Forecasting the future supply of pediatric subspecialists in the United States from 2020-2040

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NAM: The Pediatric Subspecialty Workforce and Its Impact on Child Health and Well-Being
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This presentation in one slide

- The model significantly improves on previous models
  - supply projections for 14 subspecialties at subnational level
  - better data, stronger methods, collaboration with ABP research staff, and significant input from stakeholders
  - an interactive data visualization that allows users to customize the findings they want to see by subspecialty and region
- Without model, story of pediatric subspecialty growth in aggregate is one of growth…not necessarily the case
- Future is unknown, but model scenarios allow users to see forecasts under different assumptions
- Dissemination of model findings will target different audiences

Subspecialties included in the supply model

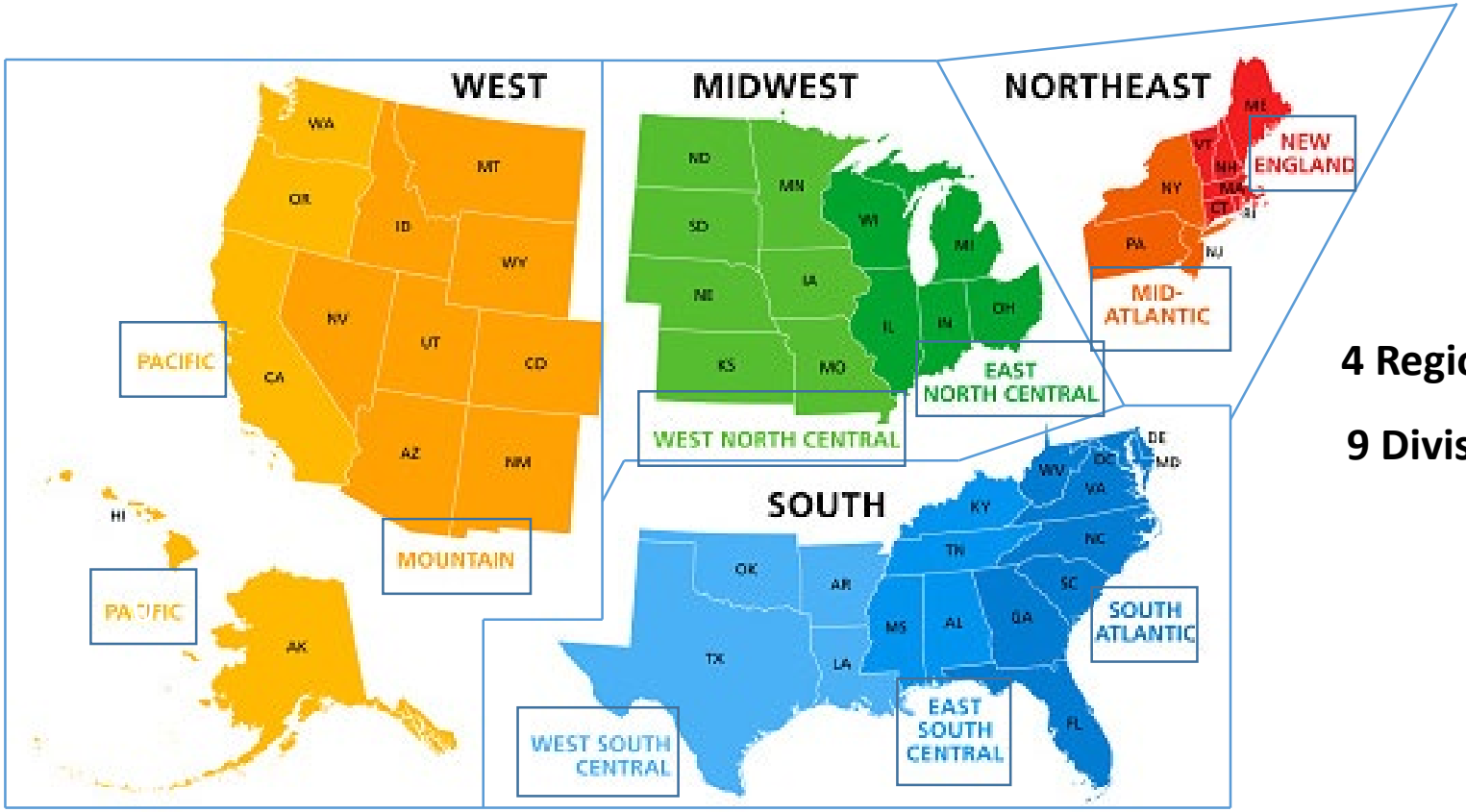
- ✓Adolescent Medicine
- ✓Pediatric Cardiology
- ✓Child Abuse Pediatrics
- ✓Pediatric Critical Care Medicine
- ✓Developmental-Behavioral Pediatrics
- ✓Pediatric Emergency Medicine
- ✓Pediatric Endocrinology
- ✓Pediatric Gastroenterology
- ✓Pediatric Hematology-Oncology
- ✓Ped Infectious Disease
- ✓Neonatal-Perinatal
- ✓Pediatric Nephrology
- ✓Pediatric Pulmonology
- ✓Pediatric Rheumatology
- X Pediatric Hospital Medicine

The model does not include pediatric hospital medicine as historical data on the number of certified pediatricians is not available.

Digging a little deeper into model components

- **Model outputs** display the forecasts for each specialty by:
  - *Headcount* and *PCT* (self-reported proportion of time spent in direct/consultative inpatient/outpatient clinical care)
  - Three levels of geography
    - National
    - 4 Census Regions
    - 9 Census Divisions

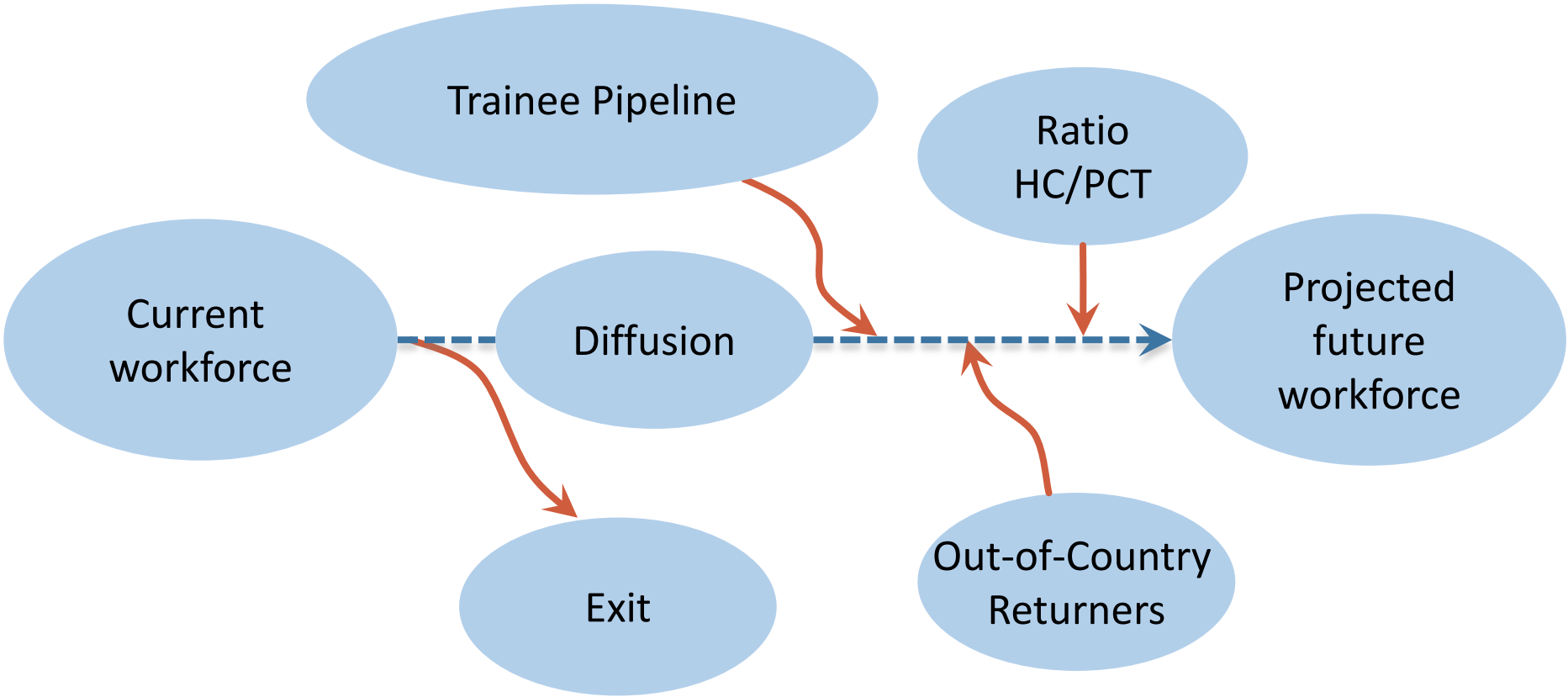
United States Census Regions and Divisions



4 Regions

9 Divisions

Model forecasts behavior of individual physicians along multiple dimensions of their career



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Model accounts for individual characteristics that affect physician behavior

Physician Characteristics	Example of how used in the model
Subspecialty	Modeling supply at subspecialty level
Location	Modeling supply at subnational level
Age	Predictor of workforce exit and percent time in clinical care
Gender	Predictor of workforce exit and percent time in clinical care
Race/ethnicity	Not in current model but able to be added in the future as data are more complete

What makes this model different and better than past models

This model improves on past models because:

- Has separate supply forecasts for the 14 subspecialties
- Models supply at the sub-national level
- Accounts for physician movement after training and during career
- Utilized wealth of ABP data on certified subspecialists
- Displays model findings in customizable, interactive, web-based visualization
- Developed with significant stakeholder input
- Designed to educate and engage stakeholders
- Captures headcount as well as clinical time

What did we find?

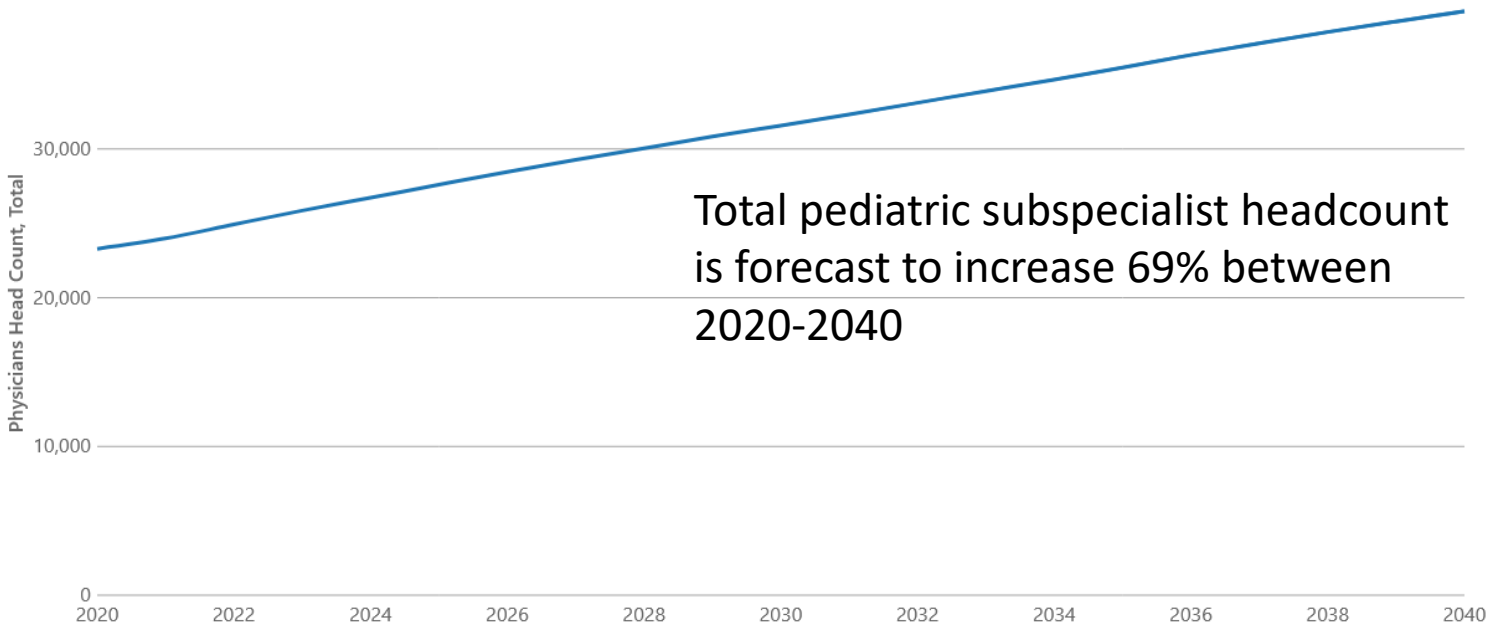
- Subspecialty Differences
- Geographic Differences
- Importance of Diffusion

Without the model, this is the national supply projection of all pediatricians

Model Parameter Summary

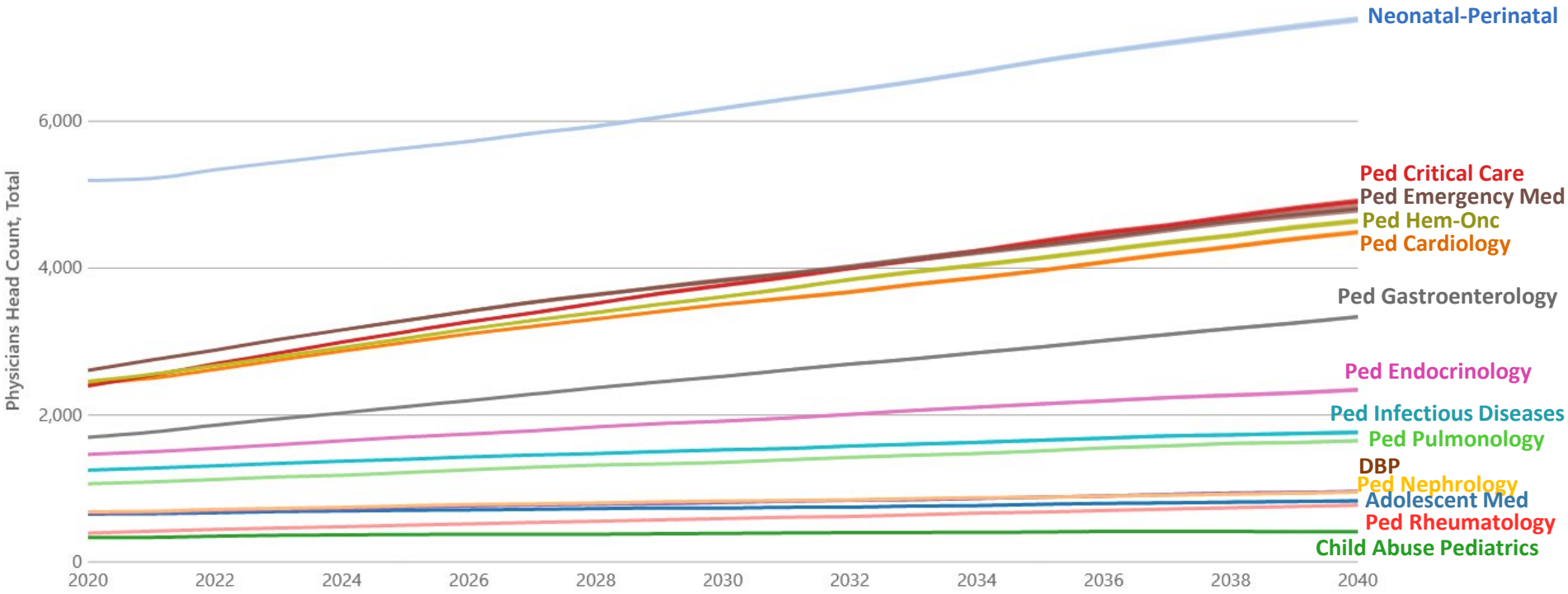
	Subspecialty	Total or Subspecialists per 100k Children	Head Count or Percent Clinical Time	Region/Division	Scenario	2020 - 2040 (% Change)
1	All Pediatric Subspecialties (Combined)	Total	Head Count	United States	Baseline	23,289 - 39,252.93 (+69%)

Interactive Projections Based on Selected Model Parameters



Total pediatric subspecialist headcount is forecast to increase 69% between 2020-2040

But subspecialties are different sizes and are forecast to grow at different rates



From 2020-2040

Fastest percentage growth: pediatric critical care (105%), pediatric gastroenterology (97%)

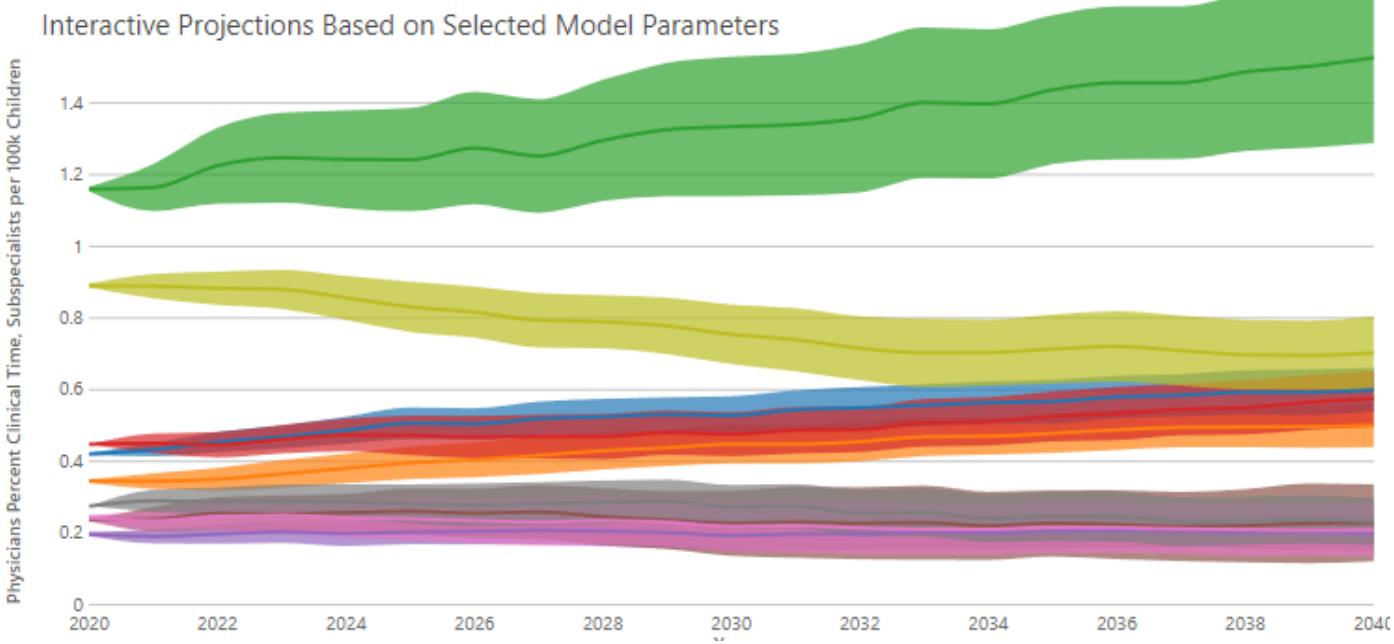
Slowest percentage growth: pediatric child abuse (24%), adolescent medicine (27%)

And projections vary by subspecialty at the sub-national level.

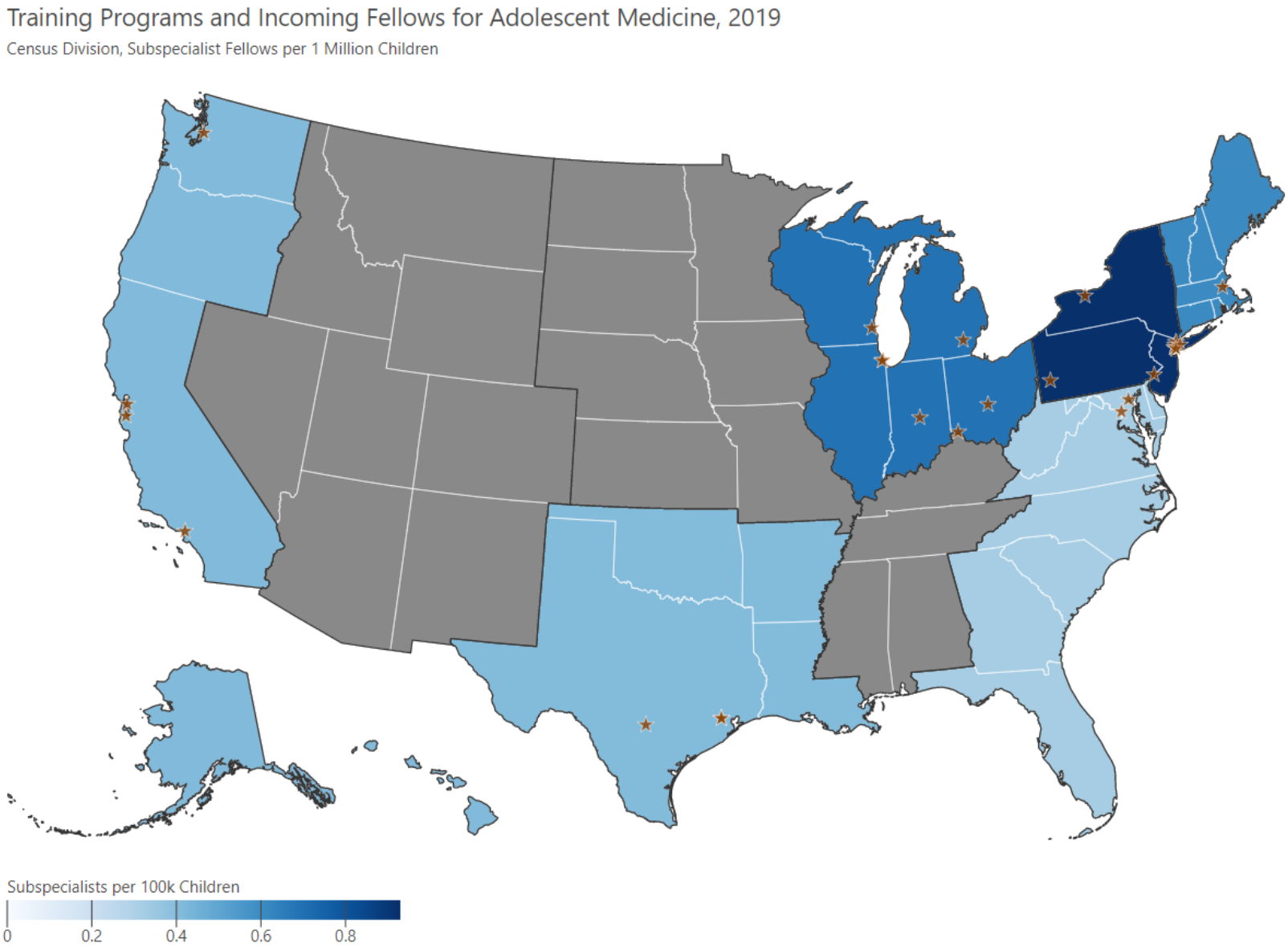
Example: Adolescent Medicine

Model Parameter Summary

	Subspecialty	Total or Subspecialists per 100k Children	Head Count or Percent Clinical Time	Region/Division	Scenario	2020 - 2040 (% Change)
1	Adolescent Medicine	Subspecialists per 100k Children	Percent Clinical Time	**South Atlantic (Census Division)**	Baseline	0.35 - 0.5 (+45%)
2	Adolescent Medicine	Subspecialists per 100k Children	Percent Clinical Time	**Pacific (Census Division)**	Baseline	0.42 - 0.6 (+43%)
3	Adolescent Medicine	Subspecialists per 100k Children	Percent Clinical Time	**New England (Census Division)**	Baseline	1.16 - 1.53 (+32%)
4	Adolescent Medicine	Subspecialists per 100k Children	Percent Clinical Time	**East North Central (Census Division)**	Baseline	0.45 - 0.57 (+28%)
5	Adolescent Medicine	Subspecialists per 100k Children	Percent Clinical Time	**West South Central (Census Division)**	Baseline	0.2 - 0.2 (+1%)
6	Adolescent Medicine	Subspecialists per 100k Children	Percent Clinical Time	**East South Central (Census Division)**	Baseline	0.24 - 0.23 (-4%)
7	Adolescent Medicine	Subspecialists per 100k Children	Percent Clinical Time	**West North Central (Census Division)**	Baseline	0.24 - 0.21 (-14%)
8	Adolescent Medicine	Subspecialists per 100k Children	Percent Clinical Time	**Mountain (Census Division)**	Baseline	0.28 - 0.23 (-15%)
9	Adolescent Medicine	Subspecialists per 100k Children	Percent Clinical Time	**Middle Atlantic (Census Division)**	Baseline	0.89 - 0.7 (-21%)



Adolescent Medicine Programs and Fellows per 1 million children



Model helps users identify where supply projections may not align with population growth per subspecialty

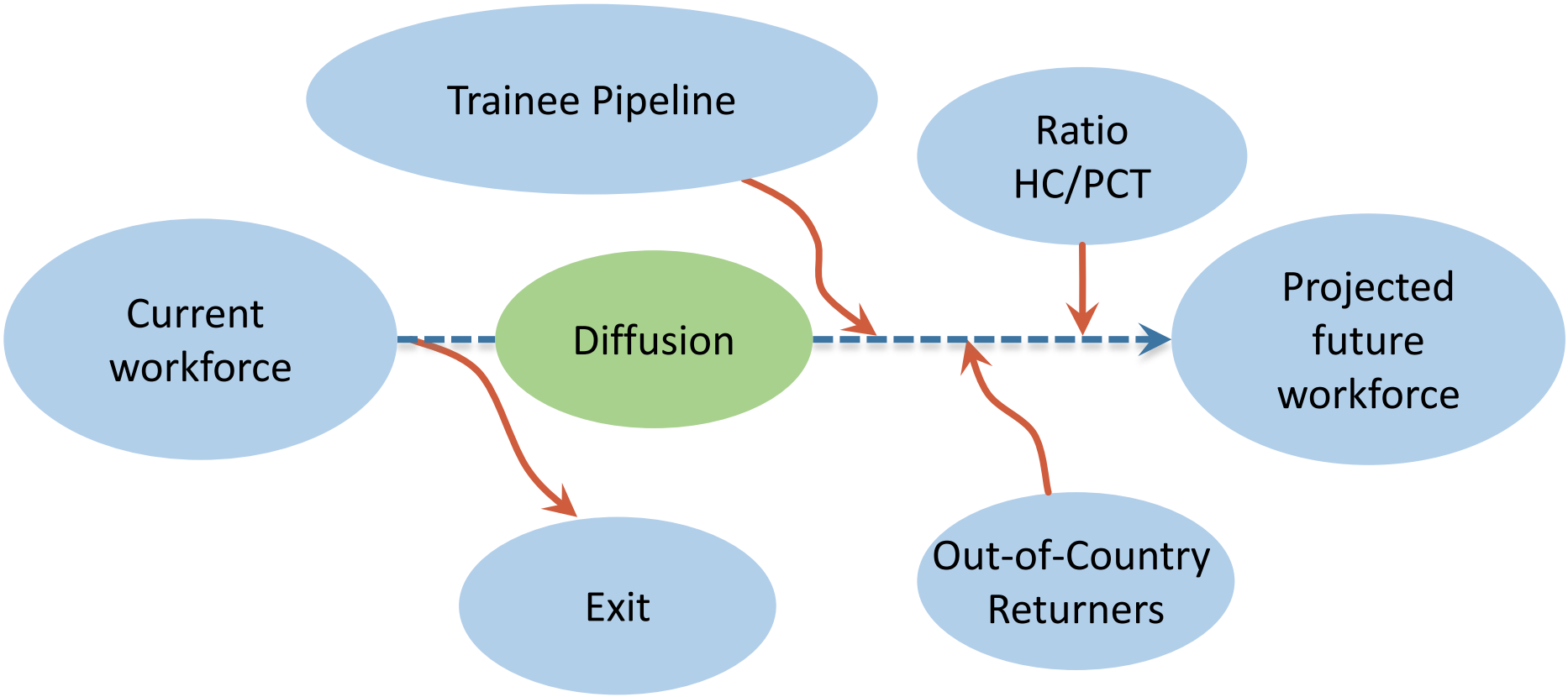
Adolescent Medicine Supply by Census Division

- West S Central +1%
- Mountain -15%

Population Growth by Census Division

- West S Central (28%)
- Mountain (20%)

Diffusion: Model accounts for physician moves during their career



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Model accounts for pediatric subspecialist moves

Model accounts for diffusion:

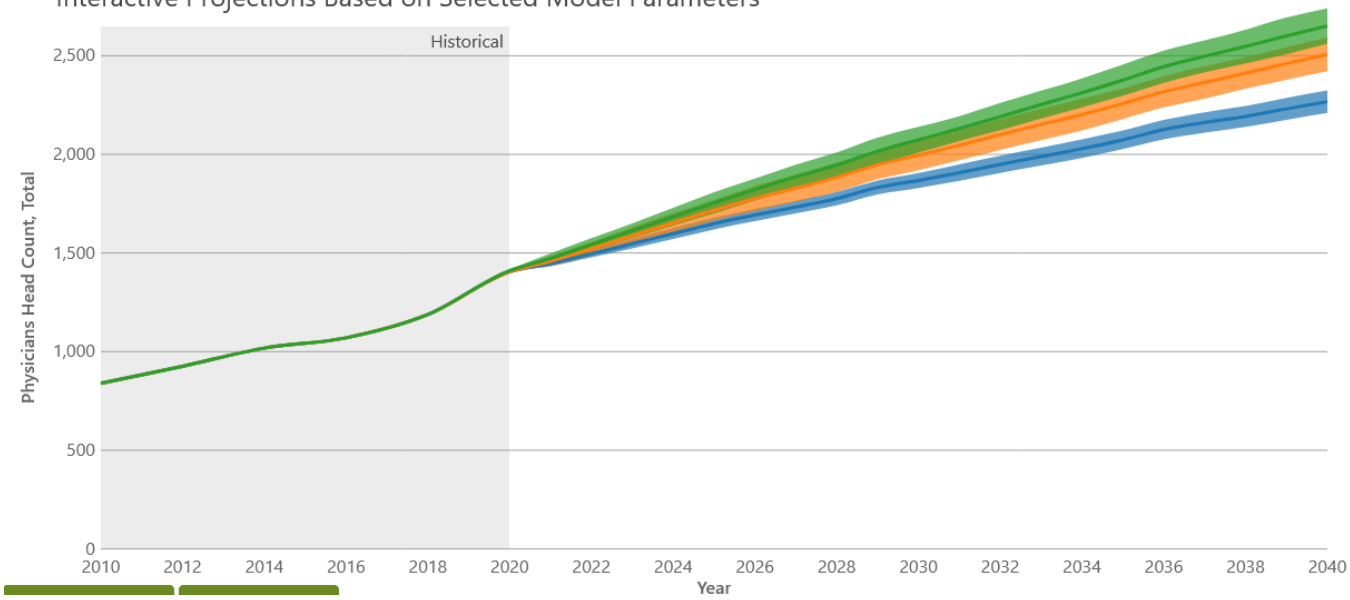
1. where fellows move from their training location to their first practice setting after completing subspecialty training
2. the annual probability that subspecialists move between census regions and census divisions
3. the probability that someone who left the country returns to practice in the United States

Diffusion can make significant impact on regional supply, especially in small subspecialties in regions with few subspecialists

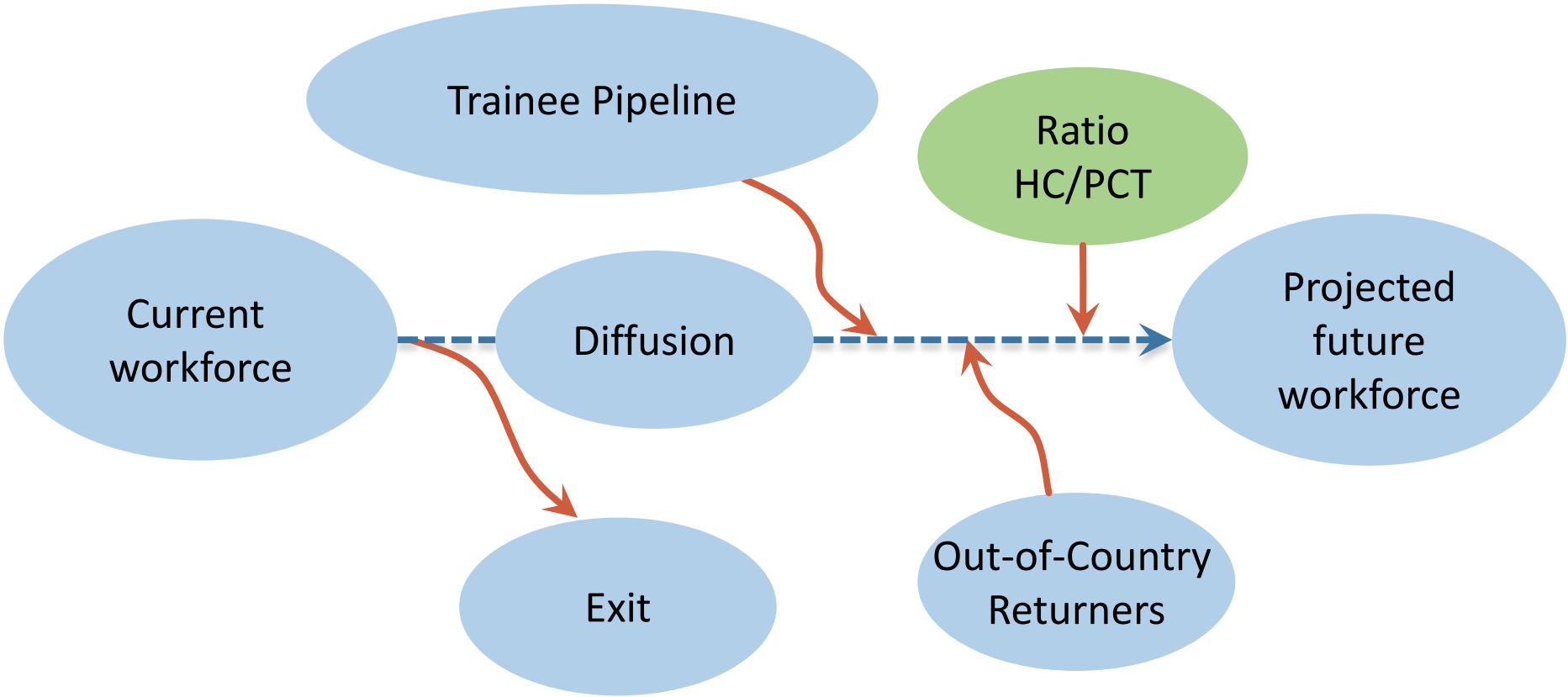
Model Parameter Summary

	Subspecialty	Total or Subspecialists per 100k Children	Head Count or Percent Clinical Time	Region/Division	Scenario	2020 - 2040 (% Change)
1	All Pediatric Subspecialties (Combined)	Total	Head Count	Mountain (Census Division)	**Baseline with no gen Diff 100 Reps**	1,404 - 2,267.2 (+61%)
2	All Pediatric Subspecialties (Combined)	Total	Head Count	Mountain (Census Division)	**Baseline with gen diff 100 Reps**	1,404 - 2,506.5 (+79%)
3	All Pediatric Subspecialties (Combined)	Total	Head Count	Mountain (Census Division)	**Baseline with gen diff & OOS 100 Reps**	1,410.8 - 2,650.96 (+88%)

Interactive Projections Based on Selected Model Parameters



Model forecasts headcount and proportion of time in clinical care



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Defining proportion of time spent in clinical care (PCT)

Derived based on questions included in MOC surveys from 2009 to 2019

- Q1: On average, over the past 6 months, approximately how many hours did you work each week?
- Q2: What proportion of your total professional time is spent performing each of the following tasks?
  a) Direct and/or consultative inpatient and outpatient care, including patient billing and charting (with or without trainees)
  b) Administration
  c) Research
  d) Medical Education
  e) Quality improvement activities
  f) Other

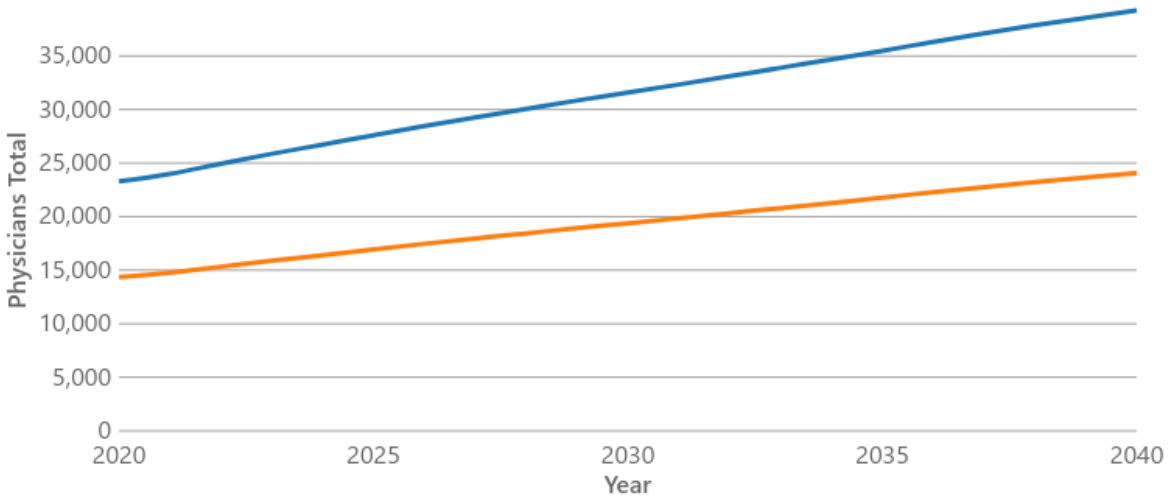
Hours in clinical care =
Q1 (total hours) * Q2a (proportion of time in direct/indirect care)

Headcount and PCT

Model Parameter Summary

	Subspecialty	Total or Subspecialists per 100k Children	Head Count or Percent Clinical Time	Region/Division	Scenario	2020 - 2040 (% Change)
1	All Pediatric Subspecialties (Combined)	Total	**Head Count**	United States	Baseline	23,289 - 39,252.93 (+69%)
2	All Pediatric Subspecialties (Combined)	Total	**Percent Clinical Time**	United States	Baseline	14,343.88 - 24,071.21 (+68%)

Projections Based on Selected Model Parameters



What if things change?

- Baseline model uses historical data to forecast future
- However, changes in workforce participation patterns, models of care, number of fellows in training programs, the economy, world-wide pandemics, and other factors will affect future supply
- To account for potential but unknown changes, we create “what if” scenarios that show alternative outcomes to the baseline model
- We worked with range of stakeholders to develop 8 scenarios

Scenarios Modeled

2 scenarios model changes to fellows (increase, decrease)

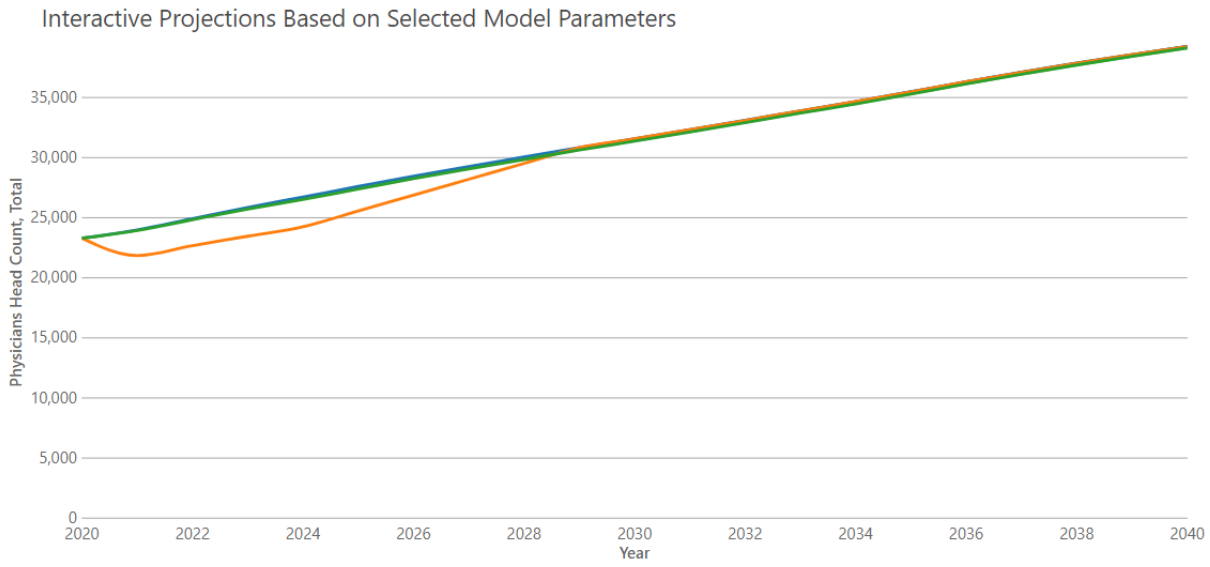
2 scenarios model changes to PCT (increase, decrease)

2 scenarios model different types of early exit

2 scenarios represent combinations of the singular scenarios (best case, worst case)

Early Exit Scenarios

	Subspecialty	Total or Subspecialists per 100k Children	Head Count or Percent Clinical Time	Region/Division	Scenario	2020 - 2040 (% Change)
1	All Pediatric Subspecialties (Combined)	Total	Head Count	United States	**Baseline**	23,289 - 39,252.93 (+69%)
2	All Pediatric Subspecialties (Combined)	Total	Head Count	United States	**Increased Level of Exit at All Ages**	23,289 - 39,248.88 (+69%)
3	All Pediatric Subspecialties (Combined)	Total	Head Count	United States	**Burnout: Increased Level of Exit in Mid-Career**	23,289 - 39,121.57 (+68%)



If all subspecialist exited 5 years early for 3 years, short term influence is sizeable (orange line), but long-term influence is small

If mid-career folks (10-15 years) leaving is increased to 10-15% according to literature, influence is small

Contact Information

Sheps Health Workforce Modeling Team

Program on Health Workforce Research and Policy

Go.unc.edu/Workforce

nchealthworkforce.unc.edu