

UNIVERSITY OF HAWAI‘I SYSTEM ANNUAL REPORT



REPORT TO THE 2018 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

October 2017

Hawai'i Physician Workforce

In accordance with Act 18, SLH, 2009; Act 186, SLH, 2012; and Act 40, SLH, 2017;

A report to the 2018 Hawai'i State Legislature:

Findings from the Hawai'i Physician Workforce Assessment Project

Prepared by:

Kelley Withy, MD, PhD

John A. Burns School of Medicine

Area Health Education Center

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2017 Hawai'i Physician Workforce Assessment Executive Summary

There are currently 3,551 physicians providing patient care to patients in Hawai'i for a total of 2,978 Full Time Equivalents (FTEs) of direct care to patients. The national demand model applied to the State of Hawai'i indicates a need for 3,399 total FTEs or a shortage of 421. However, when island geography and unmet specialty specific needs by county are examined, the unmet need for physicians has grown to 769 FTEs (from 707 last year). Primary care is the largest shortage statewide and on all islands, with Infectious Disease, Pathology, Pulmonary, Colorectal Surgery and Neurosurgery the largest subspecialty shortages statewide by percent of unmet need.

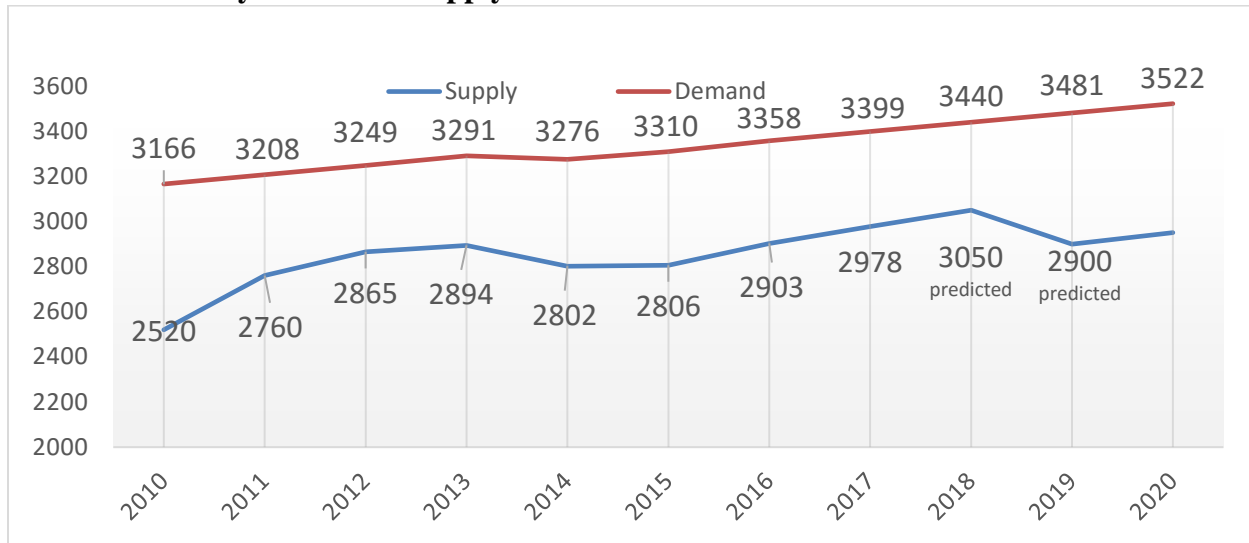
To help meet these needs, the Hawai'i Physician Workforce Special Fund activities have focused on: 1. Maintaining the workforce database and providing de-identified data as requested throughout the state; 2. Providing presentations on workforce statistics (over 12 in 2017); 3. Providing continuing education including the Hawai'i Health Workforce Summit (almost 500 providers a year for the last three years) and Project ECHO (1,500 people hours of case-based education); 4. Providing Loan Repayment: the Hawai'i State Loan Repayment Program currently supports 12 loan repayment recipients, and has supported 25 during the five years of existence. **As a result of State Legislative funding becoming available in 2017, we expect to award an additional 10 loan repayment contracts shortly and at least an additional 10 in the coming year.** 5. Posting all job openings online through collaboration with Hawai'i Physician Recruiters Group; 6. Supporting the health career pipeline by promoting health careers to students across Hawai'i through publication of the 138-page Health Career Navigator resource (3,000 printed and distributed across the State), 94 page interactive Student Companion booklet (1,500 printed and distributed across the State) and the Pre-Health Career Corps mentoring program for 700 youth to date. 7. Collaborating with the Hawai'i Health Workforce Advisory Board to increase loan repayment and expand conversation about health workforce needs and methods for monitoring; 8. Assisting Department of Health with potentially increasing Health Professions Shortage Area designations in Hawai'i. In addition, three new activities have been undertaken:

1. Bridge to Practice Mentoring Program in collaboration with Hawai'i Medical Association and Queen's Hospital.
2. Rural Coordination: an individual will be hired shortly to coordinate neighbor island clinical teaching, travel, lodging, community activities and recruitment of health careers.
3. Ask the Insurer Portal to get answers for providers wondering 'why' from insurance companies.

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 (Appendix 2) 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 98% of the providers who report working in Hawai‘i. Of the over 9,000 physicians licensed to practice in Hawai‘i, only 3,551 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 2,978 FTEs.

Table 1: 2017 Physician FTE Supply and Demand Estimates Hawai‘i



Of this shortage, the largest single factor is primary care with a shortage of 282.5 FTEs across islands (up from a shortage of 228 last year). The shortage of physicians grew in all counties except Kauai this year, where the shortage improved by nine. O‘ahu shortage increased from 339 to 381; Big Island shortage increased from 183 to 196; Maui shortage increased from 125 to 139; and Kaula‘i shortage decreased from 62 to 53.

Table 1: Physician Shortage by County 2017

	O‘ahu	Big Island	Maui County	Kaula‘i	Statewide
Shortage	381	196	139	53	769
Percentage	16.5%	38.7%	34%	30%	22.6%

Primary care shortages also increased on all islands except Kaua‘i. The shortage on Oahu increased from 142 to 187; Big Island 36 to 46; Maui 34 to 39; and Kaua‘i it decreased from 16 to 10.5 full time physicians.

Table 2: Primary Care Physician Shortage by County 2017

	O‘ahu	Big Island	Maui County	Kaua‘i	Statewide
Shortage	187	46	39	10.5	282.5
Percentage	22%	25%	26%	16%	22%

There are slight improvements in supply numbers for physicians between 2016 and 2017, but no large jumps in supply numbers over the past 6 years. 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).

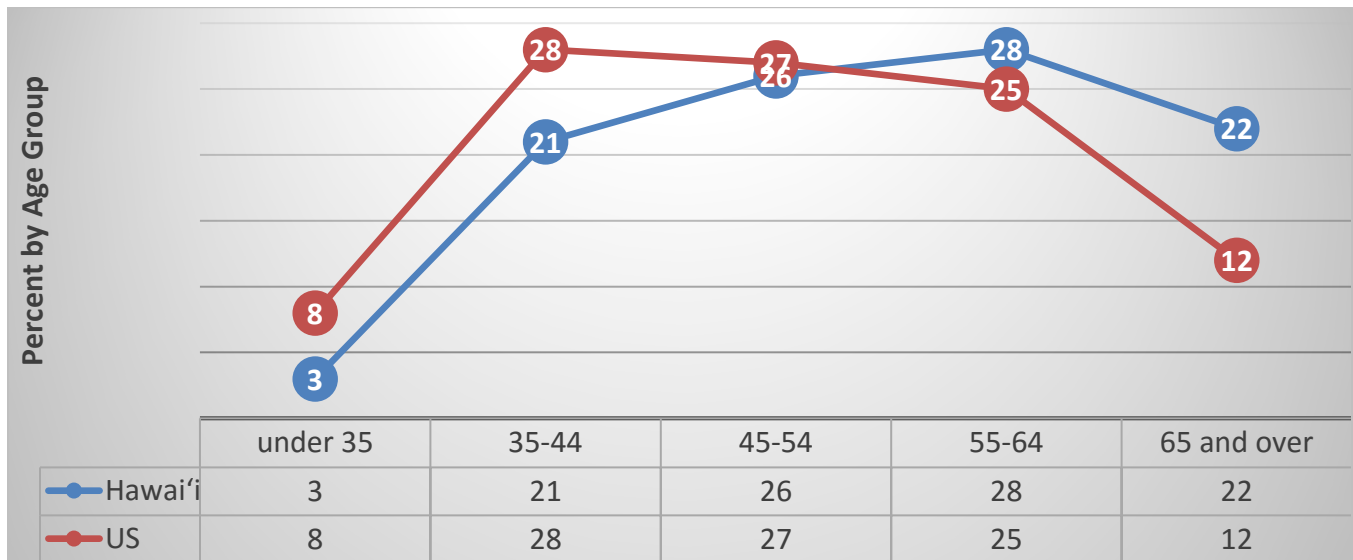
Table 1. Hawai‘i Physician Supply Trends (in Full Time Equivalents)

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

Workforce statistics:

- 9,996 physicians licensed in Hawai‘i
- 3,551 physicians are practicing in non-military settings in Hawai‘i
- 2,978 total Full Time Equivalents (FTEs) of physicians are practicing in Hawai‘i
- At least 65 physicians were found to have retired in 2016 and 136 are known to have left the State
- 691 of our physicians are 65 years or over in 2017 (up from 608 a year ago), or 22% of our practicing doctors for whom we have age data
- 35% female, 65% male
- Average age of non-military practicing physicians in Hawai‘i is 54.6 years
- 52% of physicians work in practices of five physicians or less (down from 58% in 2014)
- 50% of Hawai‘i’s practicing physicians are 55 of older

Figure 1. Age of Hawai'i Physicians Compared to Average US Physicians¹



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 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, therefore, 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, but 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 2017 is 3,399

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 769 physician FTEs (up from 707 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. With the introduction of Medicare MACRA payment changes in 2019, it is likely that approximately a quarter of physicians over 65 will retire. If this occurs, the demand curve is expected to 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.

O‘ahu

Infectious Disease
Pathology
General & Family Practice
Pulmonology
General Surgery

Big Island

Colorectal Surgery
Infectious Disease
Thoracic Surgery
Neurological Surgery
Neonatal- Perinatal

Maui County

Geriatrics
Colorectal Surgery
Neonatal-Perinatal
Rheumatology
Pulmonology

Kaua‘i

Infectious Disease
Endocrinology
Critical Care
Neonatal-Perinatal
Nephrology

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 Counsel 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:

- 1) 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 138-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 3,000 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 begin the Hawai'i Pre-Health Career Corps for students interested in health careers to receive shadowing, research and mentoring experiences with over 700 students currently enrolled;
- 2) Expand rural training opportunities: AHEC is hiring 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.
- 3) Expand Loan Repayment: With newly funded State support, the number of loan repayment will double and we are expected to support up to 50 providers in rural and underserved areas across the State.
- 4) The 2017 Hawai'i Health Workforce Summit offered 7.25 hours of Continuing Education Credit to 475 participants. The Summit addressed new models of care, interprofessional practice, new

payment methodologies, avoiding burnout, oral health topics, geriatric topics, rural health and distance education. Evaluation demonstrated a high level of satisfaction with the event. In addition, the ECHOHawaii project provided over 1,150 hours of continuing education in 2017.

- 5) 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. In addition, the Hawai'i AHEC is introducing a forum for physicians to ask questions of health insurers at www.ahec.hawaii.edu.
- 6) 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.
- 7) Medical Malpractice Reform was introduced in 2013 and the impact is being studied, but is initially disappointing. Dr. Withy regularly recruits additional physicians to participate in the Medical Inquiry and Conciliation Panels.
- 8) 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.
- 9) In addition to these activities, Dr. Withy serves on the Hawai'i Health Workforce Advisory Board, is assisting with Health Professions Shortage Area designations for additional areas of Hawai'i and has provided over 12 informational sessions on workforce shortage, as well as provided de-identified data to 7 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 both the Physician Assistant and Advanced Practice Nurse Practitioner workforce to enhance the accuracy of the demand for healthcare services. 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 a mentoring pipeline to provide knowledge of and connection to practice opportunities across the State. The Bridge to Practice initiative will encourage primary care residents to be mentored by and explore work opportunities in independent practices across Hawai‘i, in hopes of their practicing there upon graduation. A second new, but related, idea is to start a “Doctor’s Club” with regular activities on a monthly basis, such as wine tastings and shows, that will allow for collegial contact and potential educational opportunities for practice and retirement planning.

In addition, a Rural Coordinator will be hired shortly to coordinate all rural recruitment, training and loan repayment activities. Finally, a web based forum for providers to ask insurers questions will be created to help keep changes transparent and all physicians informed about what is happening in the payment arena.

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, 2017.

Appendix 1: 2017 Supply and Demand Calculations

2017 Demand and Supply of Physicians (MD/DO) for the State of Hawaii																									
	State of Hawaii					Oahu County					Hawaii County					Kauai County					Maui County				
	Demand	Supply	Shortage	Shortage without Overages	Percent Shortage	Demand	Supply	Shortage	Shortage without Overages	Percent Shortage	Demand	Supply	Shortage	Shortage without Overages	Percent Shortage	Demand	Supply	Shortage	Shortage without Overages	Percent Shortage	Demand	Supply	Shortage	Shortage without Overages	Percent Shortage
General & Family Practice	520.1	345.5	174.63	175.3	33.70%	355.9	193.1	162.81	162.8	45.75%	75.7	76.34	-0.64	0	0.00%	26.5	24.42	2.08	2.08	7.85%	62	51.62	10.38	10.38	16.74%
General IM	479	400.2	78.85	78.9	16.47%	329.6	316.4	13.24	13.24	4.02%	69.2	35.43	33.77	33.77	48.80%	24.35	15.95	8.4	8.4	34.50%	55.9	32.41	23.49	23.49	42.02%
Pediatrics	246.15	220.3	25.87	26.02	10.57%	167.25	156.3	10.99	10.99	6.57%	36.3	24.87	11.43	11.43	31.49%	12.65	12.75	-0.1	0	0.00%	30	26.4	3.6	3.6	12.00%
Geriatrics	17.05	33.58	-16.53	2.35	13.78%	11.9	29.68	-17.78	0	0.00%	2.45	1.9	0.55	0.55	22.45%	0.9	2	-1.1	0	0.00%	1.8	0	1.8	1.8	100.00%
Allergy & Immunology	20.6	15.1	5.5	5.5	26.70%	14.1	12.8	1.3	1.3	9.22%	3	0.8	2.2	2.2	73.33%	1.05	0.5	0.55	0.55	52.38%	2.45	1	1.45	1.45	59.18%
Cardiology	112.65	81.4	31.25	31.25	27.74%	77.1	62.75	14.35	14.35	18.61%	16.6	5.4	11.2	11.2	67.47%	5.85	1	4.85	4.85	82.91%	13.1	12.25	0.85	0.85	6.49%
Endocrinology	29.3	24.72	4.58	7.2	24.57%	20.35	22.97	-2.62	0	0.00%	4.1	0.75	3.35	3.35	81.71%	1.5	0	1.5	1.5	100.00%	3.35	1	2.35	2.35	70.15%
Gastroenterology	62.55	58.77	3.78	6.1	9.75%	42.7	44.97	-2.27	0	0.00%	9.2	5.4	3.8	3.8	41.30%	3.25	2	1.25	1.25	38.46%	7.45	6.4	1.05	1.05	14.09%
Hematology & Oncology	60.95	39.85	21.1	21.05	34.54%	39.95	30.9	9.05	9.05	22.65%	9.8	2.5	7.3	7.3	74.49%	3.4	2	1.4	1.4	41.18%	7.75	4.45	3.3	3.3	42.58%
Infectious Disease	39.4	11.86	27.54	27.49	69.77%	26.95	10.88	16.07	16.07	59.63%	5.75	0.05	5.7	5.7	99.13%	2	0	2	2	100.00%	4.65	0.93	3.72	3.72	80.00%
Nephrology	34.3	30.97	3.33	3.58	10.44%	23.85	22.52	1.33	1.33	5.58%	4.85	5.05	-0.2	0	0.00%	1.7	0.1	1.6	1.6	94.12%	3.95	3.3	0.65	0.65	16.46%
Pulmonology	55.05	26.62	28.43	28.48	51.73%	37.55	23.87	13.68	13.68	36.43%	8.15	1	7.15	7.15	87.73%	2.85	0.5	2.35	2.35	82.46%	6.55	1.25	5.3	5.3	80.92%
Critical Care	26.5	34.69	-8.19	6.15	23.21%	18.15	32.49	-14.34	0	0.00%	3.9	0.5	3.4	3.4	87.18%	1.4	0	1.4	1.4	100.00%	3.05	1.7	1.35	1.35	44.26%
Rheumatology	19.3	12.47	6.83	6.88	35.65%	13.15	10.6	2.55	2.55	19.39%	2.85	1.5	1.35	1.35	47.37%	1.05	0.1	0.95	0.95	90.48%	2.3	0.27	2.03	2.03	88.26%
General Surgery	116.9	73.39	43.51	43.51	37.22%	79.6	51.64	27.96	27.96	35.13%	17.3	8.8	8.5	8.5	49.13%	6.1	6	0.1	0.1	1.64%	13.9	6.95	6.95	6.95	50.00%
Colorectal Surgery	6.9	3.55	3.35	3.35	48.55%	4.6	3.3	1.3	1.3	28.26%	1.05	0	1.05	1.05	100.00%	0.4	0.25	0.15	0.15	37.50%	0.85	0	0.85	0.85	100.00%
Neurological Surgery	21.2	11.8	9.4	9.35	44.10%	14.45	9.5	4.95	4.95	34.26%	3.15	0.2	2.95	2.95	93.65%	1.05	0.1	0.95	0.95	90.48%	2.5	2	0.5	0.5	20.00%
OB/GYN	185	158.7	26.34	26.34	14.24%	127.8	117.1	10.69	10.69	8.36%	26.45	20.2	6.25	6.25	23.63%	9	5.5	3.5	3.5	38.89%	21.75	15.85	5.9	5.9	27.13%
Ophthalmology	83.8	91.17	-7.37	8.91	10.63%	57.65	73.88	-16.23	0	0.00%	12.05	6.64	5.41	5.41	44.90%	4.25	4	0.25	0.25	5.88%	9.9	6.65	3.25	3.25	32.83%
Orthopedic Surgery	106.85	77.87	28.98	29.03	27.17%	72.95	60.18	12.77	12.77	17.51%	15.65	5.05	10.6	10.6	67.73%	5.55	3.57	1.98	1.98	35.68%	12.75	9.07	3.68	3.68	28.86%
Otolaryngology	42.9	37.24	5.66	5.71	13.31%	29.35	26.84	2.51	2.51	8.55%	6.2	3.6	2.6	2.6	41.94%	2.2	2.3	-0.1	0	0.00%	5.1	4.5	0.6	0.6	11.76%
Plastic Surgery	32	26.62	5.38	7.15	22.34%	21.55	23.27	-1.72	0	0.00%	4.85	1.65	3.2	3.2	65.98%	1.7	0.1	1.6	1.6	94.12%	3.95	1.6	2.35	2.35	59.49%
Thoracic Surgery	20	12.27	7.73	7.68	38.40%	13.55	10.29	3.26	3.26	24.06%	2.95	0.12	2.83	2.83	95.93%	1.05	0.5	0.55	0.55	52.38%	2.4	1.36	1.04	1.04	43.33%
Urology	45.3	33.05	12.25	12.25	27.04%	30.75	26.25	4.5	4.5	14.63%	6.75	1.7	5.05	5.05	74.81%	2.35	2.1	0.25	0.25	10.64%	5.45	3	2.45	2.45	44.95%
Vascular Surgery	12.95	13.38	-0.43	1.17	9.03%	9	10.32	-1.32	0	0.00%	1.85	2.13	-0.28	0	0.00%	0.65	0.05	0.6	0.6	92.31%	1.45	0.88	0.57	0.57	39.31%
Anesthesiology	165.95	135.5	30.44	33.24	20.03%	112.65	97.91	14.74	14.74	13.08%	24.6	11.1	13.5	13.5	54.88%	8.7	11.5	-2.8	0	0.00%	20	15	5	5	25.00%
Dermatology	46.4	52.53	-6.13	5.16	11.12%	31.7	39.64	-7.94	0	0.00%	6.85	3.09	3.76	3.76	54.89%	2.4	1	1.4	1.4	58.33%	5.55	8.8	-3.25	0	0.00%
Emergency Medicine	176.5	192.6	-16.08	18.47	10.46%	105.65	137.4	-31.72	0	0.00%	32.65	27.6	5.05	5.05	15.47%	11.4	14.28	-2.88	0	0.00%	26.75	13.33	13.42	13.42	50.17%
Neonatal-perinatal	22.3	34.77	-12.47	6.65	29.82%	15.25	34.42	-19.17	0	0.00%	3.3	0.25	3.05	3.05	92.42%	1.1	0	1.1	1.1	100.00%	2.6	0.1	2.5	2.5	96.15%
Neurology	75.7	46.32	29.38	29.43	38.88%	51.75	36.38	15.37	15.37	29.70%	11.1	3.9	7.2	7.2	64.86%	3.85	1	2.85	2.85	74.03%	9.05	5.04	4.01	4.01	44.31%
Pain Medicine	0	17.95	-17.95	0	0.00%	0	10.2	-10.2	0	0.00%	0	3.3	-3.3	0	0.00%	0	2	-2	0	0.00%	0	2.45	-2.45	0	0.00%
Pathology	85.75	35.1	50.65	50.6	59.01%	58.65	29.6	29.05	29.05	49.53%	12.65	2.5	10.15	10.15	80.24%	4.4	1	3.4	3.4	77.27%	10	2	8	8	80.00%
Physical Medicine and Rehabilitation	34.45	32.6	1.85	5.45	15.82%	23.65	27.3	-3.65	0	0.00%	4.95	2.28	2.67	2.67	53.94%	1.75	1	0.75	0.75	42.86%	4.05	2.02	2.03	2.03	50.12%
Preventive Medicine	0	6.42	-6.42	0	0.00%	0	5.25	-5.25	0	0.00%	0	0.5	-0.5	0	0.00%	0	0.5	-0.5	0	0.00%	0	0.17	-0.17	0	0.00%
Psychiatry	192.45	177.4	15.04	16.77	8.71%	131.05	132.7	-1.68	0	0.00%	28.3	27.32	0.98	0.98	3.46%	9.9	6.67	3.23	3.23	32.63%	23.25	10.69	12.56	12.56	54.02%
Radiation Oncology	0	16.6	-16.6	0	0.00%	0	8.1	-8.1	0	0.00%	0	3.5	-3.5	0	0.00%	0	2	-2	0	0.00%	0	3	-3	0	0.00%
Radiology	136.2	113.7	22.47	22.47	16.50%	90.95	82.13	8.82	8.82	9.70%	21.15	11.65	9.5	9.5	44.92%	7.3	5.5	1.8	1.8	24.66%	16.8	14.45	2.35	2.35	13.99%
Other Medical Specialties	66.65	241.6	-174.9	0	0.00%	45.2	179.1	-133.9	0	0.00%	9.95	21.2	-11.25	0	0.00%	3.45	11.05	-7.6	0	0.00%	8.05	30.2	-22.15	0	0.00%
Total	3399.1	2978	421.04	768.9	22.62%	2306.3	2203	103.39	381.3	16.53%	505.6	329.8	175.83	195.5	38.67%	177	143	33.71	52.8	29.82%	410.4	302.1	108.31	139.3	33.95%

Appendix 1A: 2017 Supply and Demand Calculations for the State of Hawai'i

	State of Hawaii				
	Demand	Supply	Shortage	Shortage without Overages	Percent Shortage
Infectious Disease	39.4	11.86	27.54	27.49	69.77%
Pathology	85.75	35.1	50.65	50.6	59.01%
Pulmonology	55.05	26.62	28.43	28.48	51.73%
Colorectal Surgery	6.9	3.55	3.35	3.35	48.55%
Neurological Surgery	21.2	11.8	9.4	9.35	44.10%
Neurology	75.7	46.32	29.38	29.43	38.88%
Thoracic Surgery	20	12.27	7.73	7.68	38.40%
General Surgery	116.9	73.39	43.51	43.51	37.22%
Rheumatology	19.3	12.47	6.83	6.88	35.65%
Hematology & Oncology	60.95	39.85	21.1	21.05	34.54%
General & Family Practice	520.1	345.5	174.63	175.3	33.70%
Neonatal-perinatal	22.3	34.77	-12.47	6.65	29.82%
Cardiology	112.65	81.4	31.25	31.25	27.74%
Orthopedic Surgery	106.85	77.87	28.98	29.03	27.17%
Urology	45.3	33.05	12.25	12.25	27.04%
Allergy & Immunology	20.6	15.1	5.5	5.5	26.70%
Endocrinology	29.3	24.72	4.58	7.2	24.57%
Critical Care	26.5	34.69	-8.19	6.15	23.21%
Plastic Surgery	32	26.62	5.38	7.15	22.34%
Anesthesiology	165.95	135.5	30.44	33.24	20.03%
Radiology	136.2	113.7	22.47	22.47	16.50%
General IM	479	400.2	78.85	78.9	16.47%
Physical Medicine and Rehabilitation	34.45	32.6	1.85	5.45	15.82%
OBGYN	185	158.7	26.34	26.34	14.24%
Geriatrics	17.05	33.58	-16.53	2.35	13.78%
Otolaryngology	42.9	37.24	5.66	5.71	13.31%
Dermatology	46.4	52.53	-6.13	5.16	11.12%
Ophthalmology	83.8	91.17	-7.37	8.91	10.63%
Pediatrics	246.15	220.3	25.87	26.02	10.57%
Emergency Medicine	176.5	192.6	-16.08	18.47	10.46%
Nephrology	34.3	30.97	3.33	3.58	10.44%
Gastroenterology	62.55	58.77	3.78	6.1	9.75%
Vascular Surgery	12.95	13.38	-0.43	1.17	9.03%
Psychiatry	192.45	177.4	15.04	16.77	8.71%
Pain Medicine	0	17.95	-17.95	0	0.00%
Preventive Medicine	0	6.42	-6.42	0	0.00%
Radiation Oncology	0	16.6	-16.6	0	0.00%
Other Medical Specialties	66.65	241.6	-174.9	0	0.00%
Total	3399.1	2978	421.04	768.9	22.62%

Appendix 1B: 2017 Supply and Demand Calculations for O‘ahu County

	Oahu County				
	Demand	Supply	Shortage	Shortage without Overages	Percent Shortage
Infectious Disease	26.95	10.88	16.07	16.07	59.63%
Pathology	58.65	29.6	29.05	29.05	49.53%
General & Family Practice	355.9	193.1	162.81	162.8	45.75%
Pulmonology	37.55	23.87	13.68	13.68	36.43%
General Surgery	79.6	51.64	27.96	27.96	35.13%
Neurological Surgery	14.45	9.5	4.95	4.95	34.26%
Neurology	51.75	36.38	15.37	15.37	29.70%
Colorectal Surgery	4.6	3.3	1.3	1.3	28.26%
Thoracic Surgery	13.55	10.29	3.26	3.26	24.06%
Hematology & Oncology	39.95	30.9	9.05	9.05	22.65%
Rheumatology	13.15	10.6	2.55	2.55	19.39%
Cardiology	77.1	62.75	14.35	14.35	18.61%
Orthopedic Surgery	72.95	60.18	12.77	12.77	17.51%
Urology	30.75	26.25	4.5	4.5	14.63%
Anesthesiology	112.65	97.91	14.74	14.74	13.08%
Radiology	90.95	82.13	8.82	8.82	9.70%
Allergy & Immunology	14.1	12.8	1.3	1.3	9.22%
Otolaryngology	29.35	26.84	2.51	2.51	8.55%
OBGYN	127.8	117.1	10.69	10.69	8.36%
Pediatrics	167.25	156.3	10.99	10.99	6.57%
Nephrology	23.85	22.52	1.33	1.33	5.58%
General IM	329.6	316.4	13.24	13.24	4.02%
Geriatrics	11.9	29.68	-17.78	0	0.00%
Endocrinology	20.35	22.97	-2.62	0	0.00%
Gastroenterology	42.7	44.97	-2.27	0	0.00%
Critical Care	18.15	32.49	-14.34	0	0.00%
Ophthalmology	57.65	73.88	-16.23	0	0.00%
Plastic Surgery	21.55	23.27	-1.72	0	0.00%
Vascular Surgery	9	10.32	-1.32	0	0.00%
Dermatology	31.7	39.64	-7.94	0	0.00%
Emergency Medicine	105.65	137.4	-31.72	0	0.00%
Neonatal-perinatal	15.25	34.42	-19.17	0	0.00%
Pain Medicine	0	10.2	-10.2	0	0.00%
Physical Medicine and Rehabilitation	23.65	27.3	-3.65	0	0.00%
Preventive Medicine	0	5.25	-5.25	0	0.00%
Psychiatry	131.05	132.7	-1.68	0	0.00%
Radiation Oncology	0	8.1	-8.1	0	0.00%
Other Medical Specialties	45.2	179.1	-133.9	0	0.00%
Total	2306.3	2203	103.39	381.3	16.53%

Appendix 1C: 2017 Supply and Demand Calculations for Hawai'i County

	Hawaii County				
	Demand	Supply	Shortage	Shortage without Overages	Percent Shortage
Colorectal Surgery	1.05	0	1.05	1.05	100.00%
Infectious Disease	5.75	0.05	5.7	5.7	99.13%
Thoracic Surgery	2.95	0.12	2.83	2.83	95.93%
Neurological Surgery	3.15	0.2	2.95	2.95	93.65%
Neonatal-perinatal	3.3	0.25	3.05	3.05	92.42%
Pulmonology	8.15	1	7.15	7.15	87.73%
Critical Care	3.9	0.5	3.4	3.4	87.18%
Endocrinology	4.1	0.75	3.35	3.35	81.71%
Pathology	12.65	2.5	10.15	10.15	80.24%
Urology	6.75	1.7	5.05	5.05	74.81%
Hematology & Oncology	9.8	2.5	7.3	7.3	74.49%
Allergy & Immunology	3	0.8	2.2	2.2	73.33%
Orthopedic Surgery	15.65	5.05	10.6	10.6	67.73%
Cardiology	16.6	5.4	11.2	11.2	67.47%
Plastic Surgery	4.85	1.65	3.2	3.2	65.98%
Neurology	11.1	3.9	7.2	7.2	64.86%
Dermatology	6.85	3.09	3.76	3.76	54.89%
Anesthesiology	24.6	11.1	13.5	13.5	54.88%
Physical Medicine and Rehabilitation	4.95	2.28	2.67	2.67	53.94%
General Surgery	17.3	8.8	8.5	8.5	49.13%
General IM	69.2	35.43	33.77	33.77	48.80%
Rheumatology	2.85	1.5	1.35	1.35	47.37%
Radiology	21.15	11.65	9.5	9.5	44.92%
Ophthalmology	12.05	6.64	5.41	5.41	44.90%
Otolaryngology	6.2	3.6	2.6	2.6	41.94%
Gastroenterology	9.2	5.4	3.8	3.8	41.30%
Pediatrics	36.3	24.87	11.43	11.43	31.49%
OBGYN	26.45	20.2	6.25	6.25	23.63%
Geriatrics	2.45	1.9	0.55	0.55	22.45%
Emergency Medicine	32.65	27.6	5.05	5.05	15.47%
Psychiatry	28.3	27.32	0.98	0.98	3.46%
General & Family Practice	75.7	76.34	-0.64	0	0.00%
Nephrology	4.85	5.05	-0.2	0	0.00%
Vascular Surgery	1.85	2.13	-0.28	0	0.00%
Pain Medicine	0	3.3	-3.3	0	0.00%
Preventive Medicine	0	0.5	-0.5	0	0.00%
Radiation Oncology	0	3.5	-3.5	0	0.00%
Other Medical Specialties	9.95	21.2	-11.25	0	0.00%
Total	505.6	329.8	175.83	195.5	38.67%

Appendix 1D: 2017 Supply and Demand Calculations for Kaua‘i County

	Kauai County				
	Demand	Supply	Shortage	Shortage without Overages	Percent Shortage
Endocrinology	1.5	0	1.5	1.5	100.00%
Infectious Disease	2	0	2	2	100.00%
Critical Care	1.4	0	1.4	1.4	100.00%
Neonatal-perinatal	1.1	0	1.1	1.1	100.00%
Nephrology	1.7	0.1	1.6	1.6	94.12%
Plastic Surgery	1.7	0.1	1.6	1.6	94.12%
Vascular Surgery	0.65	0.05	0.6	0.6	92.31%
Rheumatology	1.05	0.1	0.95	0.95	90.48%
Neurological Surgery	1.05	0.1	0.95	0.95	90.48%
Cardiology	5.85	1	4.85	4.85	82.91%
Pulmonology	2.85	0.5	2.35	2.35	82.46%
Pathology	4.4	1	3.4	3.4	77.27%
Neurology	3.85	1	2.85	2.85	74.03%
Dermatology	2.4	1	1.4	1.4	58.33%
Allergy & Immunology	1.05	0.5	0.55	0.55	52.38%
Thoracic Surgery	1.05	0.5	0.55	0.55	52.38%
Physical Medicine and Rehabilitation	1.75	1	0.75	0.75	42.86%
Hematology & Oncology	3.4	2	1.4	1.4	41.18%
OBGYN	9	5.5	3.5	3.5	38.89%
Gastroenterology	3.25	2	1.25	1.25	38.46%
Colorectal Surgery	0.4	0.25	0.15	0.15	37.50%
Orthopedic Surgery	5.55	3.57	1.98	1.98	35.68%
General IM	24.35	15.95	8.4	8.4	34.50%
Psychiatry	9.9	6.67	3.23	3.23	32.63%
Radiology	7.3	5.5	1.8	1.8	24.66%
Urology	2.35	2.1	0.25	0.25	10.64%
General & Family Practice	26.5	24.42	2.08	2.08	7.85%
Ophthalmology	4.25	4	0.25	0.25	5.88%
General Surgery	6.1	6	0.1	0.1	1.64%
Pediatrics	12.65	12.75	-0.1	0	0.00%
Geriatrics	0.9	2	-1.1	0	0.00%
Otolaryngology	2.2	2.3	-0.1	0	0.00%
Anesthesiology	8.7	11.5	-2.8	0	0.00%
Emergency Medicine	11.4	14.28	-2.88	0	0.00%
Pain Medicine	0	2	-2	0	0.00%
Preventive Medicine	0	0.5	-0.5	0	0.00%
Radiation Oncology	0	2	-2	0	0.00%
Other Medical Specialties	3.45	11.05	-7.6	0	0.00%
Total	177	143	33.71	52.8	29.82%

Appendix 1E: 2017 Supply and Demand Calculations for Maui County

	Maui County				
	Demand	Supply	Shortage	Shortage without overages	Percent Shortage
Geriatrics	1.8	0	1.8	1.8	100.00%
Colorectal Surgery	0.85	0	0.85	0.85	100.00%
Neonatal-perinatal	2.6	0.1	2.5	2.5	96.15%
Rheumatology	2.3	0.27	2.03	2.03	88.26%
Pulmonology	6.55	1.25	5.3	5.3	80.92%
Infectious Disease	4.65	0.93	3.72	3.72	80.00%
Pathology	10	2	8	8	80.00%
Endocrinology	3.35	1	2.35	2.35	70.15%
Plastic Surgery	3.95	1.6	2.35	2.35	59.49%
Allergy & Immunology	2.45	1	1.45	1.45	59.18%
Psychiatry	23.25	10.69	12.56	12.56	54.02%
Emergency Medicine	26.75	13.33	13.42	13.42	50.17%
Physical Medicine and Rehabilitation	4.05	2.02	2.03	2.03	50.12%
General Surgery	13.9	6.95	6.95	6.95	50.00%
Urology	5.45	3	2.45	2.45	44.95%
Neurology	9.05	5.04	4.01	4.01	44.31%
Critical Care	3.05	1.7	1.35	1.35	44.26%
Thoracic Surgery	2.4	1.36	1.04	1.04	43.33%
Hematology & Oncology	7.75	4.45	3.3	3.3	42.58%
General IM	55.9	32.41	23.49	23.49	42.02%
Vascular Surgery	1.45	0.88	0.57	0.57	39.31%
Ophthalmology	9.9	6.65	3.25	3.25	32.83%
Orthopedic Surgery	12.75	9.07	3.68	3.68	28.86%
OBGYN	21.75	15.85	5.9	5.9	27.13%
Anesthesiology	20	15	5	5	25.00%
Neurological Surgery	2.5	2	0.5	0.5	20.00%
General & Family Practice	62	51.62	10.38	10.38	16.74%
Nephrology	3.95	3.3	0.65	0.65	16.46%
Gastroenterology	7.45	6.4	1.05	1.05	14.09%
Radiology	16.8	14.45	2.35	2.35	13.99%
Pediatrics	30	26.4	3.6	3.6	12.00%
Otolaryngology	5.1	4.5	0.6	0.6	11.76%
Cardiology	13.1	12.25	0.85	0.85	6.49%
Dermatology	5.55	8.8	-3.25	0	0.00%
Pain Medicine	0	2.45	-2.45	0	0.00%
Preventive Medicine	0	0.17	-0.17	0	0.00%
Radiation Oncology	0	3	-3	0	0.00%
Other Medical Specialties	8.05	30.2	-22.15	0	0.00%
Total	410.4	302.1	108.31	139.3	33.95%

Appendix 2: 2017 Physician Workforce Relicensure Survey Questions

The following questions ask for essential information needed by the University of Hawaii John A. Burns School of Medicine for their assessment of the Hawaii 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?