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2015 American College of Rheumatology Workforce Study and Demand Projections of Pediatric Rheumatology Workforce, 2015-2030

(Pediatric Rheumatology Workforce)

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Abstract

Objective: Describe the character and composition of the 2015 pediatric rheumatology workforce in the United States (US), evaluate current workforce trends, and project future supply and demand of pediatric rheumatology workforce through 2030.

Methods: The American College of Rheumatology (ACR) created the Workforce Study Group (WSG) to study the rheumatology workforce. The WSG used primary and secondary data to create a representative workforce model. Pediatric rheumatology supply and demand was projected through 2030 using an integrated data-driven framework to capture a more realistic clinical full-time equivalent (FTE) and produce a better picture of access to care issues in pediatric rheumatology.

Results: The 2015 pediatric workforce was estimated at 287 FTE (300 providers), while the estimated excess demand was 95 (33%). The projected demand will continue to increase to almost 100% (N=230) by 2030 if no changes occur in succession planning, new graduate entrants into the profession, and other factors associated with the workforce.

Conclusion: This study projects that the pediatric rheumatology workforce gap will continue to worsen significantly from the 2015 baseline, and by 2030 the demand for

pediatric rheumatologists will be twice the supply. Innovative strategies are needed to increase the workforce supply and to improve access to care.

Significance and Innovations

- There is currently a shortage of the United States (US) pediatric rheumatology workforce to treat children with rheumatic diseases.
- Some geographic regions in the US, especially the South and Southwest, have a severe shortage in pediatric rheumatology providers, and this is expected to worsen if interventions are not done.
- The overall shortage of the workforce is predicted to worsen so that by 2030 demand for pediatric rheumatology providers will be twice the supply.
- Strategies are needed to recruit rheumatologists, physician assistants and nurse practitioners to pediatric rheumatology and to augment the provider network.

The relative lack of pediatric rheumatologists to treat the ~300,000 children in the United States (US) with chronic arthritis and other rheumatic diseases has been a recognized problem for decades (1). In the late 1990s Cassidy et al. reported that the number of practicing pediatric rheumatologists had grown from 27 in 1976 to 178 (121 board-certified) in 1996 (2). Although it seemed promising that the specialty had grown 7-fold over those 20 years, it remained concerning that more than one-third of 125 pediatric academic centers did not have a pediatric rheumatologist faculty member. In 2006, the American Board of Pediatrics (ABP) published data showing that there were 200 board-certified pediatric rheumatologists, and that there was a clear increasing trend in the number of pediatric rheumatology fellows over 10 years (3). However, the same study demonstrated that there were only 3 pediatric rheumatologists per million children in the US, and 14 states had no practicing pediatric rheumatologists. The American College of Rheumatology (ACR) workforce study published one year later predicted a pediatric rheumatology deficit of 33 providers by 2025 (4). In response to these findings, a series of policy recommendations—focused on training and economics, health care delivery, and global outreach—were published to aid in increasing the pediatric rheumatology workforce (5–7). Despite these studies and policy recommendations, a significant deficit in the pediatric rheumatology workforce remains.

To understand the full extent of this workforce gap, in 2015 the ACR created the workforce study group (WSG). The purpose of the WSG was to evaluate the changes in the adult and pediatric workforce through 2030 and to provide potential solutions to be addressed by the ACR and other stakeholders. The goals of the pediatric arm of the WSG were to describe the current state of the pediatric rheumatology workforce as compared to the previous ACR workforce study (4), project a succession plan as rheumatologists near retirement, develop assumptions regarding the key factors affecting the supply of and demand for rheumatologists, create a patient-centered approach to providing quality care to all patients with rheumatologic conditions, and conduct a sensitivity analysis of this workforce model to determine the potential best and worst case scenarios. Results from the 2015 adult rheumatology arm of this study have been published previously (8). Here we present the pediatric rheumatology workforce study findings. From these findings, we propose solutions to improve the supply of pediatric rheumatology providers.

Materials and Methods

Workforce study group (WSG): The WSG was comprised of a diverse membership group of volunteer rheumatology specialists including pediatric rheumatologists. There were five members of the core leadership, three of whom are co-authors on this study (DB, SM, and MD). Two of the core leaders (DB and SM) were adult rheumatologists and the other three had expertise in workforce and academic leadership. There were an additional nine members of the core group. The core membership group included two pediatric rheumatologists (co-authors MKG, LI), one fellow in adult and pediatric rheumatology, one physician assistant (PA) and one nurse practitioner (NP). Among

both groups there were four division directors (2 adult, 2 pediatric) and two adult program directors. Group members came from a variety of geographic locations in the US. Full details of the WSG can be found in Appendix A of the 2015 Workforce Study document (9). Additional focus groups were used to ensure members of the pediatric rheumatology workforce not represented in the WSG were able to provide their perspectives. The WSG provided input into the secondary data collection procedures, provided guidance in the primary data collection methods of ACR/Association of Rheumatology Health Professionals (ARHP) members, identified critical factors affecting supply and demand for rheumatology services, approved the workforce study modeling process, and accepted the final workforce study findings. The University of Michigan Institutional Review Board (IRB) reviewed the study and determined it to be exempt from ongoing review (Exemption #2 of the 45 CFR 46.101.(b); HUM00104523).

Data collection: A mixed methods approach (both primary and secondary data) was used to identify and evaluate workforce issues. These issues informed the model used to help predict the future pediatric rheumatology workforce. Data were collected from many secondary sources (e.g., American Medical Association, ABP, Rheumatology Nurses Society, National Commission Certification of Physician Assistants) (9). Primary data was collected through electronic surveys distributed to the ACR membership, current rheumatology fellows-in-training (FITs), and a group of rheumatology patients identified by the Arthritis Foundation (9). These data were supplemented by data collected through pediatric focus groups and personal interviews. Volunteers were recruited through the ACR to participate in focus groups, both in-person at the ACR

Annual Meeting, and via teleconference, for a total of 8 focus groups that included 5-10 participants in each group. Information from these interviews was integrated into the workforce study.

Workforce study modeling: The workforce study model was a critical focus of the WSG. The challenge was developing a model that would ensure translating population needs into the appropriate provider supply. The WSG selected an integrated workforce framework model that combined socioeconomic and epidemiologic factors along with utilization rates that incorporated the current use of health care services. The first step was to determine the number of pediatric rheumatology providers in the workforce. This was done by reviewing the number of providers that were ABP board-certified and was supplemented by reviewing pediatric providers in the ACR website and by reviewing responses to the workforce study survey. This included physicians, NPs, and PAs. The next step was to define the pediatric rheumatology workforce that provided direct patient care at the time of the study (2015), defined as the clinical full-time equivalent (FTE). Because of the changing demographics and pattern trends identified, it became clear that understanding the actual number of practitioners was not sufficient to determine the workforce supply. The clinical FTE, which is the ratio of units that equate to the number of practitioners seeing patients full-time, was subsequently identified, and used to provide a realistic level of effort devoted to direct patient care. For example, a clinical FTE of 0.5 (or 50%) means that a provider spends half of their time in patient care. Therefore, two providers with 0.5 FTE would equate to 1 clinical FTE. After careful assessment and consensus discussion among pediatric rheumatologists in the

workforce, the clinical FTE definition for pediatric rheumatology used in the workforce model was 1.0 clinical FTE for physicians in non-academic settings (~5% workforce) and 0.8 clinical FTE for those working in academic settings (~95% workforce). The pediatric academic FTE was unique from the adult academic FTE, which was estimated at 0.5. This was because compared to pediatric academic rheumatologists, adult academic rheumatologists spent a greater amount of time in scholarly activities and less time in patient care (8). The non-physician providers (NPs and PAs) were defined as 0.9 clinical FTE regardless of setting.

Workforce study supply and demand assumptions (Table 1): *Factors influencing supply* included geographic domestic patterns of population distribution and density (geographic mobility, net migration, and micropolitan statistical areas), practice setting and productivity, succession trends, gender and generational breakdown, and demographic breakdown of new graduates entering the rheumatology workforce. The base model assumed no geographic changes over ten years, that providers working in micropolitan statistical areas worked 15% less than those who worked outside those areas, and that on average, pediatric rheumatologists worked 55 hours per week. *Factors influencing demand* included health care utilization patterns, prevalence of disease, changes in patient demographics and gross domestic product (GDP) per capita income overall and by region (10–14). While the projected population increase in children was anticipated to be relatively small (~3-4%) from 2015-2030, this was factored in the demand model (15). While the projected effect of the aging US population was far less on pediatric rheumatology than on adult rheumatology, the cost

of rheumatology care and GDP per capita income impact was also evaluated. In the 2015 workforce study, a sample of patients were queried to evaluate perceived need and access, which added a new perspective to the supply and demand modeling. Based on the information collected, the workforce study identified shifts in the demographic breakdown (e.g., gender and generational differences), geographic distribution trends, and practice patterns that indicated a much larger decline in the supply of pediatric rheumatology effort than projected in the 2005 workforce study (4). This decline in supply was theorized to be multifactorial with an increased number of retiring rheumatology providers, the expansion of part-time providers in the workforce, and the increased number of rheumatology graduates seeking part-time employment. Multivariate and logistic regression with backward stepwise analysis was used to determine factors that contributed significantly to the model for pediatric rheumatology services ($F=39.06$, $p<0.001$; $R2=0.37$). Goodness-of-fit tests were used to determine model fit.

Sensitivity testing: To address the variability in the results from the base-model, sensitivity analyses were conducted. Sensitivity testing is an analytic methodology used to build confidence in results. It allows for alternate models to be used in conjunction with a "base-case" model that incorporates "best-estimated" values of all selected parameters (16). ST was used to ascertain a “best-case” and “worst-case” scenario providing an estimated range of supply for and demand of services through 2030 (Supplement 1). Sensitivity testing is critical to provide for a range in variability that can occur when making future projections.

Results

Baseline Rheumatology Workforce

Pediatric rheumatology providers were defined as rheumatologists, NPs and PAs who specialized in treating pediatric patients. Calculations were conducted based on the estimated time providers spent treating patients (referred to as clinical FTE). Figure 1 graphically depicts the pediatric rheumatology workforce supply projections in provider clinical FTE, including PAs and NPs, from 2015 through 2030. The projections anticipate a 16% decrease between 2015 and 2030.

Demand Factors

The factors that were used to assess the future demand of the pediatric rheumatology services included: changes in population demographics, health care utilization patterns, practice trends, GDP per capita income, and net migration/geographic trends. Unlike the adult rheumatology workforce, aging was not a major driving force, because according to the US Census Bureau, the population of children under the age of 18 was not expected to increase significantly between 2014 and 2030, remaining at approximately 74 million by 2020 and 76 million by 2030 (15,17,18). Therefore, population demographics and geographic trends played less of a role in the demand in pediatric rheumatology compared to adult rheumatology. Based on GDP per capita compound growth from 2010 to 2015 and the forecasted value for 2020, an estimated compound growth for 2015-2030 would be approximately 2.5%, up 1.5% from the 2005 (19–21). In 2015, the growth of the real GDP per capita in the US was around 1.5%

compared to the previous year. While the GDP per capita continues to rise, the percentage of increase is expected to decrease beginning in 2018 through 2022 (22).

Supply Factors

Of the factors used to assess future supply for pediatric rheumatology specialists, three major drivers included workforce practice trends, access to care/geographic distribution of rheumatology services, and changes in the demographic breakdown of the new graduates entering the workforce (Table 1) (23–25).

Current Workforce Practice Trends

Given the aging pediatric rheumatology workforce and taking into consideration the current low numbers of pediatric rheumatology providers in the US, succession patterns (e.g., retirement, anticipated changes in workload, etc.) are critical. Labor workforce participation rates for providers of a given age, sex, and international medical graduate (IMG) status from year to year were reflected in the projections. In addition, gender and millennial workforce practice trends were also included.

Income Variability and Access to Rheumatology Workforce

Access to care was defined as physician per population and geographic trends/net migration. While the overall trends show an increase, income varies widely between demographics within the US (26). The poverty rate in the US in 2015 was approximately 15% (15). Poverty rates are persistently higher in rural and inner-city parts of the country as compared to suburban areas. Moreover, 29 states had lower median income, and 18 states had higher median income. When reviewing geographic trends of

pediatric providers, there were three geographic areas of particular concern. The Southeast had only 0.21 providers per 100,000 children, with a projection of 0.04 per 100,000 in 2030, the South Central region had 0.2 providers per 100,000 children with a projection of 0.04 per 100,000 in 2030, and the Southwest had 0.17 providers per 100,000 with a projection rate of only 0.03 in 2030 (Figure 2).

New graduates entering the workforce and succession planning

When considering the future supply of pediatric rheumatologists, graduating fellows who enter the workforce were an important factor in the model. The calculated number depended on available fellowship positions, the fill-rate of those positions, graduation rates, and number of IMGs who anticipate remaining in the US. Other factors that contributed to the entering workforce calculations included gender shifts. 68% of the pediatric rheumatology workforce was female. Our model assumed that 18% of new graduates entering the workforce would work part-time and 90% of those were female. Our WSG survey indicated that 32% of pediatric rheumatologists planned to retire within the next 10 years. Moreover, approximately 80% of those who plan to retire anticipate a decrease in their patient load by 25%. There were approximately 25 pediatric rheumatology fellows graduating each year. Our model predicts that by 2025 there will be an overall loss between retirees and new fellow graduate entrants of 27 providers.

Supply-Demand Projections

The supply and demand projections of pediatric rheumatology services included NPs and PAs. Figure 1 compares the total number of rheumatology providers (physician and

non-physician) to the projected clinical FTE of all providers from 2015 to 2030. Figure 3 demonstrates the projected gap between supply of rheumatologists and demand. This figure includes the previously predicted projection from the 2005 workforce study (4). By 2030, the projected supply of pediatric rheumatologist clinical FTEs is 231 compared to a projected demand of 461, thus projecting a net deficit of 230 clinical FTE.

Discussion

The pediatric rheumatology workforce shortage has been a recognized problem for decades. Although pediatric rheumatology has grown substantially (10-fold) since its beginnings in the 1970s (27), the workforce is approximately 300 providers in the U.S. which is still a major shortage. The aim of our study was to reassess the trends in supply and demand for pediatric rheumatology care. It is important to note that the ABP also conducted a pediatric rheumatology workforce study (2018) (28). However, this study primarily utilized board-certification status as a proxy for clinically available pediatric rheumatology providers whereas our study attempted to define clinical FTE to more accurately reflect clinically available rheumatologists. This is important because most pediatric rheumatologists work in academic settings, and clinical FTE in academia is typically less than that of community practice. At the time of the workforce study, the academic clinical FTE was determined to be 0.8, based upon the fact that anecdotally, most pediatric rheumatologists held clinical educator positions with 0.8 clinical FTE. However, a more recent survey conducted by the American Academy of Pediatrics in 2018 demonstrated that most pediatric rheumatologists self-reported spending only 54% (0.54 FTE) of their time in direct patient care (29). Therefore, currently, the clinical

FTE may be closer to 0.5 or 0.6, resulting in an even greater workforce gap than this model predicted. Our study also estimated that approximately 30% of practicing pediatric rheumatologists will retire in the next 10 years. Supportive of this projection, data from the ABP shows that ~35% of board certified pediatric rheumatologists are more than 50 years old (28).

The shortage of providers most certainly affects the quality of care of children with rheumatic diseases, as primary care providers refer children to non-rheumatologist pediatric subspecialists and adult rheumatologists (30–32). To provide the highest quality of care, children should be treated by providers with specialized training in pediatric rheumatology and who understand the unique challenges of evaluating and treating a growing child. Given the prediction of a significant workforce shortage, several strategies must be considered to address this problem, including increasing recruitment of physicians and non-physicians into pediatric rheumatology, promoting changes in the geographical distribution of providers, extending the use of telemedicine, and improving quality of care initiatives in primary care (Table 2).

The ACR and the Childhood Arthritis and Rheumatology Research Alliance (CARRA) both have programs aimed to improve recruitment of pediatric residents into the specialty and as these programs mature, they should be assessed to determine whether these interventions have been effective (33,34). There are several recognized barriers to recruiting physicians into pediatric rheumatology. These include resident debt, lack of exposure in medical school and residency, concern about being the only specialist in a state or hospital, lower salary than other pediatric specialties and length of training (3-year pediatric fellowship without 2-year option offered as in adult

rheumatology fellowship) (5,35). With only 20-30 new fellows graduating each year, substantial recruitment efforts are needed. The majority of pediatric rheumatologists work in academic institutions in which there is an expectation that academic work requires additional training. Therefore, 3-year fellowships have been the normal in pediatric subspecialties. Few pediatric rheumatologists work in community practice, so a possible solution might be to create a 2-year fellowship for physicians seeking to work in community practice and/or creating strictly clinical positions within academic institutions. Other measures to improve supply must include recruiting and training more PAs and NPs into the pediatric rheumatology workforce; they have been effectively utilized to treat adult rheumatology patients (36,37). Financial incentive programs, including medical student loan debt relief are also important. Loan repayment programs have been employed to increase primary care providers in underserved areas (38). A similar loan repayment program for pediatric rheumatology has been introduced to the Senate but to date has not moved (39).

An important aspect of the workforce supply issue is not only having too few pediatric rheumatologists but also the imbalanced geographical distribution of providers. According to the ABP, there are 9 states (Alaska, Idaho, Montana, New Hampshire, New Mexico, Oklahoma, South Dakota, West Virginia, Wyoming) without a practicing board certified pediatric rheumatologist. Several of these states have coverage by outreach programs from other states (28). However, an equally important problem is that several states with large populations of children (e.g. Texas) have only a few pediatric rheumatologists to treat them. Telemedicine has been considered an important possible solution to the geographic barriers to augment timely consultation, reduce

patient travel costs, and provide access to care and modify medical management for diagnosed patients. Prior to the COVID-19 pandemic, few pediatric rheumatology telemedicine programs existed (40,41). However, after the COVID-19 pandemic, use of telemedicine skyrocketed across healthcare in the United States, including pediatric rheumatology and so we will likely see a continuation in telehealth care (42). Anecdotally, the authors of this manuscript have found patient and provider satisfaction with telemedicine, but studies are needed to optimally assess quality of care in this setting, with a particular emphasis on the quality of the joint exam in telemedicine.

More efforts are needed to reduce the demand on pediatric rheumatologists. Education for primary care providers in conducting musculoskeletal exams and ordering of rheumatology tests may help reduce referrals of patients with non-rheumatologic diseases (43,44). Such training has been successful in adult medicine (45).

A strength of this study was that it used an integrative approach to assess not only the changes in pediatric rheumatology workforce over time, but also integrated changes in the US population, economy, and geographic distribution of providers. Sensitivity testing was used to ascertain best- and worst-case scenarios in order to establish a range of supply and demand. Importantly, this study also included the patient's perspective on barriers to access to care, and patients reported substantial direct and indirect costs for them when trying to access this care (46). The lack of workforce supply is not limited to pediatric rheumatology; adult rheumatology and several pediatric specialties face similar workforce supply challenges (8,28,47). We believe that this study can serve as a model for assessing workforce problems in other specialties as well.

There were several limitations that are important to highlight. First, it was difficult to determine accurately the number of providers in the workforce who actually treat patients, the ratio of non-academic and academic providers, the number of medicine/pediatric subspecialists and how they were documented to ensure they were not being counted twice. Second, the clinical FTE was selected based on the limited information that was available at the time and cannot be considered 100% accurate. Next, the primary data collection was conducted using the ACR membership which may limit the generalizability to the overall rheumatology workforce. It is notable that the findings from this 2015 workforce study demonstrates a significant worsening in the workforce gap compared to the 2005 study. The supply and demand model is complex taking into account several population-level factors, in addition to direct rheumatology practice measures such as FTE and disease prevalence. Although great attention was taken in creating the model assumptions, it is possible that some of the assumptions were inaccurate and thus overestimated the workforce gap, in comparison to the 2005 study. However, the primary purpose of these projections is to demonstrate important trends in workforce gaps and to identify access to care concerns for pediatric rheumatology care with potential solutions for the future.

In conclusion, this ACR/AHRP workforce study has demonstrated that the pediatric rheumatology workforce is not meeting demand, and projections show that this excess demand is increasing significantly. Based upon our model, by 2030, we are likely to have only half the supply of pediatric rheumatology care needed to meet the demand. Innovative strategies are needed to increase the workforce supply and to improve access to care for pediatric rheumatology patients.

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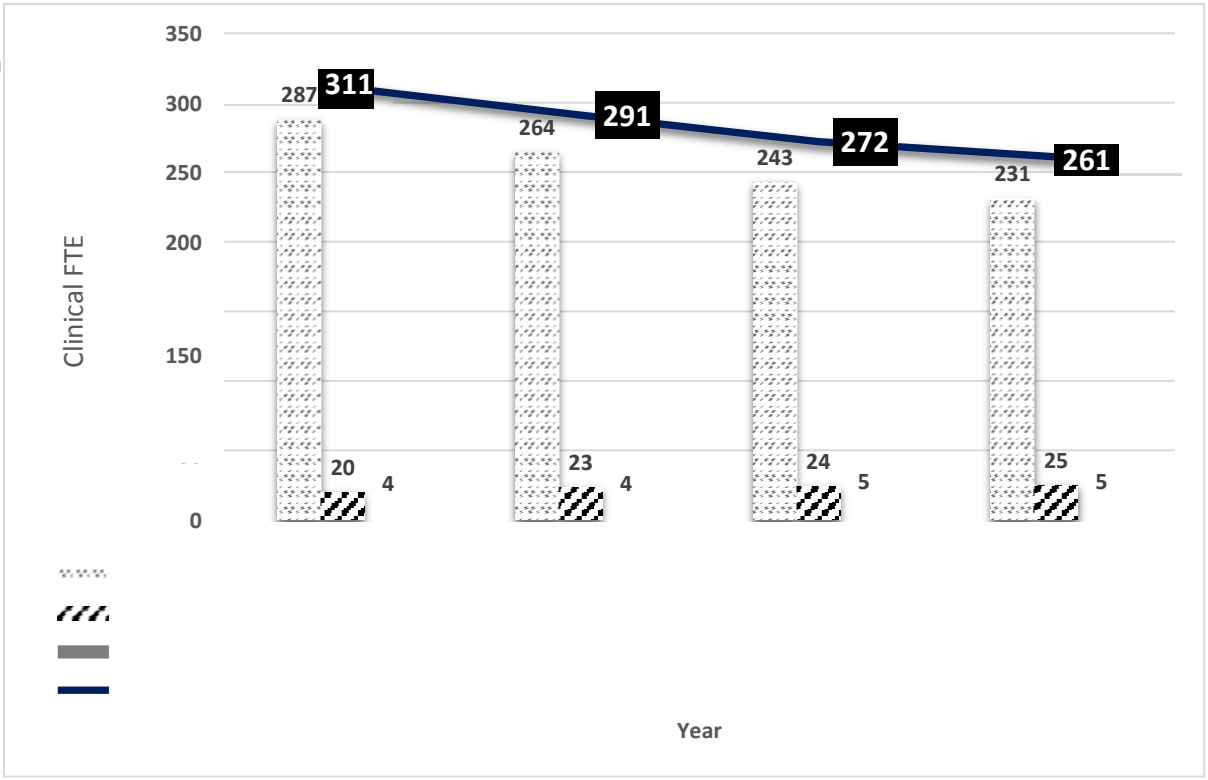


	2015	2020	2025	2030
Physicians	287	264	243	231
NPs	20	23	24	25
PAs	4	4	5	5
Total	311	291	272	261

Figure 1. Projected pediatric rheumatology clinical full-time equivalent (FTE) from 2015 through 2030.

NPs = nurse practitioners PAs = physician assistants

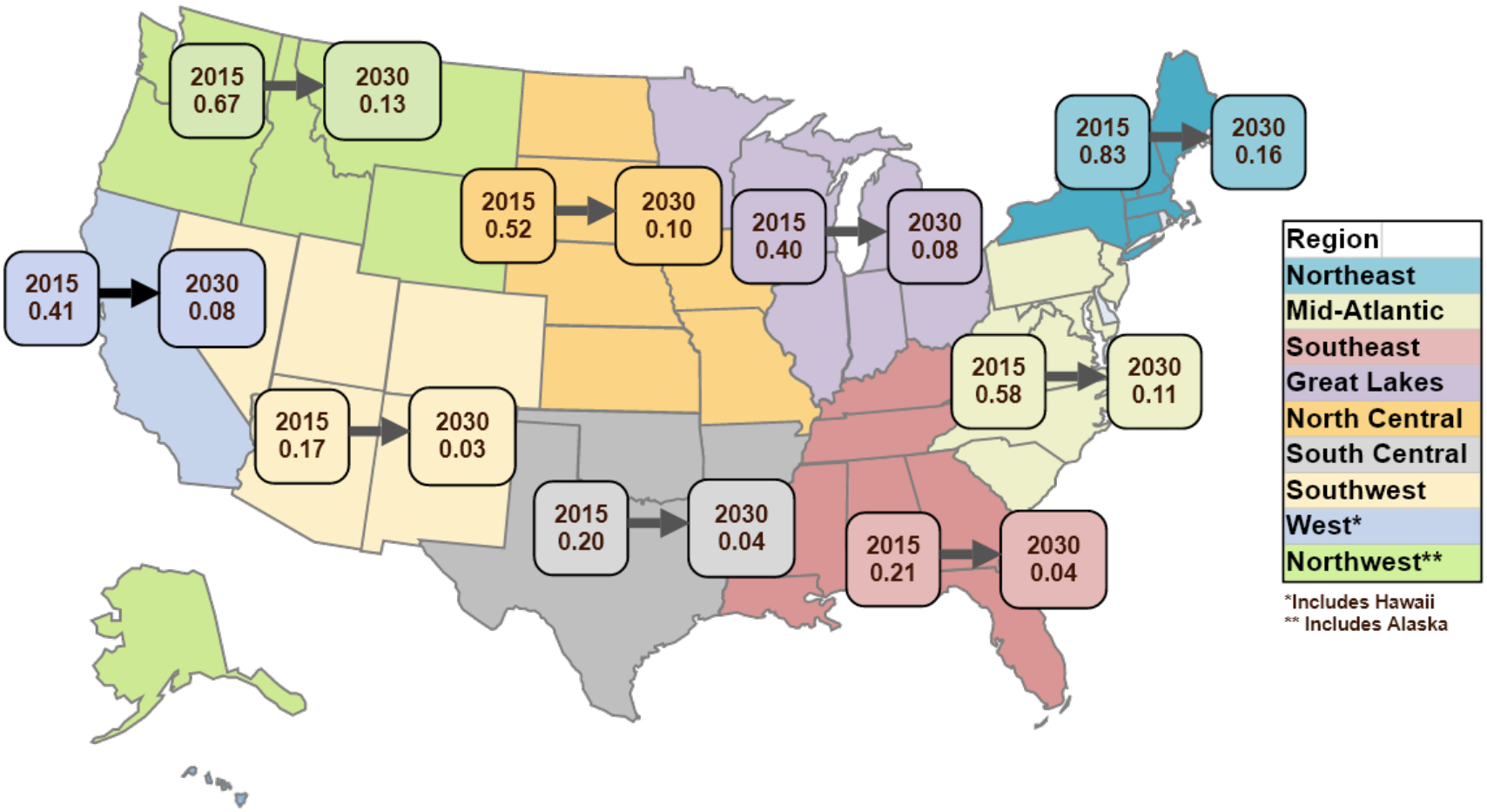
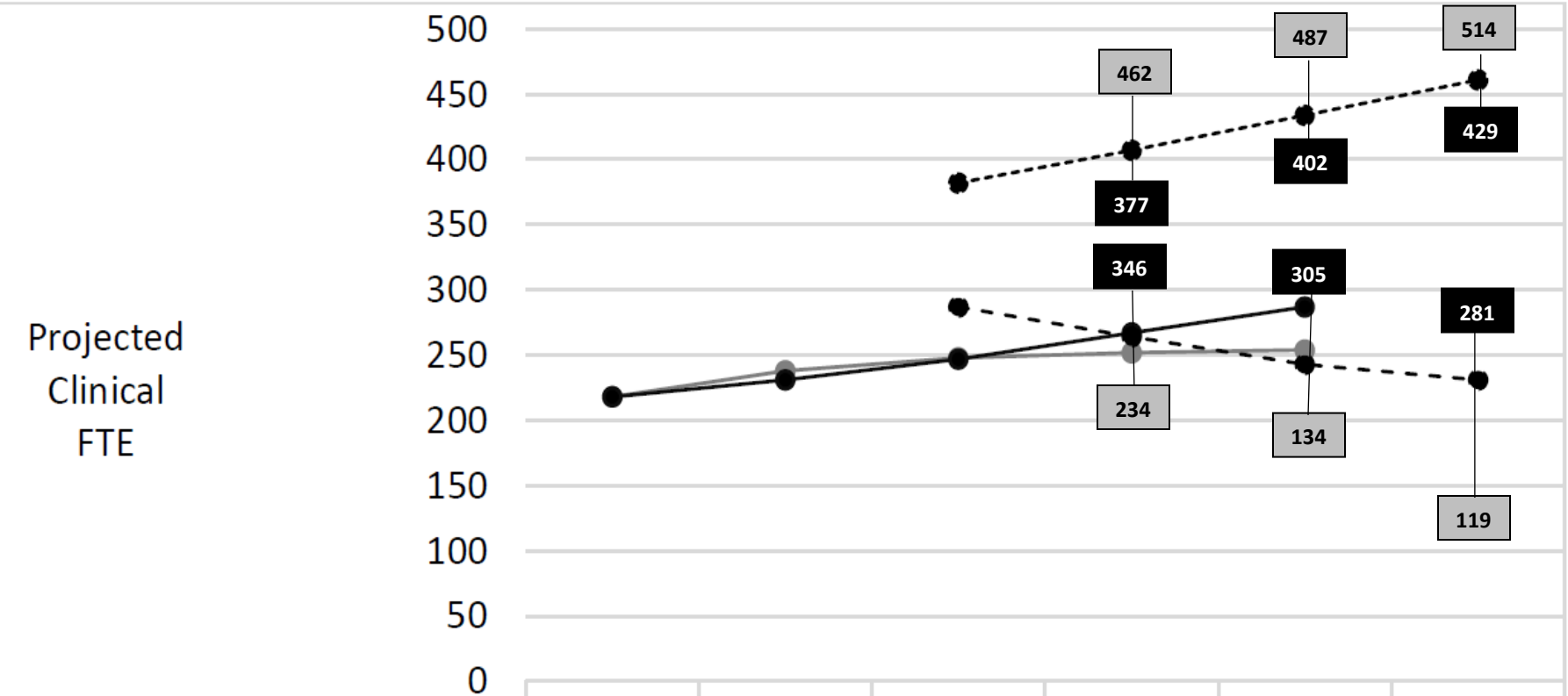


Figure 2. Pediatric rheumatology distribution rate per 100,000 children (2015 vs 2030)



	2005	2010	2015	2020	2025	2030
2005 Projected Supply	218	238	248	252	254	
2005 Projected Demand	218	231	247	267	287	
2015 Projected Supply			287	264	243	231
2015 Projected Demand			382	407	434	461

Figure 3: Projected gap between supply of rheumatologists and demand. This figure includes the previously predicted projection from the 2005 workforce study (4).