonary	19	-73%	11	57%	15	-57%	2.1
Rheumatology	3	-55%	5	150%	2	-28%	2.1

*Pediatrics, family medicine, and internal medicine graduates feed into fellowships, and their trainees per year were reduced: 50 percent for pediatrics, 10 percent for family medicine, 80 percent for internal medicine

**Assumes critical care surgery fellows are general surgery graduates and that 50 percent go on to further sub-specialization.

Significant variation existed between regions and counties as shown in Appendix D.

The analysis shows a need for improved access and more physician training in South Carolina. Except for emergency medicine, general surgery, neurology, and vascular surgery, the Access and Training Score indicates the need for continued investments in the training of physicians in the specialties of focus. The highest score was for pediatric neurology, which has extremely low utilization and has only one graduate per year in South Carolina.

Of note, the Medicaid analysis was generally congruent with the all-payer analysis. Table 17 compares the percent gap by the two methods and compares the 2022 gap between the two methodologies and the improvement in the gap considering both absolute and relative improvements.

Table 17. Gaps in Medicaid and All-Payer Analyses, 2022 and 2035 (Projected)

	Medicaid Analysis			All-Payer Analysis			Comparisons	
Specialty	2022 Gap		2035 Gap	2022 Gap		2035 Gap	2022 Medicaid Minus All-Payer	Improvement Considering Absolute and Relative Changes
Pediatrics	-43%	→	-27%	-28%	→	-18%	-15%	Similar
Family Medicine	-51%	→	-28%	-34%	→	-28%	-17%	↑
Internal Medicine	-41%	→	-1%	-28%	→	-8%	-13%	↑
Non-OB/Gyn Primary Care Combined	-46%	→	-14%	-31%	→	-20%	-15%	↑
Obstetrics/Gynecology	-75%	→	-45%	-29%	→	-10%	-46%	Similar
Dermatology	-89%	→	-70%	-45%	→	-41%	-44%	Similar
Emergency Medicine	-23%	→	+7%	-38%	→	-23%	+15%	↑↑
General Surgery	-9%	→	+17%	-45%	→	-32%	+36%	↑↑
Neurology	+166%	→	+193%	-46%	→	-29%	+212%	Similar
Ophthalmology	-73%	→	-58%	-43%	→	-43%	-30%	↑↑
Orthopedics	-54%	→	-31%	-28%	→	-23%	-26%	↑↑
Otolaryngology	-32%	→	-13%	-41%	→	-34%	+8%	↑↑

Specialty	Medicaid Analysis			All-Payer Analysis			Comparisons	
	2022 Gap		2035 Gap	2022 Gap		2035 Gap	2022 Medicaid Minus All-Payer	Improvement Considering Absolute and Relative Changes
Pediatric Neurology	-91%	→	-64%	-72%	→	-53%	-19%	Similar
Plastic Surgery	-55%	→	-34%	-39%	→	-29%	-16%	Similar
Psychiatry	-68%	→	-26%	-32%	→	-5%	-36%	Similar
Radiology	-67%	→	-30%	-50%	→	-40%	-17%	↑↑
Urology	-72%	→	-47%	-36%	→	-30%	-36%	↑
Vascular Surgery	-30%	→	-1%	-51%	→	-34%	+19%	↑↑
Specialties Trained through Fellowships								
Cardiology	-35%	→	-26%	-41%	→	-46%	+6%	↑↑
Endocrinology	-76%	→	-45%	-54%	→	-39%	-22%	Similar
Gastroenterology	-72%	→	-50%	-30%	→	-27%	-42%	↑
Hematology/Oncology	-72%	→	-53%	-40%	→	-36%	-32%	↑
Infectious Disease	-48%	→	-29%	-43%	→	-36%	-5%	↑
Nephrology	-97%	→	-97%	-45%	→	-47%	-52%	Similar
Pediatric Psychiatry	-91%	→	-73%	-51%	→	-47%	-40%	↑
Pulmonology	-73%	→	-57%	-30%	→	-30%	-43%	↑↑
Rheumatology	-48%	→	-29%	-39%	→	-23%	-9%	Similar

Table 18 demonstrates that most specialties have more significant gaps in Medicaid to start, and most show congruent or somewhat greater improvement, although eight specialties show much more improvement in Medicaid when considering both absolute and relative changes.

Table 18. Distribution of Specialties in Medicaid to All-Payer Analyses

		Improvement of Medicaid Compared to All-Payer (Residency Bolded, Fellowship Italicized)		
		Similar	**More Improvement**	**Much More Improvement**
Medicaid Gap as Compared to All-Payer	**MUCH Better**	**Neurology**	---	---
	Better	---	---	**Emergency Medicine** **General Surgery** **Vascular Surgery**
	About same	---	*Infectious Disease*	*Cardiology*
	Worse	**Pediatrics** **Pediatric Neurology** **Plastic Surgery** *Endocrinology* *Rheumatology*	**Family Medicine** **Internal Medicine** **Primary Care Combined**	**Orthopedics** **Otolaryngology** **Radiology**
	Much Worse	**Obstetrics & Gynecology** **Dermatology** **Psychiatry** *Nephrology*	*Gastroenterology* *Hematology & Oncology* *Pediatric Psychiatry* *Urology*	**Ophthalmology** Pulmonology

Neurology was by far the largest outlier in what was found to be generally worse gaps in Medicaid than for all payers. The same benchmark sources were used for neurology as for many other sources, but Medicaid utilization was much closer to Medicare for neurology (27%) than for other specialties that would be expected to have similar or higher relative utilization (e.g., hematology and oncology, 14%; gastroenterology, 13%; urology, 12%; and dermatology, 4%). Table 19 provides an analysis of neurology plus five specialties that are close to neurology in the adult Medicaid benchmark showing that in 2016, neurology was on par with two other relatively better resourced specialties (plastic surgery and urology) and had more growth than the other five specialties, making it a significant outlier by 2022, with 12 percent to 74 percent more adjusted specialists than the other five specialties with relatively close benchmark numbers.

Table 19. Specialties With Significant Medicaid Workforce Gaps

Specialty	Medicaid Expectation FTEs per 100,000	Whole United States FTEs Expectations per 100,000	Medicaid / United States	2016 South Carolina Supply	2016 Supply Adjusted to US Neurology	2022 South Carolina Supply	Growth Of Supply 2016 To 2022	2022 Supply Adjusted to US Neurology
Dermatology	2.23	3.19	57%	138	150	165	20%	179
Hematology/Oncology	1.86	5.11	36%	140	116	148	6%	123
Gastroenterology	2.09	4.80	44%	164	145	177	8%	156
Neurology	1.74	4.24	41%	179	179	214	20%	214
Plastic Surgery	1.43	2.21	65%	94	180	81	-14%	155
Urology	2.73	3.09	88%	130	178	139	7%	191

The Medicaid utilization expectation was used with the assumption that neurologists were seeing only adult patients younger than 65 years old; however, because South Carolina has only two pediatric neurologists, it is likely that neurologists are seeing adolescents and perhaps younger children as well, which may have increased utilization significantly. Nonetheless, even with this consideration, neurology is quite well utilized among Medicaid enrollees in South Carolina.

The other notable outliers are emergency medicine, general surgery, and vascular surgery, each with smaller gaps in Medicaid, particularly by 2035, when the gaps should close in the first two specialties and essentially close in vascular surgery. The smaller gap in Medicaid could be caused by above optimal utilization in South Carolina for all payers for these specialties at baseline. The all-payer analysis uses internal benchmarks (top three counties). Therefore, closing the all-payer gap may not accurately reflect the optimal workforce for those specialties.

CONCLUSION

The analysis of physician supply and demand reveals significant gaps as measured by physicians per specialty per population (a traditional method) and when using the more robust methods of using claims for South Carolinians. Population growth and the aging population are contributing factors to the supply-demand gap. The rapid population growth has been met with increases in training for most specialties, with some, such as interventional radiology, neurology, and emergency medicine, increasing the number of trainees graduating per year by more than 100 percent in last decade, a much faster rate than the underlying population growth. Growth in trainees per year in some specialties have occurred mainly since 2020, including interventional radiology, ophthalmology, orthopedics, obstetrics/gynecology, and neurology. For these specialties, the impacts of increased training would likely be undetectable until after the baseline claim years of 2016 to 2023.

The supply-demand gap also was assessed for Medicaid beneficiaries specifically. The Medicaid findings are generally aligned with the all-payer analysis, with neurology, emergency medicine, general surgery, and vascular surgery being notable exceptions. Both identify primary care as an important gap to continue to emphasize closing through training and retention.

South Carolina is considering a modified method of supporting GME to provide incentives more specifically for training and retention in specialties with significant projected gaps. A quantitative score that recognizes various areas of gap stress, such as current gaps, future gaps, gaps in relation to expected entrants, and trainee shortfalls was created to have an objective metric to guide changes in GME support. In addition, a Medicaid Access and Training Score was created that considers how far Medicaid beneficiaries are from expected utilization. The quantitative scores need to be supplemented by qualitative information about the physician training milieu, the limitations of the data, and stakeholder input.

Methodologic limitations are highlighted in psychiatry, which has a score of zero in the all-payer analysis, which is surprising given the obvious and worsening shortages of psychiatrists in rural areas of South Carolina.[15] It should be noted, however, that the current analysis shows a significant gap in Pee Dee (more than 40% below need) that will remain even into 2035, congruent with other findings. And at a regional level, only Lowcountry is without a significant gap in 2025 (see Appendix C). Nonetheless, psychiatry gaps may be underestimated because the number of psychiatrists identified by claims was 73 percent of the number of psychiatrists in the AMA Master File. That file also shows that South Carolina's rate of psychiatrists per population is 75 percent of the national average—8.9 per 100,000 in South Carolina compared with 11.8 per 100,000 nationally.

[15] Laird S. As Access to Mental Health Care Declines in Rural SC, State Agency Tries to Fill Gaps. *South Carolina Daily Gazette*. December 22, 2023. Available at: https://scdailygazette.com/2023/12/22/as-access-to-mental-health-care-declines-in-rural-sc-state-agency-tries-to-fill-gaps/.

Combining the somewhat low capture rate (perhaps because of Medicare and Medicaid opt outs, for which psychiatry has the highest rate of all specialties[16]) and the low rate of psychiatrists per population could result in a low initial supply of psychiatrists across all counties resulting in an underestimation of the demand and, therefore, an underestimation of the resultant gap. A high number of entrants (25 per year on average in the base years) and a high number of trainees as compared with the total number of psychiatrist (35 trainees per year, approximately 10% of the 335 psychiatrists supply in 2020) does suggest that South Carolina is making strides toward closing this gap. At least within the next 10 years, even with a zero score, qualitative data suggests continued support of the current level of graduate medical education in psychiatry would be prudent. In addition, the Medicaid analysis shows a score of 1.5, demonstrating a large population-specific gap, though the gap is projected to narrow significantly.

Emergency medicine reveals the opposite side of this methodologic issue. Emergency medicine has a high quantitative score on the all-payer analysis (1.6), but a score of zero on the Medicaid Access and Training Score. If overutilization is occurring in some counties, then the all-payer analysis method will overestimate the demand, and the factors that make psychiatry relatively underrepresented are the opposite for emergency medicine. The number of specialists identified by claims was 3 percent higher than the number identified in the AMA Master File. Almost no emergency medicine physicians could opt out of Medicare and Medicaid and practice in their specialty, with one in 1,000 opting out, according to a 2025 KFF report.[17]

South Carolina's emergency medicine physicians per population rate is 104 percent of the national rate, the highest of the specialties. South Carolina has increased the number of graduates from emergency medicine residencies from 19 in 2015 to 52 in 2024, greatly outpacing the underlying change in population. Fully 10 percent of all South Carolina medical school graduates match in emergency medicine,[18] even though emergency medicine physicians comprise 5 percent of all physicians in the US.[19] This finding further suggests an overemphasis on emergency medicine in the South Carolina training milieu.

Even in this clear example of a low Access and Training Score and aligned qualitative data, however, 47 new emergency medicine physicians will be needed each year, and, per historical trends, South Carolina can expect to retain 30 emergency medicine trainees as South Carolinian practicing emergency medicine physicians (54% of the 56 graduates each year: 53.9% is a weighted average of 45.7% retention for trainees with residency in South Carolina and medical school in another state and 78.0% retention in trainees with medical school and residency in South Carolina, wherein 132 out of 522 matches were in-state matches). The delta between the yearly need and the yearly trainees

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[16] Cottrill, A., Ochieng, N., Neuman, T. *How Many Physicians Have Opted Out of the Medicare Program?* January 2025. Available at: https://www.kff.org/medicare/issue-brief/how-many-physicians-have-opted-out-of-the-medicare-program/

[17] Ibid.

[18] Chastain-Brown A, Gaul K, Lefebvre A. *Trends of South Carolina Medical School Graduates Pursuing Residency*. Charleston, SC: South Carolina Office for Healthcare Workforce, South Carolina Area Health Education Consortium. September 2024. Available at: https://dc.statelibrary.sc.gov/server/api/core/bitstreams/7c689a75-6d1a-4811-8d0d-3090439c3922/content.

[19] Association of American Medical Colleges. U.S. Physician Workforce Data Dashboard. 2024. AAMC. Available at: https://www.aamc.org/data-reports/report/us-physician-workforce-data-dashboard.

retained will be filled by various training institutions across the country or seasoned emergency medicine physicians relocating to South Carolina. This situation is arguably beneficial and, therefore, being able to fill 30 of the 47 needed entrant slots would seem to be, per analysis, more than sufficient.

Neurology is another specialty with differences between the Medicaid (score <0) and the all-payer analysis (score 0.9). This specialty also was an outlier in the Medicaid analysis with much higher utilization than expected. Further analysis has shown that the neurologist supply in South Carolina by 2022 was significantly higher than comparator specialties (i.e., those with similar expected utilization). The lack of pediatric neurology specialists may have contributed to the higher utilization but is not fully explanatory. It is important to note that like emergency medicine, if three or more counties had excess utilization in neurology (perhaps because of excess supply), then the all-payer methodology would necessarily show a supply-demand gap because the top three counties were the internal benchmark. The weight of evidence suggests a relative deemphasis on neurology training.

Participation in the survey of trainees in South Carolina was too low to affect projections; however, the survey did reinforce the power of graduate medical education positions to impact physician supply in their respective geographies. The 60 percent of trainees intent to stay in the same geography as their training demonstrates the impact of placing training in particular geographies. The survey is consistent with other sources that have shown that the combination of medical school training and graduate medical education in-state is the likeliest pathway to retaining a physician in South Carolina for the long term. Recruiting more candidates from in-state schools and programs is measurable, and increasing this rate could be tied to GME payments in the future.

Physician workforce studies have inherent limitations (see Appendix A for further discussion of limitations). Although the future is always uncertain, public policy makers need to understand the relative position of various specialties and the forces that are likely to impact future supply, demand, and gaps. Changes in supply and demand should be periodically assessed to understand if projections unfold as models predict.

APPENDICES

Appendix A. Data Assumptions and Limitations

Payers Other Than Medicare and Medicaid

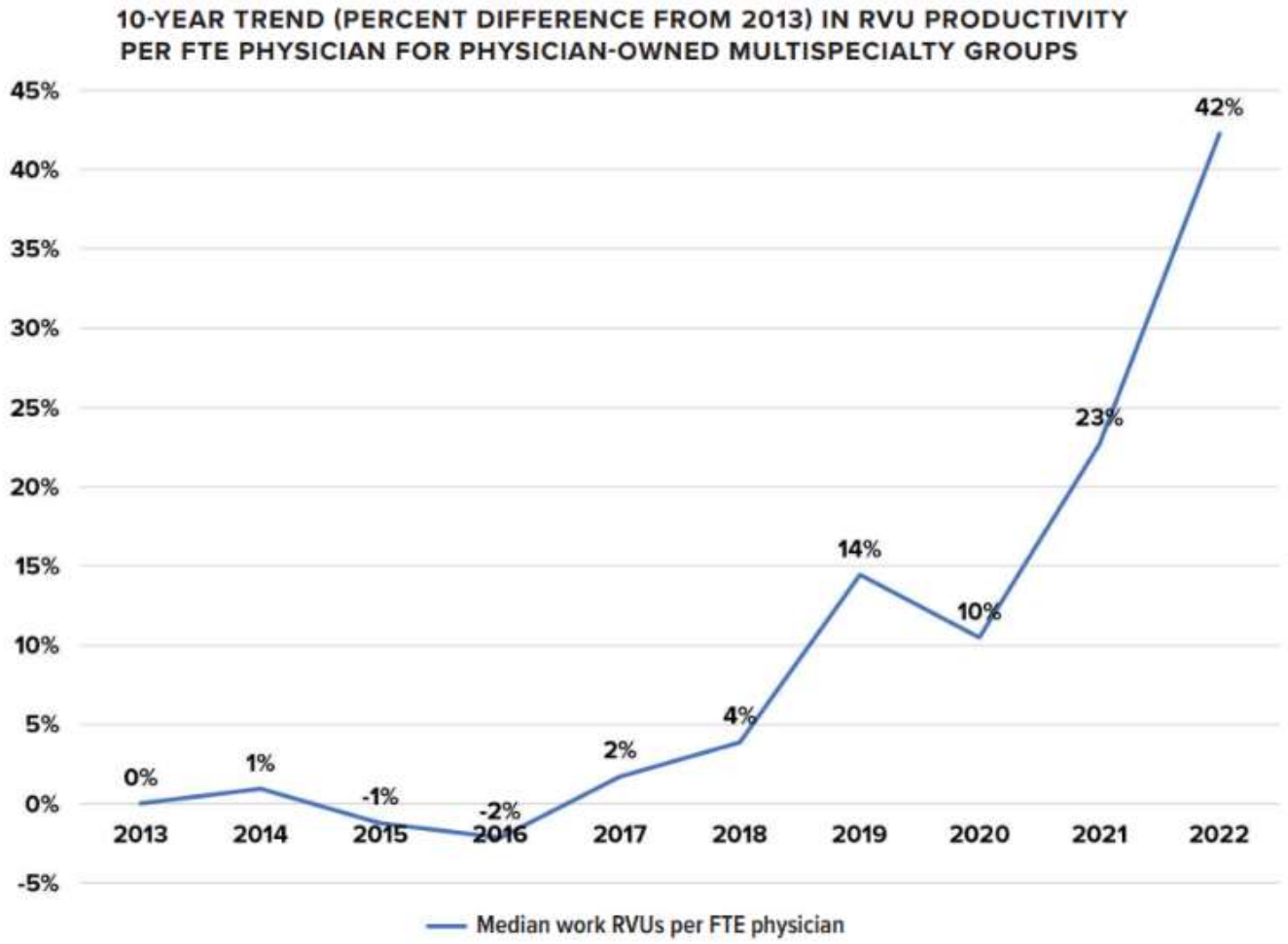
Claims for all payers other than Medicare and Medicaid (employer insurance, marketplace/ACA plans, military and veterans administration, workers compensation, etcetera) were unavailable and, therefore, utilization (demand) could not be measured directly. Commercial claims data are expensive to acquire and would be incomplete, even if purchased, because any given data provider only has only a partial view of all claims (fragmented market with changes in use of clearinghouses over time). In addition, data use agreements with clearinghouses often restrict sharing data or derivative analysis with government entities. For these reasons, utilization (demand) is derived indirectly for all other payers. As described in the body, this relies on benchmark data on RVUs per specialists.

Relative Value Units

The analysis assumes that, on average, the RVU output per specialist has and will remain the same over the course of the study. This RVU per specialist assumption is used because there is a high degree of uncertainty about future productivity, which will be affected by changing technology, including artificial intelligence (AI), and by choices made by the next generation of physicians about lifestyle choices reflected in employment contracts and in the percent of time in clinical practice. Over the past five years, MGMA has identified large increases in RVU productivity in physician-owned multispecialty practices. See Figure 1 from an MGMA Data Dive report.[20] While the picture may be very different for hospital employed physicians, this data none the less shows the uncertainty concerning future productivity.

[20] MGMA. *Provider Pay and the Dawn of a New Era of Productivity Data Report*. May 2024. Available at: https://www.mgma.com/getkaiasset/252744ee-c63b-4a96-9211-8a5d6b908b39/MGMA-2024-Provider-Compensation-Data-Report.pdf.

Figure A1. Percent Change in per FTE RVU Productivity 2013-2022



Part time status is not discernable from the claims data as the range of RVUs is very wide without clear peaks for full time versus part time. Because the RVUs do not reflect all payers, low RVUs can represent a high commercial payer mix, rather than part time status. Although changes in part time status are clearly affecting physician supply, this analysis needed to assume this number stayed approximately the same over the years analyzed.

Appendix B. Medicaid Enrollment Data

South Carolina Department of Health and Human Services supplied enrollment data per county for October of each of the years 2016 through 2024. All years had total managed care and fee-for-service (FFS) enrollment. The years 2021−2024 had the fee-for-service enrollment separated for full benefit and partial benefit enrollees. South Carolina also supplied projected total enrollment for the years 2025−2035 (not by county).

For demand calculations, managed care enrollees and full benefit enrollees were counted because, as partial benefit enrollees were either already accounted for in the Medicare data as dual members or had benefits that would be unlikely to result in claims for the full set of physician specialty services.

For the years 2016 through 2020, the number of limited benefit enrollees was estimated by applying the ratio of limited benefit enrollees to total fee-for-service enrollees in 2024.The preceding years were excluded because of the sharp decrease in limited benefit enrollees in 2024 that coincided with the end of the public health emergency and the reinstated redetermination process. This sharp drop suggested that many in this category were enrolled (or remained enrolled) in October 2021 through October 2023, and the ratios were, therefore, not as reliable as 2024 data, which likely better reflected historic conditions. The estimated number of people with limited benefits was subtracted from the total FFS enrollment to provide estimated full benefit enrollment for 2016−2020.

For 2025−2026, a model was created to apportion the total state-level enrollment to each county. Data from KFF (formerly The Kaiser Family Foundation) on total Medicaid enrollment for children and adults[21], as well as US Census Bureau data on the statewide poverty level, per county poverty levels and per county adults ages 18−64 and children younger than 18 years old were used to create a model of likely apportionment. The model had an r^2 value of 98.3 when modeled 2024 enrollment was benchmarked against 2024 actuals. The output of the model was adjusted for each county by the ratio of the SC Department of Health and Human Services supplied data from 2021 through 2024 with the model output for the same years (difference was 0.55% and correlation was 0.983, but the range of County adjustments was 69.3% to 172%). Afterward an adjustment factor was applied to each year to ensure that the total equaled the South Carolina supplied projections for the year.

[21] Accessed at https://www.kff.org/medicaid/state-indicator/distribution-of-medicaid-enrollees-by-enrollment-group/

Table A1. Medicaid Full and Actual Benefits, 2016 and 2021–2024, and Modeled Apportionment, 2025–2035

County	2016 Medicaid (estimated full benefit)	2021 Medicaid (all actual)	2022 Medicaid (all actual)	2023 Medicaid (all actual)	2024 Medicaid (all actual)	2025 Medicaid (modeled apportionment)	2030 Medicaid (modeled apportionment)	2035 Medicaid (modeled apportionment)
Allendale	3,174	3,178	3,285	3,088	2,670	2,756	2,683	2,658
Bamberg	4,579	4,653	4,907	4,572	3,826	3,983	3,712	3,462
Barnwell	7,423	7,972	8,311	7,807	6,649	6,995	6,924	6,903
Beaufort	23,903	29,507	31,652	29,692	24,290	26,958	28,837	31,266
Berkeley	34,105	43,860	47,831	45,916	38,319	42,775	48,858	55,935
Charleston	63,648	75,501	80,269	76,160	62,498	69,940	75,155	79,775
Colleton	12,502	13,360	14,040	13,279	11,034	12,081	12,600	13,083
Dorchester	25,217	32,721	35,522	34,093	28,322	31,136	34,299	37,826
Hampton	6,068	6,633	6,973	6,558	5,391	5,781	5,665	5,546
Jasper	6,771	8,286	8,931	8,367	7,201	7,693	8,166	8,715
Orangeburg	27,645	30,138	31,783	29,697	24,963	26,443	25,688	25,235
Aiken	34,265	40,028	43,153	41,540	34,577	37,396	39,473	41,477
Calhoun	3,170	3,503	3,767	3,575	3,039	3,117	3,021	2,934
Chester	10,108	10,839	11,362	10,656	8,912	9,601	9,770	10,035
Fairfield	6,071	6,459	6,855	6,487	5,523	5,671	5,425	5,193
Kershaw	13,901	16,548	17,832	17,102	14,988	15,774	17,115	18,629
Lancaster	16,182	19,337	20,745	20,031	16,751	19,337	23,381	27,972
Lexington	47,908	59,484	63,992	61,207	51,850	56,234	61,230	66,780
Newberry	9,231	10,472	11,131	10,592	9,025	9,833	10,745	11,669
Richland	75,803	95,990	103,675	99,475	84,897	91,476	99,337	107,802
York	41,067	50,844	54,695	51,699	42,808	49,073	56,985	66,045
Chesterfield	12,327	13,858	14,825	13,984	11,978	12,717	13,111	13,377
Clarendon	9,819	10,612	11,160	10,414	8,784	9,207	8,903	8,648

County	2016 Medicaid (estimated full benefit)	2021 Medicaid (all actual)	2022 Medicaid (all actual)	2023 Medicaid (all actual)	2024 Medicaid (all actual)	2025 Medicaid (modeled apportionment)	2030 Medicaid (modeled apportionment)	2035 Medicaid (modeled apportionment)
Darlington	18,695	21,100	22,234	21,091	18,311	19,230	19,859	20,301
Dillon	11,502	12,427	13,109	12,353	10,763	11,218	11,310	11,363
Florence	38,866	43,414	46,289	44,040	37,565	39,524	40,112	40,952
Georgetown	13,968	15,357	16,251	15,207	12,734	13,653	13,977	14,419
Horry	61,815	78,449	85,012	81,186	68,402	75,714	85,161	96,100
Lee	5,865	5,998	6,327	5,991	5,069	5,287	5,196	5,083
Marion	12,035	12,323	12,940	12,163	10,548	10,950	10,888	10,847
Marlboro	9,072	9,468	10,026	9,562	8,488	8,651	8,665	8,675
Sumter	28,381	32,628	34,744	33,185	28,801	29,889	30,262	30,561
Williamsburg	10,504	10,872	11,378	10,712	9,256	9,480	9,208	8,802
Abbeville	5,463	5,961	6,298	5,966	4,892	5,237	5,229	5,296
Anderson	39,436	47,771	51,383	49,408	42,210	45,714	50,359	55,380
Cherokee	13,933	16,307	17,472	16,772	14,347	15,182	15,799	16,436
Edgefield	4,842	5,559	5,910	5,664	4,841	5,102	5,325	5,587
Greenville	86,444	107,168	116,518	112,590	93,902	103,043	114,420	127,434
Greenwood	16,246	19,138	20,403	19,581	16,592	17,668	18,402	19,234
Laurens	16,151	18,802	20,038	19,198	16,429	17,385	18,055	18,731
McCormick	1,866	2,091	2,167	2,015	1,700	1,740	1,621	1,521
Oconee	14,797	17,347	18,523	17,632	15,034	16,150	17,178	18,369
Pickens	21,214	24,814	26,756	25,445	21,643	23,675	26,074	28,510
Saluda	4,874	5,462	5,809	5,518	4,632	4,971	5,150	5,374
Spartanburg	63,265	81,264	89,667	88,643	76,567	81,074	90,675	101,451
Union	7,628	8,445	8,894	8,416	7,175	7,698	7,991	8,198

Appendix C. Supply and Demand Graphs and Tables

See data book: insert here as desired.

Appendix D. Medicaid Analysis Details

See data book: insert here as desired.

Appendix E. Counties with the Highest RVUs per Population Used for Defining Demand

Medicaid RVUs per Enrolled Beneficiary in Three Highest Utilizing Counties

Specialty	Rank	County	RVUs/Population
Anesthesiology	**1**	Greenwood	0.0402
	2	Abbeville	0.0332
	3	Georgetown	0.0300
Cardiology	**1**	Chester	0.2535
	2	Lancaster	0.2353
	3	Kershaw	0.2276
Dermatology	**1**	Beaufort	0.0651
	2	Hampton	0.0619
	3	Oconee	0.0594
Emergency Medicine	**1**	Colleton	1.6089
	2	Fairfield	1.4074
	3	Charleston	1.4027
Endocrinology	**1**	Barnwell	0.0614
	2	Sumter	0.0385
	3	Allendale	0.0322
Family Medicine	**1**	Abbeville	1.9345
	2	Greenwood	1.3701
	3	Spartanburg	1.3224
Gastroenterology	**1**	Dorchester	0.1007

Specialty	Rank	County	RVUs/Population
	2	Berkeley	0.0973
	3	Greenwood	0.0906
General Surgery	1	York	0.6401
	2	Darlington	0.4508
	3	Chesterfield	0.4204
Hematology and Oncology	1	Union	0.0523
	2	Bamberg	0.0454
	3	Anderson	0.0451
Infectious Disease	1	Florence	0.0375
	2	Lexington	0.0368
	3	Georgetown	0.0322
Internal Medicine	1	Hampton	0.6602
	2	Chester	0.6255
	3	Dillon	0.5730
Interventional Radiology	1	Lexington	0.0481
	2	Calhoun	0.0297
	3	Saluda	0.0266
Nephrology	1	Jasper	0.0054
	2	Aiken	0.0043
	3	Kershaw	0.0040

Specialty	Rank	County	RVUs/Population
Neurology	**1**	Pickens	0.1432
	2	Laurens	0.1403
	3	Greenville	0.1320
Obstetrics and Gynecology	**1**	Dorchester	0.9289
	2	Berkeley	0.9045
	3	Sumter	0.8283
Ophthalmology	**1**	Greenwood	0.1675
	2	Chester	0.1473
	3	Abbeville	0.1253
Orthopedics	**1**	Chester	0.2887
	2	Union	0.2572
	3	Colleton	0.2459
Otolaryngology	**1**	Kershaw	0.2552
	2	Dorchester	0.2069
	3	Sumter	0.2044
Pathology	**1**	Berkeley	0.0716
	2	Aiken	0.0659
	3	Dorchester	0.0639
Pediatric Neurology	**1**	Edgefield	0.0222
	2	Aiken	0.0192

Specialty	Rank	County	RVUs/Population
	3	Dorchester	0.0169
Pediatric Psychiatry	1	Pickens	0.0277
	2	Oconee	0.0276
	3	Greenville	0.0259
Pediatrics	1	Beaufort	1.5954
	2	Dorchester	1.4832
	3	Charleston	1.4174
Plastic Surgery	1	Pickens	0.0672
	2	Lee	0.0648
	3	Allendale	0.0510
Psychiatry	1	Anderson	0.1252
	2	Charleston	0.1135
	3	Oconee	0.0908
Pulmonary	1	Anderson	0.0685
	2	Laurens	0.0621
	3	Williamsburg	0.0589
Radiology	1	Colleton	0.4784
	2	Dillon	0.4509
	3	Chester	0.4302
Rheumatology	1	Anderson	0.0232

Specialty	Rank	County	RVUs/Population
	2	Pickens	0.0170
	3	Horry	0.0160
Thoracic Surgery	1	Allendale	0.0465
	2	Lee	0.0443
	3	Barnwell	0.0412
Urology	1	Horry	0.0803
	2	Colleton	0.0789
	3	Bamberg	0.0676
Vascular Surgery	1	Bamberg	0.0519
	2	Anderson	0.0512
	3	Calhoun	0.0509

Medicare RVUs per Person Ages 65 and Older

Specialty	Rank	County	RVUs/Population
Anesthesiology	1	Greenwood	0.4106
	2	Sumter	0.2893
	3	Pickens	0.2807
Cardiology	1	Kershaw	3.2942
	2	Chester	3.0914
	3	York	2.7458
Dermatology	1	Charleston	1.2858

Specialty	Rank	County	RVUs/Population
	2	York	1.0662
	3	Pickens	0.9710
Emergency Medicine	1	Union	2.8115
	2	Hampton	2.2644
	3	Orangeburg	2.2100
Endocrinology	1	Barnwell	0.3001
	2	Aiken	0.1937
	3	Orangeburg	0.1468
Family Medicine	1	Abbeville	4.2977
	2	Greenwood	3.9345
	3	Dillon	3.8670
Gastroenterology	1	Greenwood	1.0139
	2	Charleston	0.9510
	3	Sumter	0.8944
General Surgery	1	Hampton	1.4291
	2	Spartanburg	1.0942
	3	York	1.0936
Hematology and Oncology	1	Greenwood	0.4412
	2	Pickens	0.4318
	3	Spartanburg	0.4205

Specialty	Rank	County	RVUs/Population
Infectious Disease	**1**	Orangeburg	0.2092
	2	Florence	0.1681
	3	Bamberg	0.1531
Internal Medicine	**1**	Spartanburg	3.2935
	2	York	3.2483
	3	Dillon	3.1510
Interventional Radiology	**1**	Lexington	0.3553
	2	Richland	0.1746
	3	Orangeburg	0.1634
Nephrology	**1**	Sumter	0.8524
	2	Dillon	0.7151
	3	Florence	0.6808
Neurology	**1**	Florence	0.7731
	2	Hampton	0.6239
	3	Greenwood	0.6179
Obstetrics and Gynecology	**1**	Chester	0.4748
	2	Georgetown	0.4296
	3	Aiken	0.3634
Ophthalmology	**1**	Greenwood	1.6325
	2	Pickens	1.5336

Specialty	Rank	County	RVUs/Population
	3	Hampton	1.5327
Orthopedics	1	Georgetown	2.1441
	2	Newberry	2.0343
	3	Horry	1.9861
Otolaryngology	1	Aiken	0.5546
	2	Sumter	0.5348
	3	Kershaw	0.5253
Pathology	1	Aiken	0.3100
	2	Georgetown	0.3073
	3	York	0.3057
Pediatric Neurology	1	Jasper	0.0069
	2	Allendale	0.0062
	3	Aiken	0.0045
Pediatric Psychiatry	1	Bamberg	0.0790
	2	Lexington	0.0448
	3	Sumter	0.0368
Pediatrics	1	Georgetown	0.1948
	2	York	0.0769
	3	Chester	0.0280
Plastic Surgery	1	Kershaw	0.1831

Specialty	Rank	County	RVUs/Population
	2	Clarendon	0.1617
	3	Richland	0.1610
Psychiatry	1	Anderson	0.3229
	2	Richland	0.2219
	3	York	0.1871
Pulmonary	1	Georgetown	0.5211
	2	Pickens	0.5180
	3	Barnwell	0.5068
Radiology	1	Florence	2.1911
	2	Kershaw	2.1196
	3	Hampton	2.1135
Rheumatology	1	York	0.1981
	2	Charleston	0.1648
	3	Pickens	0.1583
Thoracic Surgery	1	Clarendon	0.2130
	2	Aiken	0.2044
	3	Florence	0.1789
Urology	1	York	0.8439
	2	Horry	0.8403
	3	Sumter	0.8250

Specialty	Rank	County	RVUs/Population
Vascular Surgery	**1**	Charleston	0.4568
	2	Anderson	0.4108
	3	Greenwood	0.4010