Texas Projections of Supply and Demand for Primary Care Physicians and Psychiatrists, 2017 - 2030

As Required by

Texas Health and Safety Code

Section 105.009

Department of State Health Services

July 2018

TEXAS
Health and Human Services

Texas Department of State Health Services

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Executive Summary

In accordance with the Texas Health and Safety Code, Section 105.009, the Texas Department of State Health Services (DSHS) is required to conduct research identifying those specialties and subspecialties in the state that are at critical shortage levels, the overall supply of physicians in the state, and the ability of the state's graduate medical education system to meet the current and future health care needs of the state. DSHS prepared this report summarizing results from primary care physician and psychiatrist supply and demand projections through 2030.

These results are based on the Health Workforce Supply and Demand Models created by IHS Markit, Inc., a consulting firm that has conducted physician workforce modelling for the Health Resources Services Administration (HRSA), the American Association of Medical Colleges, and other states, as well as nursing workforce modelling for DSHS' Texas Center for Nursing Workforce Studies. To project supply, the model uses physician licensure data that the Texas Medical Board provides to DSHS' comprehensive health professions resource center, as well as physician workforce and retirement data from other validated sources. Consumer demand for physician services is projected using Texas data from the American Community Survey, statewide Behavioral Risk Factor Surveillance System (BRFSS) data, population data from the Texas Demographic Center, and other sources.

For the purposes of this report, primary care physicians include those with specialties in family medicine, general practice, internal medicine, obstetrics and gynecology, and pediatrics.

Key findings include the following:

- The shortage of primary care physicians in Texas will grow from 2,002 full-time equivalents (FTEs) in 2017 to 3,375 in 2030, an increase of 67 percent.
- Among the four primary care specialties included in these projections, general internal medicine will have the greatest absolute need of an additional 1,644 FTEs to meet projected demand in 2030.

- Similarly, the shortage of psychiatrists is projected to grow from 1,067 FTEs in 2017 to 1,208 FTEs by 2030, an increase of 13 percent.

- Regionally, the Rio Grande Valley (Texas Public Health Region 11) will face a shortage of 722 primary care FTEs by 2030 leading to 32.3 percent of demand going unmet. North Texas (Texas Public Health Region 2/3) will face the greatest absolute shortage of psychiatrists at 425 FTEs, or 36.5 percent of demand for these providers.

In summary, the supply and demand for both primary care physicians and psychiatrists is projected to increase between 2017 and 2030, with the increase in demand outpacing supply leading to increasingly severe provider shortages across the state. Furthermore, current Texas Higher Education Coordinating Board projections in medical school enrollment and resident positions are not projected to be sufficient to create a supply that can meet projected demand.

1. Introduction

Senate Bill 18 (S.B. 18), 84th Texas Legislature, Regular Session, 2015, added Section 105.009 to the Texas Health and Safety Code. S.B. 18 requires that the Department of State Health Services (DSHS) conduct research identifying those specialties and subspecialties in the state that are at critical shortage levels, the overall supply of physicians in the state, and the ability of the state's graduate medical education system to meet the current and future health care needs of the state. By May 1 of even-numbered years, the Statewide Health Coordinating Council shall report the results of research conducted by DSHS to the Legislative Budget Board, the Texas Higher Education Coordinating Board (THECB), the Office of the Governor, and the standing committees of each house of the Legislature with primary jurisdiction over state finance or appropriations. This report is in fulfillment of the S.B. 18 requirement. This report assesses shortage levels for two physician specialties – primary care physicians and psychiatrists.

This report was due May 1,2018. However, in a letter dated April 2, 2018, DSHS notified all recipients that there would be a delay since DSHS was currently in the process of making modifications to the report to better fulfill the intent of the legislation. These changes will also help ensure that THECB has more usable information to inform decision-making as contemplated in the original legislation. While we feel that the information in our previous draft addressed some of this charge, we believe that we could improve the document by providing additional information and analysis. Therefore, we have worked with stakeholders including the Coordinating Board in development of this report and as we move forward.

These results are based on the Health Workforce Supply and Demand Models created by IHS Markit, Inc., a consulting firm that has conducted physician workforce modelling for the Health Resources Services Administration (HRSA),[1] the

[1] Health Resources and Services Administration. *Health workforce projections*. https://bhw.hrsa.gov/health-workforce-analysis/research/projections. Accessed June 20, 2018.

American Association of Medical Colleges,[2] and other states,[3,4] as well as nursing workforce modelling for DSHS' Texas Center for Nursing Workforce Studies.[5]

The report is organized into seven sections beginning with a brief introduction and the background and objectives of the report. Section 3 describes the methodology for the supply and demand models used for these projections. Sections 4 and 5, respectively, describe the supply and demand projections for primary care physicians and psychiatrists from 2017 through 2030. Section 6 summarizes limitations of the methodology and Section 7 provides report conclusions.

At the end of the report, there are three appendices. Appendix A provides a map of Texas' Public Health Regions with the regional names used throughout the report, as well as a table indicating in which region each Texas county is located. Appendix B provides regional data using maps and charts for each specialty projected by the analytical model described in the body of the report. Finally, Appendix C provides a summary of key physician workforce size and distribution, demographic, and medical education data.

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[2] IHS Markit, Ltd. *The complexities of physician supply and demand: projections from 2016 to 2030*. https://aamc-black.global.ssl.fastly.net/production/media/filer_public/85/d7/85d7b689-f417-4ef0-97fb-ecc129836829/aamc_2018_workforce_projections_update_april_11_2018.pdf. Accessed June 20, 2018.

[3] IHS Markit, Inc. *Current and projected future health care workforce demand in Vermont*. http://healthcareinnovation.vermont.gov/sites/vhcip/files/documents/Vermont%20Health%20Care%20Demand%20Modeling%20Final%20Report%206-16-17%20FINAL.pdf. Accessed June 20, 2018.

[4] South Carolina Office for Healthcare Workforce. *Forecasting healthcare provider needs in South Carolina*. https://www.scohw.org/projects/. Report forthcoming.

[5] Texas Center for Nursing Workforce Studies, Texas Department of State Health Services. *Nurse supply and demand projections,2015-2030*. https://www.dshs.texas.gov/chs/cnws/WorkforceReports/SupplyDemand.pdf. Accessed June 20, 2018.

2. Background

Improving quality of care, increasing access to care, and controlling health care costs depend on the adequate availability of primary care providers.[6] According to the Bureau of Labor Statistics, health care occupations will add 2.3 million jobs nationally—a growth of 18 percent—from 2016 to 2026.[7] As the population ages, demand increases for health care services. In Texas, health care and social assistance sectors added 196,291 jobs, growing at the rate of 2.8 percent for the last five years.[8] Despite this growth, a report by the National Center of Health Workforce Analysis on health care projections concluded "that the U.S. supply of primary care physicians will grow more slowly than demand for primary care physician services."[9]

Estimates show that there is currently a shortage of primary care providers in many areas of the nation, including Texas. For example, in the nation's Health Resources and Services Administration (HRSA) designated shortage areas, there is an estimated existing deficiency of 17,122 primary care providers.[10] The Robert Graham Center, a research center of the American Academy of Family Physicians,

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[6] Abrams M, Nuzum R, Mika S, Lawlor G. *Realizing Health Reform's Potential: How the Affordable Care Act Will Strengthen Primary Care and Benefit Patients, Providers, and Payers*. New York: The Commonwealth Fund, 2011. http://www.commonwealthfund.org/~/media/Files/Publications/Issue percent20Brief/2011/Jan/1466_Abrams_how_ACA_will_strengthen_primary_care_reform_brief_v3.pdf Accessed November 7, 2017.

[7] *Occupational Outlook Handbook.* Washington, DC: Bureau of Labor Statistics. https://www.bls.gov/ooh/home.htm Accessed November 7, 2017.

[8] *Texas Growth Occupations 2016 Annual Report*. Austin, TX: Texas Workforce Commission, 2016. http://www.lmci.state.tx.us/shared/PDFs/High-Growth-Annual-Report-Final-Review-12-16.pdf Accessed November 7, 2017.

[9] U.S. Department of Health and Human Services, Health Resources and Services Administration. *State-Level Projections of Supply and Demand for Primary Care Practitioners: 2013-2025*. Rockville, MD: National Center for Health Workforce Analysis, 2016. https://bhw.hrsa.gov/sites/default/files/bhw/health-workforce-analysis/research/projections/primary-care-state-projections2013-2025.pdf Accessed November 7, 2017.

[10] Carrier ER, Yee T, Stark L. *Matching Supply to Demand: Addressing the US Primary Care Workforce Shortage*. Washington, DC: National Institute for Health Care Reform, 2011.

projected that Texas would need an additional 6,260 physicians by 2030.[11] Further, the Centers for Disease Control and Prevention's National Center for Health Statistics reported that, as of 2012, Texas had significantly fewer primary care physicians than the national average, controlling for population size.[12]

HRSA produced a model of patient demand for primary care services that also incorporated the sizable challenges of an aging and growing population. Notably, these demographic changes are the primary drivers for future primary care provider shortages.[13,14] These sources concluded that the demand for primary care services would grow more quickly than physician supply between 2010 and 2020 and would exacerbate the nationwide shortage of physicians.

However, a sheer increase in the number of providers alone will not address problems of access to primary care. The geographic distribution of primary care providers remains disparate, especially between urban and rural areas.[15] Indeed, there is a direct relationship nationwide between the supply of primary care physicians relative to the population and the size of the local population. That is, physicians in smaller cities and towns often have to serve more patients than those in larger urban areas.

The shortage of psychiatrists is well documented nationally. Nationwide, just 39 percent of persons with mental illness and 10.8 percent of persons with substance

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[11] Petterson SM, Cai A, Moore M, Bazemore A. *State-level projections of primary care workforce, 2010-2030*. Washington, DC: Robert Graham Center, 2013.

[12] Hing E, Hsiao C. *State Variability in Supply of Office-based Primary Care Providers: United States, 2012*. Centers for Disease Control and Prevention, 2014.

[13] Petterson SM, Liaw WR, Phillips JR, Rabin DL, Meyers DS, Bazemore AW. (2012). Projecting US primary care physician workforce needs: 2010-2025. *Annals of Family Medicine*. 2012;10(6):503-509.

[14] U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis. *Projecting the Supply and Demand for Primary Care Practitioners Through 2020*. Rockville, Maryland: U.S. Department of Health and Human Services, 2013.

[15] U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis. *Projecting the Supply and Demand for Primary Care Practitioners Through 2020*. Rockville, Maryland: U.S. Department of Health and Human Services, 2013.

abuse issues receive the treatment they need.[16] A national study conducted by the Center for Studying Health System Change found that 66.8 percent of primary care physicians were unable to refer their patients to high quality mental health specialists. This is a far higher rate of unavailability than those seen for other specialty referrals, nonemergency hospital admissions, or high-quality imaging services (between 17 percent and 34 percent). The study attributed unavailability to either inadequate health insurance coverage or a shortage of mental health providers.[17]

The supply of providers can be conceptualized as being composed of two broad determinants. The first is the entire number of practitioners qualified to serve in mental health and the second is the number of those providers committed to providing patient care and the percentage of their productive time committed to doing so.[18] The state's shortage of supply is expected to worsen as many of the most skilled practitioners are nearing retirement age. At the same time, educational institutions in the state and the nation are not producing enough new graduates to meet predicted demand. Given the nationwide shortage, it is unlikely that Texas can meet its staffing needs by recruiting practitioners from other states[19] and the extent of the mental health shortage is expected to worsen as the workforce continues to age.[20]

Physician availability to patients has been recognized as one of the top barriers to meeting the health care needs of patients in the U.S.[5] "Availability is defined as the relationship of the volume of existing physician services and health resources to

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[16] Hoge MA, Stuart GW, Morris J, Flaherty MT, Paris MJ, Goplerud E. Mental health and addiction workforce development: Federal leadership is needed to address the growing crisis. *Health Affairs*. 2013; 32(11): 2005-2012.

[17] Cunningham PJ. Beyond Parity: Primary care physicians' perspectives on access to mental health care. *Health Affairs*. 2009; 28(3): w490-w501.

[18] Murphy GT, Birch S, MacKenzie A, Alder R, Lethbridge L, Little L. Eliminating the shortage of registered nurses in Canada: An exercise in applied needs-based planning. *Health Policy*. 2012; 105: 192-202.

[19] Thomas KC, Ellis AR, Konrad TR, Morrissey JP. North Carolina's mental health workforce: Unmet need, maldistribution, and no quick fixes. *North Carolina Medical Journal*. 2012; 73(3): 161-168.

[20] *Crisis Point: Mental Health Workforce Shortage in Texas*. Austin, TX: Hogg Foundation for Mental Health, 2011.

patient volumes and types of medical needs".[21] In 2014, the number of physicians of all specialties on a per 100,000 population basis was estimated to be around 226 nationally, while the corresponding number was 183 for Texas.[22]

The purpose of this study is to identify the degree of shortage of primary care physicians and psychiatrists in Texas. In addition, results are reported for the state's eight public health regions. For the purposes of the present analyses, the baseline year is 2017 and supply and demand are projected out to the year 2030.

This analysis will serve to inform state officials and stakeholders regarding areas of critical shortage. This should prove beneficial in the development of policies that address the availability of physicians in Texas.

2.1 Objectives

The primary objectives of this report are to:

- Project supply and demand for primary care physicians statewide and by geographic region; and
- Project supply and demand for psychiatrists statewide and by geographic region.

[21] Kullgren JT, McLaughlin CG, Mitra N, Armstrong K. Nonfinancial Barriers and Access to Care for U.S. Adults. *Health Serv Res*. 2012;47(1, part 2):462-485.

[22] *The Physician Workforce in Texas*. North Texas Regional Extension Center, 2015. https://www.merritthawkins.com/UploadedFiles/MerrittHawkings/Surveys/Merritt_Hawkins_NTREC_Physician_Workforce_Survey.pdf Accessed November 7, 2017.

3. Methodology for Supply and Demand Projections

Projected supply and demand for primary care physicians and psychiatrists are estimated for Texas and for each of the eight public health regions using IHS Markit, Inc.'s Health Workforce Model, which has previously been utilized by the Health Resources and Services Administration, the American Association of Medical Colleges, and multiple states.

This model is composed of two parts: the Health Workforce Supply Model (HWSM) and the Healthcare Demand Microsimulation Model (HDMM). The supply projections are derived from the HWSM and the demand projections are derived from the HDMM. Both models use a microsimulation approach for which the unit of analysis is the individual, in this case providers for the HWSM and patients for the HDMM. Information about the models contained within this report is based on IHS' Health Workforce Model Documentation.[23]

The model used Texas specific data when possible and data from national or other sources when necessary. The model presents results for all primary care physicians, for four primary care specialties, and for psychiatry. The four primary care specialties analyzed by the model are general internal medicine, family practice (including general practitioners), pediatrics (excluding pediatric subspecialties), and obstetrics/gynecology (including obstetrics alone and gynecology alone).

3.1 Supply Model

Supply, when used in reference to the physician workforce, refers to the capacity of physicians to provide patient care. In general, the HWSM uses a microsimulation approach that models the likely career choices of individual physicians to project what supply might look like annually through 2030. The HWSM starts with the current supply of physicians taking into consideration their demographics and practice specialties, physicians entering and leaving the workforce, and workforce participation patterns as physician demographics change over time. Because supply is not necessarily a headcount of physicians, the HWSM report supply data as a

[23] IHS, Inc. *Health workforce model documentation*, version 4.4.2016. https://cdn.ihs.com/www/pdf/IHS-HDMM-DocumentationApr2016.pdf. Accessed June 20, 2018.

count of the number of full-time equivalents (FTEs) available to provide patient care.

The supply projections presented below are based on multiple data sources. Texas physician licensure data comes from the Texas Medical Board and is geocoded and processed by DSHS' health professions resource center (HPRC). The 2014 through 2016 HPRC primary care physician and psychiatrist files were used to model projected new entrants to the Texas workforce. The 2017 HPRC data was used as the baseline supply for the Texas primary and psychiatry workforce.

Table 1. Supply of Physicians in Texas, 2017

	Starting Supply
Primary Care Total	21,142
• **Family Practice**	6,377
• **General Internal Medicine**	8,007
• **Obstetrics/Gynecology**	2,640
• **Pediatrics**	4,118
Psychiatry	2,172

Additionally, projected medical school enrollments and graduate medical education position data provided by the Texas Higher Education Coordinating Board was used to reflect expected growth in new workforce entrants in the near future. To reflect the number of hours practiced by physicians, data from Florida, New York, and South Carolina were used, while data from Florida were used to estimate physician retirement patterns. In both cases, reliable and validated data from Texas were unavailable. However, where reliable and validated data from other states were used, patterns were verified to be generalizable.

3.2 Demand Model

Demand may be defined as the quantity of physician-provided health care services and care delivery necessary so that Texans, based on their demographic and health

profiles, receive the national average level of care. HDMM models demand for health care services and providers and includes three major components.

The first component includes characteristics of each person in a representative sample of the current and future population. Characteristics of these individuals include demographics, socioeconomics, health behaviors, and occurrence of chronic conditions among others. Specifically, the HDMM uses Texas data from the 2016 American Community Survey, county population projections from the Texas Demographics Center, 2016 county-level data from the U.S. Census Bureau and 2014-2016 Texas Behavioral Risk Factor Surveillance System (BRFSS) results. Data from BRFSS include cigarette use, alcohol use, prevalence of asthma, prevalence of chronic obstructive pulmonary disease, emphysema, or chronic bronchitis, and prevalence of depressive order.

The second component is health care use patterns that relate to patient characteristics. This included use of data from the 2015 Medical Expenditure Panel Survey (MEPS), 2015 Centers for Medicare and Medicaid Services' Nursing Home Minimum Dataset and 2013 Medicare Beneficiary Survey. The MEPS is used to provide a measure of health care services consumed by the national population, while the latter surveys are specific to those (generally older) populations in nursing homes and those receiving Medicare benefits, respectively.

The third component is staffing patterns that translate demand for services into the need for full-time equivalent physicians by specialty and delivery setting. In this model, demand is defined as "the level and mix of health care services (and providers) that are likely to be used based on population characteristics and economic considerations such as price of services and people's ability and willingness to pay for services." Data for this third component include the federal Medical Expenditure Panel Survey, the Nationwide Inpatient Sample, and the American Medical Association Masterfile, among others.

When demand is greater than supply, there can be said to be a shortage of physician FTEs. When supply is greater than demand, a surplus of physician FTEs can be said to exist.

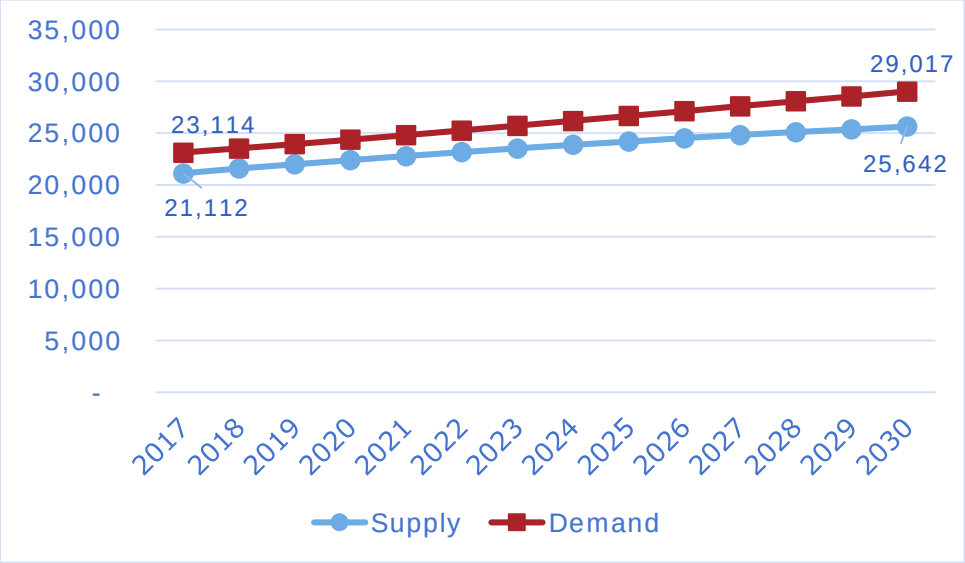
4. Supply and Demand for Primary Care Physicians

This section presents the supply and demand projections of primary care physicians statewide and by region through 2030.

4.1 Supply and Demand for Primary Care Physicians in Texas

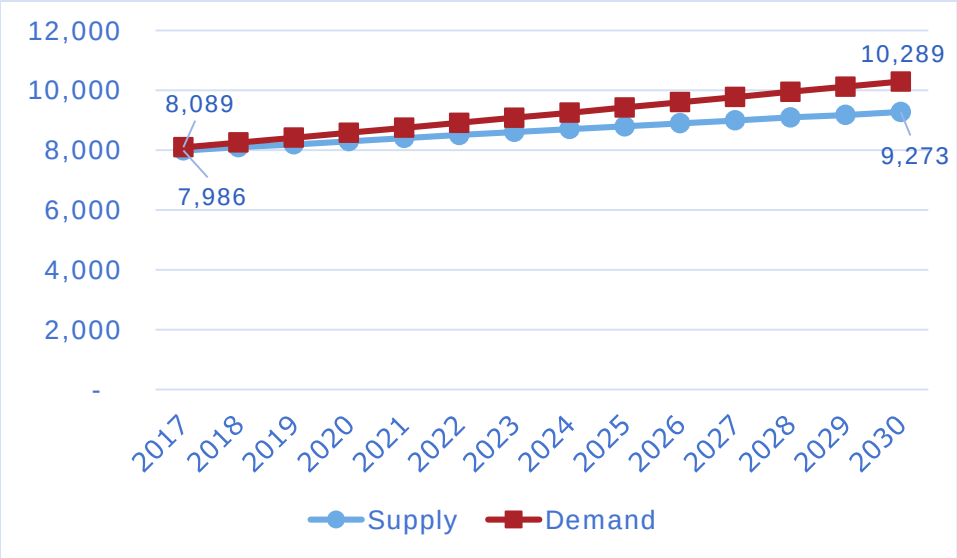
From 2017 to 2030, the supply of primary care physicians is projected to grow by 21.4 percent while demand for primary care physicians is projected to grow by 25.5 percent. Demand for primary care physicians will outpace supply leading to a shortage of 3,375 primary care full-time equivalents (FTEs) in Texas by 2030.

Figure 1. Supply and Demand for Primary Care Physician FTEs, Texas



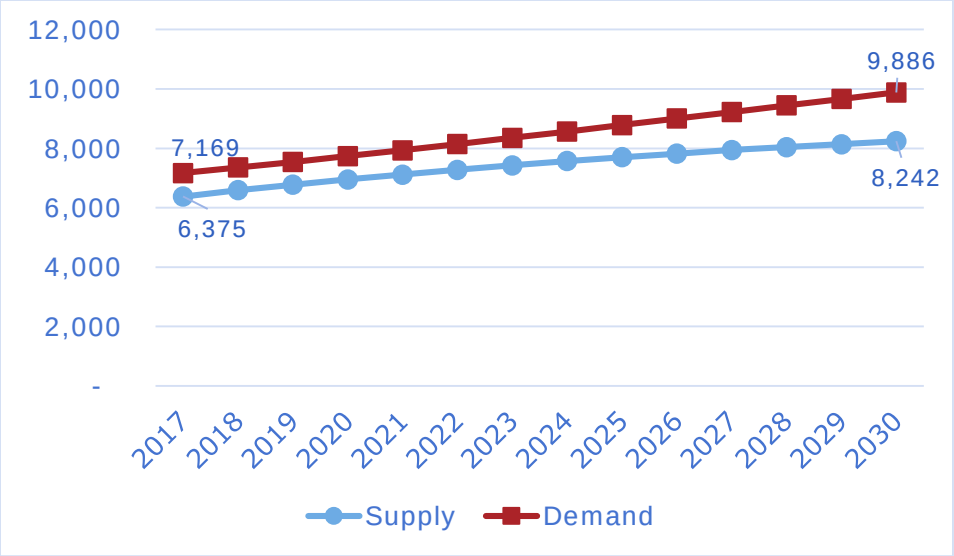
Projections by primary care specialty estimate that the supply of family medicine FTEs will increase by 16.1 percent between 2017 and 2030 while demand will increase by 27.1 percent. As demand outpaces supply, the shortage for this provider will increase from 103 FTEs in 2017 to 1,016 FTEs in 2030.

Figure 2. Supply and Demand for Family Medicine FTEs, Texas



The demand for general internal medicine FTEs is projected to grow by 37.9 percent from 2017 to 2030 while supply is projected to grow by 29.2 percent. The shortage for this provider type is projected to double between 2017 and 2030, growing from a deficit of 794 FTEs in 2017 to 1,644 FTEs in 2030.

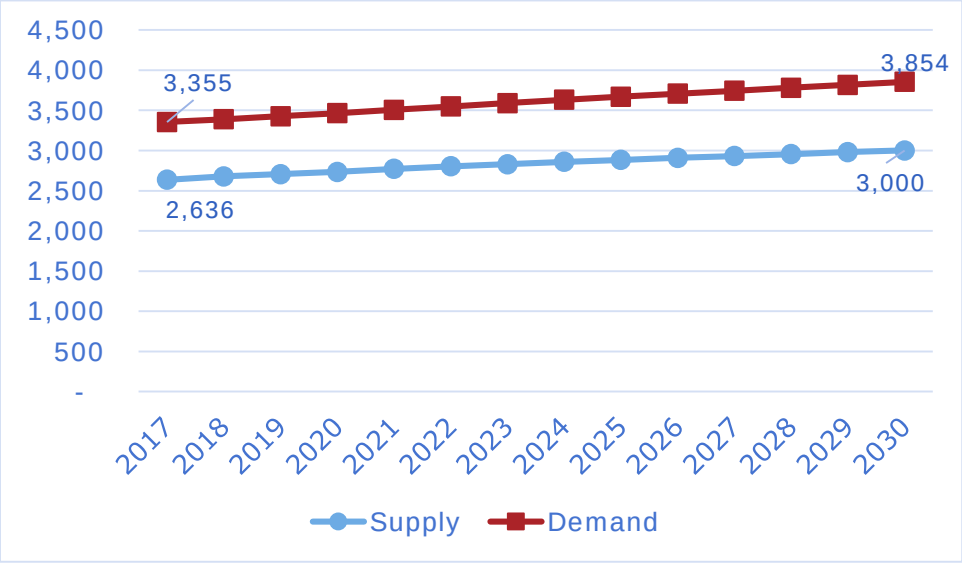
Figure 3. Supply and Demand for General Internal Medicine FTEs, Texas



Between 2017 and 2030, the supply and demand for obstetrics and gynecology FTEs are projected to increase by 13.8 percent and 14.9 percent, respectively. The

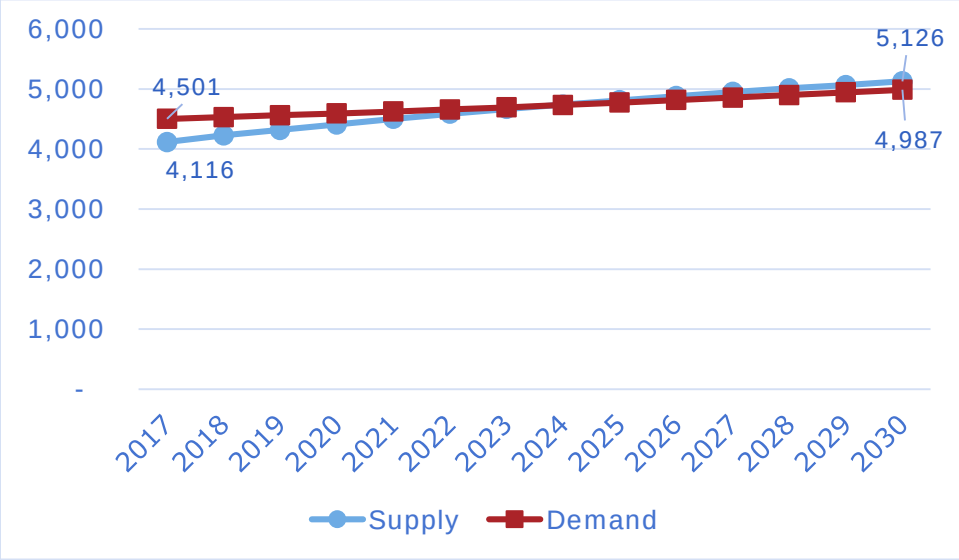
shortage of these providers will increase from 719 FTEs to 854 FTEs during this time period.

Figure 4. Supply and Demand for Obstetrics and Gynecology FTEs, Texas



Pediatricians are the only primary care specialty for which supply will exceed demand in 2030. The supply of these providers is projected to grow by 24.5 percent between 2017 and 2030, while demand is projected to grow by 10.8 percent. A shortage of 385 pediatric FTEs in 2017 will improve to an excess of 139 FTEs by 2030.

Figure 5. Supply and Demand for Pediatrician FTE, Texas



4.2 Supply and Demand Projections for Primary Care Physicians by Region

Regionally, demand will exceed supply for primary care physicians every year between 2017 and 2030 in seven of Texas' eight public health regions, as defined by DSHS. Shortage maps (2017 and 2030) and regional primary care physician projections are shown in Appendix B.

In the Panhandle (Public Health Region 1), supply and demand are projected to grow at the same rate of 17 percent between 2017 and 2030 and the shortage of providers is projected to increase by 29 FTEs. The Rio Grande Valley (Public Health Region 11) is projected to have the greatest absolute need by 2030. It is projected that in the Rio Grande Valley the shortage of primary care providers will grow from 423 to 722 primary care FTEs.

In North Texas (Public Health Region 2/3), the shortage of primary care providers is projected to grow by 90 percent from 361 FTEs in 2017 to 687 FTEs in 2030. In East Texas (Public Health Region 4/5N), supply for primary care physicians is projected to increase 14.3 percent by 2030 while demand is projected to increase by 13.4 percent. The shortage of providers in this region is projected to grow by almost 10 percent from 265 FTEs in 2017 to 291 FTEs in 2030. In the Gulf Coast (Public Health Region 6/5S), the shortage of primary care physicians is projected to grow by 254 percent from 196 FTEs in 2017 to 694 FTEs in 2030.

The Central Texas region (Public Health Region 7) is the only region where the shortage of primary care providers is projected to improve from a shortage of 67 FTEs in 2017 to a surplus of 33 FTEs in 2027. From 2027 to 2030, that surplus decreases to an eventual shortage of 19 FTEs. In South Texas (Public Health Region 8), supply is projected to increase by 18.5 percent while demand is projected to increase by 24.2 percent, increasing the shortage from 214 FTEs in 2017 to 392 FTEs by 2030. Finally, in West Texas (Public Health Region 9/10), supply and demand are projected to grow at similar rates, 21.4 percent and 20.9 percent, increasing the shortage of providers from 320 FTEs in 2017 to 383 FTEs by 2030.

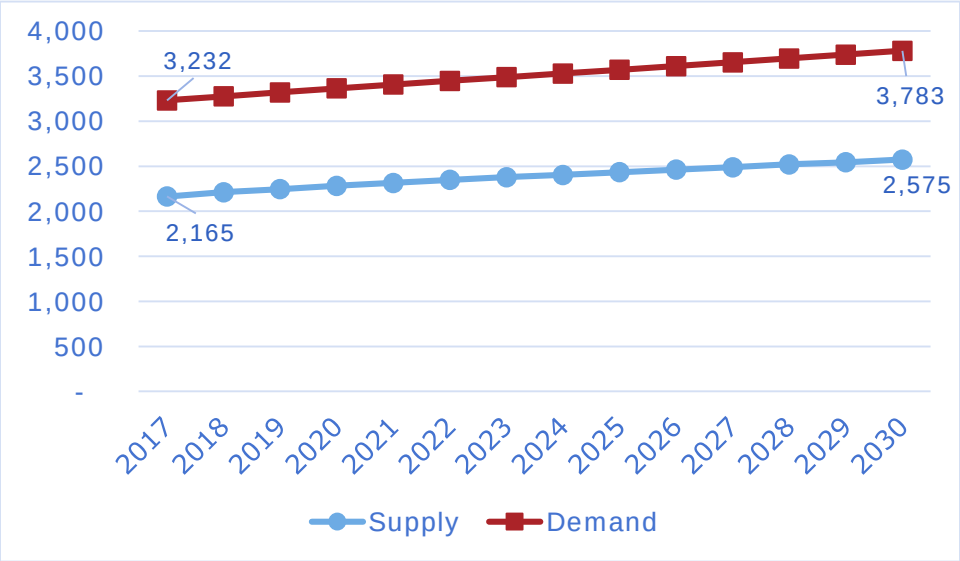
5. Supply and Demand for Psychiatrists

As a means to understand the extent of psychiatric workforce shortages in Texas, the Health Workforce Model also projects the supply and demand for psychiatrists at the state and regional level.

5.1 Supply and Demand Projections for Psychiatrists in Texas

The supply for psychiatrists in Texas is projected to grow by 18.9 percent between 2017 and 2030 while demand is projected to grow by 17 percent. Demand for psychiatrists is projected to exceed supply by 1,067 FTEs in 2017 and grow to a deficit of 1,208 full-time equivalents (FTEs) by 2030.

Figure 6. Supply and Demand for Psychiatrist FTEs, Texas



5.2 Supply and Demand Projections for Psychiatrists by Region

Regionally, the shortage of psychiatrists is projected to increase between 2017 and 2030 in six of eight public health regions. Shortage maps (2017 and 2030) and regional psychiatrist projections are shown in Appendix B.

In East Texas (Public Health Region 4/5N), between 2017 and 2030, the supply of psychiatrist FTEs is projected to grow by 20 percent while demand is projected to grow by just 5.8 percent. While the supply deficit is projected to decrease during those years, East Texas is still projected to have a shortage of 111 psychiatrist FTEs. In Central Texas (Public Health Region 7), supply will grow faster than demand and the shortage of psychiatrists will decrease by 86.9 percent from 46 FTEs in 2017 to 6 FTEs in 2030.

In the Panhandle (Public Health Region 1), an additional 82 psychiatric FTEs would be needed for supply to meet demand in 2030. In the Rio Grande Valley (Public Health Region 11), the shortage of psychiatrists is projected to grow from 137 FTEs in 2017 to 168 in 2030. While the supply and demand for psychiatrists is projected to grow by approximately 17 percent between 2017 and 2030 in North Texas (Public Health Region), the shortage of this provider type is projected to increase from 361 FTEs to 425 FTEs.

In the Gulf Coast (Public Health Region 6/5S), supply of psychiatrists is projected to grow from 657 FTEs in 2017 to 800 by 2030, while demand is projected to grow from 843 FTEs to 998 by 2030, leading to a deficit of 198 FTEs. In the South Texas region (Public Health Region 11), demand is projected to grow by 15.9 percent between 2017 and 2030 while supply is projected to grow by 3.9 percent. From 2017 to 2030, demand for psychiatrists in this region is projected to outpace supply leading to a shortage of 111 FTEs by 2030. In West Texas (Public Health Region 9/10), the projected shortage of providers is estimated to grow from 85 FTEs in 109 FTEs by 2030.

6. Strengths and Limitations

Both the key strengths and limitations of these projections lie in the availability and quality of state-level data.

The main strength of the supply side projections is the use of state-level physician data. This data provides a timely and accurate count of the number of physicians practicing in Texas, their demographics, and their practice specialties. Likewise, the use of state-level medical school graduation numbers provides an accurate depiction of the production of new physicians. On the demand side, the use of state-level population numbers and demographics provide a sound starting-point for estimating the population's demand for health care.

As with any model, there are also limitations. On the demand side, baseline projections model the impact of changing demographics over time while health care use and delivery patterns remain the same. The baseline demand projections also assume that disease prevalence and health risk factors will remain consistent by demographic groups over time. As access to care changes, models of care transform, and technology improves health practices and outcomes, it is difficult to predict how health care use and delivery patterns as well as disease prevalence and health risk factors will change over time. However difficult it is to predict the future of health and healthcare delivery, it is unlikely that they will remain consistent.

Another limitation is that the demand projections are based on national healthcare utilization patterns. Without better state-level data on healthcare utilization to use in the demand model, it is difficult to know how Texas compares to national utilization patterns. Additionally, this assumption does not address the quality of care provided by national utilization patterns. For example, national utilization patterns of psychiatrists rely on services currently being provided and it is well-documented that currently there is a scarcity of mental health care providers and services.

7. Discussion

This report presents the results of an analysis of the supply of, and demand for, primary care physicians and psychiatrists in Texas. Results show that shortages of psychiatrists are severe and projected to continue. In 2017, it is projected that supply was 67.0 percent of demand. In 2030, supply is projected to be 68 percent of demand and the deficiency of psychiatrist FTEs is expected to grow from 1,067 in 2017 to 1,208 in 2030.

Results of the analyses indicate that currently there is a shortage of primary care physicians statewide and across all regions of the state. Projections through 2030 indicate that these shortages will generally worsen. For example, while primary care supply is 91.3 percent of demand in 2017, the proportion is expected to drop to 88.4 percent in 2030. Over this time, the statewide shortage of family medicine FTEs will grow from 103 to 1,016 FTEs, the shortage of general internal medicine FTEs will grow from 794 to 1,644 FTEs, and the shortage of obstetric/gynecologic FTEs will grow from 719 to 853. At the same time, the 2017 shortage of pediatric FTEs is projected to be a statewide surplus of 139 FTEs in 2030. However, half of the state's public health regions still continue to experience pediatrician shortages.

A secondary concern is the distribution of physicians throughout the state. As noted above and demonstrated by the maps and graphs in Appendices B & C, physicians are not evenly distributed throughout the state, growth is greater in areas with large urban areas, and some rural areas may see stagnation or decline in the number of physicians.

The study shows that shortages in both physician specialties might persist beyond 2030 unless corrective measures are put in place. National studies have also found similar results with increasing shortages for physicians. The study[24] titled "Projecting US Primary Care Physician Workforce Needs: 2010-2025" concludes that by 2025, the United States will require nearly 52,000 additional primary care physicians. Population growth and aging will be the greatest driver of expected

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Shortage maps (2017 and 2030) and regional psychiatrist projections are shown in Appendix B.

Care Physician Workforce Needs: 2010-2025. *Annals of Family Medicine*. 2012 http://www.annfammed.org/content/10/6/503.full Accessed February 07, 2018

increases in primary care utilization, accounting for 43,000 additional physicians. Another report released by National Center for Health Workforce Analysis in 2016 found that a greater increase in demand compared to supply will result in a projected deficit of 23,640 full time equivalents primary care physicians nationally. Therefore, both studies point toward consistent shortages for primary care physicians.

A multi-pronged approach might be needed to alleviate physician shortage. A 2017 study advocated use of team-based care and electronic communication for reducing shortages.[25] In addition, it also discussed the need for medical schools and residencies to train enough physicians to meet the needs of the population. Finally, a number of studies[26] have recommended to remove the caps placed on federal Medicare funding for residency training as it limits the ability to expand graduate medical education.

[25] Kirch DG, Petelle K. Addressing the Physician Shortage: The Peril of Ignoring Demography. *JAMA.* 2017;317(19):1947-1948. https://jamanetwork.com/journals/jama/fullarticle/2613210 Accessed on February 07, 2018

[26] *New Research Reaffirms Physician Shortage*.; 2017. Available at: https://news.aamc.org/press-releases/article/workforce_projections_03142017/. Accessed February 07, 2018.

8. Conclusion

This report demonstrates that shortages exist for both primary care physicians and psychiatrists in Texas and will continue through 2030. As the legislature continues to analyze the shortage of physicians in Texas, DSHS will continue to work with stakeholders to ensure accurate and consistent understanding of the shortages facing Texas today and in the future.

List of Acronyms

Acronym	Full Name
DSHS	Department of State Health Services
FTE	Full-time equivalent
HDMM	Healthcare Demand Microsimulation Model
HPRC	Health Professions Resource Center
HRSA	Health Resources and Services Administration
HWSM	Health Workforce Supply Model
S.B. 18	Senate Bill 18
THECB	Texas Higher Education Coordinating Board

Appendix A. Texas Public Health Regions

Figure 7 – Map of Texas Regions

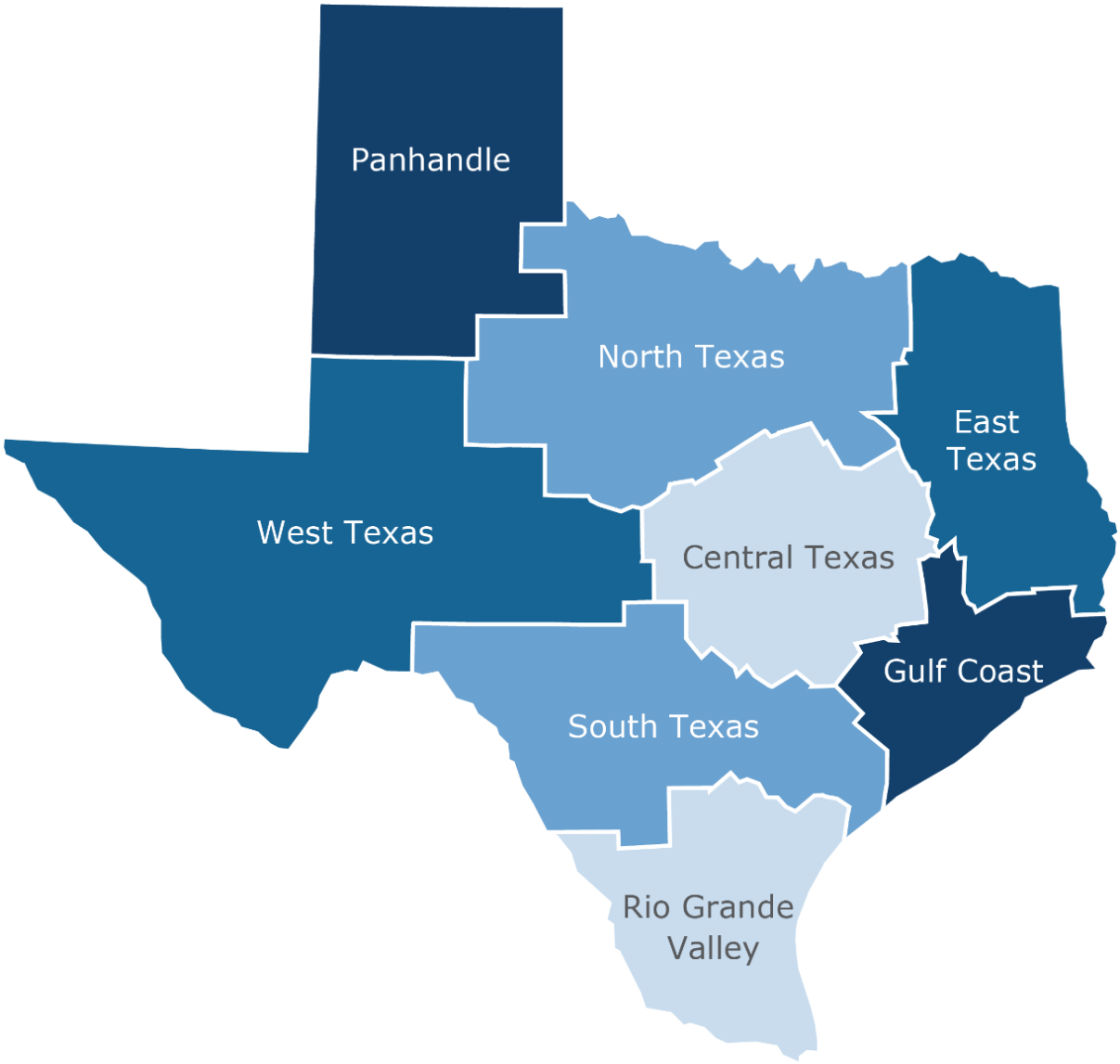


Table 2 - Texas Counties by Public Health Region

County Name	Region
Anderson	East Texas
Andrews	West Texas
Angelina	East Texas
Aransas	Rio Grande Valley
Archer	North Texas
Armstrong	Panhandle
Atascosa	South Texas
Austin	Gulf Coast
Bailey	Panhandle
Bandera	South Texas
Bastrop	Central Texas
Baylor	North Texas
Bee	Rio Grande Valley
Bell	Central Texas
Bexar	South Texas
Blanco	Central Texas
Borden	West Texas

County Name	Region
Bosque	Central Texas
Bowie	East Texas
Brazoria	Gulf Coast
Brazos	Central Texas
Brewster	West Texas
Briscoe	Panhandle
Brooks	Rio Grande Valley
Brown	North Texas
Burleson	Central Texas
Burnet	Central Texas
Caldwell	Central Texas
Calhoun	South Texas
Callahan	North Texas
Cameron	Rio Grande Valley
Camp	East Texas
Carson	Panhandle
Cass	East Texas

County Name	Region
Castro	Panhandle
Chambers	Gulf Coast
Cherokee	East Texas
Childress	Panhandle
Clay	North Texas
Cochran	Panhandle
Coke	West Texas
Coleman	North Texas
Collin	North Texas
Collingsworth	Panhandle
Colorado	Gulf Coast
Comal	South Texas
Comanche	North Texas
Concho	West Texas
Cooke	North Texas
Coryell	Central Texas
Cottle	North Texas

County Name	Region
Crane	West Texas
Crockett	West Texas
Crosby	Panhandle
Culberson	West Texas
Dallam	Panhandle
Dallas	North Texas
Dawson	West Texas
De Witt	South Texas
Deaf Smith	Panhandle
Delta	East Texas
Denton	North Texas
Dickens	Panhandle
Dimmit	South Texas
Donley	Panhandle
Duval	Rio Grande Valley
Eastland	North Texas
Ector	West Texas

County Name	Region
Edwards	South Texas
El Paso	West Texas
Ellis	North Texas
Erath	North Texas
Falls	Central Texas
Fannin	North Texas
Fayette	Central Texas
Fisher	North Texas
Floyd	Panhandle
Foard	North Texas
Fort Bend	Gulf Coast
Franklin	East Texas
Freestone	Central Texas
Frio	South Texas
Gaines	West Texas
Galveston	Gulf Coast
Garza	Panhandle

County Name	Region
Gillespie	South Texas
Glasscock	West Texas
Goliad	South Texas
Gonzales	South Texas
Gray	Panhandle
Grayson	North Texas
Gregg	East Texas
Grimes	Central Texas
Guadalupe	South Texas
Hale	Panhandle
Hall	Panhandle
Hamilton	Central Texas
Hansford	Panhandle
Hardeman	North Texas
Hardin	Gulf Coast
Harris	Gulf Coast
Harrison	East Texas

County Name	Region
Hartley	Panhandle
Haskell	North Texas
Hays	Central Texas
Hemphill	Panhandle
Henderson	East Texas
Hidalgo	Rio Grande Valley
Hill	Central Texas
Hockley	Panhandle
Hood	North Texas
Hopkins	East Texas
Houston	East Texas
Howard	West Texas
Hudspeth	West Texas
Hunt	North Texas
Hutchinson	Panhandle
Irion	West Texas
Jack	North Texas

County Name	Region
Jackson	South Texas
Jasper	East Texas
Jeff Davis	West Texas
Jefferson	Gulf Coast
Jim Hogg	Rio Grande Valley
Jim Wells	Rio Grande Valley
Johnson	North Texas
Jones	North Texas
Karnes	South Texas
Kaufman	North Texas
Kendall	South Texas
Kenedy	Rio Grande Valley
Kent	North Texas
Kerr	South Texas
Kimble	West Texas
King	Panhandle
Kinney	South Texas

County Name	Region
Kleberg	Rio Grande Valley
Knox	North Texas
La Salle	South Texas
Lamar	East Texas
Lamb	Panhandle
Lampasas	Central Texas
Lavaca	South Texas
Lee	Central Texas
Leon	Central Texas
Liberty	Gulf Coast
Limestone	Central Texas
Lipscomb	Panhandle
Live Oak	Rio Grande Valley
Llano	Central Texas
Loving	West Texas
Lubbock	Panhandle
Lynn	Panhandle

County Name	Region
Madison	Central Texas
Marion	East Texas
Martin	West Texas
Mason	West Texas
Matagorda	Gulf Coast
Maverick	South Texas
McCulloch	West Texas
McLennan	Central Texas
McMullen	Rio Grande Valley
Medina	South Texas
Menard	West Texas
Midland	West Texas
Milam	Central Texas
Mills	Central Texas
Mitchell	North Texas
Montague	North Texas
Montgomery	Gulf Coast

County Name	Region
Moore	Panhandle
Morris	East Texas
Motley	Panhandle
Nacogdoches	East Texas
Navarro	North Texas
Newton	East Texas
Nolan	North Texas
Nueces	Rio Grande Valley
Ochiltree	Panhandle
Oldham	Panhandle
Orange	Gulf Coast
Palo Pinto	North Texas
Panola	East Texas
Parker	North Texas
Parmer	Panhandle
Pecos	West Texas
Polk	East Texas

County Name	Region
Potter	Panhandle
Presidio	West Texas
Rains	East Texas
Randall	Panhandle
Reagan	West Texas
Real	South Texas
Red River	East Texas
Reeves	West Texas
Refugio	Rio Grande Valley
Roberts	Panhandle
Robertson	Central Texas
Rockwall	North Texas
Runnels	North Texas
Rusk	East Texas
Sabine	East Texas
San Augustine	East Texas
San Jacinto	East Texas

County Name	Region
San Patricio	Rio Grande Valley
San Saba	Central Texas
Schleicher	West Texas
Scurry	North Texas
Shackelford	North Texas
Shelby	East Texas
Sherman	Panhandle
Smith	East Texas
Somervell	North Texas
Starr	Rio Grande Valley
Stephens	North Texas
Sterling	West Texas
Stonewall	North Texas
Sutton	West Texas
Swisher	Panhandle
Tarrant	North Texas
Taylor	North Texas

County Name	Region
Terrell	West Texas
Terry	Panhandle
Throckmorton	North Texas
Titus	East Texas
Tom Green	West Texas
Travis	Central Texas
Trinity	East Texas
Tyler	East Texas
Upshur	East Texas
Upton	West Texas
Uvalde	South Texas
Val Verde	South Texas
Van Zandt	East Texas
Victoria	South Texas
Walker	Gulf Coast
Waller	Gulf Coast
Ward	West Texas

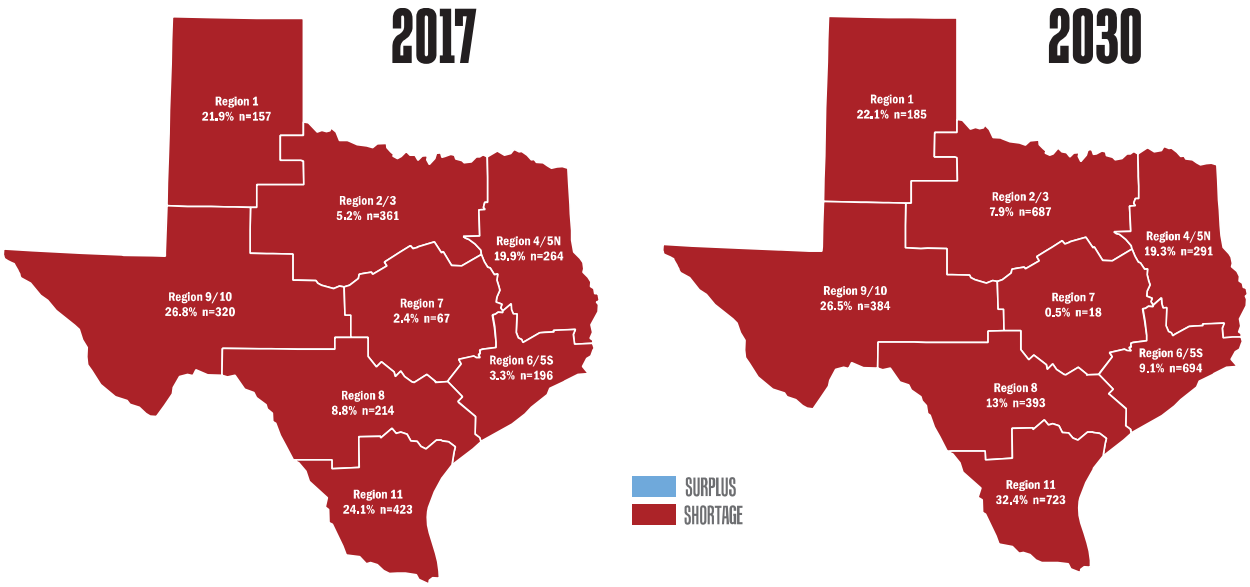
County Name	Region
Washington	Central Texas
Webb	Rio Grande Valley
Wharton	Gulf Coast
Wheeler	Panhandle
Wichita	North Texas
Wilbarger	North Texas
Willacy	Rio Grande Valley
Williamson	Central Texas
Wilson	South Texas
Winkler	West Texas
Wise	North Texas
Wood	East Texas
Yoakum	Panhandle
Young	North Texas
Zapata	Rio Grande Valley
Zavala	South Texas

Appendix B. Shortage, Supply, and Demand by Region

Map of Primary Care Physician Shortage by Region, 2017 and 2030

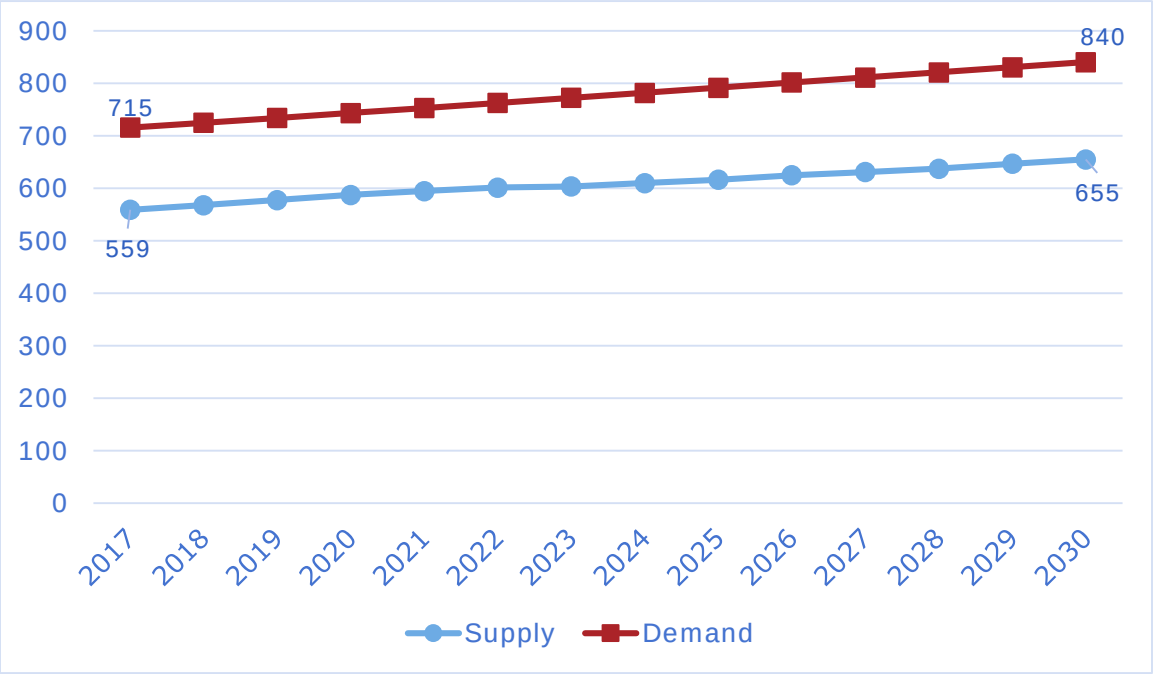
In both 2017 and 2030, all regions of the state are projected to experience primary care physician shortages, indicated in red.

Figure 8 - Percent of Primary Care Physician Demand Exceeding Supply and FTE shortage/surplus (n)



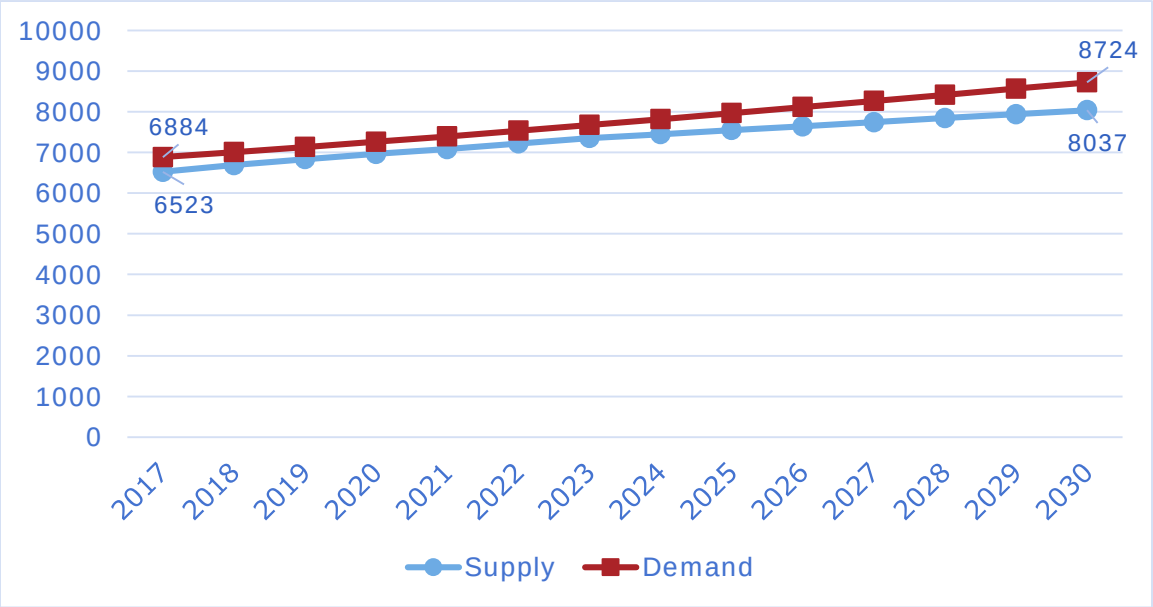
Supply and Demand of Primary Care Physicians by Region, 2017-2030

Figure 9 - Supply and Demand - Primary Care, Panhandle



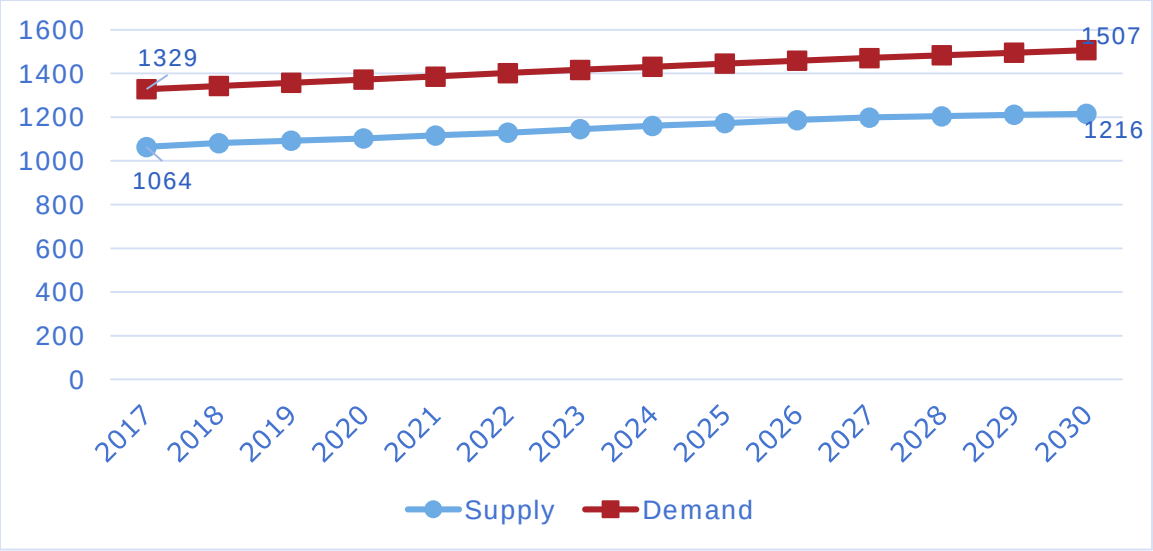
From 2017 to 2030, supply of primary care physicians in Texas will increase by 4,529 FTEs while demand will increase by 5,902 FTEs. This indicates an ongoing and worsening shortage of primary care physicians.

Figure 10 - Supply and Demand - Primary Care, North Texas



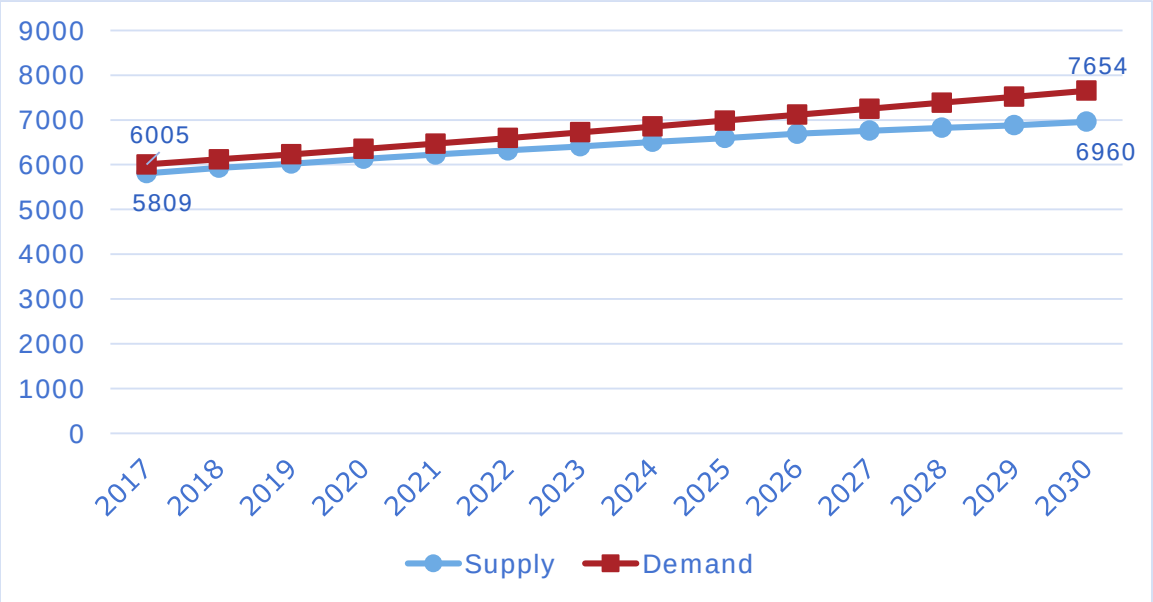
From 2017 to 2030, supply of primary care physician FTEs in North Texas will increase by 1,514 while demand will increase by 1,840. This indicates an ongoing and worsening shortage of primary care physicians in North Texas.

Figure 11 - Supply and Demand - Primary Care, East Texas



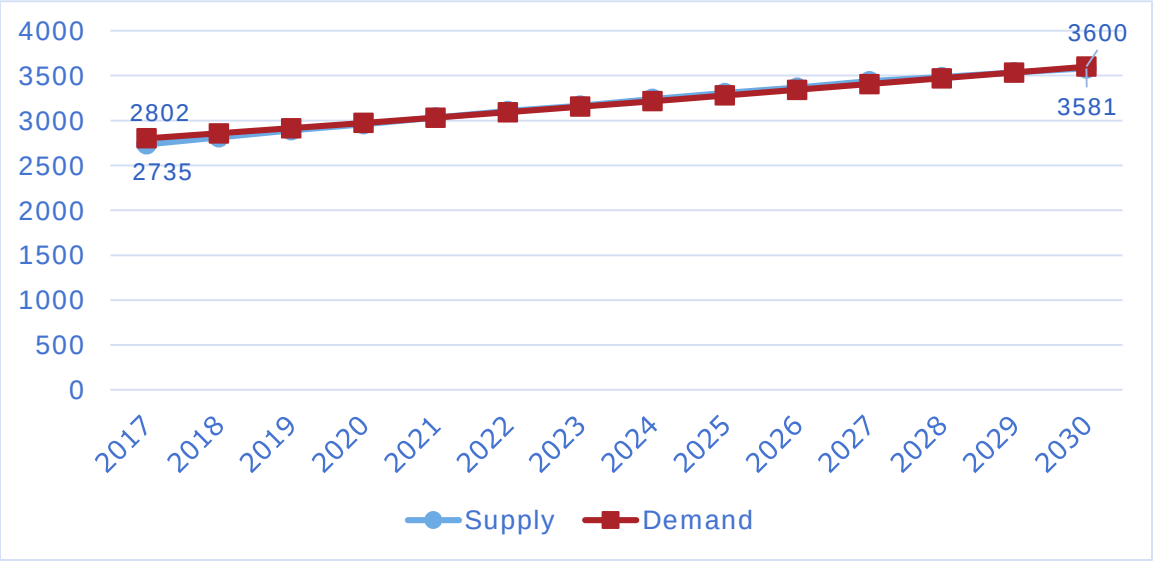
From 2017 to 2030, supply of primary care physicians in East Texas will increase by 151 FTEs while demand will increase by 179. This indicates an ongoing and worsening shortage of primary care physicians in East Texas.

Figure 12 - Supply and Demand - Primary Care, Gulf Coast



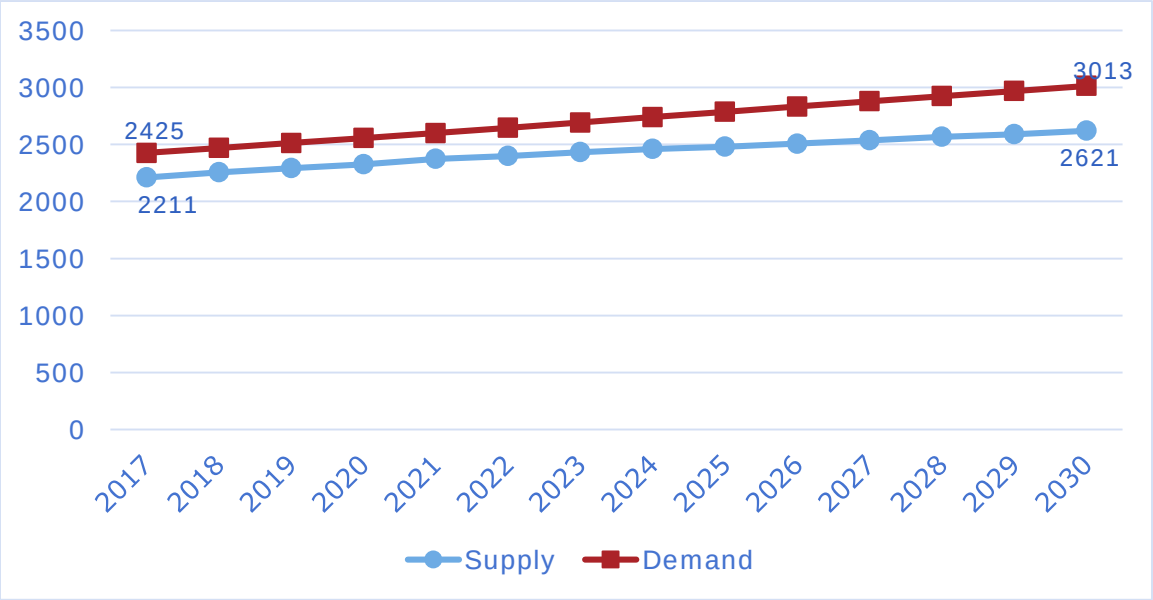
From 2017 to 2030, supply of primary care physicians in the Gulf Coast will increase by 1,151 FTEs while demand will increase by 1,649. This indicates an ongoing and worsening shortage of primary care physicians in the Gulf Coast.

Figure 13 - Supply and Demand - Primary Care, Central Texas



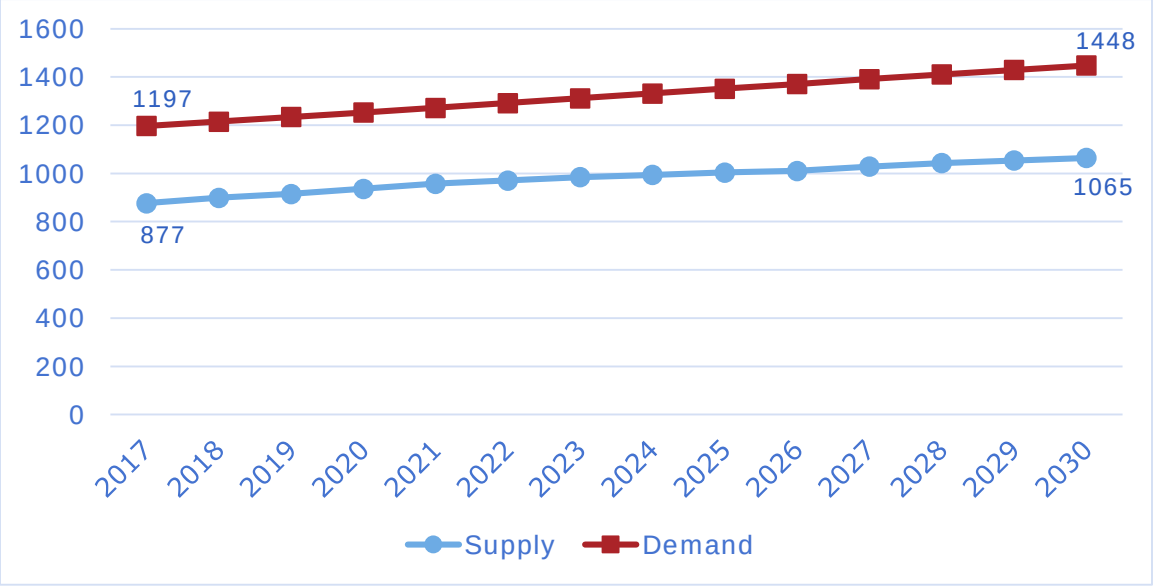
From 2017 to 2030, supply of primary care physicians in Central Texas will increase by 846 FTEs while demand will increase by 797. This indicates an ongoing shortage of primary care physicians in Central Texas.

Figure 14 - Supply and Demand - Primary Care, South Texas



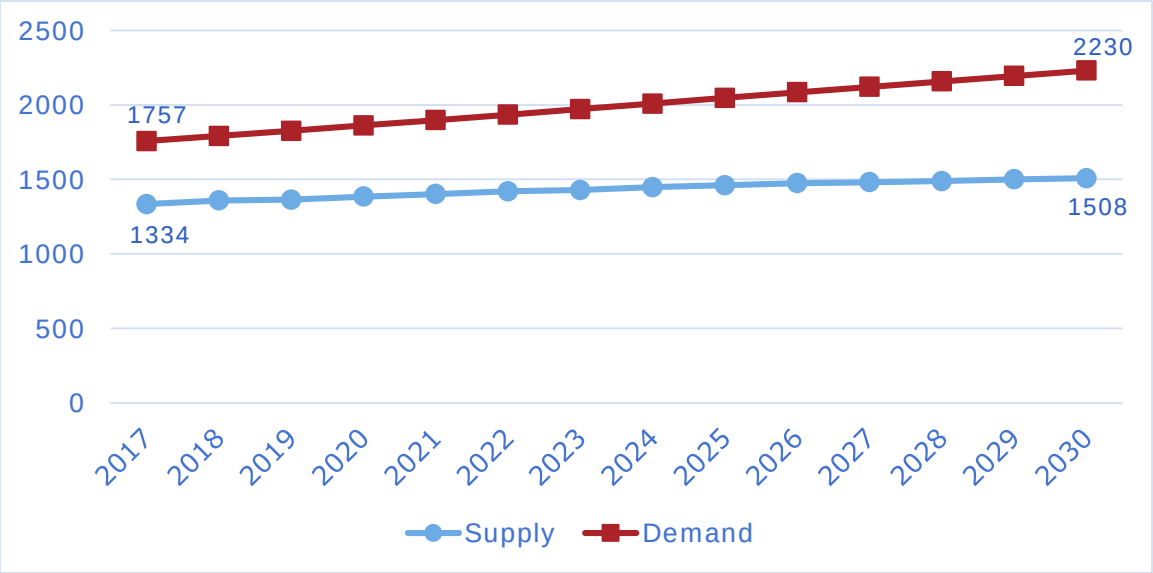
From 2017 to 2030, supply of primary care physicians in South Texas will increase by 409 FTEs while demand will increase by 588. This indicates an ongoing and worsening shortage of primary care physicians in South Texas.

Figure 15 - Supply and Demand - Primary Care, West Texas



From 2017 to 2030, supply of primary care physicians in West Texas will increase by 188 FTEs while demand will increase by 251. This indicates an ongoing and worsening shortage of primary care physicians in West Texas.

Figure 16 - Supply and Demand - Primary Care, Rio Grande Valley

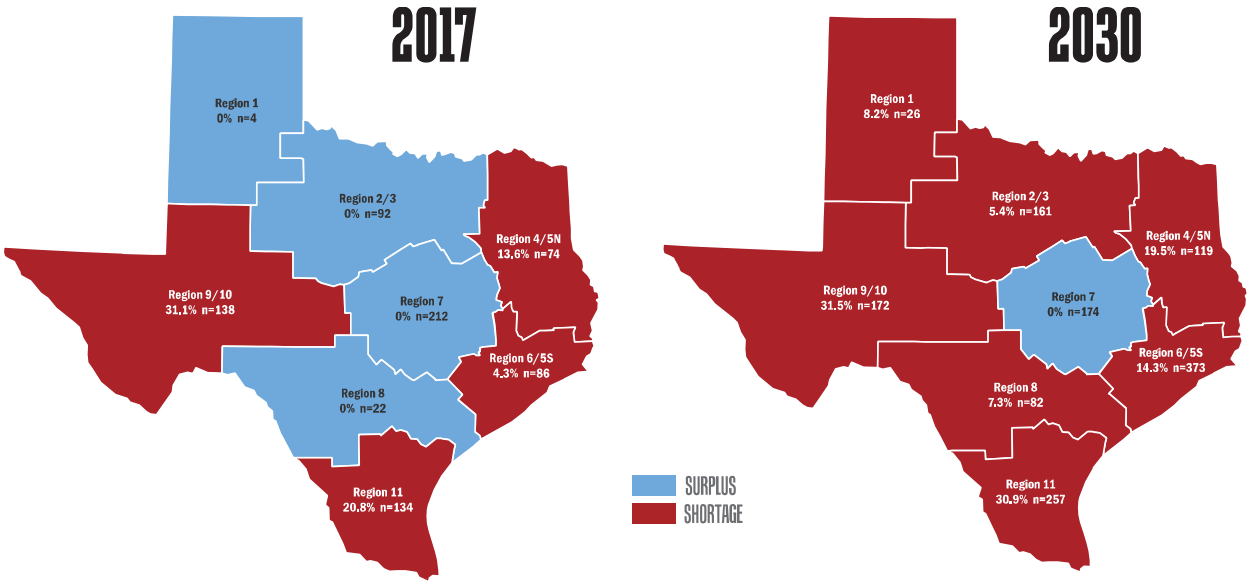


From 2017 to 2030, supply of primary care physicians in the Rio Grande Valley will increase by 173 FTEs while demand will increase by 473. This indicates an ongoing and worsening shortage of primary care physicians in the Rio Grande Valley.

Map of Family Practice Physician Shortage by Region, 2017 and 2030

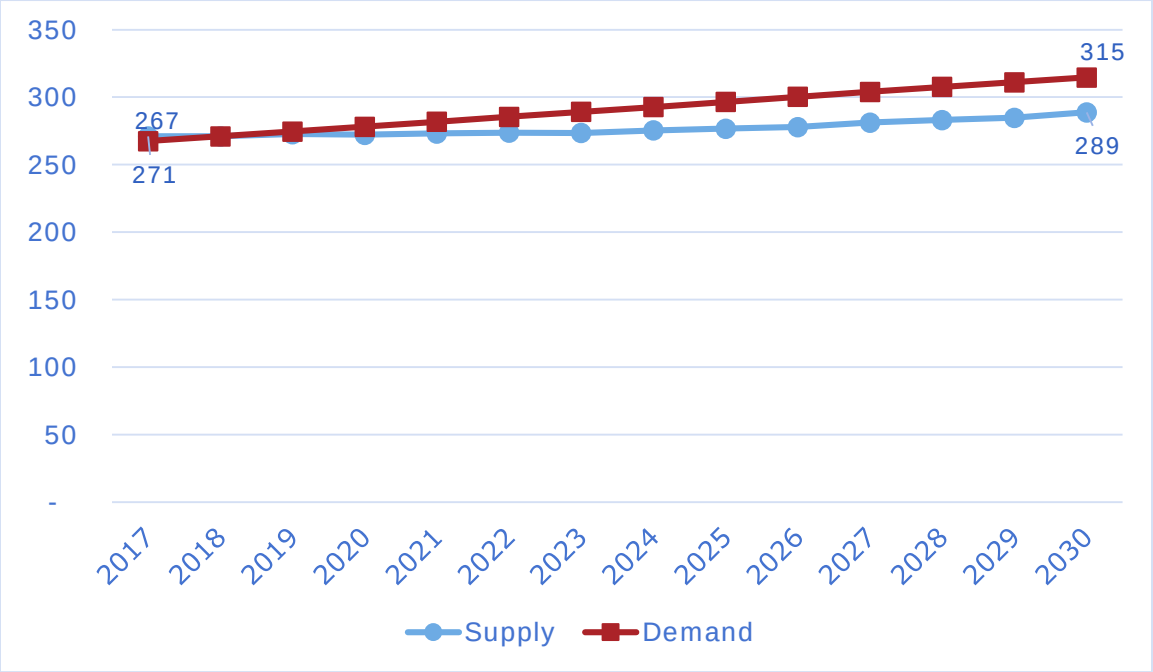
In 2017, the supply of family medicine physicians exceeds demands in four regions, a surplus, indicated in blue in Figure 17. By 2030, only Central Texas (Public Health Region 7) will have a supply of family medicine physicians that exceeds demand.

Figure 17 - Percent of Family Medicine Physician Demand Exceeding Supply and FTE shortage/surplus (n)



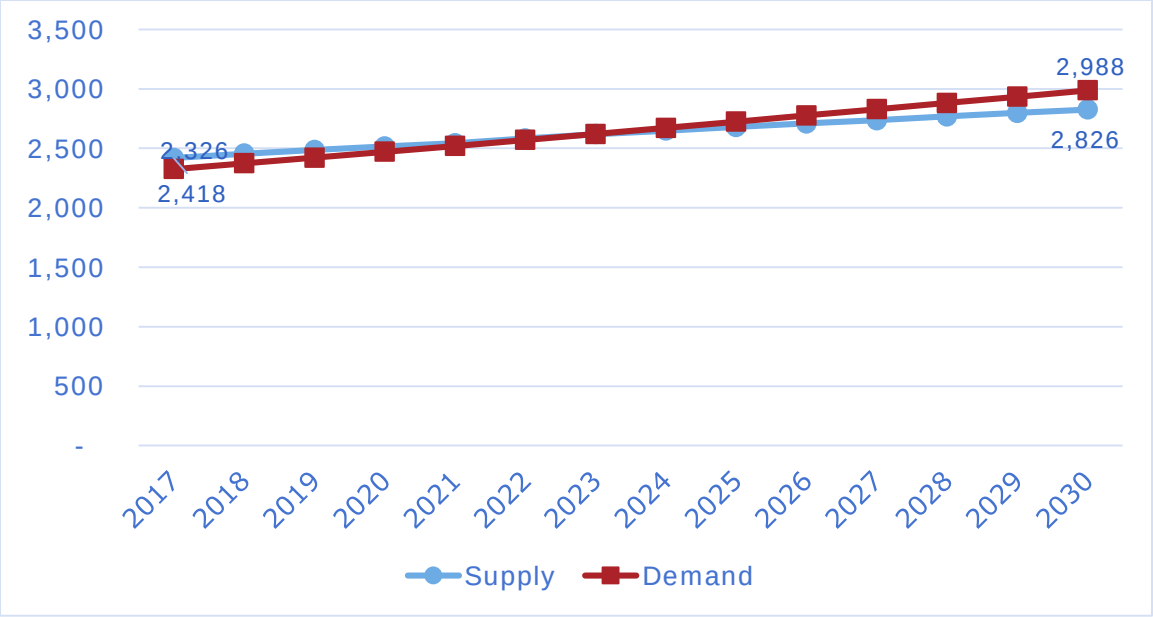
Supply and Demand of Family Practice Physicians by Region, 2017-2030

Figure 18 - Supply and Demand - Family Medicine, Panhandle



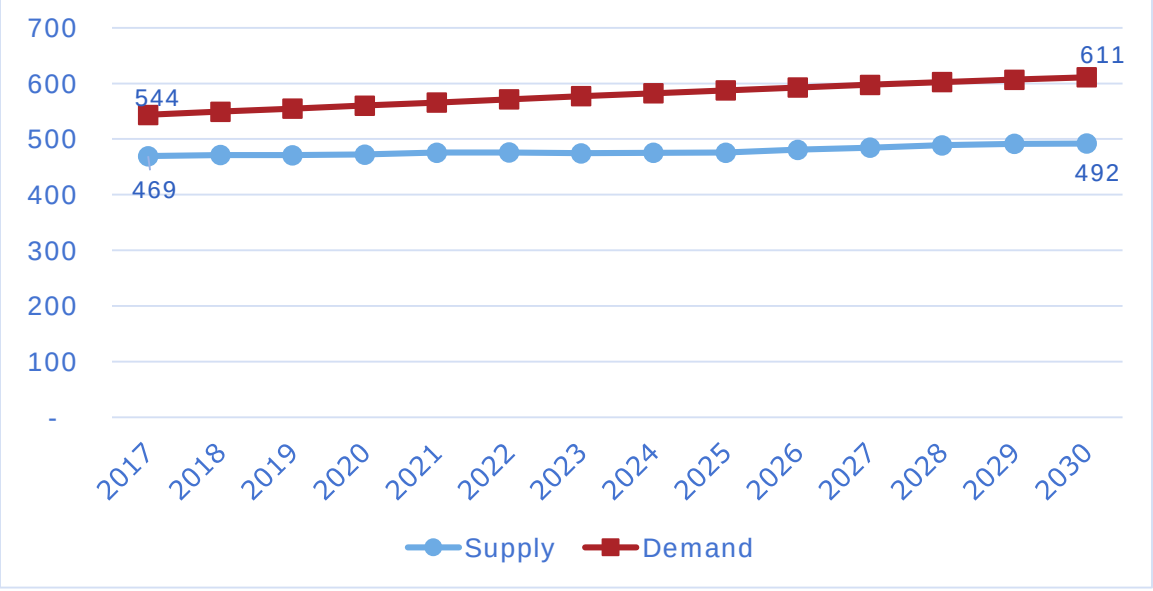
From 2017 to 2030, supply of family practice physicians in the Panhandle will increase by 18 FTEs while demand will increase by 47. This indicates an ongoing and worsening shortage of family practice physicians in the Panhandle.

Figure 19 - Supply and Demand - Family Medicine, North Texas



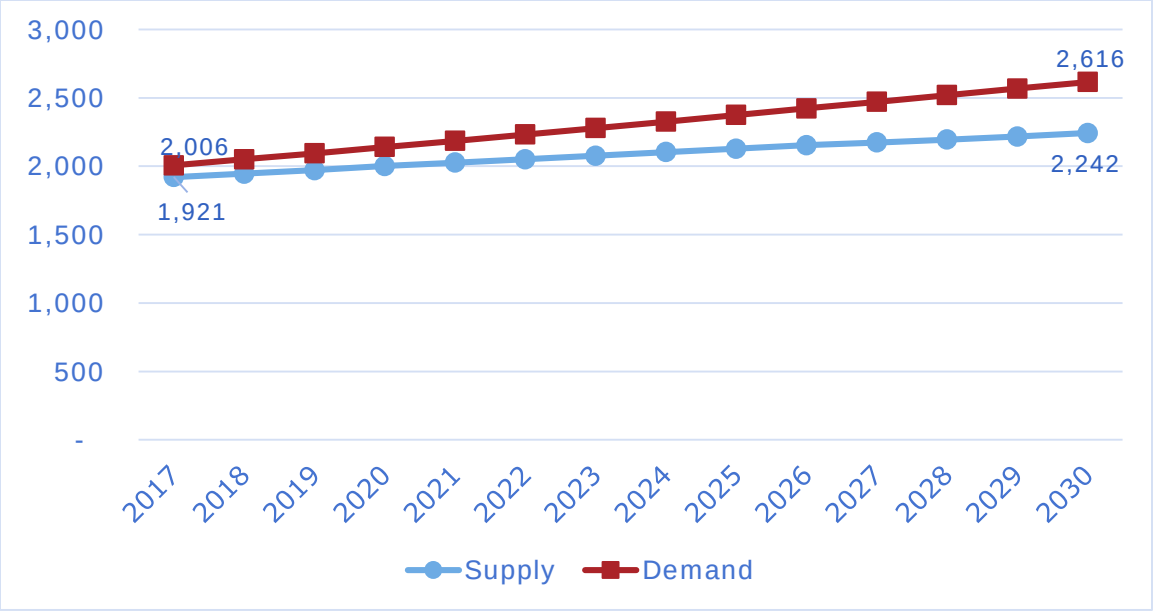
From 2017 to 2030, supply of family practice physicians in North Texas will increase by 408 FTEs while demand will increase by 662. This indicates an ongoing and worsening shortage of family practice physicians in North Texas.

Figure 90 - Supply and Demand - Family Medicine, East Texas



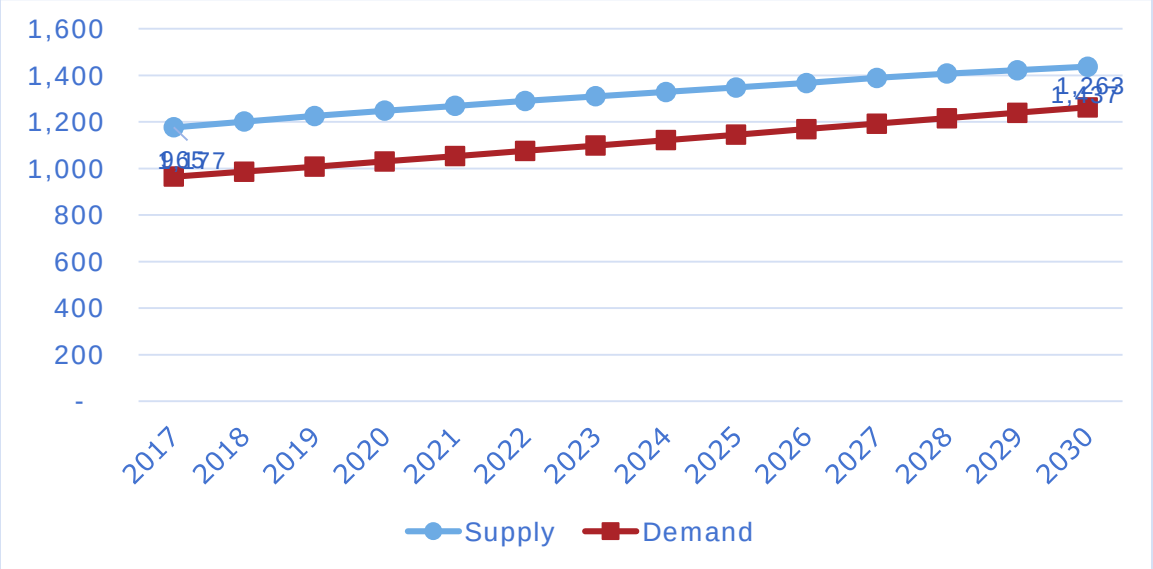
From 2017 to 2030, supply of family practice physicians in East Texas will increase by 492 FTEs while demand will increase by 611. This indicates an ongoing and worsening shortage of family practice physicians in East Texas.

Figure 10 - Supply and Demand - Family Medicine, Gulf Coast



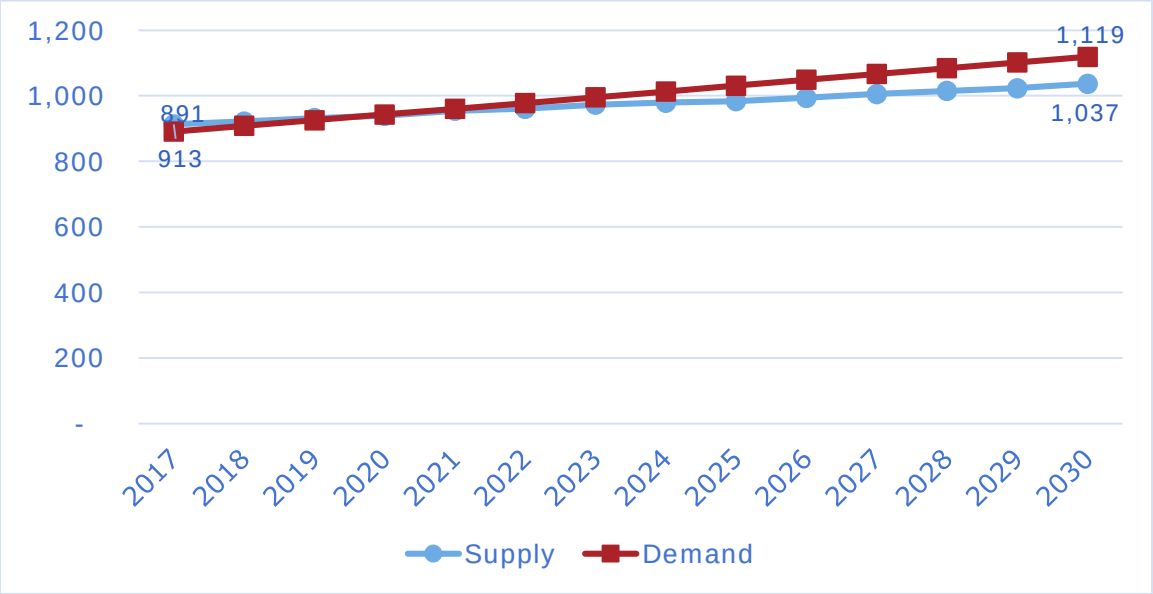
From 2017 to 2030, supply of family practice physicians in the Gulf Coast will increase by 322 FTEs while demand will increase by 609. This indicates an ongoing and worsening shortage of family practice physicians in the Gulf Coast.

Figure 2211 - Supply and Demand - Family Medicine, Central Texas



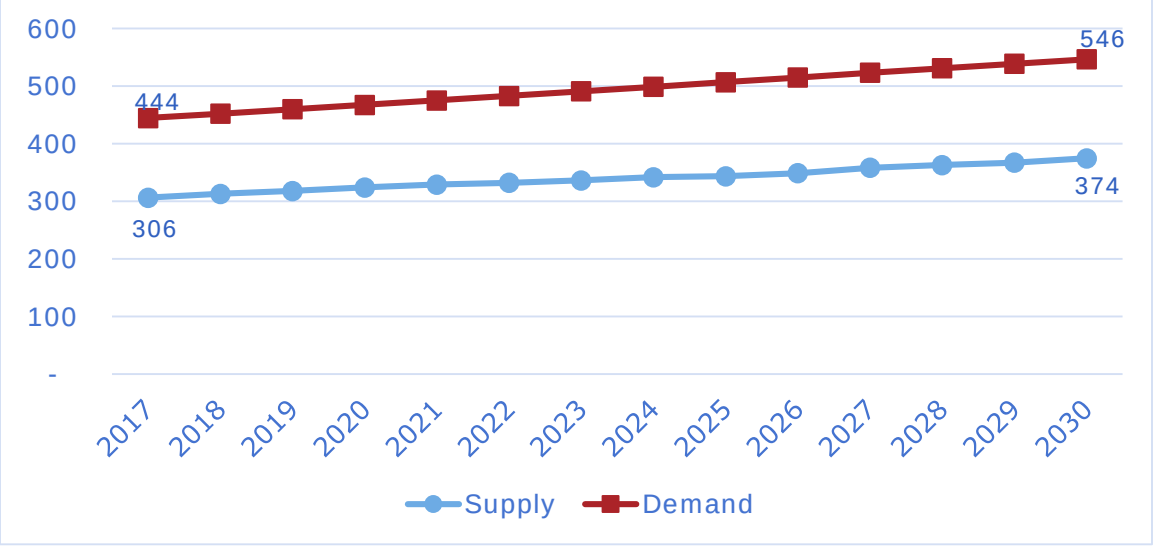
From 2017 to 2030, supply of family practice physicians in Central Texas will increase by 260 FTEs while demand will increase by 298. This indicates that the surplus of family practice physicians in Central Texas will shrink by 2030.

Figure 23 - Supply and Demand - Family Medicine, South Texas



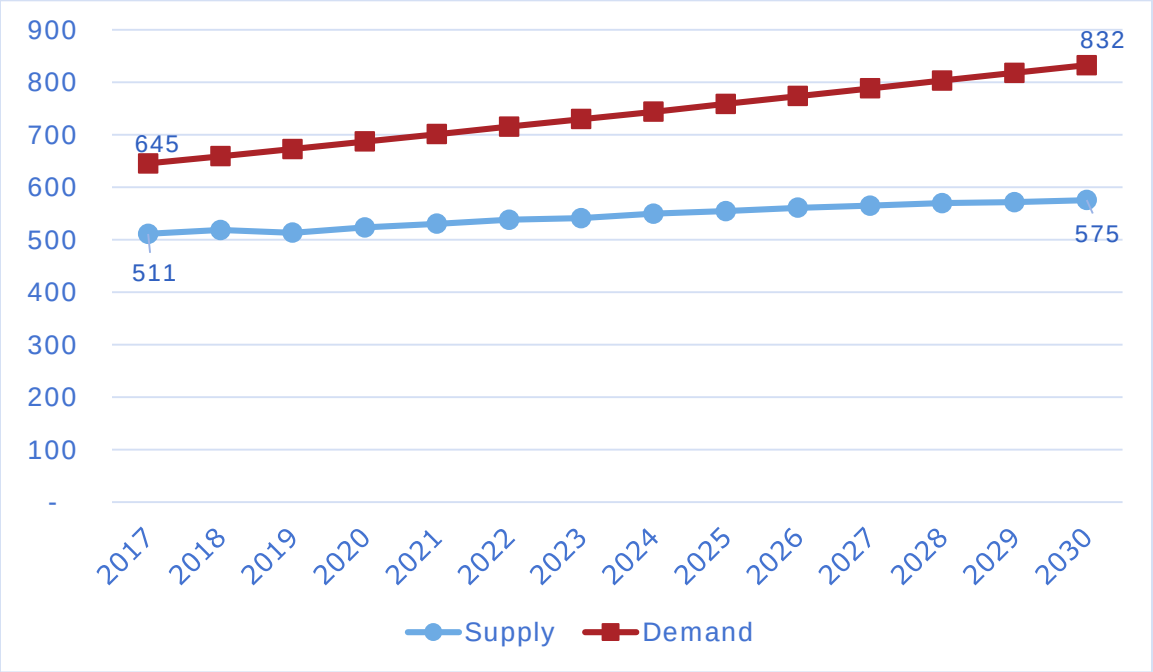
From 2017 to 2030, supply of family practice physicians in South Texas will increase by 124 FTEs while demand will increase by 228. This indicates that the surplus of family practice physicians in South Texas will become a shortage by 2030.

Figure 24 - Supply and Demand - Family Medicine, West Texas



From 2017 to 2030, supply of family practice physicians in West Texas will increase by 68 FTEs while demand will increase by 102. This indicates an ongoing and worsening shortage of family practice physicians in West Texas.

Figure 25 - Supply and Demand - Family Medicine, Rio Grande Valley

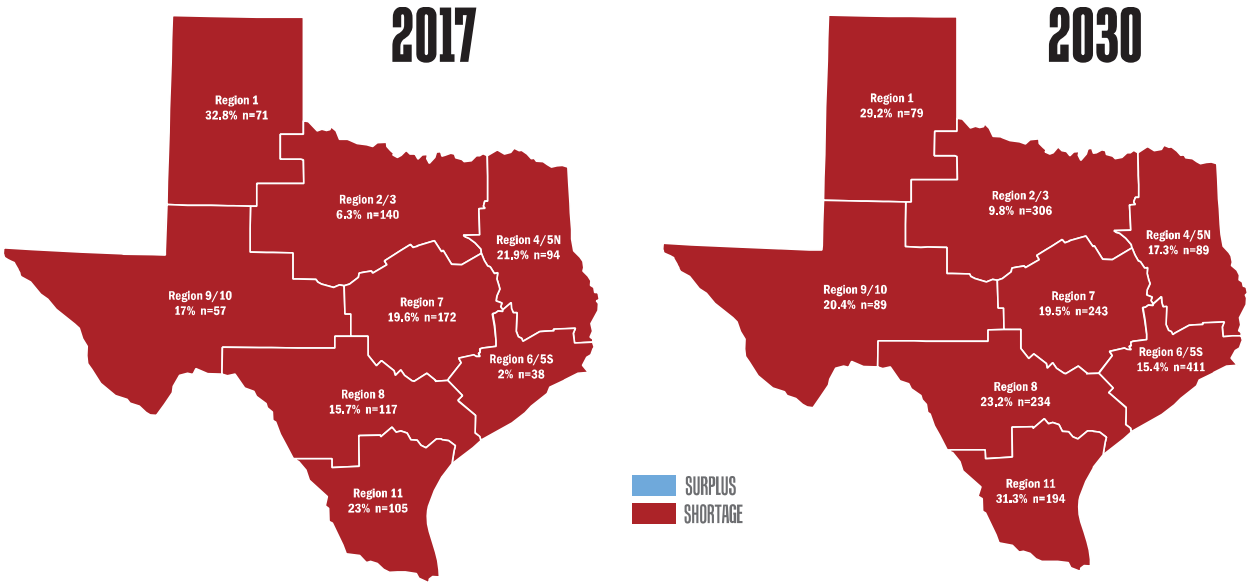


From 2017 to 2030, supply of family practice physicians in the Rio Grande Valley will increase by 64 FTEs while demand will increase by 187. This indicates an ongoing and worsening shortage of family practice physicians in the Rio Grande Valley.

Map of Internal Medicine Physician Shortage by Region, 2017 and 2030

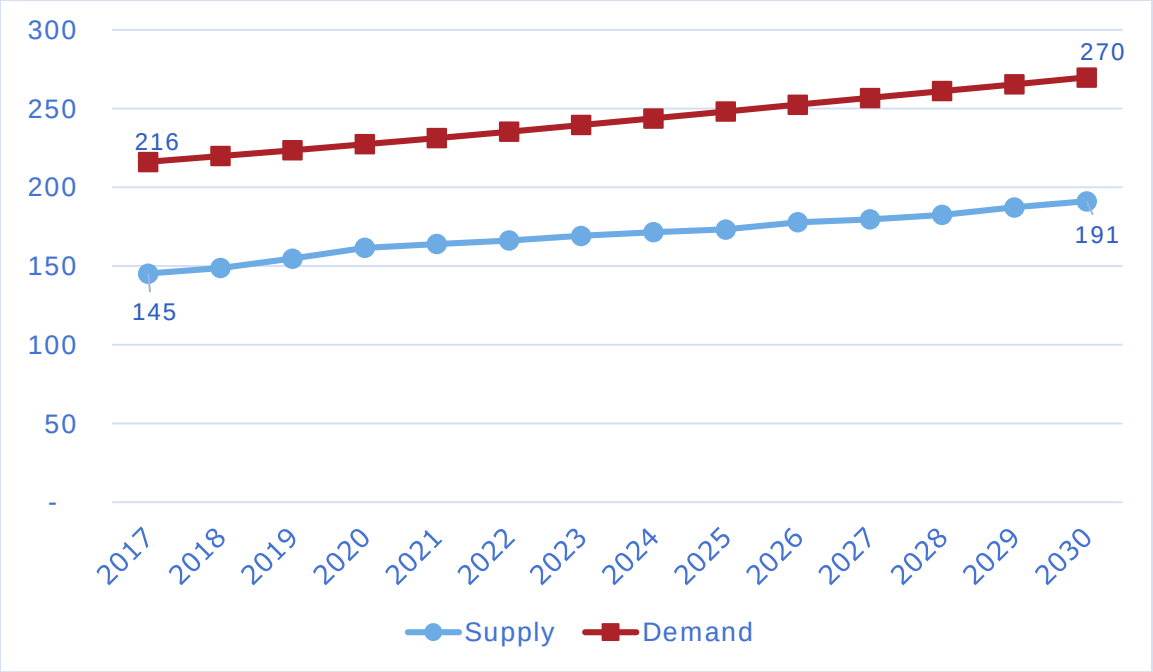
In both 2017 and 2030, demand for general internal medicine physicians exceeds supply.

Figure 126 - Percent of Internal Medicine Physician Demand Exceeding Supply and FTE shortage/surplus (n)



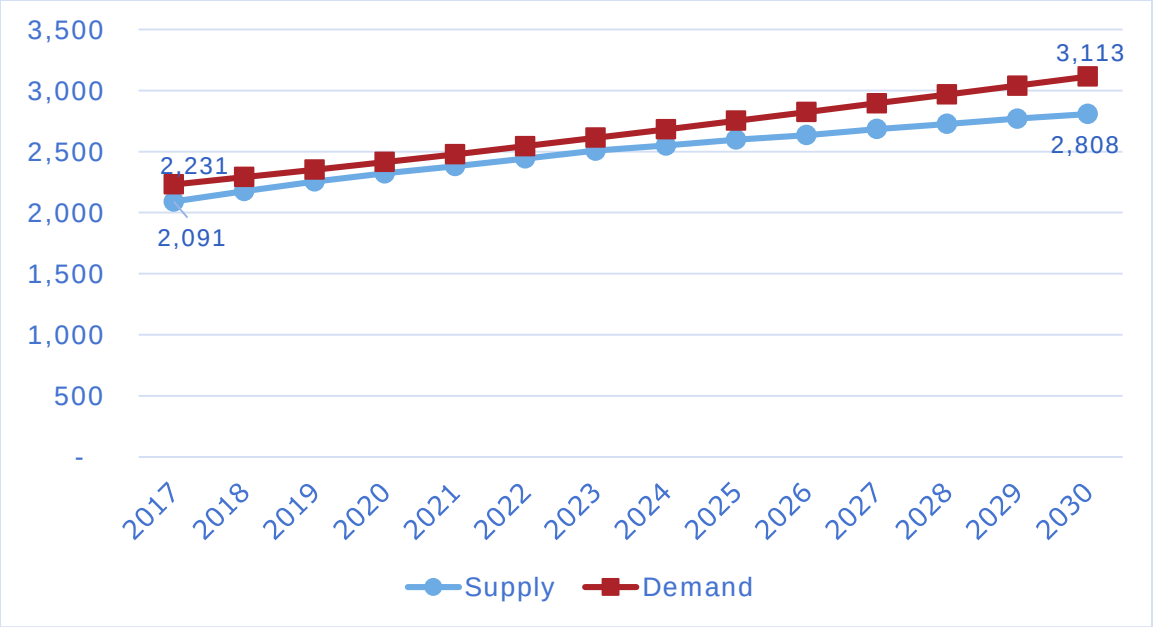
Supply and Demand of General Internal Medicine Physicians by Region, 2017-2030

Figure 27 - Supply and Demand - General Internal Medicine, Panhandle



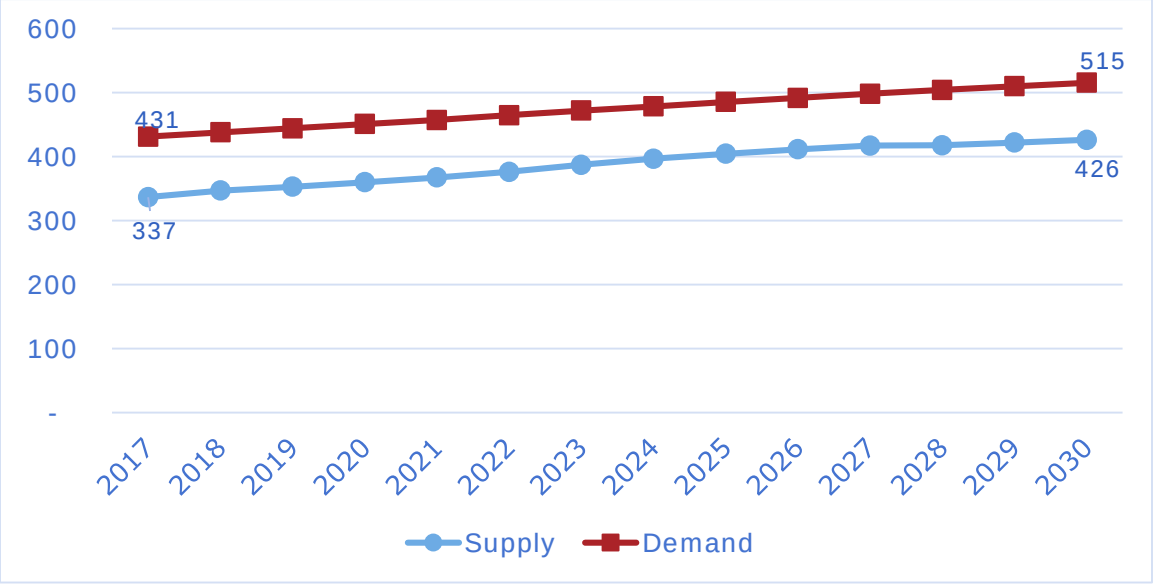
From 2017 to 2030, supply of general internal medicine physicians in the Panhandle will increase by 46 FTEs while demand will increase by 54. This indicates an ongoing and worsening shortage of general internal medicine physicians in the Panhandle.

Figure 28 - Supply and Demand - General Internal Medicine, North Texas



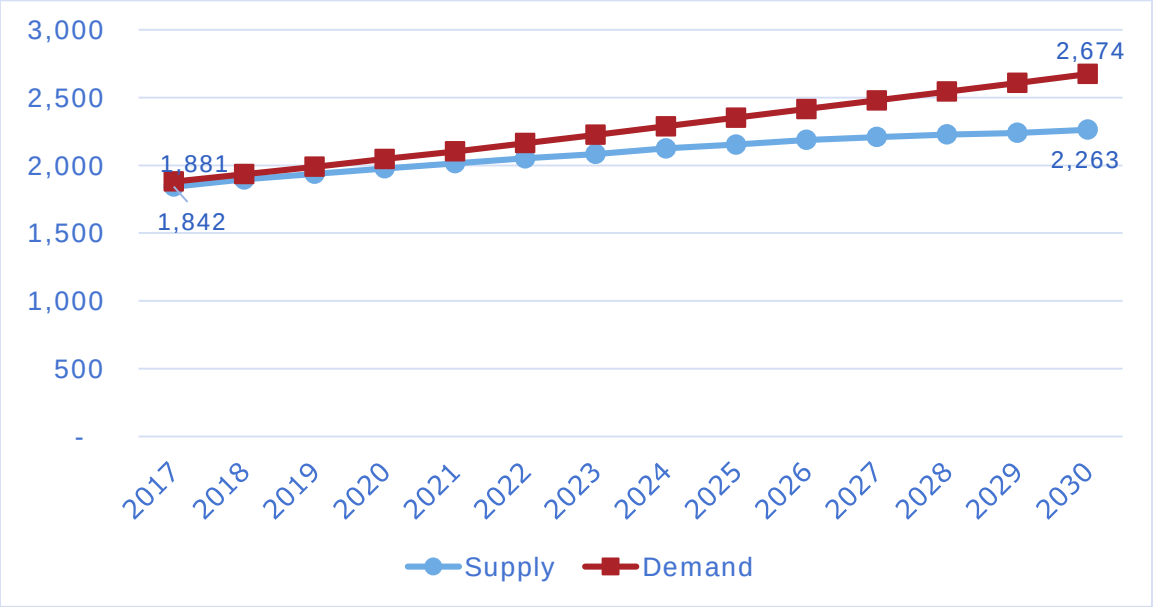
From 2017 to 2030, supply of general internal medicine physicians in North Texas will increase by 717 FTEs while demand will increase by 882. This indicates an ongoing and worsening shortage of general internal medicine physicians in North Texas.

Figure 29 - Supply and Demand - General Internal Medicine, East Texas



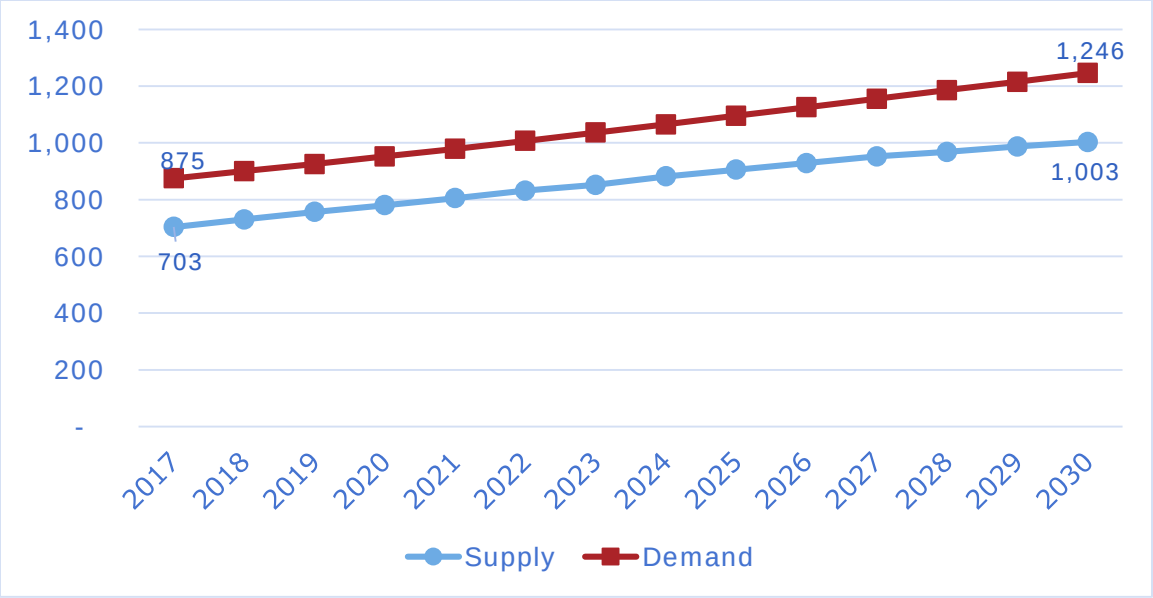
From 2017 to 2030, supply of general internal medicine physicians in East Texas will increase by 89 FTEs while demand will increase by 84. This indicates an ongoing shortage of general internal medicine physicians in East Texas.

Figure 30 - Supply and Demand - General Internal Medicine, Gulf Coast



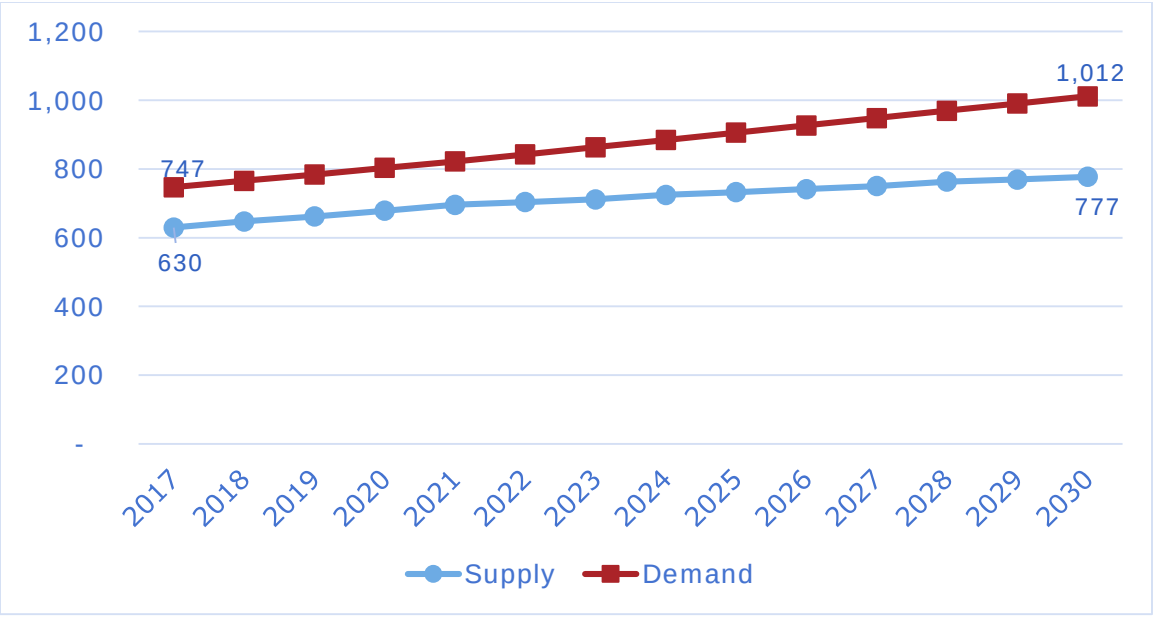
From 2017 to 2030, supply of general internal medicine physicians in the Gulf Coast will increase by 420 FTEs while demand will increase by 793. This indicates an ongoing and worsening shortage of general internal medicine physicians in the Gulf Coast.

Figure 31 - Supply and Demand - General Internal Medicine, Central Texas



From 2017 to 2030, supply of general internal medicine physicians in Central Texas will increase by 300 FTEs while demand will increase by 371. This indicates an ongoing and worsening shortage of general internal medicine physicians in Central Texas.

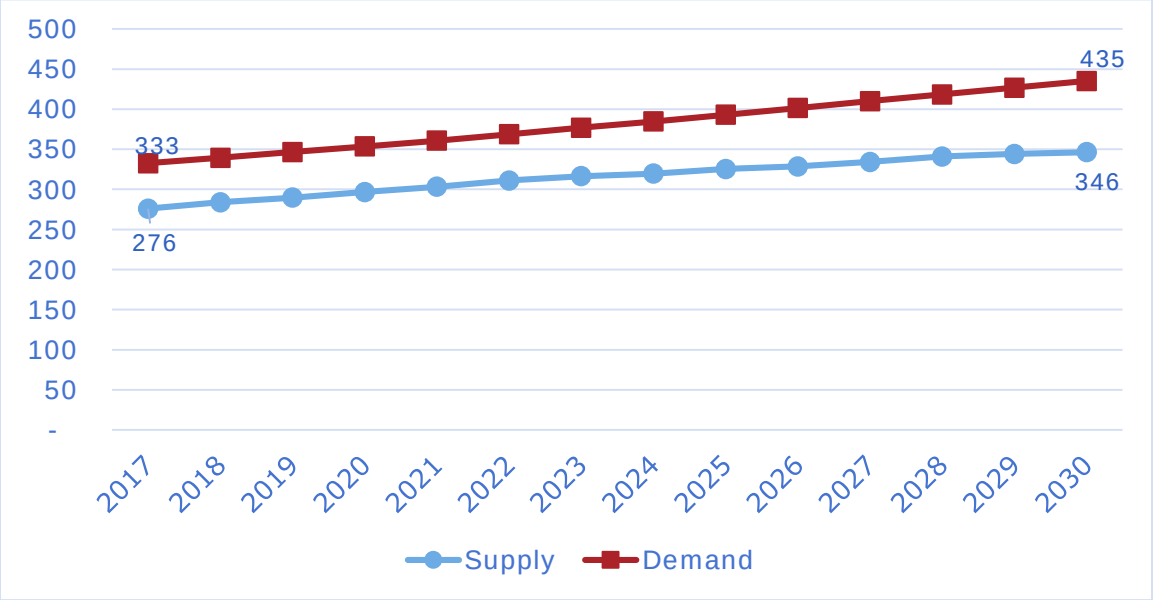
Figure 32 - Supply and Demand - General Internal Medicine, South Texas



From 2017 to 2030, supply of general internal medicine physicians in South Texas will increase by 148 FTEs while demand will increase by 265. This indicates an

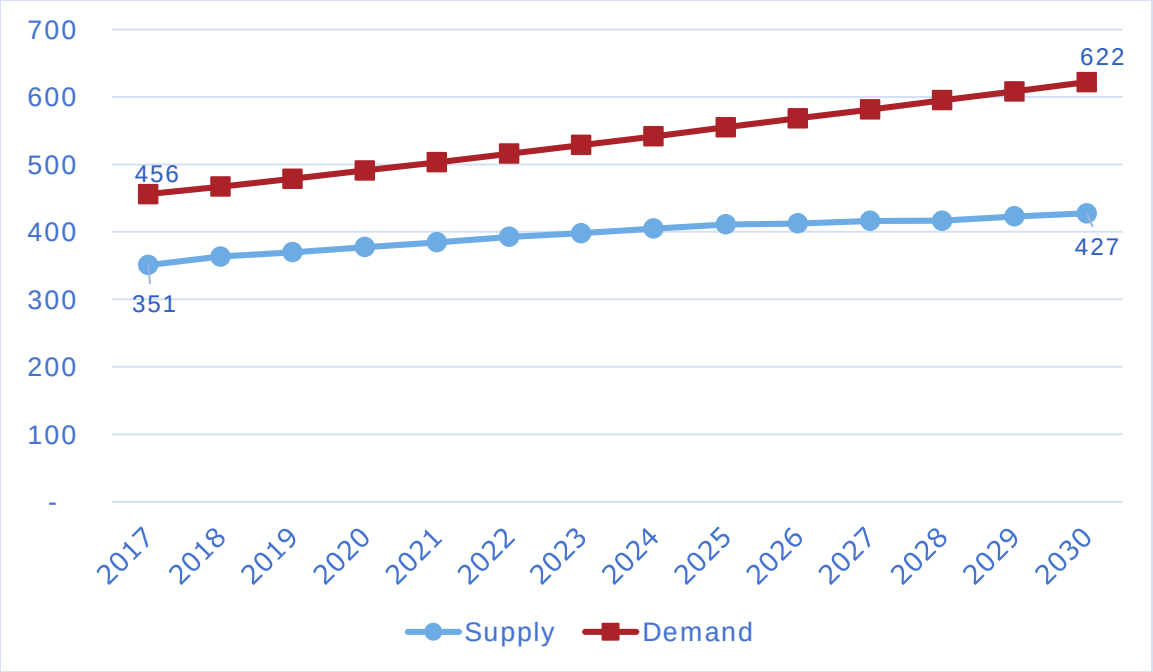
ongoing and worsening shortage of general internal medicine physicians in South Texas.

Figure 33 - Supply and Demand - General Internal Medicine, West Texas



From 2017 to 2030, supply of general internal medicine physicians in West Texas will increase by 70 FTEs while demand will increase by 102. This indicates an ongoing and worsening shortage of general internal medicine physicians in West Texas.

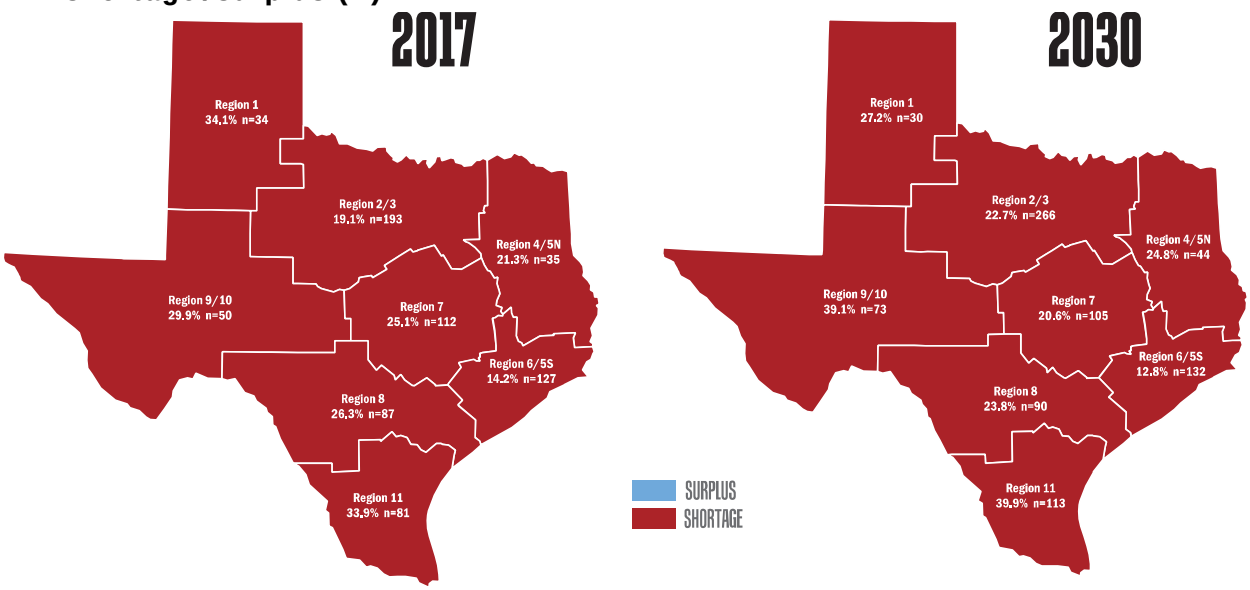
Figure 34 - Supply and Demand - General Internal Medicine, Rio Grande Valley



From 2017 to 2030, supply of general internal medicine physicians in the Rio Grande Valley will increase by 77 FTEs while demand will increase by 166. This indicates an ongoing and worsening shortage of general internal medicine physicians in the Rio Grande Valley.

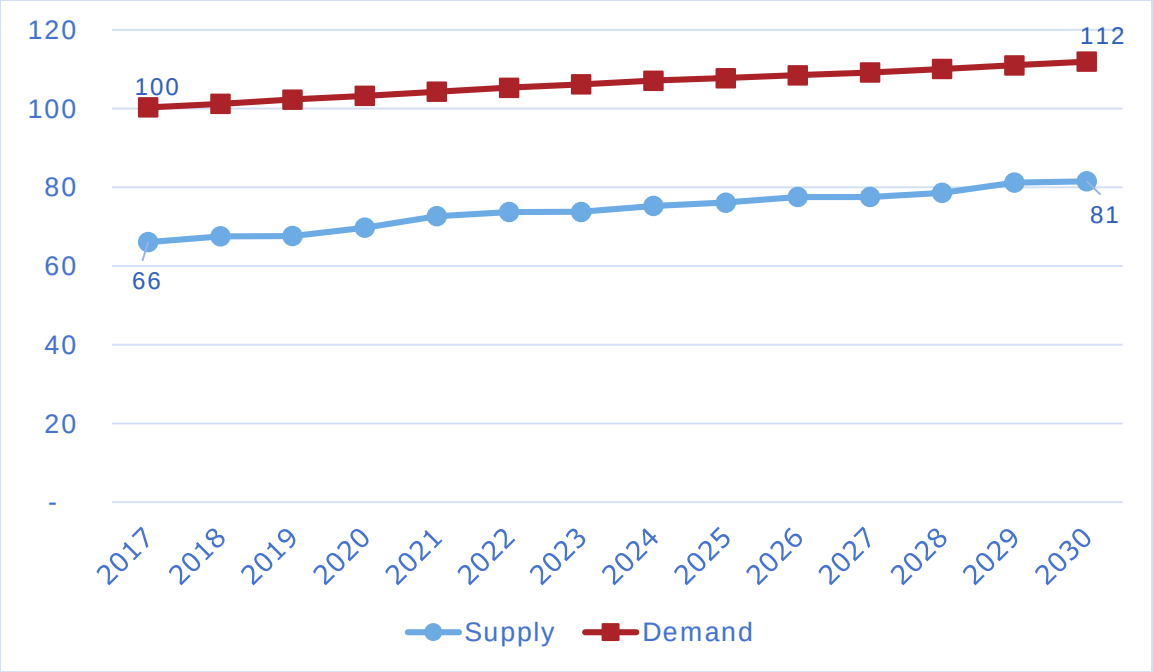
Map of Obstetrics/Gynecologist Shortage by Region, 2017 and 2030

Figure 35 - Percent of Obstetricians/Gynecologist Demand Exceeding Supply and FTE shortage/surplus (n)



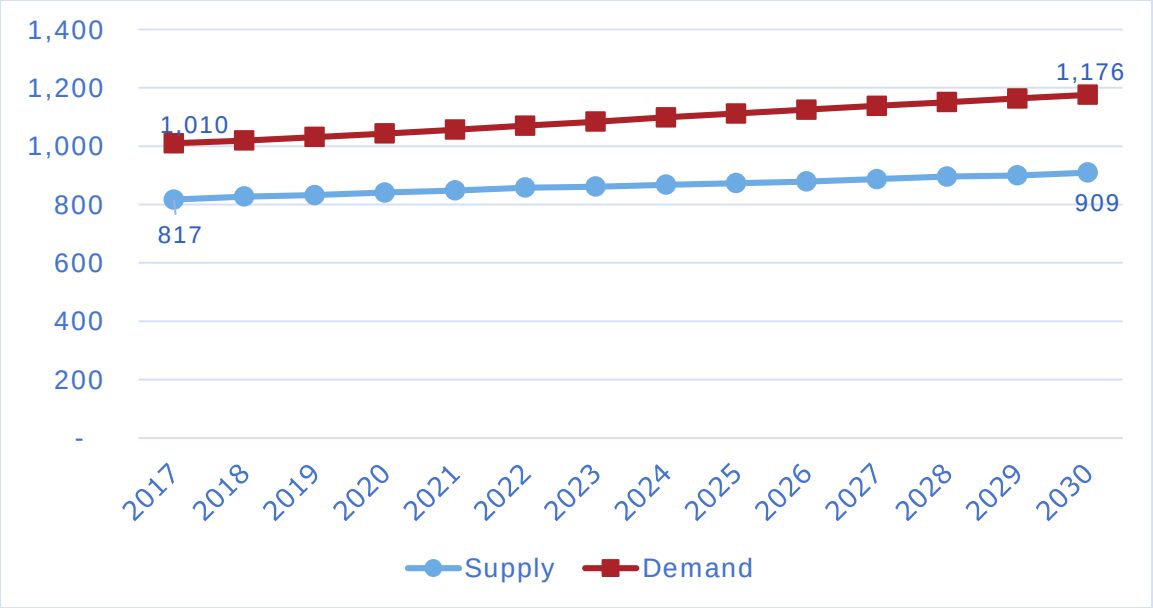
Supply and Demand of Obstetricians and Gynecologists by Region, 2017-2030

Figure 36 - Supply and Demand - Obstetrics and Gynecology, Panhandle



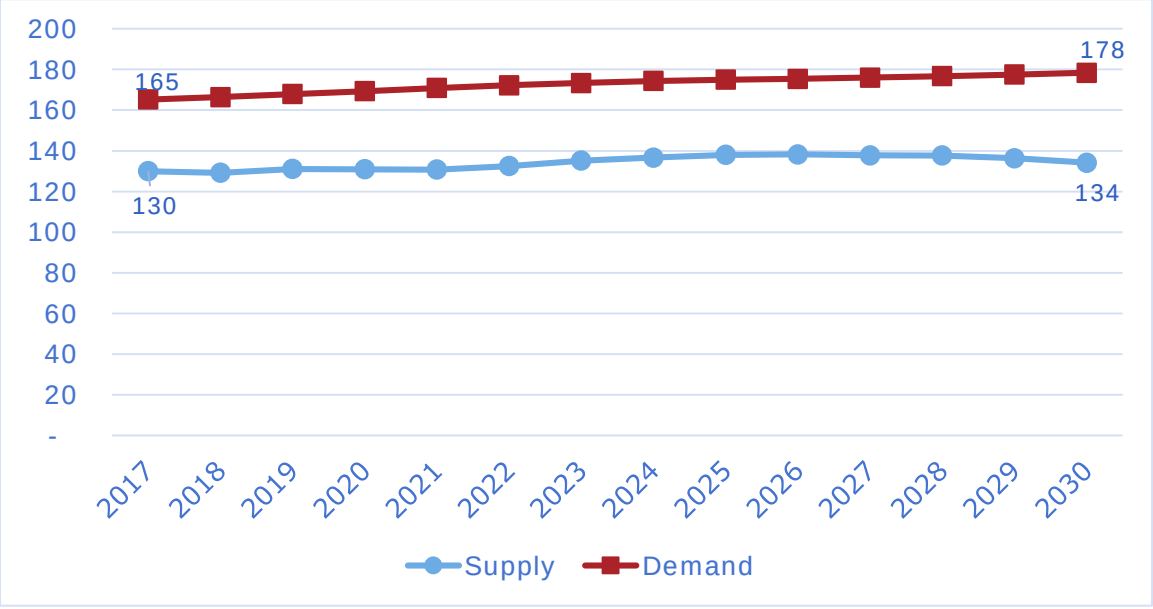
From 2017 to 2030, supply of obstetricians and gynecologists in the Panhandle will increase by 15 FTEs while demand will increase by 12. This indicates an ongoing shortage of obstetricians and gynecologists in the Panhandle.

Figure 13 - Supply and Demand - Obstetrics and Gynecology, North Texas



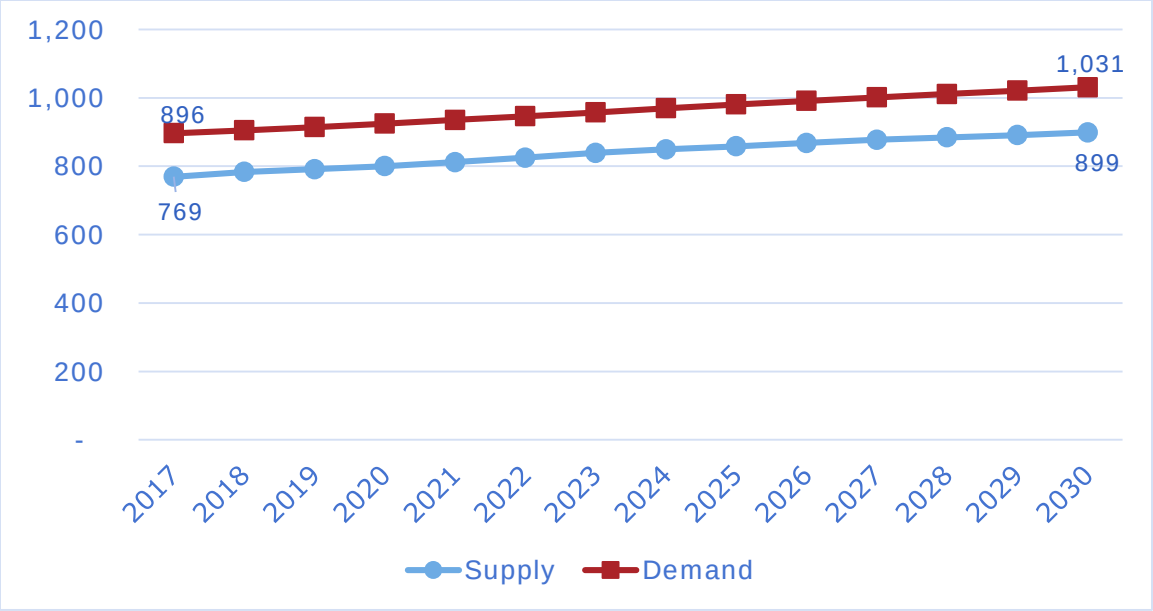
From 2017 to 2030, supply of obstetricians and gynecologists in North Texas will increase by 92 FTEs while demand will increase by 166. This indicates an ongoing and worsening shortage of obstetricians and gynecologists in North Texas.

Figure 38 - Supply and Demand - Obstetrics and Gynecology, East Texas



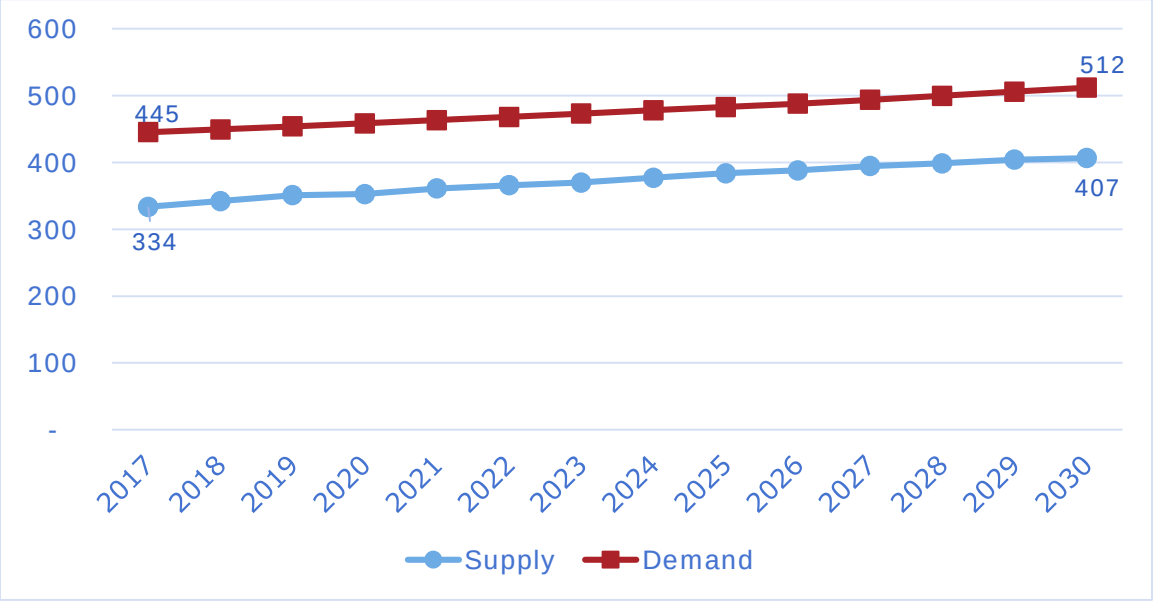
From 2017 to 2030, supply of obstetricians and gynecologists in East Texas will increase by 4 FTEs while demand will increase by 13. This indicates an ongoing and worsening shortage of obstetricians and gynecologists in East Texas.

Figure 39 - Supply and Demand - Obstetrics and Gynecology, Gulf Coast



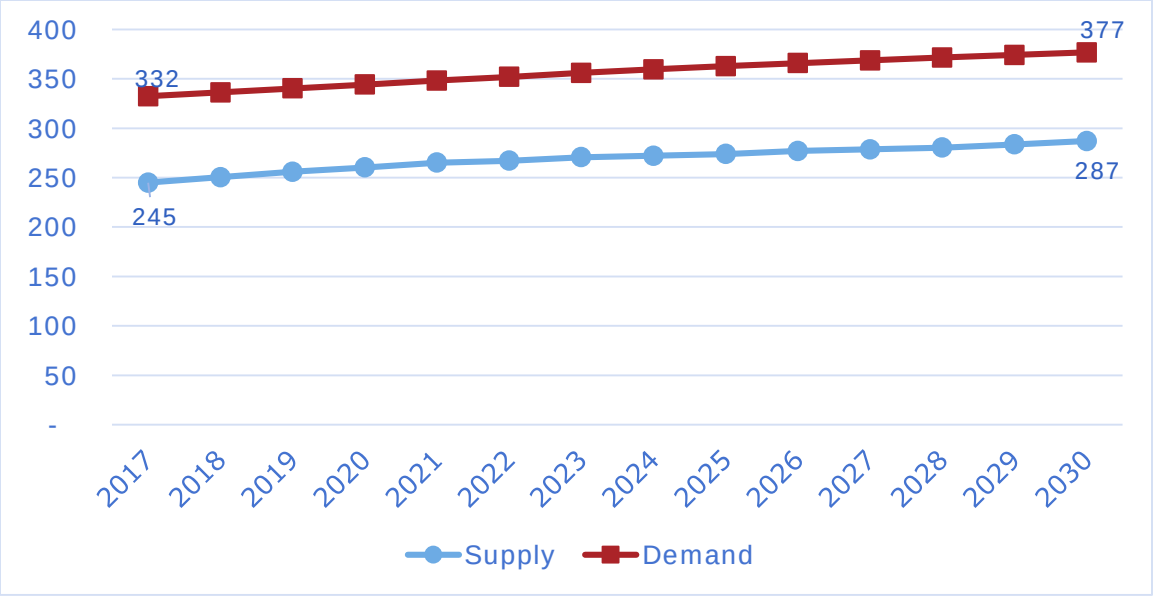
From 2017 to 2030, supply of obstetricians and gynecologists in the Gulf Coast will increase by 130 FTEs while demand will increase by 135. This indicates an ongoing and worsening shortage of obstetricians and gynecologists in the Gulf Coast.

Figure 40 - Supply and Demand - Obstetrics and Gynecology, Central Texas



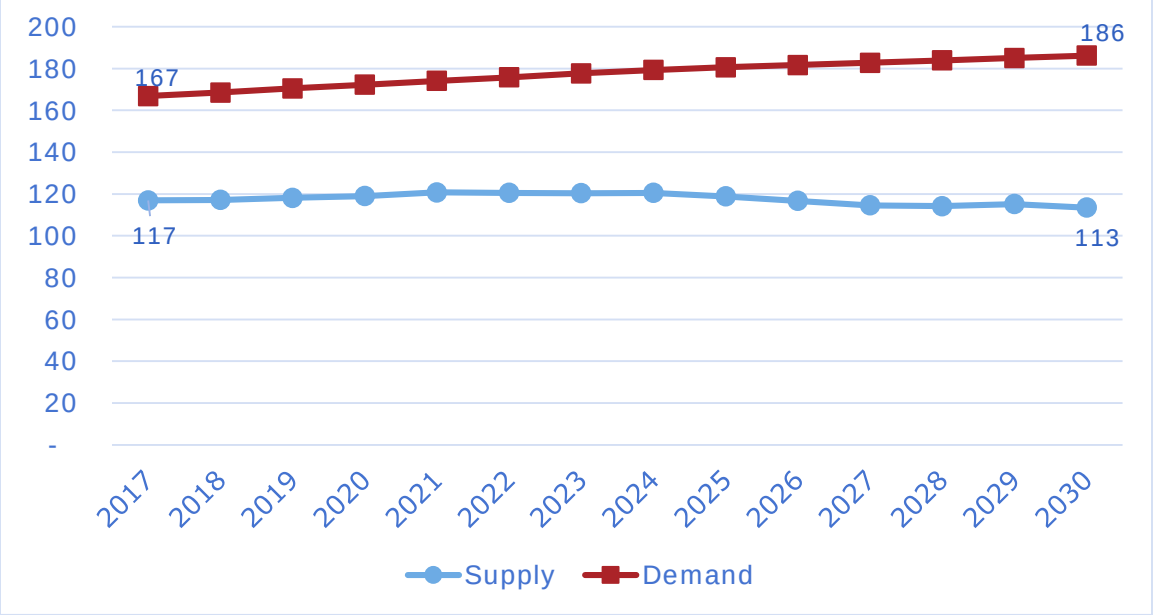
From 2017 to 2030, supply of obstetricians and gynecologists in Central Texas will increase by 73 FTEs while demand will increase by 67. This indicates an ongoing shortage of obstetricians and gynecologists in Central Texas.

Figure 41 - Supply and Demand - Obstetrics and Gynecology, South Texas



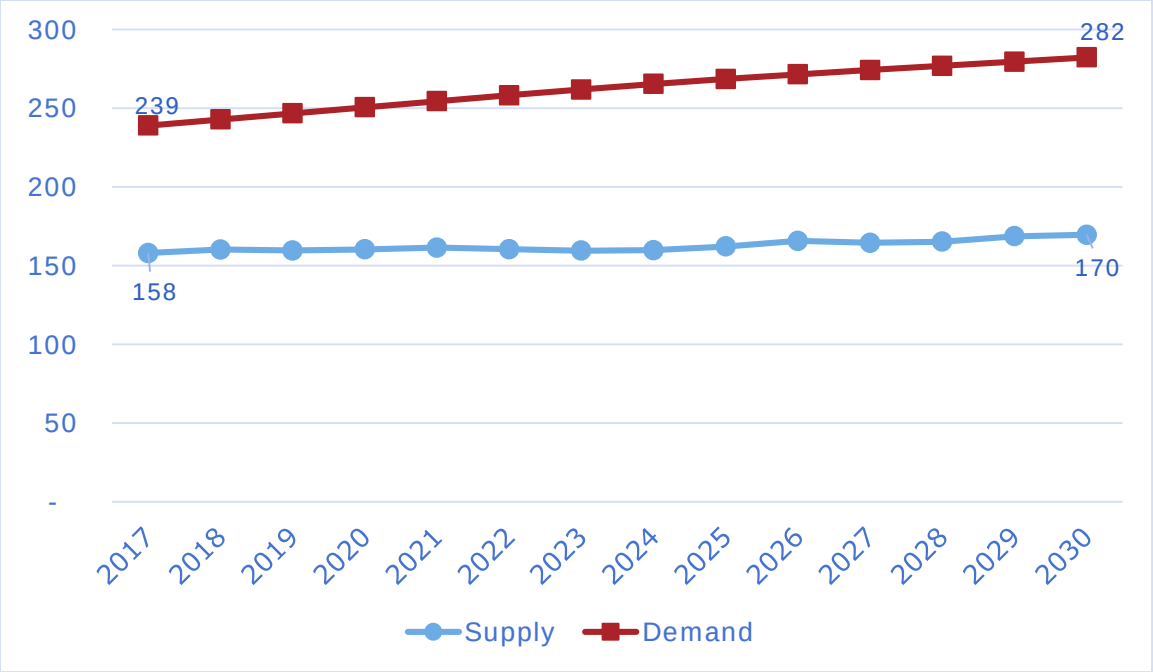
From 2017 to 2030, supply of obstetricians and gynecologists in South Texas will increase by 42 FTEs while demand will increase by 44. This indicates an ongoing and worsening shortage of obstetricians and gynecologists in South Texas.

Figure 42 - Supply and Demand - Obstetrics and Gynecology, West Texas



From 2017 to 2030, supply of obstetricians and gynecologists in West Texas will decrease by 3 FTEs while demand will increase by 19. This indicates an ongoing and worsening shortage of obstetricians and gynecologists in West Texas.

Figure 43 - Supply and Demand - Obstetrics and Gynecology, Rio Grande Valley

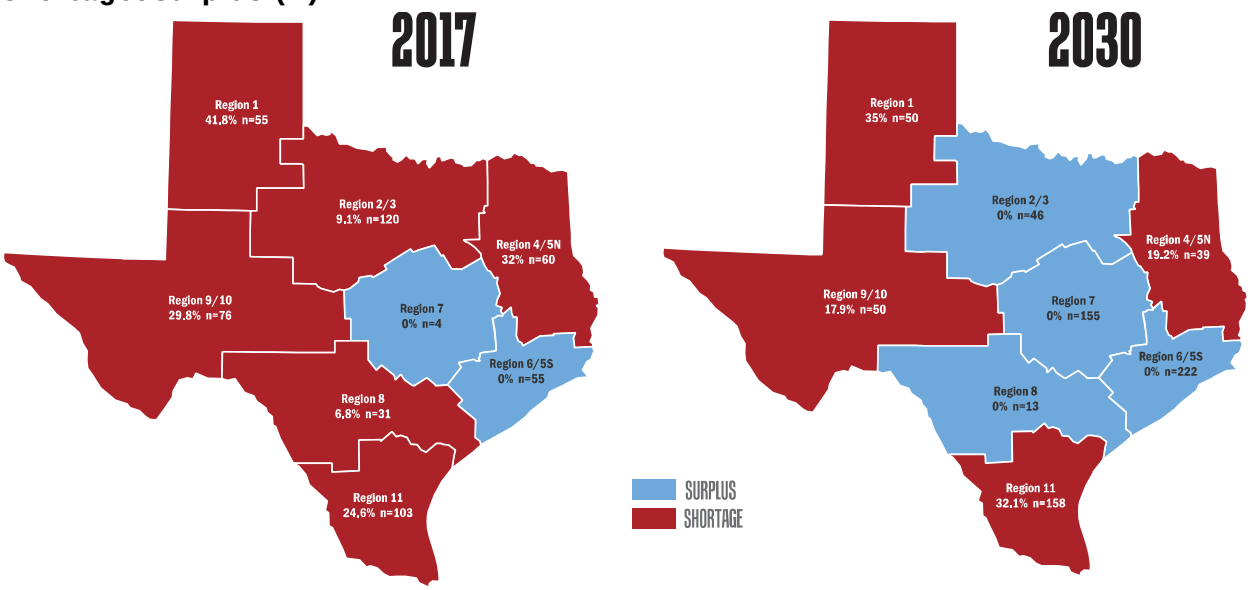


From 2017 to 2030, supply of obstetricians and gynecologists in the Rio Grande Valley will increase by 12 FTEs while demand will increase by 43. This indicates an ongoing and worsening shortage of obstetricians and gynecologists in the Rio Grande Valley.

Map of Pediatrician Shortage by Region, 2017 and 2030

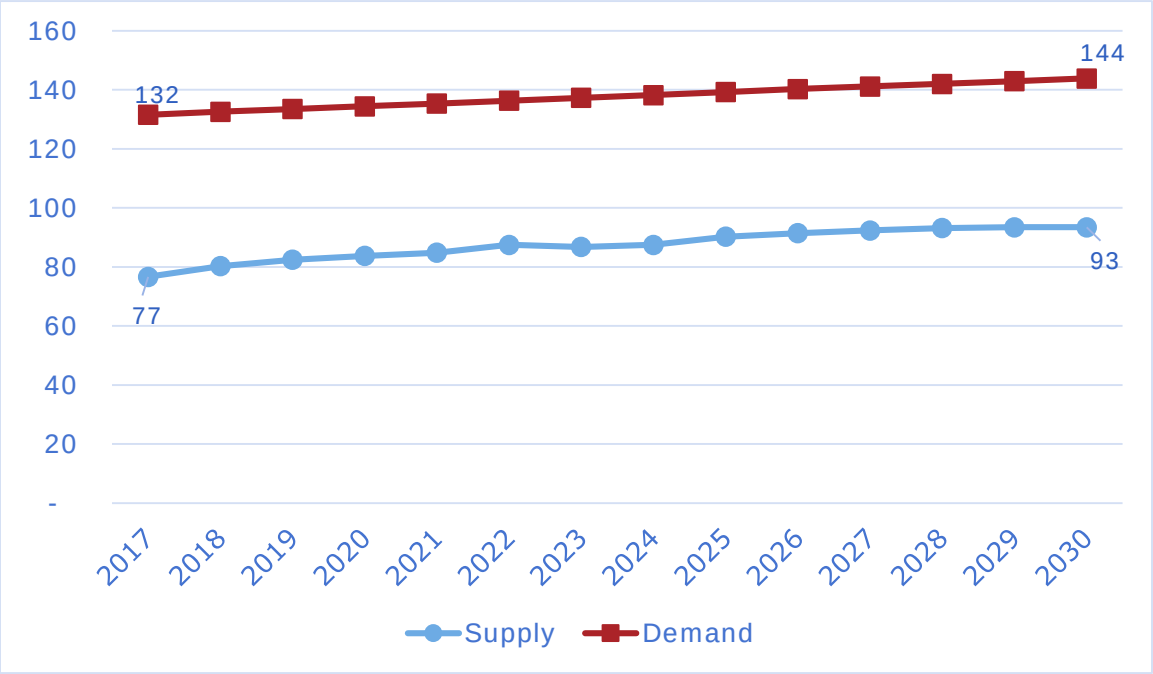
In 2017, just Central Texas (Public Health Region 7) and the Gulf Coast (Public Health Region 6/5S) are projected to have the supply of pediatricians exceeding demand (a surplus). By 2030, four regions will have a surplus of pediatricians, indicated in blue in Figure 44.

Figure 4414 - Percent of Pediatrician Demand Exceeding Supply and FTE shortage/surplus (n)



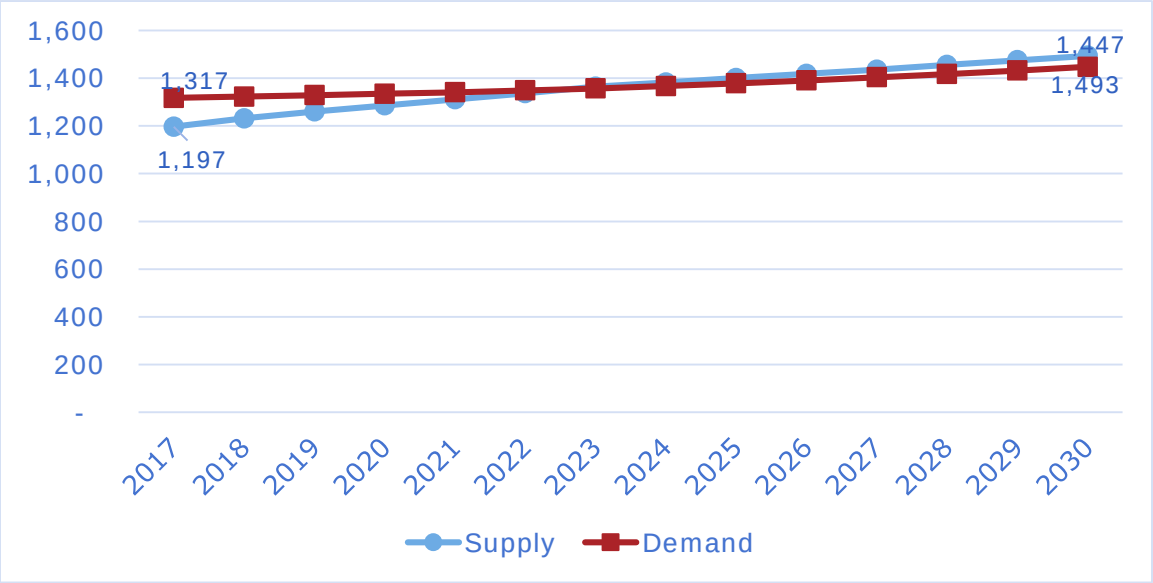
Supply and Demand of Pediatricians by Region, 2017-2030

Figure 45 - Supply and Demand - Pediatrics, Panhandle



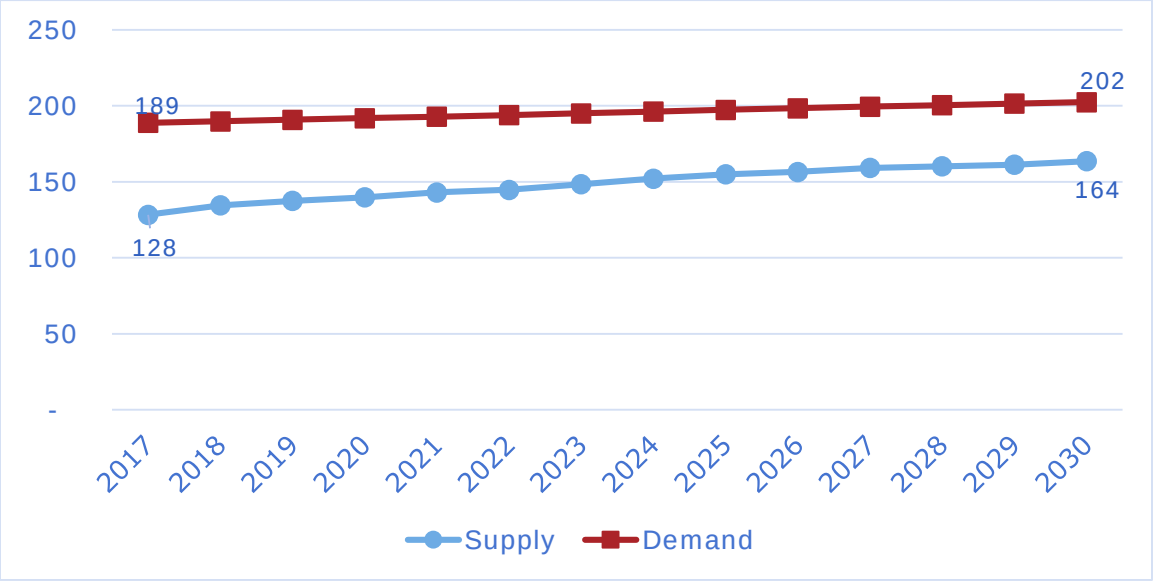
From 2017 to 2030, supply of pediatricians in the Panhandle will increase by 17 FTEs while demand will increase by 12. This indicates an ongoing shortage of pediatricians in the Panhandle.

Figure 46 - Supply and Demand - Pediatrics, North Texas



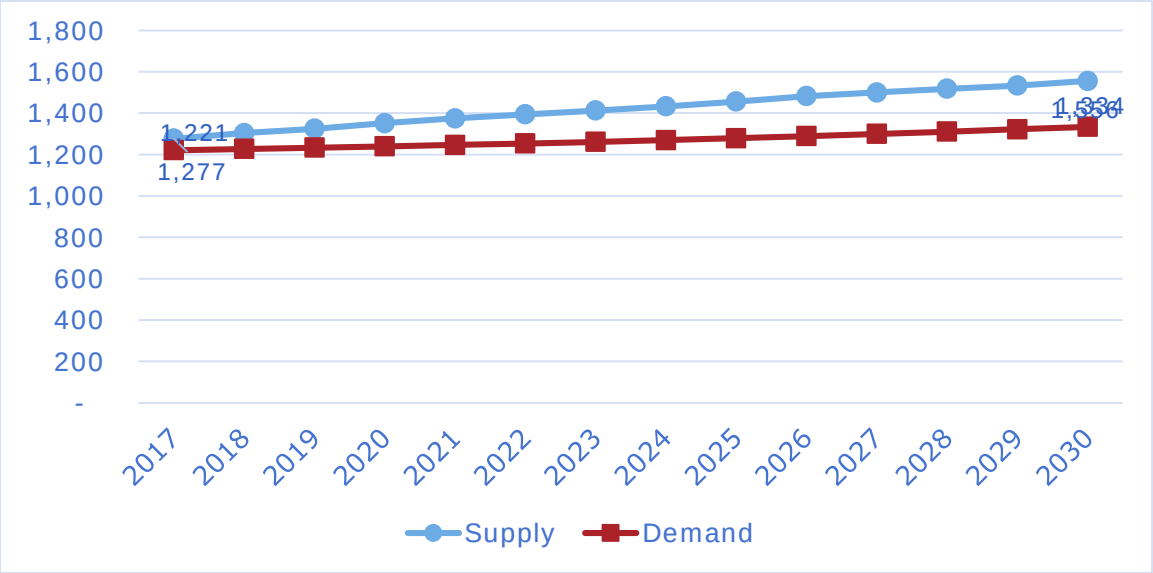
From 2017 to 2030, supply of pediatricians in North Texas will increase by 297 FTEs while demand will increase by 130. This indicates that by 2030, there will be a surplus of pediatricians in North Texas.

Figure 47 - Supply and Demand - Pediatrics, East Texas



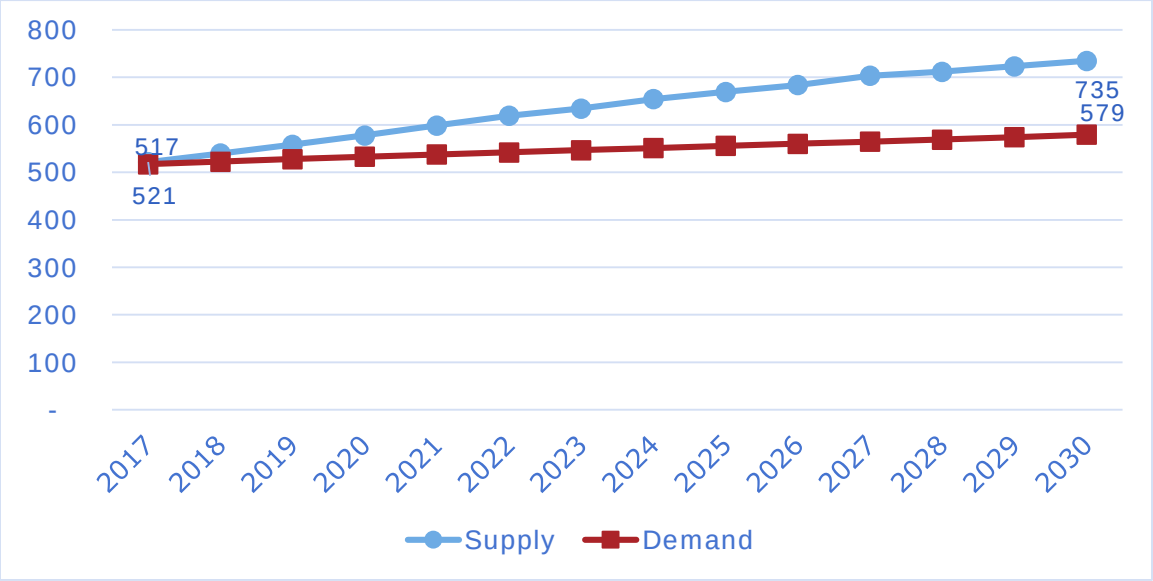
From 2017 to 2030, supply of pediatricians in East Texas will increase by 35 FTEs while demand will increase by 14. This indicates an ongoing shortage of pediatricians in East Texas.

Figure 48 - Supply and Demand - Pediatrics, Gulf Coast



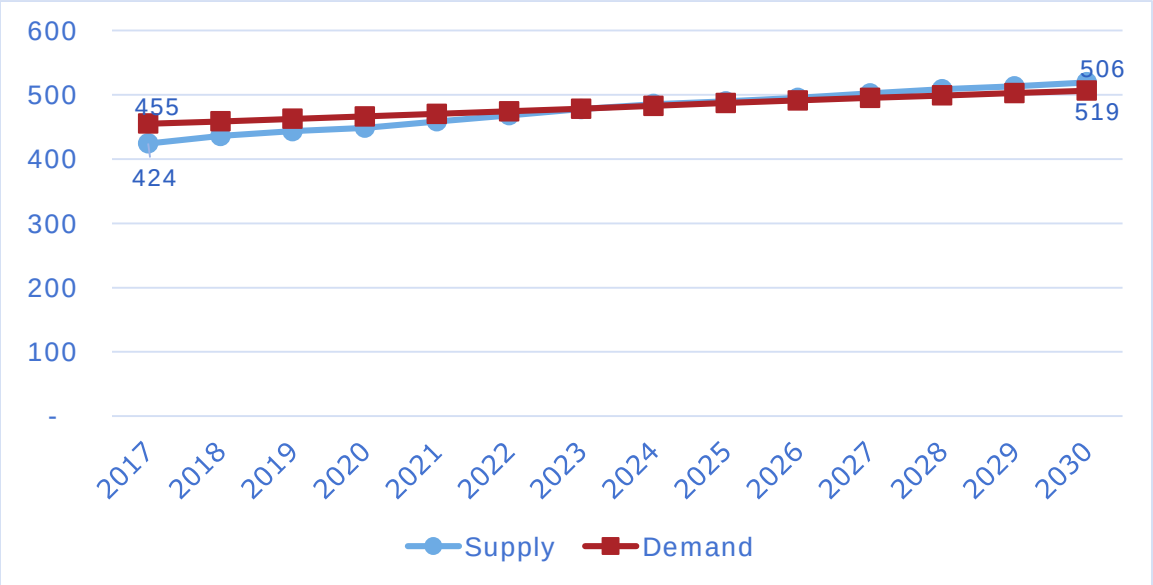
From 2017 to 2030, supply of pediatricians in the Gulf Coast will increase by 279 FTEs while demand will increase by 112. This indicates an ongoing surplus of pediatricians in the Gulf Coast.

Figure 49 - Supply and Demand - Pediatrics, Central Texas



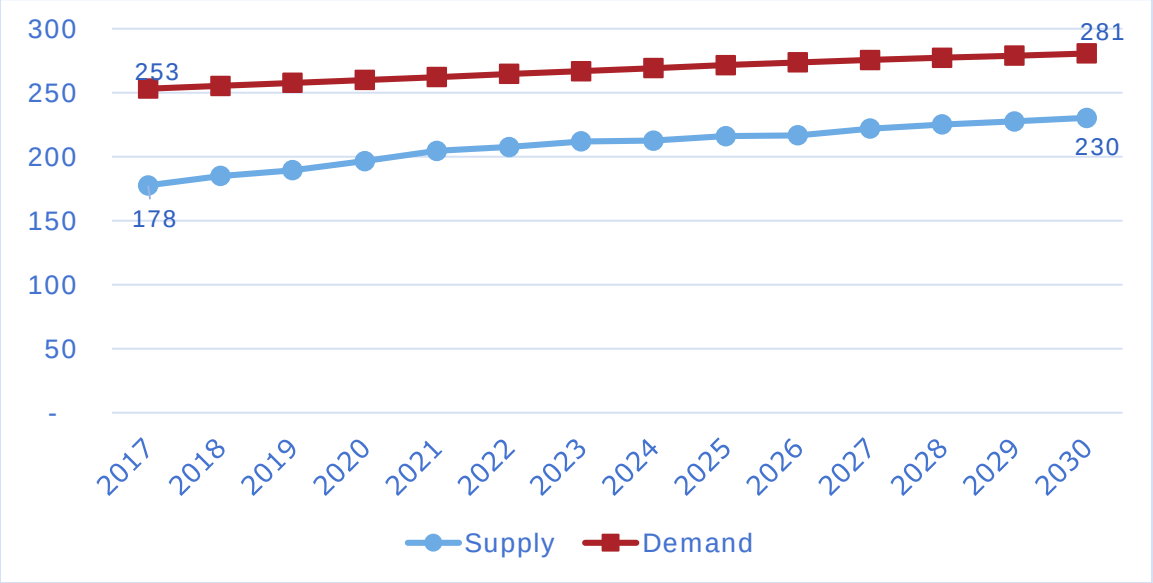
From 2017 to 2030, supply of pediatricians in Central Texas will increase by 213 FTEs while demand will increase by 62. This indicates an ongoing surplus of pediatricians in Central Texas.

Figure 50 - Supply and Demand - Pediatrics, South Texas



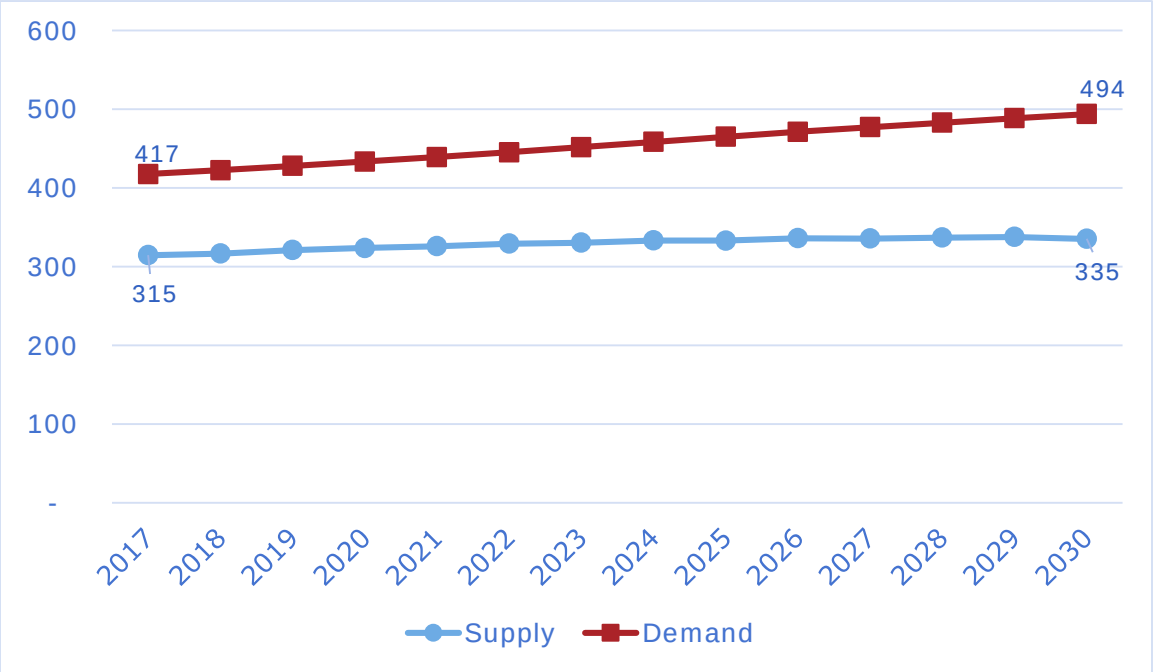
From 2017 to 2030, supply of pediatricians in South Texas will increase by 95 FTEs while demand will increase by 51. This indicates that by 2030, there will be a surplus of pediatricians in South Texas.

Figure 15 - Supply and Demand - Pediatrics, West Texas



From 2017 to 2030, supply of pediatricians in West Texas will increase by 53 FTEs while demand will increase by 28. This indicates an ongoing shortage of pediatricians in West Texas.

Figure 52 - Supply and Demand - Pediatrics, Rio Grande Valley

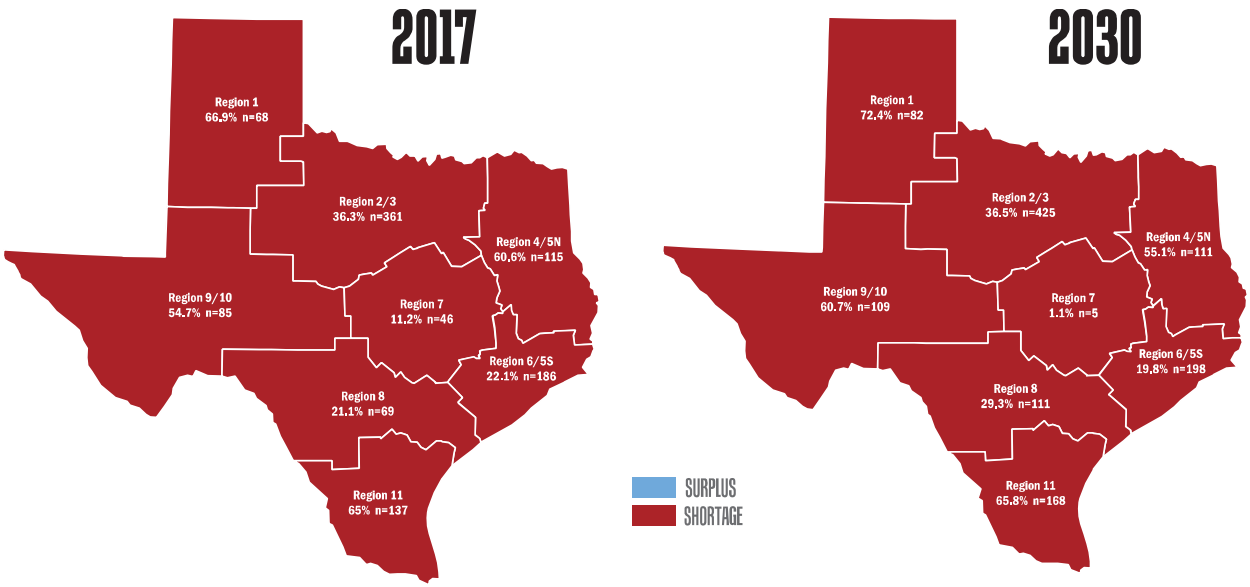


From 2017 to 2030, supply of pediatricians in the Rio Grande Valley will increase by 21 FTEs while demand will increase by 76. This indicates an ongoing and worsening shortage of pediatricians in the Rio Grande Valley.

Map of Psychiatrist Shortage by Region, 2017 and 2030

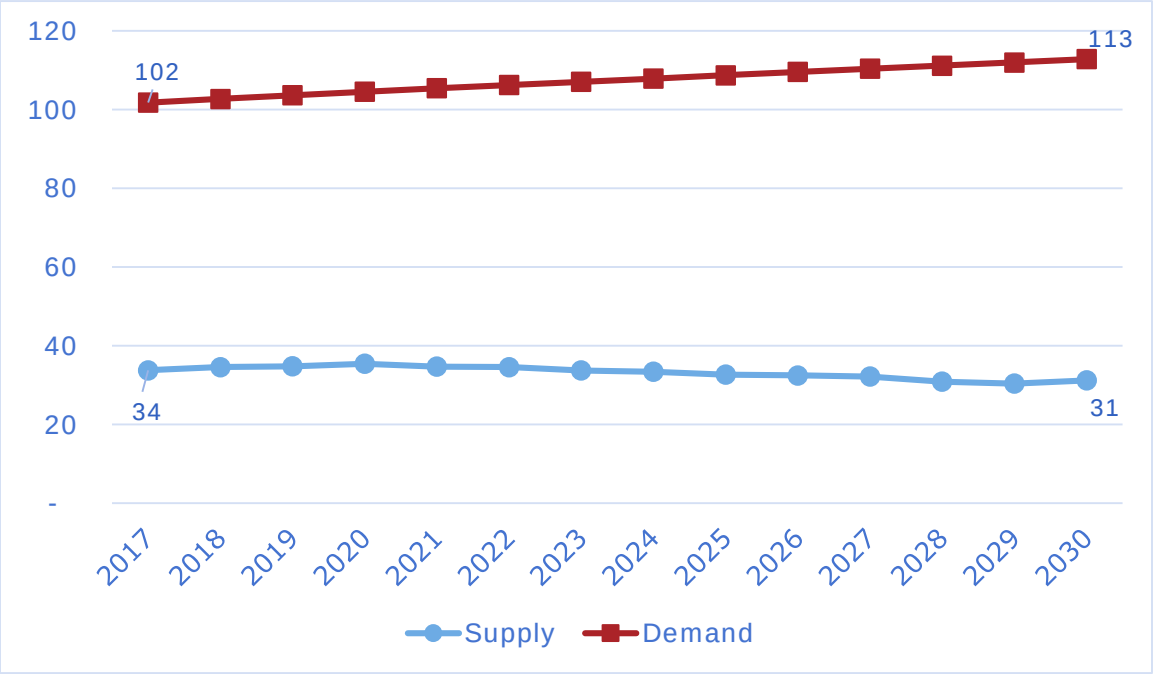
In 2017 and 2030, all regions are projected to have a shortage of psychiatrists, indicated in red in Figure 53.

Figure 53 - Percent of Psychiatrist Demand Exceeding Supply and FTE shortage/surplus (n)



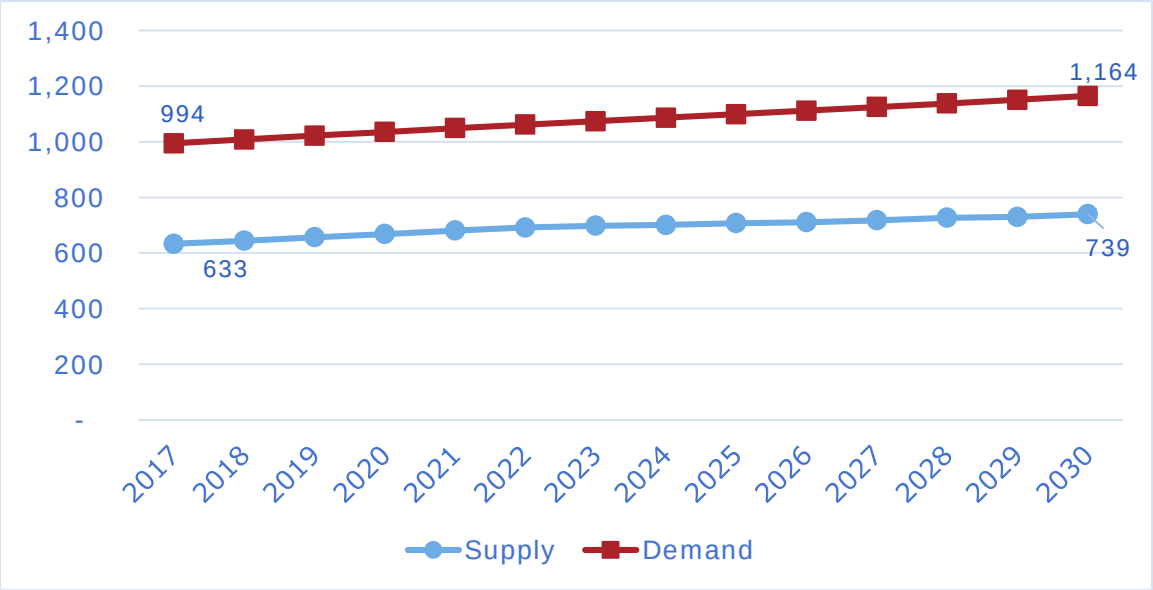
Supply and Demand of Psychiatry by Region, 2017-2030

Figure 54 - Supply and Demand - Psychiatry, Panhandle



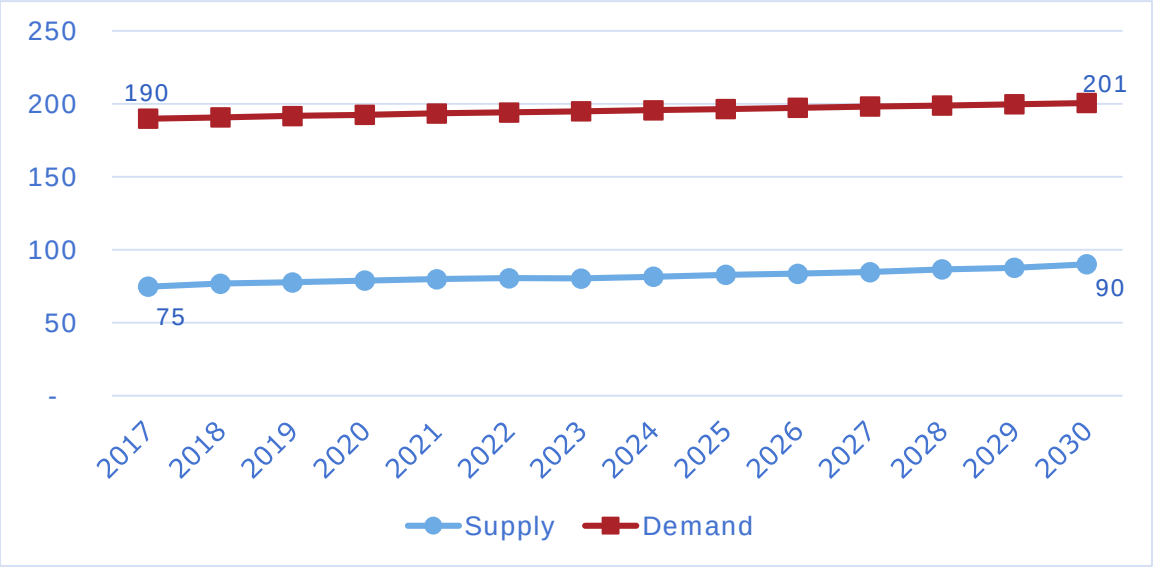
From 2017 to 2030, supply of psychiatrists in the Panhandle will decrease by 3 FTEs while demand will increase by 11. This indicates an ongoing and worsening shortage of psychiatrists in the Panhandle.

Figure 16 - Supply and Demand - Psychiatry, North Texas



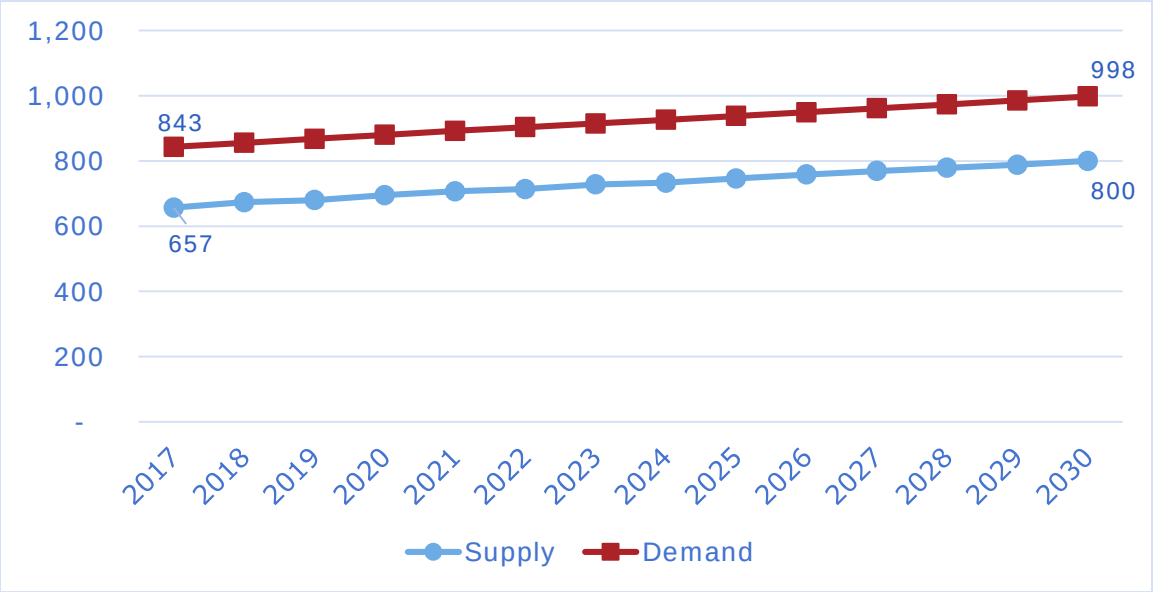
From 2017 to 2030, supply of psychiatrists in North Texas will increase by 106 FTEs while demand will increase by 171. This indicates an ongoing and worsening shortage of psychiatrists in North Texas.

Figure 56 - Supply and Demand - Psychiatry, East Texas



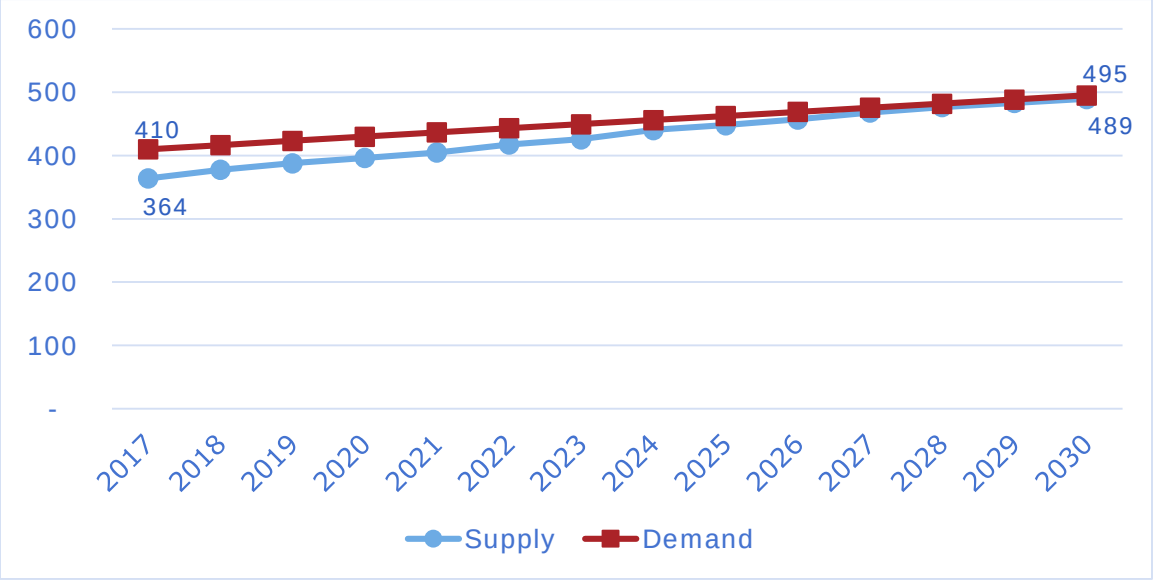
From 2017 to 2030, supply of psychiatrists in East Texas will increase by 15 FTEs while demand will increase by 11. This indicates an ongoing shortage of psychiatrists in East Texas.

Figure 57 - Supply and Demand - Psychiatry, Gulf Coast



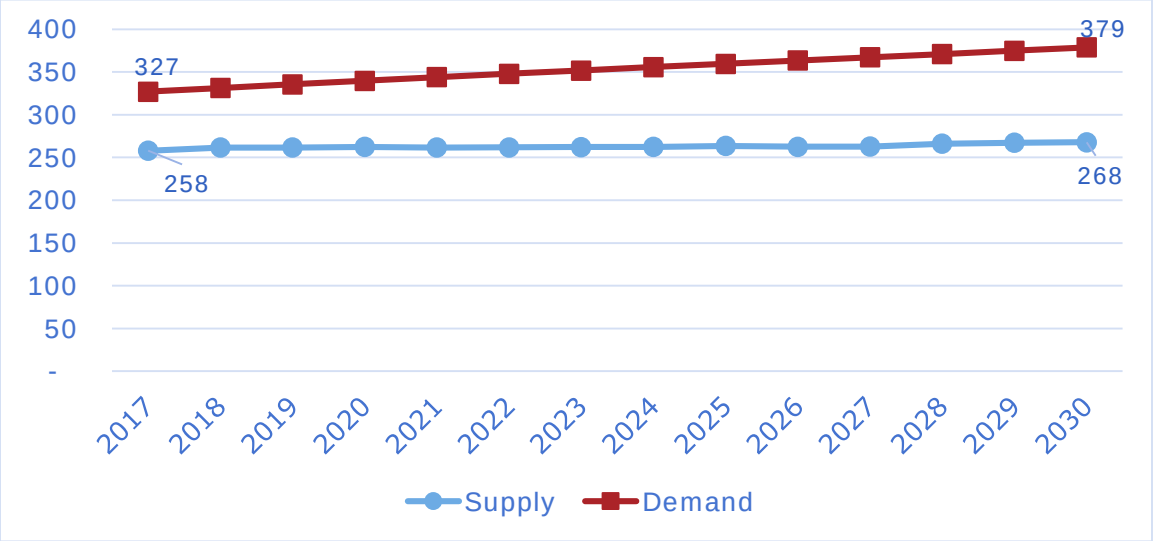
From 2017 to 2030, supply of psychiatrists in the Gulf Coast will increase by 143 FTEs while demand will increase by 155. This indicates an ongoing and worsening shortage of psychiatrists in the Gulf Coast.

Figure 58 - Supply and Demand - Psychiatry, Central Texas



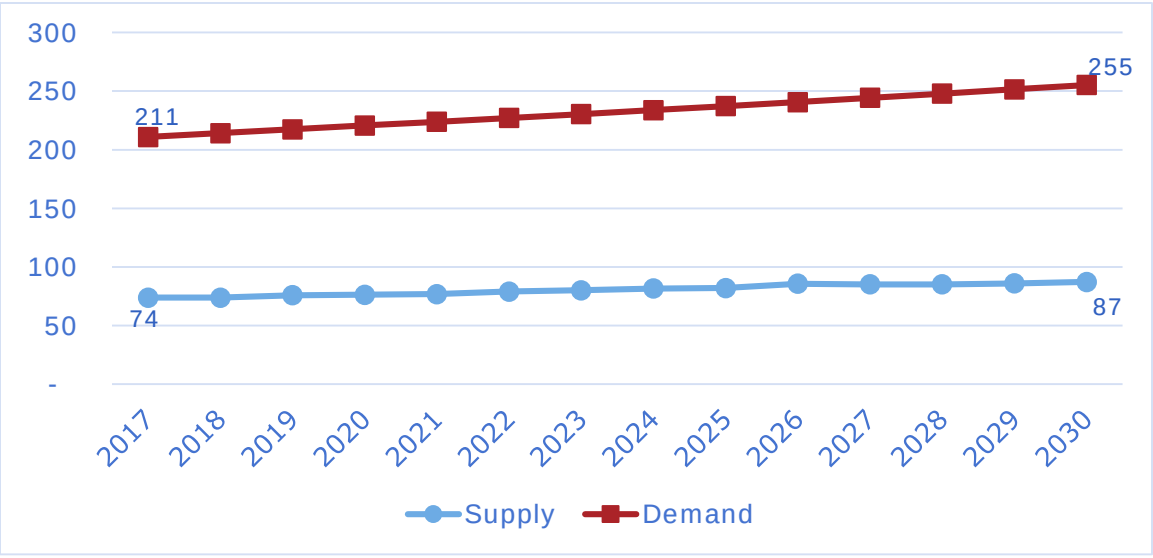
From 2017 to 2030, supply of psychiatrists in Central Texas will increase by 126 FTEs while demand will increase by 85. This indicates an ongoing shortage of psychiatrists in Central Texas.

Figure 59 - Supply and Demand - Psychiatry, South Texas



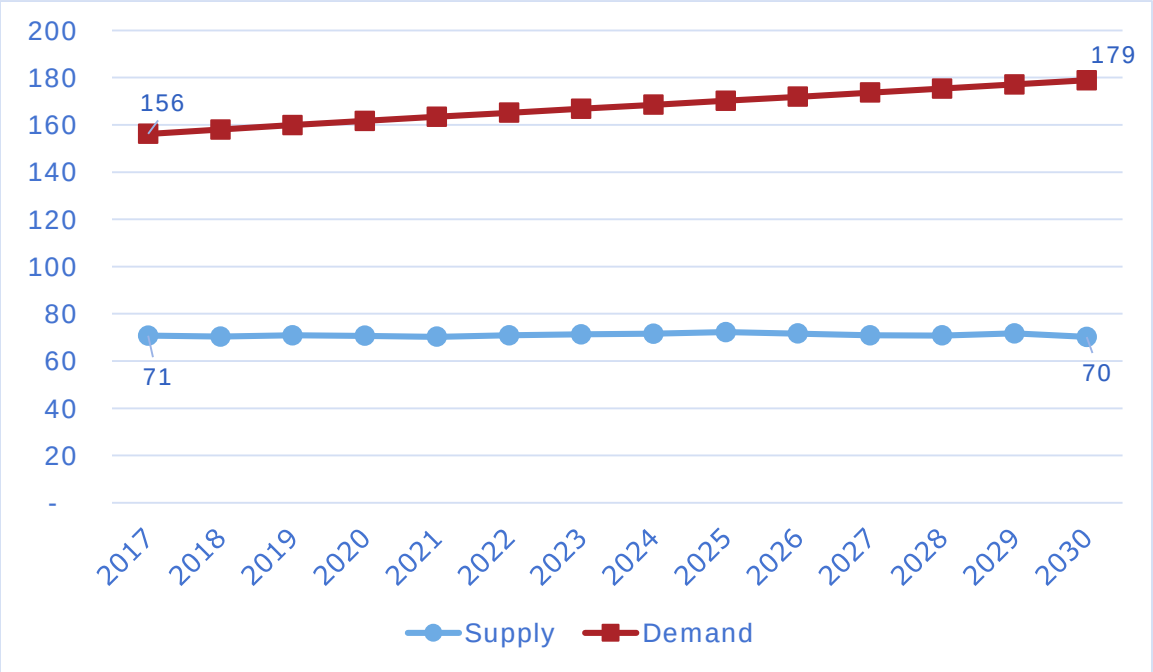
From 2017 to 2030, supply of psychiatrists in South Texas will increase by 10 FTEs while demand will increase by 52. This indicates an ongoing and worsening shortage of psychiatrists in South Texas.

Figure 60 - Supply and Demand - Psychiatry, Rio Grande Valley



From 2017 to 2030, supply of psychiatrists in the Rio Grande Valley will increase by 14 FTEs while demand will increase by 44. This indicates an ongoing and worsening shortage of psychiatrists in the Rio Grande Valley.

Figure 61 - Supply and Demand - Psychiatry, West Texas



From 2017 to 2030, supply of psychiatrists in West Texas will decrease by 1 FTE while demand will increase by 23 FTEs. This indicates an ongoing and worsening shortage of psychiatrists in West Texas.

Appendix C. Primary Care Physician and Psychiatrist Trends and Distribution

This body of this report describes an analysis of Texas' primary care physician and psychiatrist workforces and indicates current and future shortages in both. This appendix contextualizes these data by providing additional information pertaining to these workforces.

Results

From 2007 to 2017, Texas saw double-digit percentage growth in the number of physicians practicing in all primary care specialties and psychiatry. T

When the geographic distribution of physicians in considered, growth relative to population has lagged in multiple primary care specialties in the Panhandle (Public Health Region 1), East Texas (Public Health Region 4/5N), and the Rio Grande Valley (Public Health Region 11). Obstetrician/gynecology growth lagged behind that of the regional populations in all regions except the Gulf Coast (Public Health Region 6/5S). Growth in psychiatry was similarly slower than population growth in the Panhandle (Public Health Region 1), East Texas (Public Health Region 4/5N), South Texas (Public Health Region 8), and West Texas (Public Health Region 9/10).

With respect to demographics, females, blacks, and Hispanics are generally underrepresented in the physician workforce. Physicians who are neither white, black, or Hispanic are generally overrepresented in the workforce. Generally, large proportions of each specialty's workforce are within ten years of retirement age, or over 55 years old.

With respect to graduate medical education, the distributions of positions across the examined specialties in Texas were similar to those nationwide.

Data Sources

As noted above, this appendix is meant to provide some context to the body of the report.Data may be compared to the overall state or regional population, but the actual health needs of the population and its demographic profile are not considered.

Unless otherwise noted below, provider data in this appendix is based on physician licensure files originally obtained from the Texas Medical Board and geocoded and processed by DSHS' health professions resource center. The process of geocoding ensures greater accuracy by matching the street address provided by a physician with a variety of other geographic information, like county, census tract, and latitude and longitude. Population data is from the Texas Demographics Center's population projections. Population to physician ratios and maps indicating change relative to the Texas population use these data sources.

Comparisons of the Texas physician workforce with that of the nation, controlling for population size, were calculated by the Texas Medical Association using American Association of Medical Colleges and U.S. Bureau Census data.[27] Data for primary care overall were from one year earlier.[28]

Data comparing graduate medical education positions nationally and in Texas were derived from data of the American Association of Medical Colleges[29] and the Texas Higher Education Coordinating Board[30], respectively.

Finally, information about national in-state retention rates for physicians' are from the American Association of Medical Colleges' Table C4.[31]

Where data did not exist or was not directly comparable to the specialties described below, information was omitted.

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[27] Texas Medical Association. *TMA comparison of ratios for Texas population-per-physician with US ratios for 41 medical specialties, 2017.*

[28] Texas Medical Association. *TMA comparison of ratios for Texas population-per-physician with US ratios for selected specialties and specialty groupings, 2016.*

[29] LeMaster, E, Pigg, T, Weiler, W, Wisniewski, S. *AAMC data book: medical schools and teaching hospitals by the numbers*. Washington, D.C.: American Association of Medical Colleges; 2016.

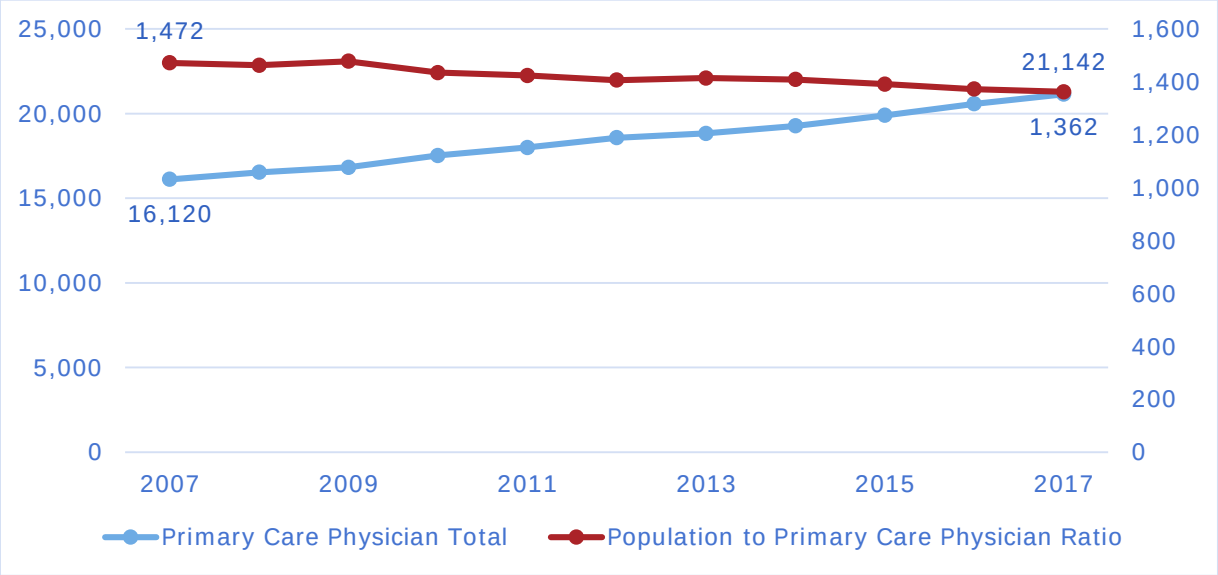
[30] Texas Higher Education Coordinating Board. *Texas health related institutions – graduate medical education data*. September 1, 2017.

[31] American Association of Medical Colleges. *Table C4. Physician retention in state of residency training, by last completed GME specialty: residents who completed training, 2007-2016*. https://www.aamc.org/data/484728/report-on-residents-2017-c4table.html. Accessed June 12, 2018.

Primary Care

In 2017, there were 21,142 actively licensed and practicing primary care physicians in Texas, a 31.2 percent increase from 2007. Over this same period, the population to primary care physician ratio has decreased by 7.5 percent, indicating a greater number of primary care physicians relative to the Texas population.

Figure 62 - Growth Trends in Primary Care

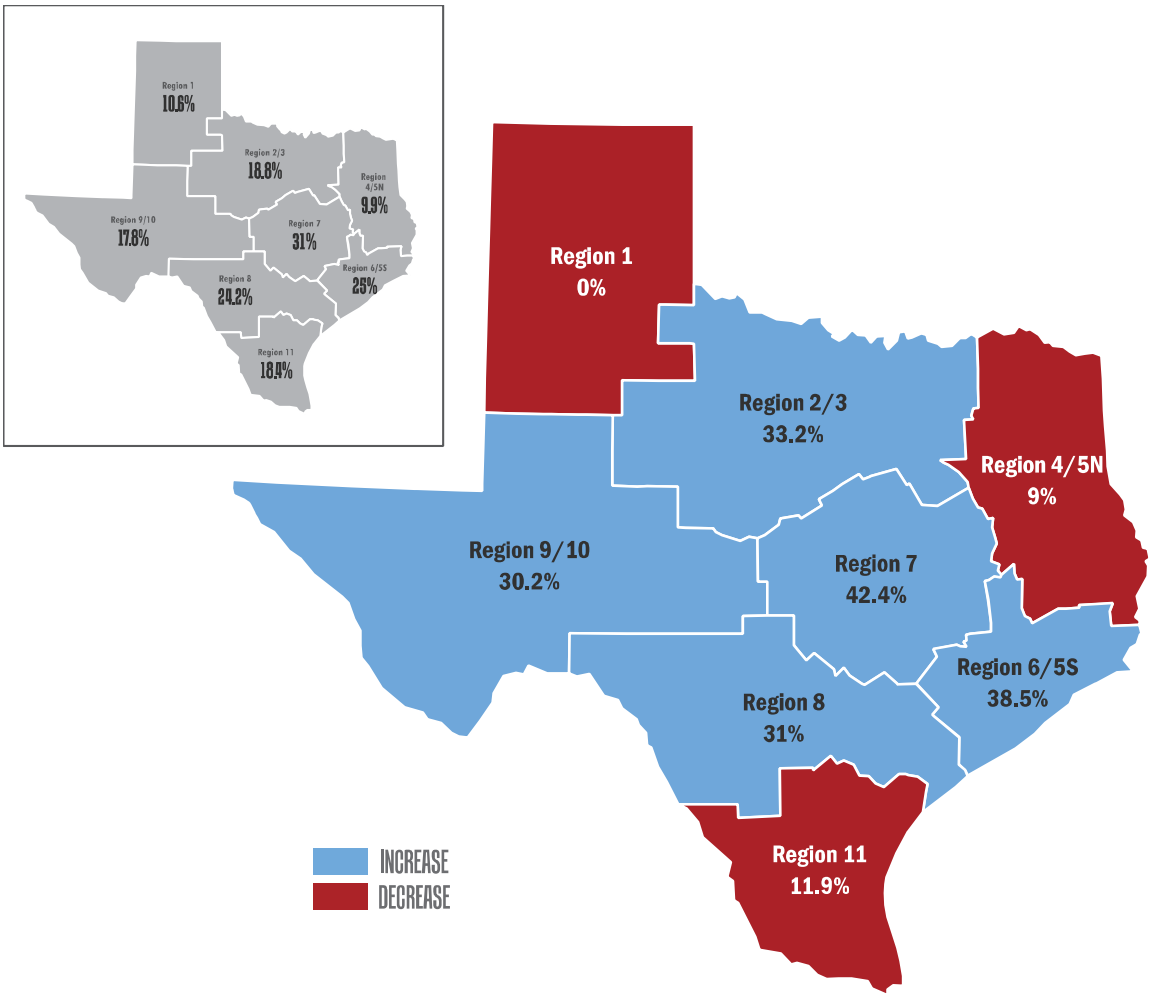


Comparing Texas' primary care workforce with that of the nation, Texas has just 80.0 percent of the primary care physicians as the nation at-large, controlling for population size.

Regional Distribution

Growth in the number of primary care physicians outpaced population growth in most regions, indicated in blue in Figure 63. The number of primary care physicians increased slower than the increase in population in the Panhandle (Public Health Region 1), East Texas (Public Health Region 4/5N), and the Rio Grande Valley (Public Health Region 11). These regions are indicated in red.

Figure 63 - Percent Change in Primary Care Physician Workforce by Region, 2007-2017



Demographics

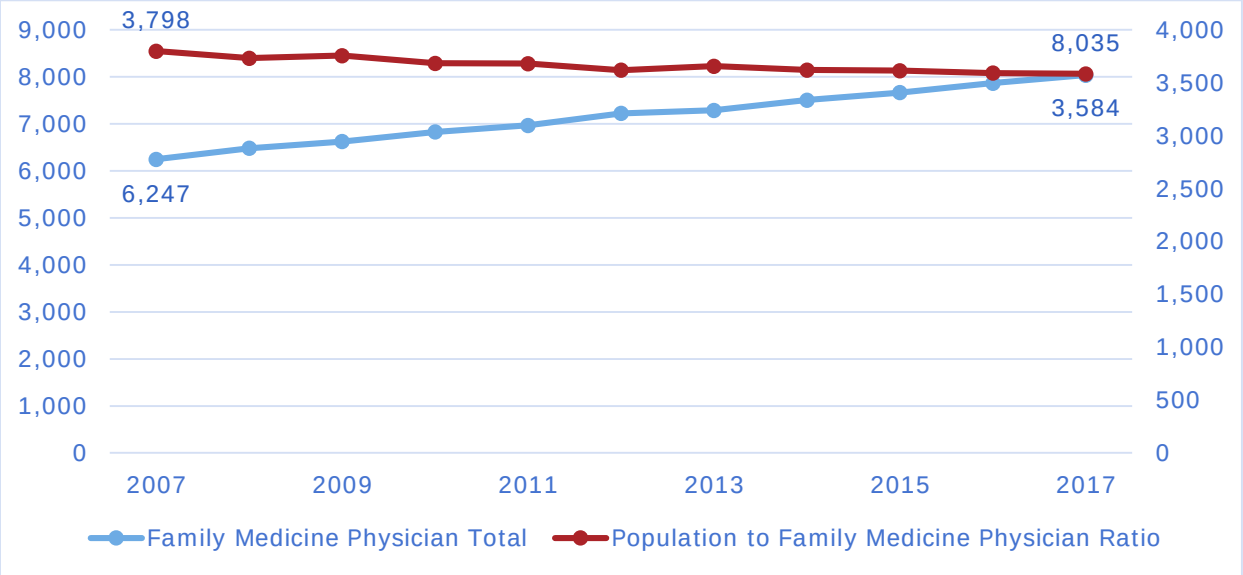
In 2007, 27.9 percent of Texas primary care physicians were within ten years of retirement age (older than 55 years of age), while by 2017 this proportion had increased to 34.1 percent. Over the same period, the proportion of primary care physicians 40 years old or younger decreased from 27.5 percent to 24.8 percent.

With respect to sex, 44.9 percent of primary care physicians were female in 2017. With respect to race/ethnicity, 53.9 percent of primary care physicians were white, 9.7 percent Hispanic, and 7.6 percent black. The remaining 28.8 percent identified as some other race/ethnicity.

Family Medicine

In 2017, there were 21,142 actively licensed and practicing family medicine physicians in Texas, a 28.6 percent increase from 2007. Over this same period, the population to family medicine physician ratio has decreased by 5.6 percent, indicating a greater number of family medicine physicians relative to the Texas population.

Figure 64 - Growth Trends in Family Medicine

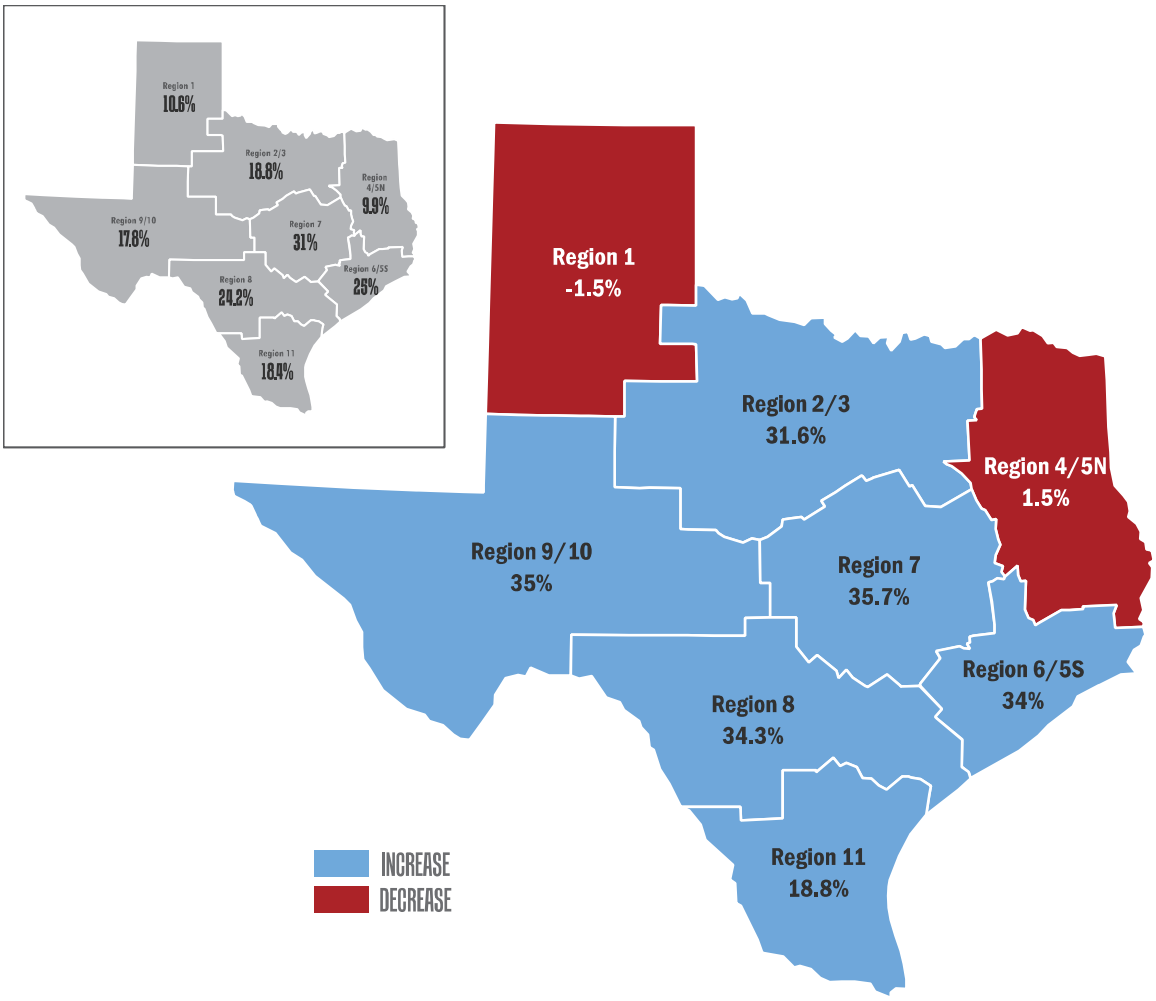


Comparing Texas' family medicine workforce with that of the nation, Texas has just 86.4 percent of the family medicine physicians as the nation at-large, controlling for population size.

Regional Distribution

Growth in the number of family medicine physicians outpaced population growth in most regions, indicated by blue in Figure 65. The number of family medicine physicians increased slower than the increase in population in East Texas (Public Health Region 4/5N), while the number of family medicine physicians decreased in the Panhandle (Public Health Region 1) from 272 in 2007 to 268 in 2017. These regions are indicated in red.

Figure 65 - Percent Change in Family Medicine Physician Workforce by Region, 2007-2017



Demographics

In 2007, 32.0 percent of Texas family medicine physicians were within ten years of retirement age (older than 55 years of age), while by 2017 this proportion had increased to 38.5 percent. Over the same period, the proportion of family medicine physicians 40 years old or younger decreased from 25.1 percent to 22.0 percent.

With respect to sex, 37.9 percent of family medicine physicians were female in 2017. With respect to race/ethnicity, 59.3 percent of family medicine physicians were white, 10.5 percent Hispanic, and 6.4 percent black. The remaining 23.8 percent identified as some other race/ethnicity.

Medical Education

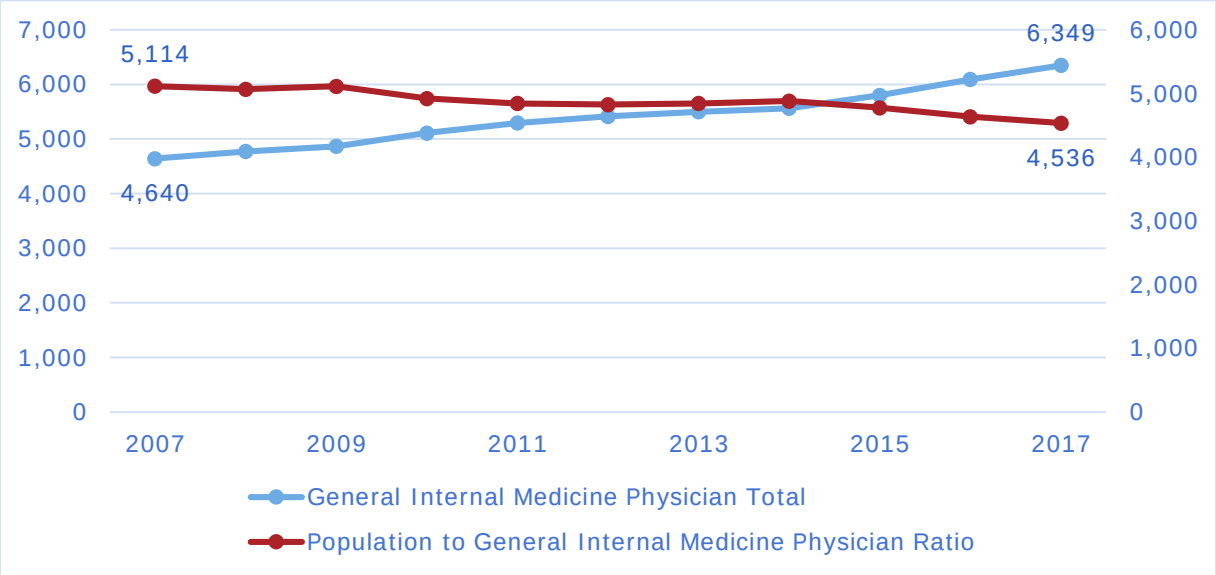
Nationally, 64.3 percent of family medicine physicians who completed their residency training between 2007 and 2016 remained in the state of training.

In 2014-2015, 8.5 percent of residents in the US were specializing in family medicine. In 2017, 774 of 8,084 (9.6 percent) residents in Texas were specializing in family medicine.

General Internal Medicine

In 2017, there were 6,349 actively licensed and practicing internal medicine physicians in Texas, a 36.8 percent increase from 2007. Over this same period, the population to internal medicine physician ratio has decreased by 11.3 percent, indicating a greater number of internal medicine physicians relative to the Texas population.

Figure 66 - Growth Trends in General Internal Medicine

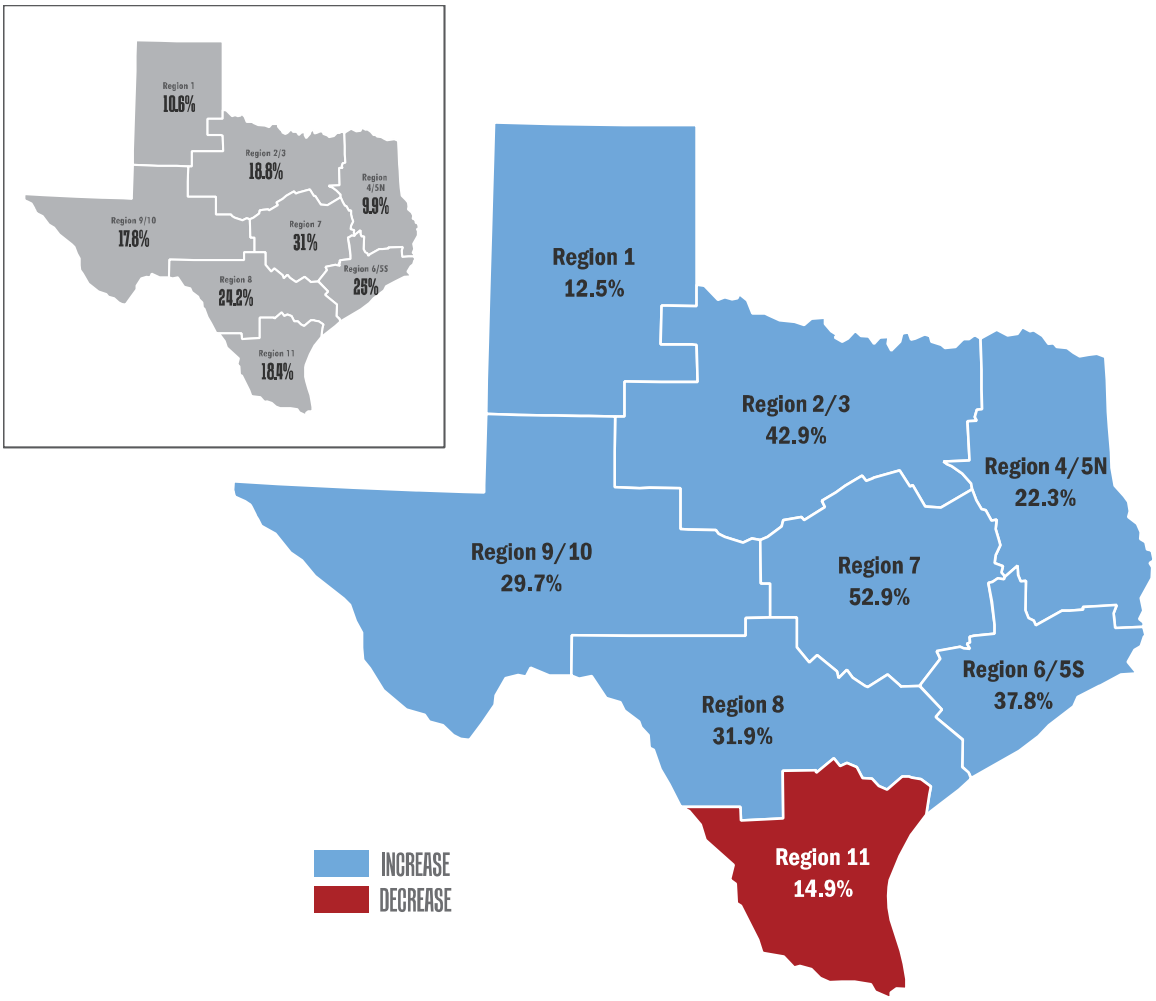


Comparing Texas' internal medicine workforce with that of the nation, Texas has just 68.1 percent of the internal medicine physicians as the nation at-large, controlling for population size.

Regional Distribution

Growth in the number of internal medicine physicians outpaced population growth in most regions, indicated in blue in Figure 67. The number of internal medicine physicians increased slower than the increase in population in the Rio Grande Valley (Public Health Region 11), indicated in red.

Figure 67 - Percent Change in the Internal Medicine Physician Workforce by Region, 2007-2017



Demographics

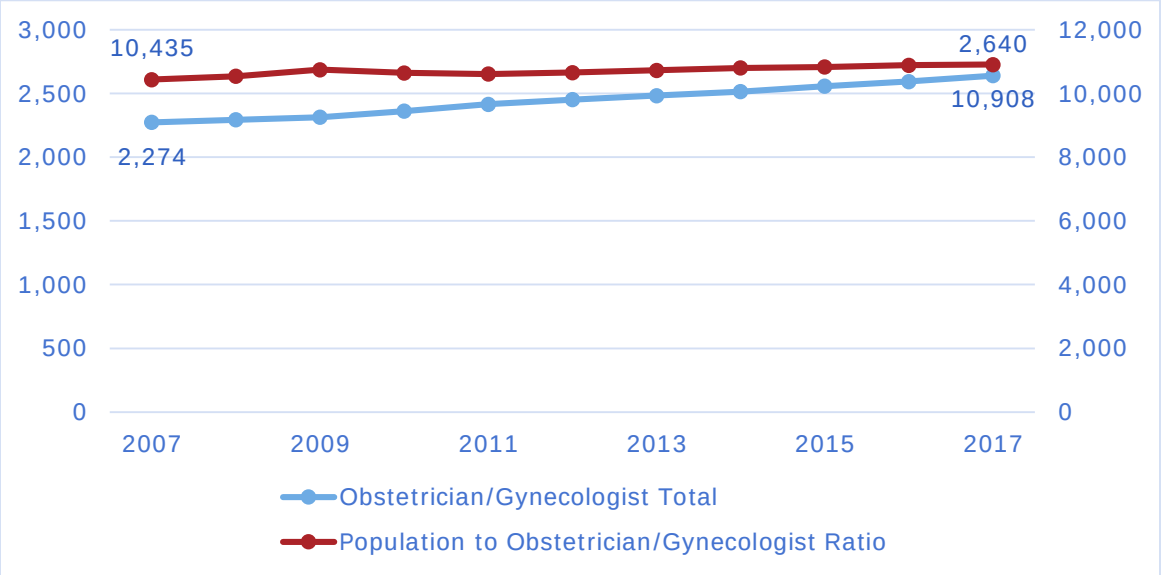
In 2007, 22.4 percent of Texas internal medicine physicians were within ten years of retirement age (older than 55 years of age), while by 2017 this proportion had increased to 30.0 percent. Over the same period, the proportion of internal medicine physicians 40 years old or younger decreased from 29.2 percent to 27.0 percent.

With respect to sex, 37.3 percent of internal medicine physicians were female in 2017. With respect to race/ethnicity, 41.6 percent of family medicine physicians were white, 8.6 percent Hispanic, and 7.7 percent black. The remaining 42.1 percent identified as some other race/ethnicity.

Obstetrics/Gynecology

In 2017, there were 2,640 actively licensed and practicing obstetricians/gynecologists in Texas, a 16.1 percent increase from 2007. Over this same period, the population to obstetrician/gynecologist ratio has increased by 4.5 percent, indicating fewer obstetricians/gynecologists relative to the Texas population.

Figure 68 - Growth Trends in Obstetrics/Gynecology

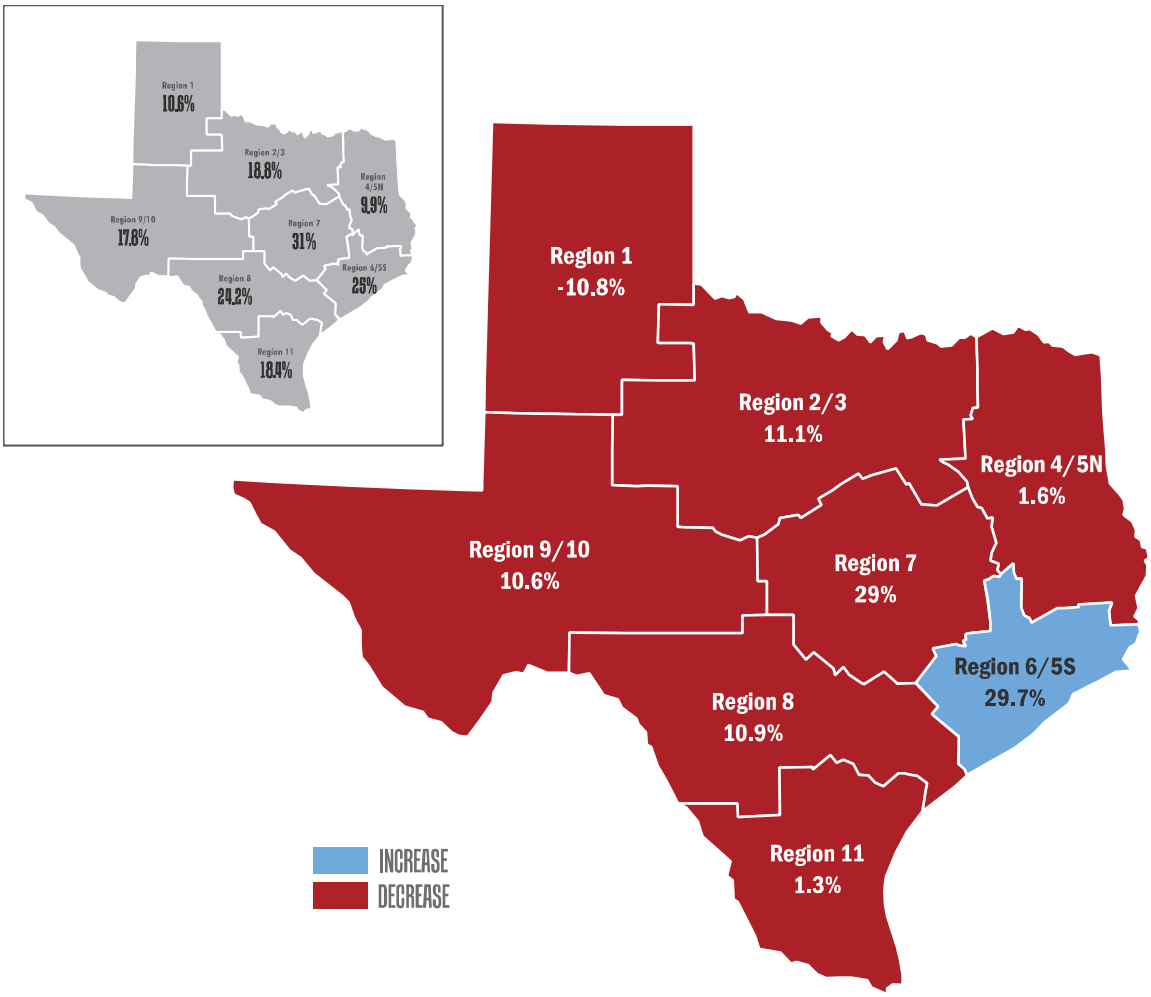


Comparing Texas' obstetrics and gynecology workforce with that of the nation, Texas has just 90.6 percent of the obstetricians/gynecologists as the nation at-large, controlling for population size.

Regional Distribution

Growth in the number of obstetricians/gynecologists failed to keep pace with population growth statewide and all regions of the state except the Gulf Coast (Public Health Region 6/5S). In the Panhandle (Public Health Region 1), there was a net decrease of obstetricians/gynecologists from 74 in 2007 to 66 in 2017. Regions where physician growth was below that of the population are indicated in red in Figure 69, while the Gulf Coast in indicated in blue.

Figure 69 - Percent Change in the Obstetric/Gynecologic Workforce by Region, 2007-2017



Demographics

In 2007, 32.5 percent of Texas obstetricians/gynecologists were within ten years of retirement age (older than 55 years of age), while by 2017 this proportion had increased to 37.3 percent. Over the same period, the proportion of obstetricians/gynecologists 40 years old or younger decreased from 24.6 percent to 21.7 percent.

With respect to sex, 54.5 percent of obstetricians/gynecologists were female in 2017. With respect to race/ethnicity, 68.1 percent of obstetricians/gynecologists were white, 8.0 percent Hispanic, and 10.5 percent black. The remaining 13.4 percent identified as some other race/ethnicity.

Medical Education

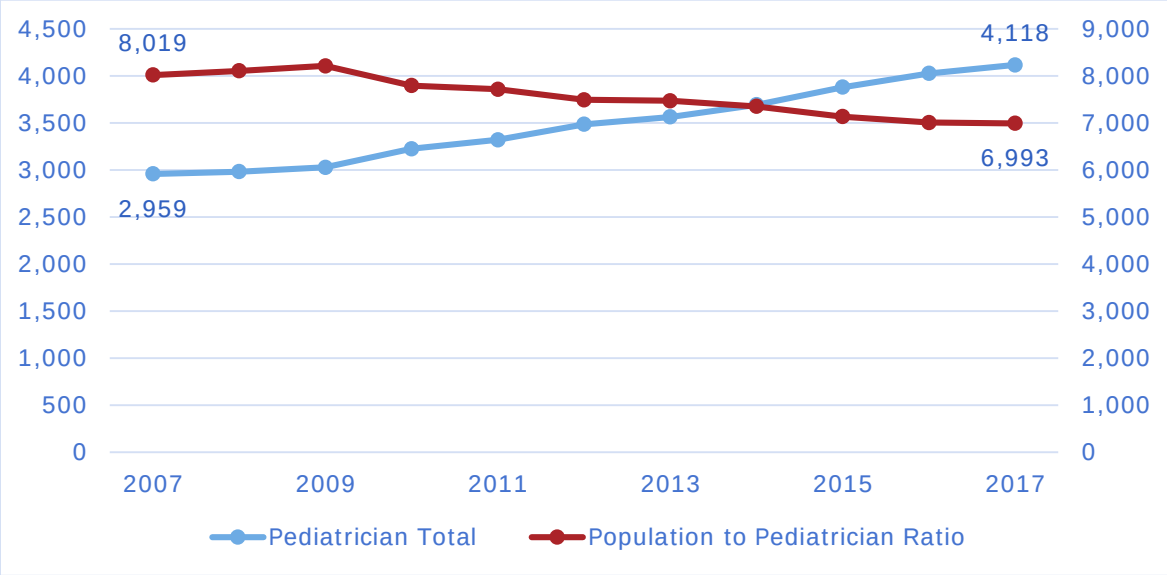
Nationally, 52.8 percent of obstetricians/gynecologists who completed their residency training between 2007 and 2016 remained in the state of training.

In 2014-2015, 4.2 percent of residents in the US were specializing in obstetrics/gynecology. In 2017, 382 of 8,084 (4.7 percent) residents in Texas were specializing in obstetrics/gynecology.

Pediatrics

In 2017, there were 4,118 actively licensed and practicing pediatricians in Texas, a 39.2 percent increase from 2007. Over this same period, the population to pediatrician ratio has decreased by 12.8 percent, indicating more pediatricians relative to the Texas population.

Figure 70 - Growth Trends in Pediatrics



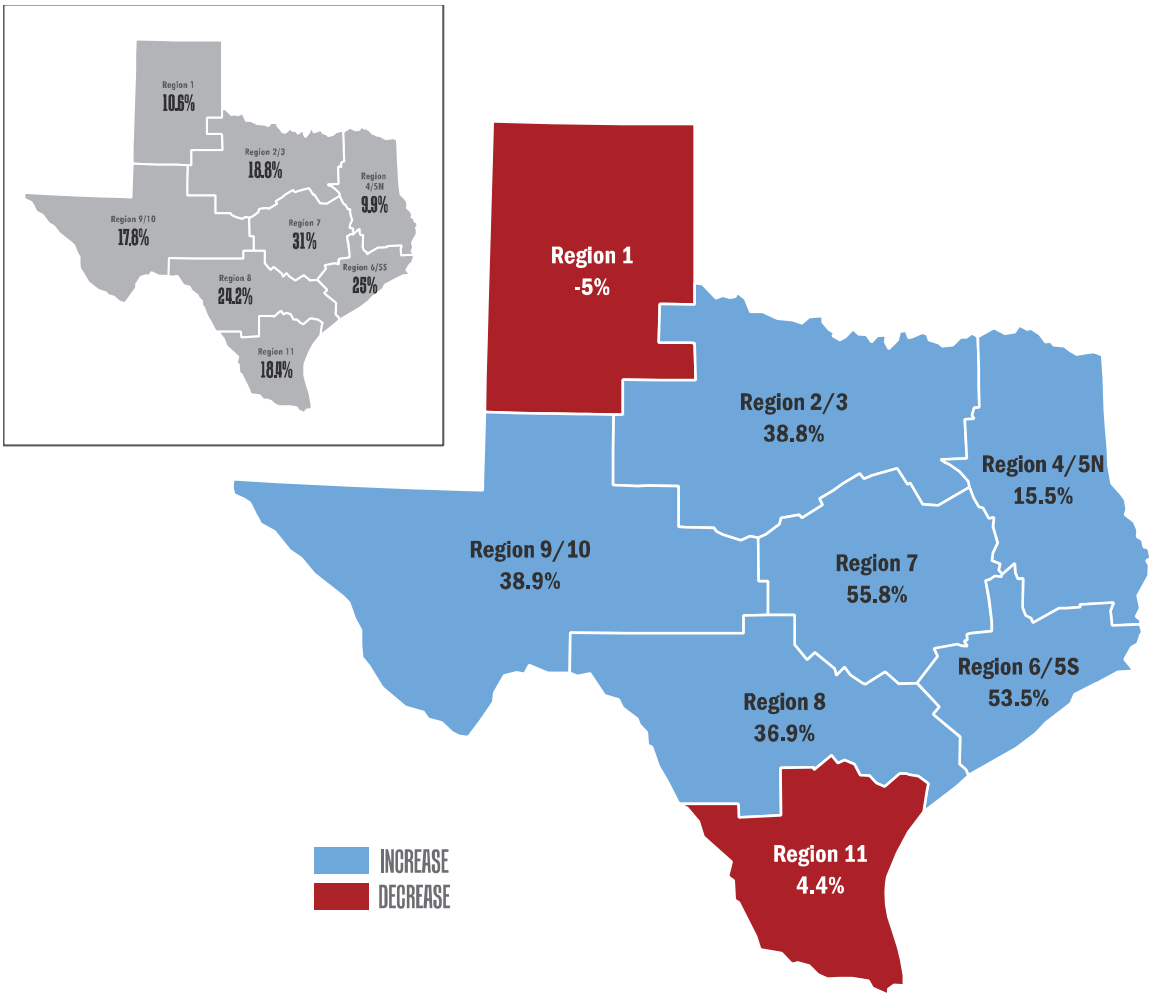
Comparing Texas' pediatrician workforce with that of the nation, Texas has just 75.9 percent of the pediatricians as the nation at-large, controlling for population size.[32]

Regional Distribution

Growth in the number of pediatricians outpaced population growth statewide and in most regions of the state, indicated by blue in Figure 71. In the Rio Grande Valley (Public Health Region 11), pediatrician growth was slower than population growth, while the Panhandle (Public Health Region 1) experienced a net decrease of pediatricians from 80 in 2007 to 76 in 2017. These two regions are indicated in red.

[32] Here, the Texas Medical Association used the population less 22 years of age in calculating its ratios.

Figure 71 - Percent Change in the Pediatrician Workforce by Region, 2007-2017



Demographics

In 2007, 24.3 percent of Texas pediatricians were within ten years of retirement age (older than 55 years of age), while by 2017 this proportion had increased to 29.8 percent. Over the same period, the proportion of pediatricians 40 years old or younger decreased from 32.0 percent to 28.8 percent.

With respect to sex, 64.0 percent of pediatricians were female in 2017. With respect to race/ethnicity, 53.0 percent of pediatricians were white, 10.9 percent Hispanic, and 7.9 percent black. The remaining 28.1 percent identified as some other race/ethnicity.

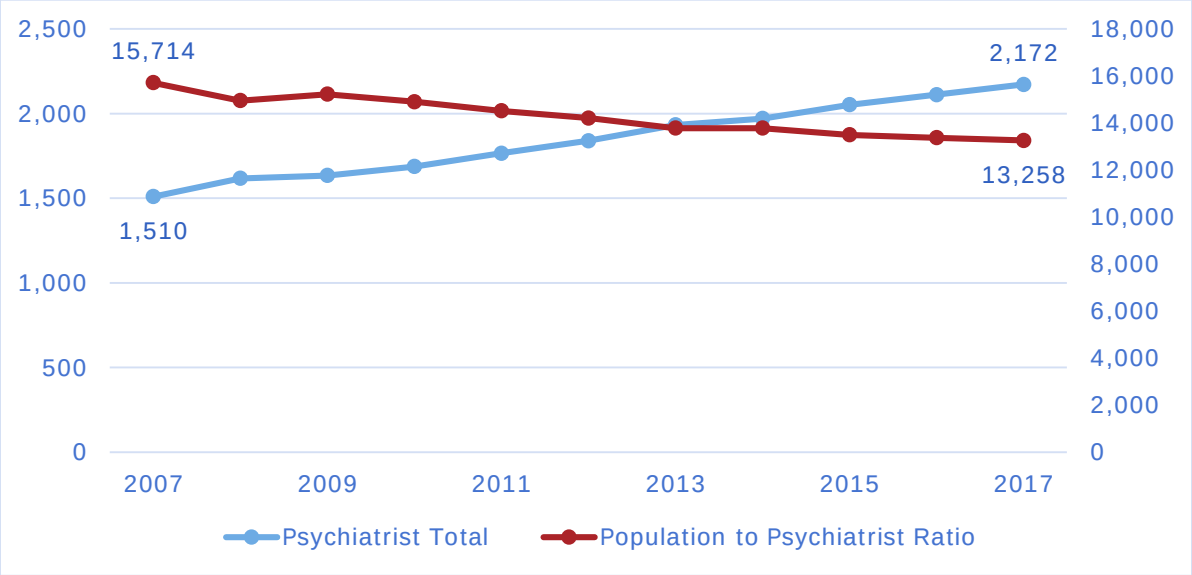
Medical Education

In 2017, 655 of 8,084 (8.1 percent) residents in Texas were specializing in pediatrics, including adolescent medicine but excluding pediatric subspecialties.

Psychiatrists

In 2017, there were 2,172 actively licensed and practicing psychiatrists in Texas, a 43.8 percent increase from 2007. Over this same period, the population to psychiatrist ratio has decreased by 115.6 percent, indicating more psychiatrists relative to the Texas population.

Figure 72 - Growth Trends in Psychiatry

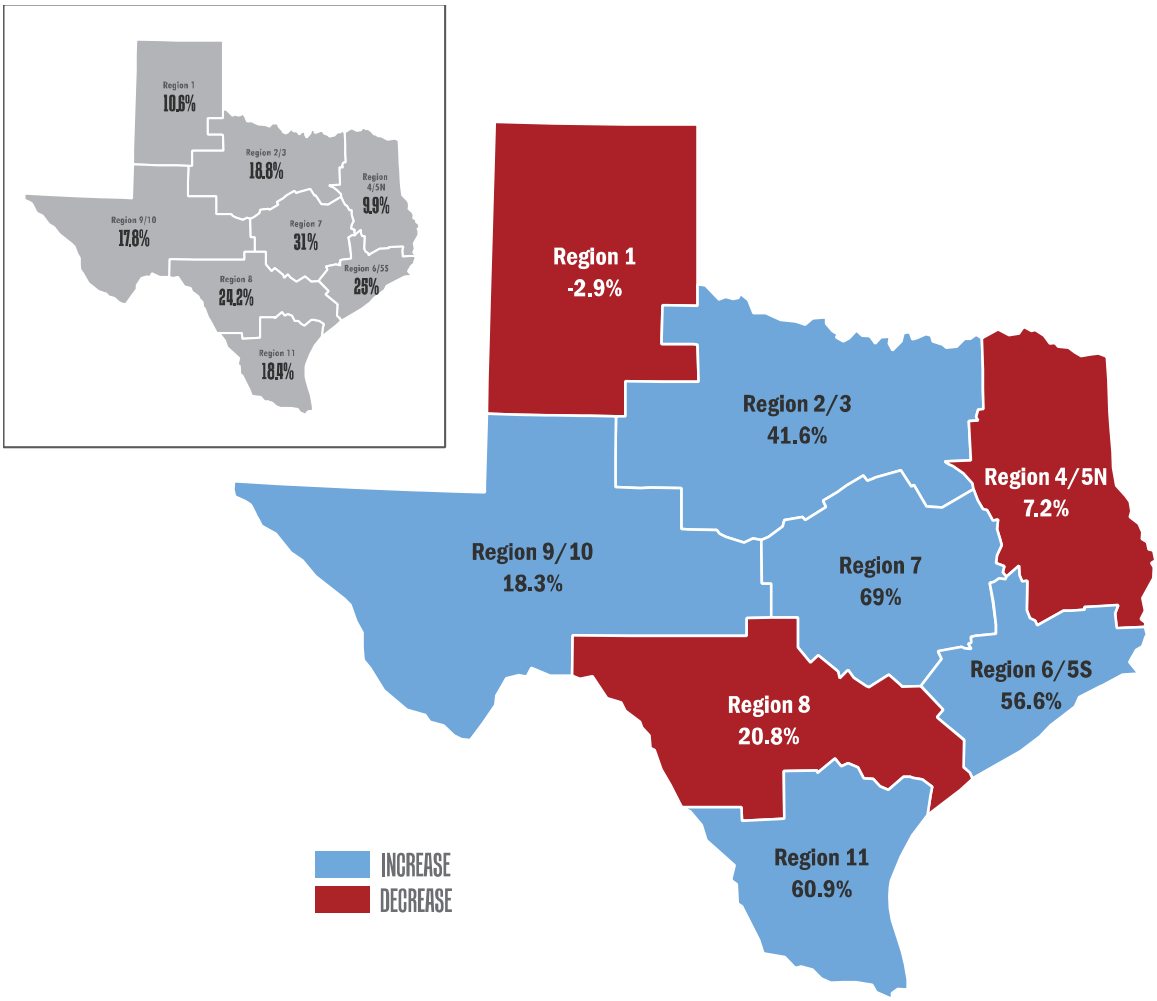


Comparing Texas' psychiatric workforce with that of the nation, Texas has just 60.5 percent of the psychiatrists as the nation at-large, controlling for population size.

Regional Distribution

Growth in the number of psychiatrists outpaced population growth statewide and in half of the state's regions, indicated by blue in Figure 73. In East Texas (Public Health Region 4/5N), South Texas (Public Health Region 8), and West Texas (Public Health Region 9/10), psychiatrist growth was slower than population growth. In the Panhandle (Public Health Region 1), there was a net decrease of one psychiatrist from 34 in 2007 to 33 in 2017. These regions are indicated in red.

Figure 73 - Percent Change in the Psychiatrist Workforce by Region, 2007-2017



Demographics

In 2007, 44.2 percent of Texas psychiatrists were within ten years of retirement age (older than 55 years of age), while by 2017 this proportion had increased to 47.2 percent. Over the same period, the proportion of psychiatrists 40 years old or younger increased from 11.9 percent to 18.6 percent.

With respect to sex, 43.7 percent of psychiatrists were female in 2017. With respect to race/ethnicity, 59.5 percent of psychiatrists were white, 9.2 percent Hispanic, and 6.5 percent black. The remaining 24.9 percent identified as some other race/ethnicity.

Medical Education

Nationally, 65.0 percent of psychiatrists who completed their residency training between 2007 and 2016 remained in the state of training.

In 2014-2015, 4.2 percent of residents in the US were specializing in psychiatry. In 2017, 441 of 8,084 (5.4 percent) residents in Texas were specializing in psychiatry, which includes child and adolescent psychiatry, addiction psychiatry, psychosomatic medicine, and geriatric psychiatry.