

## Appendix 1: Metadata on Specialty Physician Demand and Supply Data

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### Background – Specialty Physician Demand Model

Previous research has attempted to measure the demand for physician specialties. Many of these models have utilized population measures such as determining the number of doctors a total population can support. In these models, they do not ascertain differences in visit rates by different age demographics or account for health outcomes.<sup>1</sup> In addition, they also do not take into account the current manner in which physicians provide care and how they are reimbursed.<sup>2</sup> With our methodology, each of the above variables are addressed, leading to the creation of an improved physician specialty demand estimate for twelve specialties: Family Medicine, General Internal Medicine, General Pediatrics, Ophthalmology, Orthopedic Surgery, General Cardiology, Dermatology, Otolaryngology, Urology, Neurology, Psychiatry, and Obstetrics & Gynecology.

### Methodology – Specialty Physician Demand Model

2015 National Ambulatory Medical Survey (NAMS) Summary tables were utilized to determine the average visit rate for each age demographic and the percent of total visits for the twelve specialties to which we applied to 2016 county-based population estimates. Special data consideration were used for OBGYN and Pediatric demand models.<sup>3</sup>

After determining the total number of visits by age demographic, the visit rate by each physician specialty was calculated to which we applied a productivity benchmark that accounted for the shifting productivity of each individual physician specialty annually.

### Background – Specialty Physician Supply Data

Considering the fact that all existing physician data sources (e.g. AMA Masterfile, the NPI<sup>4</sup>, Healthgrades, etc.) use self-reported data as the basis of their data, the National Center for Analysis of Healthcare Data (NCAHD) created, in 2008, a unique process using the only regulated physician data source, state licensure data, as our base to which we integrate other data sources as needed. We call this our Enhanced State Licensure (ESL) dataset. Individual specialty physician practice site information is aggregated to the county level for this tool.

### Methodology – Specialty Physician Supply Data

Each year since 2007, we contact each state licensure board and go through the process of acquiring their data. After inventory the attributes provided by the board, we perform a QA/QC process which includes the normalization of the data and removal of duplicates. Those licensees that are out-of-state are reserved for other research, with online in-state, actively practicing providers included in this research and included in the mapping portal. For this analysis, our 2016 ESL national physician supply data is utilized. Our 2017 and 2018 ESL physician workforce data is available upon request.

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<sup>1</sup> Weiner, Jonathan P., "Prepaid Group Practice Staffing and U.S. Physician Supply: Lessons for Workforce Policy," *Health Affairs*, February 4, 2004, pp.43-59; Shell, Eric, Stroudwater Associates, "Performance Improvement Strategies for Rural Hospitals.

<sup>2</sup> Petterson, S. M., Liaw, W. R., Phillips, R. L., Rabin, D. L., Meyers, D. S., & Bazemore, A. W. (2012). Projecting US primary care physician workforce needs: 2010-2025. *Annals of family medicine*, 10(6), 503-9.

<sup>3</sup>U. S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center of Health Statistics, "National Ambulatory Medical Care Survey: 2015 Summary Tables.

<sup>4</sup> Bindman, A.B., (2013). Using the National Provider Identifier for Health Care Workforce Evaluation, *MMRR*, vol., 3(3). Retrieved from: [http://cms.hhs.gov/mmrr/Downloads/MMRR2013\\_003\\_03\\_b03.pdf](http://cms.hhs.gov/mmrr/Downloads/MMRR2013_003_03_b03.pdf)