

UNIVERSITY OF HAWAI‘I SYSTEM ANNUAL REPORT



REPORT TO THE 2019 LEGISLATURE

Annual Report on Findings from the
Hawai'i Physician Workforce Assessment Project

Act 18, SSLH 2009 (Section 5)
Act 186, SLH 2012
Act 40, SLH 2017

December 2018

Hawai'i Physician Workforce Report

In accordance with Act 18, SLH, 2009; Act 186, SLH, 2012; and Act 40, SLH,
2017; A report to the 2019 Hawai'i State Legislature:
Findings from the Hawai'i Physician Workforce Assessment Project

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2018 Hawai'i Physician Workforce Assessment Executive Summary

There are currently 3,492 active physicians providing patient care to patients in Hawai'i for a total of 2,927 Full Time Equivalents (FTEs) of direct care to patients. The national demand model applied to the State of Hawai'i indicates a need for 3,440 total FTEs or a shortage of 513. However, when island geography and unmet specialty specific needs by county are examined, the estimated unmet need for physicians (accounting for geographic distance and air travel) increases to 797 FTEs (up from 769 last year). Primary care is the largest shortage statewide and on all islands, with Infectious Disease, Pathology, Colorectal Surgery, Neurosurgery and Pulmonary being the largest subspecialty shortages statewide by percent of estimated unmet need.

To help meet these needs, the Hawai'i Physician Workforce Special Fund has supported the following ongoing activities:

- Maintaining the workforce database and providing de-identified data as requested throughout the state;
- Providing presentations on workforce statistics (over 8 in 2018);
- Providing continuing education including the Hawai'i Health Workforce Summit (569 participants in 2018) and Project ECHO (over 1,700 people-hours of case-based education);
- Providing Educational Loan Repayment: the Hawai'i State Loan Repayment Program currently supports 23 loan repayment recipients, and has supported 42 during the six years of existence. As a result of State Legislative funding becoming available in 2017, we expect to award an additional 6 loan repayment contracts shortly and at least an additional 6 in the coming year;
- Posting all job openings online through collaboration with Hawai'i Physician Recruiters Group;
- Supporting the health career pipeline by promoting health careers to students of all ages across Hawai'i through publication of the 140-page Health Career Navigator resource (3,500 printed and distributed across the State), 94-page interactive

Student Companion booklet (1,900 printed and distributed across the State) and the Pre-Health Career Corps mentoring program for 1,300 youth to date;

- Collaborating with the Hawai'i Health Workforce Advisory Board to increase loan repayment opportunities and expand conversation about health workforce needs and methods for monitoring;
- Assisting the Department of Health with increasing Health Professional Shortage Area designations in Hawai'i;
- Coordinating neighbor island clinical teaching, travel, lodging, community activities and recruitment of health careers.

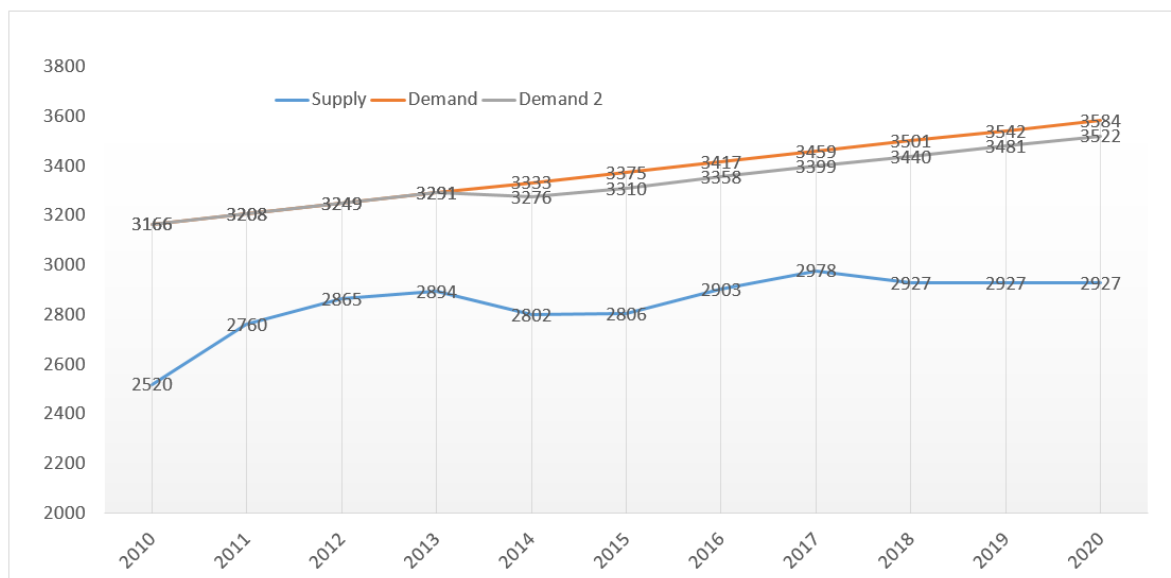
In addition, four new activities have been undertaken:

- Bridge to Practice Mentoring Program in collaboration with Hawai'i Medical Association and Queen's Hospital.
- The Hawai'i Health Career Academy, a college and career success course for eighth grade through undergraduate students.
- Local Area Consortia to promote careers locally and generate support for providers (Mental Health Huis now exist on Moloka'i, Maui and East Hawai'i).
- Health preceptor tax credit for preceptors offering professional instruction, training, and supervision to students and residents in medicine, nursing and pharmacy. In June, a new law was signed to allow these vital preceptors to receive an annual tax credit, which will apply to taxable years after December 31, 2018.

Hawai'i Physician Shortage: Supply and Demand

The **supply** of physicians in Hawai'i is estimated based on responses to a voluntary survey of physicians administered at the time of state medical license renewal, queries of local community contacts, internet searches and direct calling of physician offices to confirm hours of active patient care. Data were obtained for an estimated 95% of the providers who report working in Hawai'i. Of the 9,671 physicians licensed to practice in Hawai'i, only 3,492 physicians are actively practicing in non-military settings. The total FTEs of direct patient care provided by these physicians (including those providing telehealth to Hawai'i patients from outside the state) is 2,927 FTEs.

Figure 1: 2018 Physician FTE Supply and Demand Estimates Hawai'i



The estimated shortage of physicians grew in all counties. The O'ahu shortage increased from 381 to 384; Big Island shortage increased from 196 to 213; Maui shortage increased from 139 to 141; and Kaua'i shortage increased from 53 to 59.

Table 1: Physician Shortage by County

	O'ahu	Big Island	Maui County	Kaua'i	Statewide
Shortage	384	213	141	59	797
Percentage	16.5%	41.2%	33.8%	32.9%	23.2%

Of this shortage, the largest single factor is primary care with a shortage of 262.7 FTEs across islands (down from a shortage of 282.5 last year). Primary care shortages also increased on all islands except Oahu. The shortage on O'ahu decreased from 187 to 157; Big Island increased from 46 to 47; Maui 39 to 44; and Kaua'i from 10.5 to 16 full time physicians.

Table 2: Primary Care Physician Shortage by County 2018

	O'ahu	Big Island	Maui County	Kaua'i	Statewide
Shortage	157	47	44	16	263
Percentage	18%	25%	28.7%	23.8%	20.6%

There is a loss of 51 FTE between 2017 and 2018. Supply numbers are given in full time equivalents of physician service based on a maximum 40-hour patient care week (so even if someone works 80 hours, we only count her as 1.0 FTE).

Table 3: Hawai'i Physician Supply Trends (in Full Time Equivalents)

Year	2010	2012	2013	2014	2015	2016	2017	2018
FTEs	2860	2995	2894	2802	2806	2903	2978	2927

Workforce statistics obtained from licensure survey (Appendix 2), internet searches, community contacts and calling of physician offices:

- 9,671 physicians licensed in Hawai'i
- 3,492 physicians are practicing in non-military settings in Hawai'i
- 2,927 total Full Time Equivalents (FTEs) of physicians are practicing in Hawai'i

- At least 132 physicians were found to have retired in 2017-2018; 176 in 2017 and an additional 57 in 2018 are known to have left the State.
- 50% of physicians work in practices of five physicians or less (down from 52% in 2016 and 58% in 2014)
- 54.5% of physicians are employed (down from 56% in 2016)
- Telehealth practice rose from 2% in 2014, to 15% in 2016, to 20.5% in 2018.

The **demand** for physician services is estimated using a model purchased from IHS Global in 2014. The major components of the demand model include: 1) a population database that contains characteristics and health risk factors for a representative sample of the population in each Hawai'i county, 2) predictive equations are based on national data that relate a person's demographic, socioeconomic and health risk factor characteristics to his or her demand for healthcare services by care delivery setting, and 3) national care delivery patterns that convert demand for healthcare services to demand for FTE physicians. For purposes of physician workforce modeling, the relevant settings are physician offices, outpatient clinics, hospital emergency departments, and hospital inpatient settings. While the forecasting equations and staffing patterns are based on national data, a population database was constructed for Hawai'i that was representative of the population in each county in Hawai'i. This was done using county-level population information (e.g., age-gender-race/ethnicity), whether a county was considered metropolitan or non-metropolitan, and information from the Behavioral Risk Factor Surveillance System (BRFSS) for the population, including summary statistics by county for factors such as prevalence of obesity, diabetes, current smoking status, and other risk factors used in the model.

Applying the model to Hawai'i produced estimates of physician demand by select specialty if people in each county were to receive a level of care consistent with the national average, while adjusting for differences across counties in demographics, health and economic factors that affect demand for health care services. The total estimated demand for physicians in Hawai'i as a state in 2018 is 3,440 FTEs before taking into account island geography and

oversupply in some areas and in some specialties. After adjusting for these factors, the current estimated shortage is 797 physician FTEs (up from 769 last year).

Projections of future supply are difficult to assess, as there are no clear indications of trends based on the seven years of data available. If the workforce remains unchanged, and we replace all departing doctors with new doctors, the demand curve will look as outlined in Figure 1.

County Specific Numbers

Tables of physician supply and demand by county are provided in Appendix 1. The largest shortages by percentage by county are included below. The largest shortage by total numbers on all islands is Primary Care and those numbers are included in Table 2 above.

Table 4: Top Five Individual Specialty Shortages by County in Rank Order of Percent Shortage Estimate (all county shortages in bold)

O'ahu	Big Island
Infectious Disease	Colorectal Surgery (100% shortage)
Pathology	Infectious Disease (100% shortage)
Colorectal Surgery	Neonatal-Perinatal (100% shortage)
General Surgery	Thoracic Surgery
Pulmonology	Endocrinology
General & Family Practice	Pulmonology
Maui County	Kaua'i
Colorectal Surgery (100% shortage)	Infectious Disease (100% shortage)
Rheumatology (100% shortage)	Endocrinology (100% shortage)
Neurological Surgery (100% shortage)	Critical Care (100% shortage)
Neonatal-Perinatal	Neonatal-Perinatal (100% shortage)
Pathology	Colorectal Surgery (100% shortage)
Infectious Disease	Rheumatology (100% shortage)

Infectious Disease and Colorectal Surgery are significant shortage areas in all counties, Neonatology/Perinatology is a shortage in all counties except O'ahu. Pathology is a shortage on O'ahu and in Maui County, and Pulmonology is a shortage on O'ahu and Big Island. Endocrinology is a shortage for both Big Island and Kaua'i. Rheumatology is a shortage in both Maui and Kaua'i Counties.

Solutions Being Implemented

Efforts to grow the population of satisfied physicians working in patient care in Hawai'i are many. The Physician Workforce Research Team held the first Physician Workforce Summit in 2010 in order to prioritize the interventions to initiate first. At the first Summit, 10 solutions were identified as the most important interventions in Hawai'i to improve the physician workforce. These are: Expand the pathway to health careers; Expand rural training opportunities; Support practice reform such as Patient Centered Medical Home; Inter-professional teamwork in practice; Payment reform; Rural payment differential; Community Involvement; Medical malpractice reform; Administrative simplification; and Assistance with Electronic Health Records. In 2012, with the reauthorization of the Physician Workforce Assessment activities and the emphasis on solutions created in Act 186, SLH 2012, the Physician Workforce Research team began closer collaboration with the Hawai'i Medical Education Council which identified two additional activities: a state loan repayment program and an initiative to recruit Hawai'i medical training graduates back to practice in Hawai'i. In 2017, the Physician Workforce Research legislative sunset was lifted and the State Loan Repayment Program was funded. Activities to advance the outlined aims are included below.

Activities have been accomplished in all areas except for Rural Payment Differential, which has met with resistance in the changing medical insurance marketplace. The most notable successes of the Physician Workforce Assessment activities are listed below by category:

- Expand the pathway to health careers: The Physician Workforce Assessment team has made contact with over 3,000 health professions students in the intervening year. Even more exciting, is the development of the Hawai'i Health Careers Navigator, a 140-page health careers resource book with information on all the health professions in Hawai'i and local resources for pursuit of health careers, which was printed and distributed to 3,500 students, counselors and parents with Hawai'i federal grant funding and can be viewed at www.ahec.hawaii.edu. In addition, a 94-page interactive Student Companion booklet to the Navigator is available at

www.ahec.hawaii.edu to help students perform activities exploring their interests and skills in healthcare. Federal grant funding has also been obtained to continue the Hawai'i Pre-Health Career Corps for students interested in health careers to receive shadowing, research and mentoring experiences with over 1,300 students currently enrolled. Through The Speakers Bureau, AHEC also recruits health professionals and sets up speakers for any school in Hawaii to discuss their careers and educate students about health opportunities.

- Expand rural training opportunities: AHEC has hired a Rural Coordinator to work with neighbor island communities to recruit additional preceptors to teach health professions students, recruit and support students interested in health careers, work with community members to host students, and document the impact of rural activities. Through the Aloha Welcome Wagon Program and UH Homestay Aloha Program, AHEC also coordinates travel and hosted lodging for UH health sciences students on clinical rotations across the state.
- Expand Loan Repayment: With newly funded State support, the number of loan repayment will double and we are expected to support over 50 providers in rural and underserved areas across the State. As a result of State Legislative funding, physicians (allopathic/osteopathic), nurse practitioners, physician assistants, psychologists, licensed clinical social workers, marriage and family therapists, licensed professional counselors and certified nurse-midwives are all eligible for loan repayment. Federal funding has also been obtained for the following additional specialties: registered nurses, pharmacists, dentists, dental hygienists and certified substance abuse counselors.
- The 2018 Hawai'i Health Workforce Summit offered 7.50 hours of Continuing Education Credit to 569 participants. The Summit addressed avoiding burnout, oral health topics, geriatric topics, rural health and distance education (see evaluation summary in Appendix 3). Evaluation demonstrated a high level of satisfaction with the event. In addition, the ECHO Hawai'i project provided over 1,718 hours of continuing education for 361 individuals between January 1 and September 21, 2018, including a two-month opioid series.

- Administrative simplification is proving challenging in the changing healthcare environment, but the Physician Workforce team is collaborating with medical organizations to highlight ideas for simplification when possible.
- Community Involvement: the Physician Workforce Assessment team is working with the Hawai'i State Rural Health Association and the Hawai'i Physician Recruiter's Group to expand community welcoming of providers and increase ability for spouses to find jobs.
- Medical Malpractice Reform was introduced in 2013 and the impact is being studied. Dr. Withy regularly recruits additional physicians to participate in the Medical Inquiry and Conciliation Panels.
- The AHEC.hawaii.edu website advertises job opportunities in Hawai'i to providers interested in practice and disseminates information. This includes searching the web for all available postings and working with recruiters to post their jobs.
- In addition to these activities, Dr. Withy serves on the Hawai'i Health Workforce Advisory Board, is assisting with Health Professional Shortage Area designations for additional areas of Hawai'i and has provided over 8 informational sessions on workforce shortage, as well as provided de-identified data to 9 inquirers.

Next Steps

The Physician Workforce Research Team will continue to conduct the research and implement the solutions described above. Additional research will be conducted to identify who is entering and leaving the workforce, and assess the Physician Assistant, Advanced Practice Nurse Practitioner, Social Worker and Psychologist workforce to enhance the accuracy of the demand for healthcare services overall and by discipline. In addition, annual Health Workforce Summits are planned, emphasizing systems and payment reforms and other factors that will improve provider recruitment and career satisfaction. These are anticipated to be held on the Saturday after Labor Day every year.

New initiatives include an educational pipeline to health careers. The Hawai'i Health Career Academy will provide the skills needed for eighth grade through undergraduate students from economically and/or educationally disadvantaged backgrounds to successfully pursue careers in health professions. Students will receive certification and training in Health Information Portability and Accountability Act procedures, Cardio Pulmonary Resuscitation, First Aid, Youth Mental Health First Aid and Occupational Safety Administration, as well as training in science, technology, engineering, and mathematics real life applications, public speaking, leadership, research literacy, teamwork abilities, interview skills, professionalism, time management, and financial planning methods.

A second initiative includes a mentoring pipeline to provide knowledge of and connection to practice opportunities across the State. The Bridge to Practice initiative encourages residents in primary care graduate medical education programs to be mentored by and explore work opportunities in independent practices across Hawai'i, in hopes of their practicing there upon graduation, however no residents have expressed interest. A new program has been implemented as well, a "Young Doctor's Hui" with regular social and professional activities on a quarterly basis, for collegial contact and potential educational opportunities associated with career networking for young physicians.

AHEC continues to support Local Area Consortia to promote careers locally and generate support for providers and upcoming health professionals. Three Local Area Consortia have been formed for mental health providers on Maui, Moloka'i and East Hawai'i. These Mental

Health Huis will also advance networking and educational interchange. Support and implementation of the health preceptor tax credit will also allow preceptors to offer professional instruction, training, and supervision to students and residents in medicine, nursing and pharmacy. As a result of a new law signed in June, preceptors will be able to receive an annual tax credit to taxable years after December 31, 2018.

More information on ongoing and upcoming activities is available at the AHEC website: www.ahec.hawaii.edu. The AHEC office number is 808-692-1060 and Dr. Withy's direct office line at JABSOM is 808-692-1070 and email is withy@hawaii.edu.

References

1. 2016 Update: The Complexities of Physician Supply and Demand: Projections from 2014 to 2025. Prepared for Association of American Medical Colleges. IHS Inc. April 5, 2016. https://www.aamc.org/download/458082/data/2016_complexities_of_supply_and_demand_projections.pdf Accessed October 16, 2018.

Appendix 1A: 2018 Supply and Demand Calculations for State of Hawaii, Honolulu County, and Hawaii County

2018 Demand and Supply of Physicians (MD/DO) for the State of Hawaii															
Specialty	State of Hawaii					Honolulu County					Hawaii County				
	Demand	Supply	Shortage	Without overage	Percent Shortage	Demand	Supply	Shortage	Without overage	Percent Shortage	Demand	Supply	Shortage	Without overage	Percent Shortage
Family Medicine/Gen Practice	525.40	355.65	169.75	170.22	32.40%	358.17	208.24	149.93	149.93	41.86%	77.23	77.7	-0.47	0	0.00%
General Internal Medicine	485.70	420.01	65.69	65.99	13.59%	333	333.3	-0.3	0	0.00%	70.8	34.7	36.1	36.1	50.99%
Pediatrics	248.30	223.84	24.46	24.46	9.85%	167.77	161.2	6.57	6.57	3.92%	37.17	27.49	9.68	9.68	26.04%
Geriatric Medicine	17.67	30.55	-12.88	2	11.32%	12.27	27.15	-14.88	0	0.00%	2.57	1.5	1.07	1.07	41.63%
Allergy & Immunology	20.87	13.86	7.01	7.01	33.59%	14.23	10.99	3.24	3.24	22.77%	3.07	1.07	2	2	65.15%
Anesthesiology	168.06	143.79	24.27	24.84	14.78%	113.73	106.92	6.81	6.81	5.99%	25.1	11.58	13.52	13.52	53.86%
Cardiology	114.53	77.2	37.33	37.33	32.59%	78.1	58.26	19.84	19.84	25.40%	17.03	4.87	12.16	12.16	71.40%
Colorectal Surgery	7.01	2.47	4.54	4.54	64.76%	4.67	2.47	2.2	2.2	47.11%	1.07	0	1.07	1.07	100.00%
Critical Care*	26.96	35.22	-8.26	5.67	21.03%	18.4	32.33	-13.93	0	0.00%	4	0.39	3.61	3.61	90.25%
Dermatology	47.07	52.32	-5.25	5.13	10.90%	31.97	40.4	-8.43	0	0.00%	7	3.3	3.7	3.7	52.86%
Emergency Medicine*	178.20	202.64	-24.44	11.29	6.34%	106.17	135.93	-29.76	0	0.00%	33.3	33.11	0.19	0.19	0.57%
Endocrinology	29.76	17.62	12.14	12.14	40.79%	20.6	15.77	4.83	4.83	23.45%	4.2	0.25	3.95	3.95	94.05%
Gastroenterology	63.33	58.86	4.47	7.93	12.52%	43.03	46.49	-3.46	0	0.00%	9.4	4.55	4.85	4.85	51.60%
General Surgery	118.53	68.84	49.69	49.69	41.92%	80.43	45.72	34.71	34.71	43.16%	17.7	10.9	6.8	6.8	38.42%
Hematology & Oncology	61.86	41.36	20.50	20.5	33.14%	40.43	32.66	7.77	7.77	19.22%	10.03	2.7	7.33	7.33	73.08%
Infectious Disease	39.93	9.92	30.01	30.01	75.16%	27.23	8.94	18.29	18.29	67.17%	5.9	0	5.9	5.9	100.00%
Neonatal-perinatal	22.50	28.84	-6.34	7	31.11%	15.3	28.64	-13.34	0	0.00%	3.4	0	3.4	3.4	100.00%
Nephrology	34.90	27.71	7.19	7.19	20.60%	24.17	22.79	1.38	1.38	5.71%	4.97	1.97	3	3	60.36%
Neurological Surgery	21.47	9.6	11.87	11.87	55.29%	14.6	8.9	5.7	5.7	39.04%	3.23	0.35	2.88	2.88	89.16%
Neurology	76.63	50.29	26.34	26.34	34.37%	52.17	42.2	9.97	9.97	19.11%	11.33	1.97	9.36	9.36	82.61%
OB/GYN	186.37	157.94	28.43	28.43	15.25%	128.17	117.67	10.5	10.5	8.19%	27	16.7	10.3	10.3	38.15%
Ophthalmology	84.70	95.96	-11.26	7.18	8.48%	58.03	76.47	-18.44	0	0.00%	12.3	7.87	4.43	4.43	36.02%
Orthopedic Surgery	108.23	74.79	33.44	33.44	30.90%	73.6	56.88	16.72	16.72	22.72%	16	4.63	11.37	11.37	71.06%
Otolaryngology	43.29	32.04	11.25	11.39	26.31%	29.53	23.45	6.08	6.08	20.59%	6.33	3.1	3.23	3.23	51.03%
Pathology	87.24	30.47	56.77	56.77	65.07%	59.47	24.97	34.5	34.5	58.01%	13	2.5	10.5	10.5	80.77%
Physical Medicine/Rehab	34.84	28.21	6.63	6.63	0.19%	23.87	23.39	0.48	0.48	2.01%	5.07	1.82	3.25	3.25	64.10%
Plastic Surgery	32.43	25.04	7.39	8.13	25.07%	21.7	22.44	-0.74	0	0.00%	4.97	0.75	4.22	4.22	84.91%
Psychiatry*	193.90	173.84	20.06	21.53	11.10%	131.5	132.97	-1.47	0	0.00%	28.8	19.31	9.49	9.49	32.95%
Pulmonology	55.83	25.08	30.75	30.75	55.08%	37.9	21.96	15.94	15.94	42.06%	8.33	0.62	7.71	7.71	92.56%
Radiology	138.40	113.52	24.88	24.88	17.98%	92.1	81.3	10.8	10.8	11.73%	21.67	13.79	7.88	7.88	36.36%
Rheumatology	19.64	11.4	8.24	8.24	41.96%	13.3	10.3	3	3	22.56%	2.9	1.1	1.8	1.8	62.07%
Thoracic Surgery	20.13	10.59	9.54	9.54	47.39%	13.63	8.82	4.81	4.81	35.29%	3	0.05	2.95	2.95	98.33%
Urology	45.87	28.54	17.33	17.33	37.78%	31	21.44	9.56	9.56	30.84%	6.9	2.1	4.8	4.8	69.57%
Vascular Surgery	13.27	12.15	1.12	1.79	13.49%	9.2	9.87	-0.67	0	0.00%	1.9	1.38	0.52	0.52	27.37%
Other Medical Specialties	67.44	236.98	-169.54	0	0.00%	45.57	173.32	-127.75	0	0.00%	10.17	21.02	-10.85	0	0.00%
Total	3440.26	2927.14	513.12	797.18	23.17%	2325.01	2174.55	150.46	383.63	16.50%	516.84	315.14	201.7	213.02	41.22%

*Models for emergency medicine, critical care, and psychiatry needs incorporate a number of additional assumptions which may not apply to Hawai'i, such as an adequate number of primary care providers in the region.

Appendix 1B: 2018 Supply and Demand Calculations for Kaua'i County and Maui County

2018 Demand and Supply of Physicians (MD/DO) for the State of Hawaii										
Specialty	Kauai County					Maui County				
	Demand	Supply	Shortage	Without overage	Percent Shortage	Demand	Supply	Shortage	Without overage	Percent Shortage
Family Medicine/Gen Practice	26.87	21.09	5.78	5.78	21.51%	63.13	48.62	14.51	14.51	22.98%
General Internal Medicine	24.77	17.1	7.67	7.67	30.96%	57.13	34.91	22.22	22.22	38.89%
Pediatrics	12.83	10.75	2.08	2.08	16.21%	30.53	24.4	6.13	6.13	20.08%
Geriatric Medicine	0.93	0.9	0.03	0.03	3.23%	1.9	1	0.9	0.9	47.37%
Allergy & Immunology	1.07	1	0.07	0.07	6.54%	2.5	0.8	1.7	1.7	68.00%
Anesthesiology	8.83	9.4	-0.57	0	0.00%	20.4	15.89	4.51	4.51	22.11%
Cardiology	5.97	2	3.97	3.97	66.50%	13.43	12.07	1.36	1.36	10.13%
Colorectal Surgery	0.40	0	0.40	0.4	100.00%	0.87	0	0.87	0.87	100.00%
Critical Care*	1.43	0	1.43	1.43	100.00%	3.13	2.5	0.63	0.63	20.13%
Dermatology	2.43	1	1.43	1.43	58.85%	5.67	7.62	-1.95	0	0.00%
Emergency Medicine*	11.53	17.5	-5.97	0	0.00%	27.2	16.1	11.1	11.1	40.81%
Endocrinology	1.53	0	1.53	1.53	100.00%	3.43	1.6	1.83	1.83	53.35%
Gastroenterology	3.30	2	1.30	1.3	39.39%	7.6	5.82	1.78	1.78	23.42%
General Surgery	6.20	4.92	1.28	1.28	20.65%	14.2	7.3	6.9	6.9	48.59%
Hematology & Oncology	3.47	2	1.47	1.47	42.36%	7.93	4	3.93	3.93	49.56%
Infectious Disease	2.03	0	2.03	2.03	100.00%	4.77	0.98	3.79	3.79	79.45%
Neonatal-perinatal	1.13	0	1.13	1.13	100.00%	2.67	0.2	2.47	2.47	92.51%
Nephrology	1.73	0.1	1.63	1.63	94.22%	4.03	2.85	1.18	1.18	29.28%
Neurological Surgery	1.07	0.35	0.72	0.72	67.29%	2.57	0	2.57	2.57	100.00%
Neurology	3.90	1	2.90	2.9	74.36%	9.23	5.12	4.11	4.11	44.53%
OB/GYN	9.10	5.75	3.35	3.35	36.81%	22.1	17.82	4.28	4.28	19.37%
Ophthalmology	4.30	4	0.30	0.3	6.98%	10.07	7.62	2.45	2.45	24.33%
Orthopedic Surgery	5.63	3.03	2.60	2.6	46.18%	13	10.25	2.75	2.75	21.15%
Otolaryngology	2.23	2.37	-0.14	0	0.00%	5.2	3.12	2.08	2.08	40.00%
Pathology	4.50	1	3.50	3.5	77.78%	10.27	2	8.27	8.27	80.53%
Physical Medicine/Rehab	1.77	1	0.77	0.77	43.50%	4.13	2	2.13	2.13	51.57%
Plastic Surgery	1.73	0.2	1.53	1.53	88.44%	4.03	1.65	2.38	2.38	59.06%
Psychiatry*	10.00	6.67	3.33	3.33	33.30%	23.6	14.89	8.71	8.71	36.91%
Pulmonology	2.90	0.5	2.40	2.4	82.76%	6.7	2	4.7	4.7	70.15%
Radiology	7.43	5.5	1.93	1.93	25.98%	17.2	12.93	4.27	4.27	24.83%
Rheumatology	1.07	0	1.07	1.07	100.00%	2.37	0	2.37	2.37	100.00%
Thoracic Surgery	1.07	0.5	0.57	0.57	53.27%	2.43	1.22	1.21	1.21	49.79%
Urology	2.40	2.1	0.30	0.3	12.50%	5.57	2.9	2.67	2.67	47.94%
Vascular Surgery	0.67	0.05	0.62	0.62	92.54%	1.5	0.85	0.65	0.65	43.33%
Other Medical Specialties	3.50	13.24	-9.74	0	0.00%	8.2	29.4	-21.2	0	0.00%
Total	179.72	137.02	42.70	59.12	32.90%	418.69	300.43	118.26	141.41	33.77%

*Models for emergency medicine, critical care, and psychiatry needs incorporate a number of additional assumptions which may not apply to Hawai'i, such as an adequate number of primary care providers in the region.

Appendix 1C: 2018 Supply and Demand Calculations for the State of Hawai'i

Specialty	State of Hawai'i				
	Demand	Supply	Shortage	Without overage	Percent Shortage
Family Medicine/Gen Practice	525.40	355.65	169.75	170.22	32.40%
General Internal Medicine	485.70	420.01	65.69	65.99	13.59%
Pediatrics	248.30	223.84	24.46	24.46	9.85%
Geriatric Medicine	17.67	30.55	-12.88	2	11.32%
Allergy & Immunology	20.87	13.86	7.01	7.01	33.59%
Anesthesiology	168.06	143.79	24.27	24.84	14.78%
Cardiology	114.53	77.2	37.33	37.33	32.59%
Colorectal Surgery	7.01	2.47	4.54	4.54	64.76%
Critical Care*	26.96	35.22	-8.26	5.67	21.03%
Dermatology	47.07	52.32	-5.25	5.13	10.90%
Emergency Medicine*	178.20	202.64	-24.44	11.29	6.34%
Endocrinology	29.76	17.62	12.14	12.14	40.79%
Gastroenterology	63.33	58.86	4.47	7.93	12.52%
General Surgery	118.53	68.84	49.69	49.69	41.92%
Hematology & Oncology	61.86	41.36	20.50	20.50	33.14%
Infectious Disease	39.93	9.92	30.01	30.01	75.16%
Neonatal-perinatal	22.50	28.84	-6.34	7	31.11%
Nephrology	34.90	27.71	7.19	7.19	20.60%
Neurological Surgery	21.47	9.6	11.87	11.87	55.29%
Neurology	76.63	50.29	26.34	26.34	34.37%
OBGYN	186.37	157.94	28.43	28.43	15.25%
Ophthalmology	84.70	95.96	-11.26	7.18	8.48%
Orthopedic Surgery	108.23	74.79	33.44	33.44	30.90%
Otolaryngology	43.29	32.04	11.25	11.39	26.31%
Pathology	87.24	30.47	56.77	56.77	65.07%
Physical Medicine/Rehab	34.84	28.21	6.63	6.63	0.19%
Plastic Surgery	32.43	25.04	7.39	8.13	25.07%
Psychiatry*	193.90	173.84	20.06	21.53	11.10%
Pulmonology	55.83	25.08	30.75	30.75	55.08%
Radiology	138.40	113.52	24.88	24.88	17.98%
Rheumatology	19.64	11.4	8.24	8.24	41.96%
Thoracic Surgery	20.13	10.59	9.54	9.54	47.39%
Urology	45.87	28.54	17.33	17.33	37.78%
Vascular Surgery	13.27	12.15	1.12	1.79	13.49%
Other Medical Specialties	67.44	236.98	-169.54	0	0.00%
Total	3440.26	2927.14	513.12	797.18	23.17%

*Models for emergency medicine, critical care, and psychiatry needs incorporate a number of additional assumptions which may not apply to Hawai'i, such as an adequate number of primary care providers in the region.

Appendix 1D: 2018 Supply and Demand Calculations for Honolulu County

Specialty	Honolulu County				
	Demand	Supply	Shortage	Without overage	Percent Shortage
Family Medicine/Gen Practice	358.17	208.24	149.93	149.93	41.86%
General Internal Medicine	333	333.3	-0.3	0	0.00%
Pediatrics	167.77	161.2	6.57	6.57	3.92%
Geriatric Medicine	12.27	27.15	-14.88	0	0.00%
Allergy & Immunology	14.23	10.99	3.24	3.24	22.77%
Anesthesiology	113.73	106.92	6.81	6.81	5.99%
Cardiology	78.1	58.26	19.84	19.84	25.40%
Colorectal Surgery	4.67	2.47	2.2	2.2	47.11%
Critical Care*	18.4	32.33	-13.93	0	0.00%
Dermatology	31.97	40.4	-8.43	0	0.00%
Emergency Medicine*	106.17	135.93	-29.76	0	0.00%
Endocrinology	20.6	15.77	4.83	4.83	23.45%
Gastroenterology	43.03	46.49	-3.46	0	0.00%
General Surgery	80.43	45.72	34.71	34.71	43.16%
Hematology & Oncology	40.43	32.66	7.77	7.77	19.22%
Infectious Disease	27.23	8.94	18.29	18.29	67.17%
Neonatal-perinatal	15.3	28.64	-13.34	0	0.00%
Nephrology	24.17	22.79	1.38	1.38	5.71%
Neurological Surgery	14.6	8.9	5.7	5.7	39.04%
Neurology	52.17	42.2	9.97	9.97	19.11%
OBGYN	128.17	117.67	10.5	10.5	8.19%
Ophthalmology	58.03	76.47	-18.44	0	0.00%
Orthopedic Surgery	73.6	56.88	16.72	16.72	22.72%
Otolaryngology	29.53	23.45	6.08	6.08	20.59%
Pathology	59.47	24.97	34.5	34.5	58.01%
Physical Medicine/Rehab	23.87	23.39	0.48	0.48	2.01%
Plastic Surgery	21.7	22.44	-0.74	0	0.00%
Psychiatry*	131.5	132.97	-1.47	0	0.00%
Pulmonology	37.9	21.96	15.94	15.94	42.06%
Radiology	92.1	81.3	10.8	10.8	11.73%
Rheumatology	13.3	10.3	3	3	22.56%
Thoracic Surgery	13.63	8.82	4.81	4.81	35.29%
Urology	31	21.44	9.56	9.56	30.84%
Vascular Surgery	9.2	9.87	-0.67	0	0.00%
Other Medical Specialties	45.57	173.32	-127.75	0	0.00%
Total	2325.01	2174.55	150.46	383.63	16.50%

*Models for emergency medicine, critical care, and psychiatry needs incorporate a number of additional assumptions which may not apply to Hawai‘i, such as an adequate number of primary care providers in the region.

Appendix 1E: 2018 Supply and Demand Calculations for Hawai'i County

Specialty	Hawai'i County				
	Demand	Supply	Shortage	Without overage	Percent Shortage
Family Medicine/Gen Practice	77.23	77.7	-0.47	0	0.00%
General Internal Medicine	70.8	34.7	36.1	36.1	50.99%
Pediatrics	37.17	27.49	9.68	9.68	26.04%
Geriatric Medicine	2.57	1.5	1.07	1.07	41.63%
Allergy & Immunology	3.07	1.07	2	2	65.15%
Anesthesiology	25.1	11.58	13.52	13.52	53.86%
Cardiology	17.03	4.87	12.16	12.16	71.40%
Colorectal Surgery	1.07	0	1.07	1.07	100.00%
Critical Care*	4	0.39	3.61	3.61	90.25%
Dermatology	7	3.3	3.7	3.7	52.86%
Emergency Medicine*	33.3	33.11	0.19	0.19	0.57%
Endocrinology	4.2	0.25	3.95	3.95	94.05%
Gastroenterology	9.4	4.55	4.85	4.85	51.60%
General Surgery	17.7	10.9	6.8	6.8	38.42%
Hematology & Oncology	10.03	2.7	7.33	7.33	73.08%
Infectious Disease	5.9	0	5.9	5.9	100.00%
Neonatal-perinatal	3.4	0	3.4	3.4	100.00%
Nephrology	4.97	1.97	3	3	60.36%
Neurological Surgery	3.23	0.35	2.88	2.88	89.16%
Neurology	11.33	1.97	9.36	9.36	82.61%
OBGYN	27	16.7	10.3	10.3	38.15%
Ophthalmology	12.3	7.87	4.43	4.43	36.02%
Orthopedic Surgery	16	4.63	11.37	11.37	71.06%
Otolaryngology	6.33	3.1	3.23	3.23	51.03%
Pathology	13	2.5	10.5	10.5	80.77%
Physical Medicine/Rehab	5.07	1.82	3.25	3.25	64.10%
Plastic Surgery	4.97	0.75	4.22	4.22	84.91%
Psychiatry*	28.8	19.31	9.49	9.49	32.95%
Pulmonology	8.33	0.62	7.71	7.71	92.56%
Radiology	21.67	13.79	7.88	7.88	36.36%
Rheumatology	2.9	1.1	1.8	1.8	62.07%
Thoracic Surgery	3	0.05	2.95	2.95	98.33%
Urology	6.9	2.1	4.8	4.8	69.57%
Vascular Surgery	1.9	1.38	0.52	0.52	27.37%
Other Medical Specialties	10.17	21.02	-10.85	0	0.00%
Total	516.84	315.14	201.7	213.02	41.22%

*Models for emergency medicine, critical care, and psychiatry needs incorporate a number of additional assumptions which may not apply to Hawai'i, such as an adequate number of primary care providers in the region.

Appendix 1F: 2018 Supply and Demand Calculations for Kaua‘i County

Specialty	Kaua‘i County				
	Demand	Supply	Shortage	Without overage	Percent Shortage
Family Medicine/Gen Practice	26.87	21.09	5.78	5.78	21.51%
General Internal Medicine	24.77	17.1	7.67	7.67	30.96%
Pediatrics	12.83	10.75	2.08	2.08	16.21%
Geriatric Medicine	0.93	0.9	0.03	0.03	3.23%
Allergy & Immunology	1.07	1	0.07	0.07	6.54%
Anesthesiology	8.83	9.4	-0.57	0	0.00%
Cardiology	5.97	2	3.97	3.97	66.50%
Colorectal Surgery	0.40	0	0.40	0.4	100.00%
Critical Care*	1.43	0	1.43	1.43	100.00%
Dermatology	2.43	1	1.43	1.43	58.85%
Emergency Medicine*	11.53	17.5	-5.97	0	0.00%
Endocrinology	1.53	0	1.53	1.53	100.00%
Gastroenterology	3.30	2	1.30	1.3	39.39%
General Surgery	6.20	4.92	1.28	1.28	20.65%
Hematology & Oncology	3.47	2	1.47	1.47	42.36%
Infectious Disease	2.03	0	2.03	2.03	100.00%
Neonatal-perinatal	1.13	0	1.13	1.13	100.00%
Nephrology	1.73	0.1	1.63	1.63	94.22%
Neurological Surgery	1.07	0.35	0.72	0.72	67.29%
Neurology	3.90	1	2.90	2.9	74.36%
OBGYN	9.10	5.75	3.35	3.35	36.81%
Ophthalmology	4.30	4	0.30	0.3	6.98%
Orthopedic Surgery	5.63	3.03	2.60	2.6	46.18%
Otolaryngology	2.23	2.37	-0.14	0	0.00%
Pathology	4.50	1	3.50	3.5	77.78%
Physical Medicine/Rehab	1.77	1	0.77	0.77	43.50%
Plastic Surgery	1.73	0.2	1.53	1.53	88.44%
Psychiatry*	10.00	6.67	3.33	3.33	33.30%
Pulmonology	2.90	0.5	2.40	2.4	82.76%
Radiology	7.43	5.5	1.93	1.93	25.98%
Rheumatology	1.07	0	1.07	1.07	100.00%
Thoracic Surgery	1.07	0.5	0.57	0.57	53.27%
Urology	2.40	2.1	0.30	0.3	12.50%
Vascular Surgery	0.67	0.05	0.62	0.62	92.54%
Other Medical Specialties	3.50	13.24	-9.74	0	0.00%
Total	179.72	137.02	42.70	59.12	32.90%

*Models for emergency medicine, critical care, and psychiatry needs incorporate a number of additional assumptions which may not apply to Hawai‘i, such as an adequate number of primary care providers in the region.

Appendix 1G: 2018 Supply and Demand Calculations for Maui County

Specialty	Maui County				
	Demand	Supply	Shortage	Without overage	Percent Shortage
Family Medicine/Gen Practice	63.13	48.62	14.51	14.51	22.98%
General Internal Medicine	57.13	34.91	22.22	22.22	38.89%
Pediatrics	30.53	24.4	6.13	6.13	20.08%
Geriatric Medicine	1.9	1	0.9	0.9	47.37%
Allergy & Immunology	2.5	0.8	1.7	1.7	68.00%
Anesthesiology	20.4	15.89	4.51	4.51	22.11%
Cardiology	13.43	12.07	1.36	1.36	10.13%
Colorectal Surgery	0.87	0	0.87	0.87	100.00%
Critical Care*	3.13	2.5	0.63	0.63	20.13%
Dermatology	5.67	7.62	-1.95	0	0.00%
Emergency Medicine*	27.2	16.1	11.1	11.1	40.81%
Endocrinology	3.43	1.6	1.83	1.83	53.35%
Gastroenterology	7.6	5.82	1.78	1.78	23.42%
General Surgery	14.2	7.3	6.9	6.9	48.59%
Hematology & Oncology	7.93	4	3.93	3.93	49.56%
Infectious Disease	4.77	0.98	3.79	3.79	79.45%
Neonatal-perinatal	2.67	0.2	2.47	2.47	92.51%
Nephrology	4.03	2.85	1.18	1.18	29.28%
Neurological Surgery	2.57	0	2.57	2.57	100.00%
Neurology	9.23	5.12	4.11	4.11	44.53%
OBGYN	22.1	17.82	4.28	4.28	19.37%
Ophthalmology	10.07	7.62	2.45	2.45	24.33%
Orthopedic Surgery	13	10.25	2.75	2.75	21.15%
Otolaryngology	5.2	3.12	2.08	2.08	40.00%
Pathology	10.27	2	8.27	8.27	80.53%
Physical Medicine/Rehab	4.13	2	2.13	2.13	51.57%
Plastic Surgery	4.03	1.65	2.38	2.38	59.06%
Psychiatry*	23.6	14.89	8.71	8.71	36.91%
Pulmonology	6.7	2	4.7	4.7	70.15%
Radiology	17.2	12.93	4.27	4.27	24.83%
Rheumatology	2.37	0	2.37	2.37	100.00%
Thoracic Surgery	2.43	1.22	1.21	1.21	49.79%
Urology	5.57	2.9	2.67	2.67	47.94%
Vascular Surgery	1.5	0.85	0.65	0.65	43.33%
Other Medical Specialties	8.2	29.4	-21.2	0	0.00%
Total	418.69	300.43	118.26	141.41	33.77%

*Models for emergency medicine, critical care, and psychiatry needs incorporate a number of additional assumptions which may not apply to Hawai‘i, such as an adequate number of primary care providers in the region.

Appendix 2: 2017-2018 Physician Workforce Relicensure Survey Questions

The following questions ask for essential information needed by the University of Hawai‘i John A. Burns School of Medicine for their assessment of the Hawai‘i physician workforce. The data will be used for planning purposes to address the needs of physicians and patients statewide. Answering these questions is not required for renewal but your assistance and cooperation is greatly appreciated. Your responses will be strictly confidential. For inquiries, contact Dr. Kelley Withy, at the John A. Burns School of Medicine: 808-692-1070 or withy@hawaii.edu.

Do you provide direct healthcare services to individual patients in Hawaii?

(If you are completely administrative or non-clinical please answer “No”)

Yes No

**If “NO”, SKIP remaining questions 2 through 13 and
Go to bottom of page and click “NEXT”**

1. Do you primarily serve a military or military dependent population?

Yes No

2. Are you still training (internship, residency or fellowship)?

Yes No

3. Do you travel to a neighbor island to provide patient care there part time?

Yes No

4. What specialty/specialties do you practice about what percent of your time?

Drop down menu #1 Drop down menu #2 Other: write in:

5. Please tell us about your primary practice environment:

Primary Address (Office or Hospital):

City: State: Zip Code:

Phone:

Email:

How many hours per week do you see patients at this address?

6. If you have more than one practice, please provide information for your second

address: Second Address (Office or Hospital):

City: State: Zip Code:

Phone:

How many hours per week do you see patients at this address?

7. If you have more than two practice locations in Hawaii, how many locations do you practice out of (in Hawaii)?

8. Is a majority of your income a result of being employed by a medical group, hospital, school (faculty) or other entity?

Yes No

Name of entity:

9. What is the size of your practice group (how many partners do you have including yourself)?

1-2 3-5 6-10 11 or more

10. How many hours a week do you provide telehealth care to Hawaii?

Appendix 3: Evaluation of 2018 Hawai'i Health Workforce Summit

1. Conference Overall

<i>Please check the box to tell us how much this conference helped you:</i>	<i>Score on 4 point scale with 4=A great Deal, 1=Not at all</i>
How to improve your career satisfaction	3.3
Feel more empowered as a provider	3.2
Feel more knowledgeable in your field	3.0
Feel more able to manage your stress when caring for others	3.3
Feel better able to care for your patients	3.2

2. Session ratings

<i>Please write in and rate the quality and helpfulness of the sessions you attended:</i>	<i>Rating on 5 point scale where 5=Excellent, 1=Poor</i>
Opening session: Tait Shanafelt – The High Cost of Physician Burnout	4.6
Breakout 1: Oral Health – Prevention: Sugar and Carries	4.5
Breakout 1: Rural Health – Rural Workforce Recruitment & Retention	4.4
Breakout1: Geriatrics – Population Health & Practice Management for the Geriatric Patient	4.1
Breakout 1: Papa Ola Lokahi: Indigenous Conversations for Building Patient Engagement	4.4
Lunch session: Dike Drummond – The Zen of Getting Home Sooner	4.7
Breakout 2: Oral Health – Oral Health and Eldercare	4.5
Breakout 2: Rural Health – Telehealth in Rural Communities	4.4
Breakout 2: Dike Drummond – The Power Guide to Teams and Teamwork	4.7
Breakout 3: Oral Health – Oral Health and Medical-Dental Integration	4.5
Breakout 3: Rural Health – Rat Lungworm/Sex Trafficking/Chlamydia Among Micronesian Women	4.5
Breakout 3: Geriatrics – Medication Management for Insomnia	4.6
Breakout 3: Todd Seto & Shilpa Patel - Provider Wellness in Hawaii	4.5