

UNIVERSITY OF HAWAI‘I SYSTEM ANNUAL REPORT



REPORT TO THE 2024 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 2023

Hawai'i Physician Workforce Report 2023

Executive Summary

Of the more than 12,000 licensed physicians in Hawai'i only 3,599 are currently providing patient care to Hawai'i's population. Further, of those practicing, not all physicians practice full-time, thus these 3,599 individuals provide approximately 3,022 Full-Time Equivalents (FTEs) of active patient care. These numbers are 89 providers and 60 FTEs higher than in 2022. The demand model used to estimate how many physicians are needed is based on the US average utilization of physician services by specialty as applied to the demographic characteristics and health risk factors of each of Hawai'i's four counties. Adaptations for geographic barriers and time-sensitive coverage needs were made for practitioners of Emergency Medicine, Critical Care, Orthopedic Surgery, Urologic Surgery, Cardiothoracic Surgery, Vascular Surgery, Neurologic Surgery, and Psychiatry. The demand model indicates the State of Hawai'i needs 3,591 FTEs of practicing physicians, indicating a statewide shortage of 567 FTEs of physician services. However, when the geographic realities of specialty coverage on different islands are addressed, the unmet need for physicians equals 757 FTEs statewide.

The greatest statewide shortage remains in primary care, with 123 FTEs needed in total across all islands. The greatest subspecialty statewide shortages include Pediatric Gastroenterology, Pediatric Endocrinology, Pediatric Pulmonology, Colorectal Surgery, Adult Endocrinology, Thoracic Surgery, and Adult Pulmonology.

Activities pursued by the Physician Workforce team coordinated by our Area Health Education Center (AHEC) to increase the physician population include ongoing recruitment of physicians to Hawai'i through a dedicated recruiter, recruitment booths at national conferences, regularly updated job board at [AHEC.hawaii.edu](https://www.ahec.hawaii.edu); maintaining the workforce database and providing de-identified data for presentations as requested throughout the state; providing continuing education including the Hawai'i Health Workforce Summit (607 participants in 2023) and Project ECHO (4,321 people-hours of case-based education from 1/1/23 to 8/31/23); expanding Educational Loan Repayment to hundreds of individuals since 2012 and assisting in the administration of JABSOM scholarships; supporting neighbor island clinical teaching, travel, lodging, community activities and recruitment of health career-focused learners; assisting with administering the Hawai'i Preceptor Tax Credit; and mentoring young physicians. Activities introduced in 2023 include active recruiting at large physician conferences on the Continent; free anonymous telecounseling for providers; and convening working groups in 8 areas identified as important to building the workforce: administrative simplification; increasing revenue/pay; expanding housing opportunities; facilitating interprofessional practice; incentivizing healthy patient behavior; expediting credentialing and licensing; streamlining electronic health record use and sharing; and expanding telehealth.

Background

Recent national estimates of physician supply indicate a current shortage of between 40,000 and almost 60,000 practicing physicians in the United States, and this shortage is expected to grow to 139,000 physicians by the year 2033.¹ Much of this projected shortage is attributed to an aging population which will require more medical care, and an aging physician workforce which is increasingly considering retirement.¹ The Federation of State Medical Boards in 2018

estimated that 30% of licensed physicians were already over the age of 60.² Furthermore, COVID is negatively affecting practicing physicians, both physically and psychologically.³ Burnout, moral distress, and compassion fatigue are prevalent in physicians working with COVID patients.⁴ Hawai'i has not been spared from these phenomena. This report outlines the activities undertaken to measure and remedy the physician shortage in the state.

Project Methodology

Supply

The supply of physicians in Hawai'i is estimated based on a voluntary relicensure survey, queries of local community contacts, internet searches, and direct calling of physician offices to confirm hours of active patient care. The phone calls were performed by staff from the Area Health Education Center (AHEC) office at the University of Hawai'i John A. Burns School of Medicine and trained pre-health interns working with the AHEC. The script used is included in Appendix 1. It includes confirming whether the physician works at the office, his/her specialty, how many hours s/he works each week on average, if s/he has other office locations or has partners working in the office. These numbers are converted to a Full Time Equivalent (FTE) based on a 40-hour week representing 1.0 FTE. Although many physicians work more than 40 hours a week, this number is used as a baseline for full-time effort and 1.0 is the maximum allocation given to a physician.

Demand

There is no perfect estimate of the ideal number of physicians per population or physician mix for an island population such as ours in Hawai'i. Therefore, a demand model was purchased from a well-known healthcare workforce modeling organization¹ which does demand estimates for the federal government and other large organizations. The model was purchased from IHS Global in 2021. 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 associate 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 healthcare delivery patterns that convert demand for healthcare services to demand for FTE of 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 of 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

¹ IHS Markit, <https://ihsmarkit.com/index.html>

statistics by county for factors such as the prevalence of obesity, diabetes, current smoking status, and other risk factors used in the model.

All data used in this model originated from sources before the COVID-19 pandemic, so this data does not reflect changes in physician use patterns due to the global pandemic. The numbers included in this report are based on average demand for services under normal healthcare circumstances, not a situation of unusual demand patterns such as we have seen since March 2020. The new model also has pediatric subspecialty estimates for most subspecialties which were not available previously.

Applying the IHS Markit model to Hawai'i produced estimates of physician demand by specialty representing the demand for service if the 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. To adapt to the island geography of Hawai'i, three changes were made to the model in collaboration with the model's creators:

1. Tourist use of emergency care: Emergency physician demand was increased to cover the percentage of Emergency Department (ED) visits which were made by non-residents in each county. The hospital ED visit numbers were obtained for 2016-2019² and ED and inpatient demand was increased by the percentage of non-residents receiving emergency care in that county.
2. Emergent surgical and intensive care services: Based on current research of best practices,^{3,4} the research team believes that every patient should be within half an hour of a hospital with available intensive care and emergency surgical capabilities to provide orthopedic, urologic, cardiothoracic, neurologic and vascular care. However, this is not possible on all islands of Hawai'i. Therefore, to create a best-case, but reasonable scenario, each island with a Level III or higher trauma center (Kaua'i, O'ahu, Maui, and Hawai'i Island) was estimated to need at least 2.0 FTE of intensivists and surgeons from the specialties noted above (orthopedic, urologic, cardiothoracic, neurologic and vascular care). Hawai'i Island was estimated to need twice that due to its geographic size (4.0 FTE). This method slightly increased the estimated demand for adult critical care and neurosurgery on all neighboring islands other than Oahu, as well as cardiovascular surgery and vascular care in Kaua'i and Hawai'i Counties, and Urology on Kaua'i. Of course, a group of only two providers in a community for a discipline is challenging to maintain due to on-call responsibilities. Unfortunately, it would be difficult to support much larger practices in rural areas, and, given physician reimbursement levels in Hawai'i, the market may not be able to support what is recommended here.

² Hospital billing data archive of the Laulima Data Alliance. Analyzed by Hawai'i Department of Health and provided to research team.

³ McCrum, M. L., Wan, N., Lizotte, S. L., Han, J., Varghese, T., & Nirula, R. (2021). Use of the spatial access ratio to measure geospatial access to emergency general surgery services in California. *The journal of trauma and acute care surgery*, 90(5), 853–860.

⁴ <https://www.facs.org/-/media/files/quality-programs/trauma/vrc-resources/resources-for-optimal-care.ashx>

3. Psychiatry demand: The need for Psychiatry care has long been reportedly underestimated. The most recent assessment of Psychiatry demand in Hawai'i is 20.5/100,000 population.⁵ This number is between the range of numbers estimated in different national publications of 3.9⁶ to 25.9⁷ per 100,000 population. To find the number of adult and child psychiatrists needed per county, the ratio was multiplied by the population of each county and then divided into the percentage of adult to child psychiatrists estimated in the IHS Markit demand model. Use of this ratio greatly increased psychiatrist demand estimations and, the authors believe, more accurately reflects the need in Hawai'i.

These changes are incorporated into the tables in Appendices 2 and 3.

Shortage

The shortage is calculated in two ways. The first is by simply subtracting supply from demand. This number is included on the Supply and Demand tables starting in Appendix 2 as "Shortage". An estimate which considers geographic differences of an island state is included in the Supply and Demand tables in Appendix 2 as "Without overage". This means that for all specialties other than primary care, any overage (i.e., when physician supply is more than demand on an island) is zeroed out, as it is unlikely a specialty physician can fill in for a physician of another specialty. Thus, the excess of physicians in a discipline is of no advantage to the other Hawaiian Islands and is eliminated from the calculation. The exception to this practice is primary care, as the four professions in primary care (Internal Medicine, Pediatrics, Family Medicine, and Geriatrics) can usually cover each other and thus an overage in one area of primary care was not zeroed out. The percentage of shortage is then calculated by dividing the total "Without overage" number by the demand (Demand minus Supply without overage)/Demand).

Other Data Collection

Physician age and gender are obtained as available from internet searches and the licensure survey. Retirement, death, decreased time practicing, and moved out of state status were obtained from community contacts, internet searches, or the physician's office upon phone call.

Project Results

Workforce statistics obtained from relicensure survey, internet searches, public records, community contacts, and calling of physician offices indicate that in 2023, Hawai'i has approximately 3,022 FTEs of physicians caring for patients.

⁵ Aaronson A, Withy K. Does Hawai'i Have Enough Psychiatrists? Assessing Mental Health Workforce Versus Demand in the Aloha State. *Hawaii J Med Public Health*. 2017 Mar;76(3 Suppl 1):15-17. PMID: 28435753; PMCID: PMC5375008.

⁶ <https://openminds.com/store/the-2018-open-minds-state-by-state-guide-to-estimating-the-number-of-psychiatrists-an-open-minds-market-intelligence-report/>

⁷ Satiani, A., Niedermier, J., Satiani, B., & Svendsen, D. P. (2018). Projected Workforce of Psychiatrists in the United States: A Population Analysis. *Psychiatric services (Washington, D.C.)*, 69(6), 710–713. <https://doi.org/10.1176/appi.ps.201700344>

Table 1: Hawai'i Physician Supply Trend (in Full Time Equivalents)

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
FTE	2894	2802	2806	2903	2978	2927	2974	2812	2857	2962	3022

The demand model based on US average physician use when applied to Hawai'i's four counties indicates the State of Hawai'i needs 3,591 FTEs of practicing physicians. This indicates a shortage of 569 FTE of physician services. However, when island geography is considered (i.e., eliminating specialty overage), the estimated unmet need for physicians increases to 757 FTEs. County-level differences are listed below.

Table 2: Shortage by County (Prior year numbers in parentheses)

	Hawai'i County	Honolulu County	Kaua'i County	Maui County	Statewide
Shortage	206(183)	318(382)	52(45)	181(167)	757(776)
Percent	41% (37%)	13%(15)	30%(26)	43%(40)	21%(22)

Table 3: Primary Care Shortage by County (Prior year numbers in parentheses)

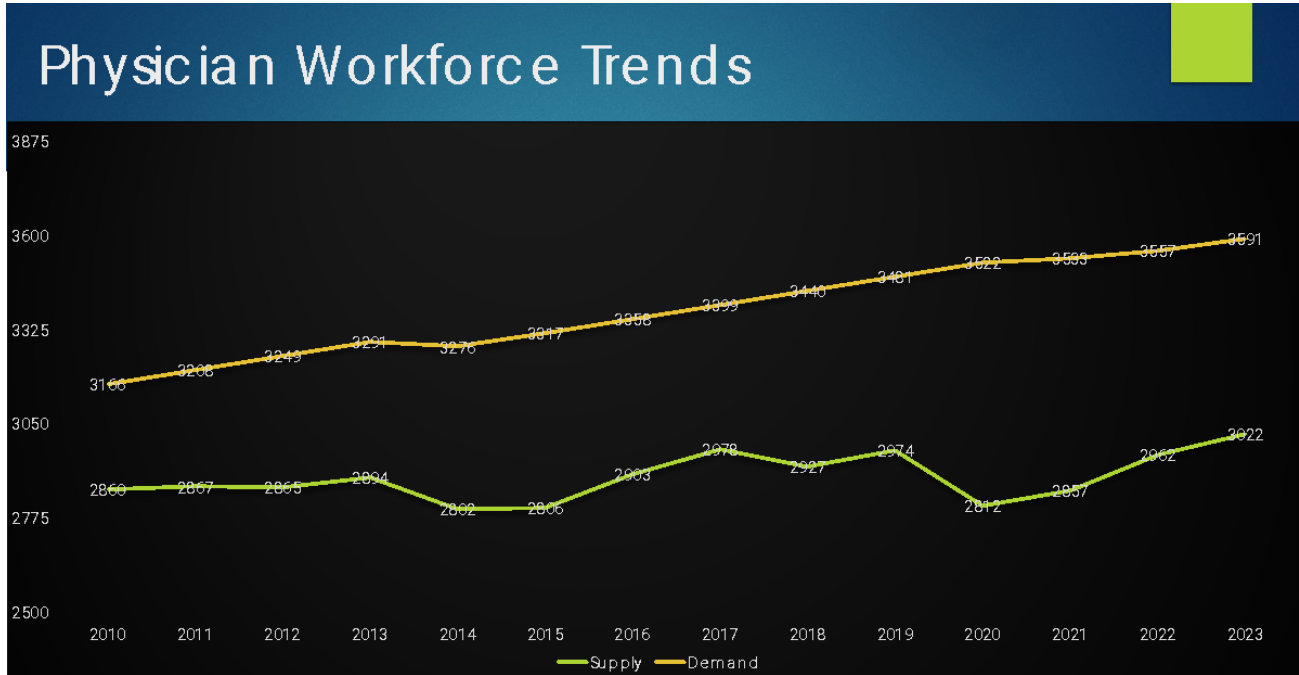
	Hawai'i County	Honolulu County	Kaua'i County	Maui County	Statewide
Shortage	17 (12)	59 (106)	6 (0)	42 (44)	123 (162)
Percent	12% (9)	7% (14)	11% (0)	33%(36)	11% (15)

Additional facts about the active physician workforce in Hawai'i

- ▶ Our practicing physicians range from age 30 to age 89 in age. The average age is 54.3 years (compared to 53.2 US average) up slightly from 53.3 in 2022.
- ▶ Currently 22% of our physicians are already age 65 years or over, constituting 706 practicing physicians. (up slightly from 21% in 2022)
- ▶ Women make up 39% of the physician workforce.
- ▶ At least 42 physicians retired, 4 passed away, 55 moved away, 212 decreased work time, 90 increased time, and the state gained over 200 new docs.

The documented physician workforce changes since the Hawai'i Physician Workforce Assessment began are outlined in Figure 1 below.

Figure 1: Physician Workforce Assessment Findings from 2010 to Present



Please note that in 2021, a new demand model was employed, without an adequate adjustment for Psychiatry. This was corrected in 2022 and represented here.

Table 4: Greatest Subspecialty Shortages by Percentage, Statewide

Specialty	FTE Shortage	Percent Short
Child Gastroenterology	5.5	66%
Child Endocrinology	5	64%
Child Pulmonology	3.5	64%
Colorectal Surgery	6.9	64%
Adult Endocrinology	17	60%
Thoracic Surgery	11.3	55%
Adult Pulmonology	31.5	54%

2023 Individual Specialty Shortages by County in Rank Order of Percent Shortage Estimates tables are included in Appendix 3.

Future Trends

The demand model predicts our demand will increase by at least 30 FTE a year. If we only increase our workforce by 60 FTE a year, we will not meet our demand in the foreseeable future. However, IF we can maintain adding 100 new physician FTEs a year to the workforce, it may be possible to meet our demand by the year 2031.

Solutions Being Implemented

Ongoing Physician Workforce activities designed to grow, keep, and support the physician workforce.

Expand the Pathway to Health Careers

- ❖ Recruit the Future Physician Workforce: Very exciting things are happening in the recruitment of students into healthcare careers.
- ❖ The Health Sector Partnership is bringing together the industry to work with Academia and has created the capability for training certifications to be provided in high school so that students enter health careers as soon as they graduate high school. The areas of training include:

Table 5: Schools Providing Certificate Training 2022-2023

Island	High School	Program/Class
Oahu	Farrington	Certified Nurse Aide, Medical Assistant
Oahu	Farrington	Patient Service Representative
Oahu	Kailua	Phlebotomy
Oahu	Castle	Certified Nurse Aide
Oahu	Wai'anae	Patient Service Representative
Kauai	Kauai High	Certified Nurse Aide
Hawaii	Honoka'a	Medical Assistant
Hawaii	Waiākea	Certified Nurse Aide/ Nurse Aide
Maui	Maui High	Certified Nurse Aide

- ❖ The AHEC team has engaged over 4,000 health professions students in activities during 2023. Health career activities have been expanded to reach students on all neighboring islands. Through federal grant funding, AHEC provides mentoring, counseling support, and activities so that students from throughout Hawai'i can successfully pursue careers in the health professions. Participating AHEC students receive certification and training in Cardio Pulmonary Resuscitation (CPR), First Aid, Youth Mental Health First Aid, and Occupational Safety Administration procedures, Health Information Portability and Accountability Act (HIPPA) procedures, as well as training in science, technology, engineering, and mathematics through real-life data acquisition, public speaking, leadership, research literacy, teamwork abilities, interview skills, professionalism, time management, and financial planning methods. The free PreHealth Career Corps program for students pursuing health careers now has over 3,000 students. More information is available at <https://www.ahec.hawaii.edu/phcc/>. AHEC is also working with the Healthcare Association of Hawai'i to bolster non-physician health professions to lighten the load on the physicians by maximizing teamwork and collaboration and assisting with other University of Hawai'i programs and the Health Sector Partnership activities which increase students pursuing health careers.
- ❖ Physician Recruitment: AHEC has hired a statewide physician recruiter to help recruit physicians to Hawai'i. In addition, AHEC posts all physician job openings online through collaboration with the Hawai'i Physician Recruiters Group. The [AHEC.hawaii.edu](https://www.ahec.hawaii.edu) website advertises job opportunities in Hawai'i to providers interested in practice and disseminates information. This endeavor includes personnel searching the web for all available postings and working with recruiters to post their jobs. Physician practices wishing to hire or transition

their practice are offered assistance with the creation of an advertisement for a new provider. Direct assistance has been provided for 12 practices during the current year to connect to a new provider. Outreach contact is planned for all JABSOM medical school and residency graduates as potential recruits.

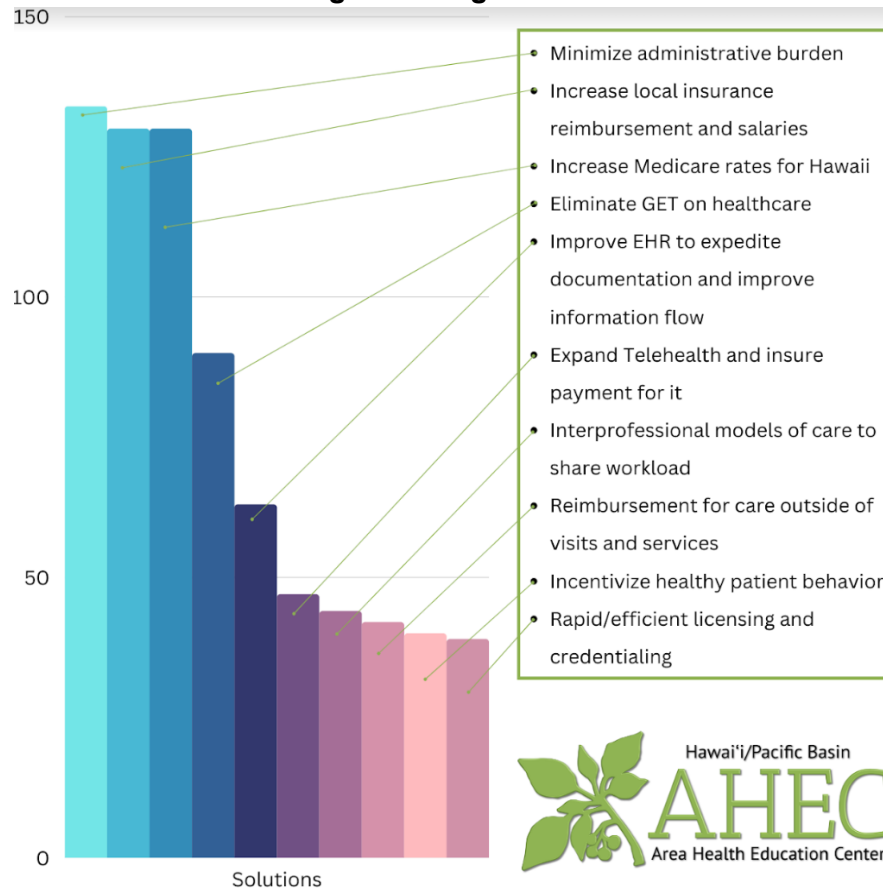
- ❖ Support for upskilling-AHEC makes a promise to any student in Hawai'i who wants to pursue or upskill in health careers to assist them. Through our PreHealth Career Corps and non-traditional student programs, we will help every step of the way. More info at: <https://www.ahec.hawaii.edu/programs-for-students/>
- ❖ Teacher and Counselor Training Conferences annually are being introduced through a collaboration between AHEC, JABSOM Admissions and funded with a grant from the Hawai'i Department of Labor and Industrial Relations. Conferences on every island are being planned to alert teachers and counselors to all the above resources and develop other additional resources needed.
- ❖ Expand Rural Training Opportunities: AHEC works 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, support travel and lodging for students to perform rural experiences and document the impact of rural activities on rural health professions training. The Chan-Zuckerburg Initiative is an exciting JABSOM program for six medical students a year to maximize training time on Kaua'i, receive full scholarships, and spend at least 4 years working on Kaua'i after residency.
- ❖ Recruit Physicians from Elsewhere to Hawai'i: AHEC works with all the physician recruiters in Hawai'i to maximize messaging to physicians. These efforts include a job board at ahec.hawaii.edu to list all open positions for physicians. It also involves the UH JABSOM Hawai'i Physician Recruiter and Dr. Withy traveling to primary care conferences in the Continent to recruit physicians. The first conference will be the American Academy of Family Physicians.
- ❖ Research into what it will take to bring doctors back to Hawai'i who have Hawai'i licenses. Two studies are taking place to determine what is needed to recruit and retain physicians in Hawai'i. The first is a medical student-inspired survey of salary/compensation compared to average salary/compensation on the US Continent. The second is a focus group survey of physicians who left Hawai'i, or who have licenses in Hawai'i, but don't practice here, to determine what it would take to recruit and retain them. This is in collaboration with Omnitrak.
- ❖ Incentives: 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 rural incentives, community welcoming of providers, and increase the ability for spouses to find jobs.

- ❖ Low Interest, Low Down Payment Loans for Physicians: AHEC is working with multiple banks to bring physicians access to banking services, especially low-interest/low-down payment loan packages for purchasing homes or practice resources.
- ❖ Scholarships: In addition, the AHEC Office has agreed to oversee the repayment responsibilities for new JABSOM scholarships which require recipients to practice in Hawai'i after graduation. AHEC anticipates creating a medical school scholarship for a student who has excelled in the AHEC program through their pursuit of medical school and training.

Retain Physicians Working in Hawai'i

- ❖ New Physician Mentoring Program: Thomas Hao, the Hawai'i physician recruiter, has created the Alaka'i program for mentoring and providing cultural awareness to new physicians moving to Hawai'i to practice. This program matches new physicians to established providers for mutual information sharing and support. AHEC Alaka'i is a 1-to-1 mentorship program designed specifically to help physicians grow and succeed in Hawai'i. More information is available at <https://www.ahec.hawaii.edu/get-connected/>.
- ❖ Educational Loan Repayment: The most exciting change in 2023 is that Governor Green, MD, has allocated \$30,000,000 for the Hawai'i Health Education Loan Repayment Program (HELP) for all healthcare providers who take 30% public insurance. This is in addition to the federally funded State Loan Repayment Program (HSLRP) which provides \$800,000 of loan repayment a year. Together this is expected to provide loan repayment to hundreds of residents in training and healthcare workers statewide every year. In the first month since creation, 806 applications have been received for this program. More information on the program can be found at: <https://www.ahec.hawaii.edu/hawai%ca%bbi-help/>
- ❖ Continuing Education: The 2023 Hawai'i Health Workforce Summit offered seven and a half hours of Continuing Education Credit to 607 participants, both in person and virtually. The Summit addressed topics including Administrative Supplementation, Interprofessional Team-Based Care Ideas, Geriatric Practice Expertise, Recognition and Treatment of Substance Use Disorder, Pediatric Mental Health and Rural Health Practice, and Improved Rural Health. The participant evaluation demonstrated a high level of satisfaction with the event and improvement in knowledge. In 2022, all participants were asked to identify the top five actions to increase the health workforce in Hawai'i. The results are shown in Figure 3.

Figure 3: Top Solutions for Recruiting/Retaining Healthcare Providers in Hawai'i



In a follow up survey of how to improve administrative burden, 117 physicians answered that these were the important categories for improvement:

- 112 physicians voted on solutions
- Qualitative analysis of themes indicated nine areas of concern in the order of mention:
 - *Prior Authorization*
 - *Training or personnel hires*
 - *EMR-Ease of use and communication between*
 - *Billing*
 - *Credentialing/licensure*
 - *Quality Metrics*
 - *Pharmacy*
 - *Telehealth*
 - *Travel (patients or providers)*

In the intervening year, a task force was started including independent and employed physicians, as well as four of the local insurance companies to improve Administrative Simplification. This resulted in sharing of a standardized prior authorization form, and additional clarifications to facilitate streamlined practice. While this task force continues to meet, it is not the only need uncovered at the Summit. Therefore, at the Summit in 2023, participants were asked to select a committee to join to create solutions. The responses are outlined below:

1. Interprofessional models of care (33)
2. Increase local reimbursement and salaries (30)
3. Incentivize healthy patient behavior (29)
4. Rapid licensing and credentialing (26)
5. Eliminate GET on healthcare expenses (20)
6. Expand telehealth (19)
7. Administrative simplification (18)
8. Improve EHR (16)
9. Reimbursement for care outside of visits and services (15)
10. Increase Medicare rates (12)

The four topics covering income/reimbursement will be combined into one and working groups will be forming or increasing in size and working to improve retention for health professionals in Hawai'i.

In addition, the ECHO Hawai'i project provided over 4,321 person-hours of continuing education to 1,109 unique individuals between January 1 and August 31, 2023, covering the topics of Behavioral Health, Medications for Opioid Use Disorder, Geriatrics and Pediatrics. The three ongoing options for case-based distance education supported by AHEC are described at www.hawaiiecho.info.

- Behavioral Health ECHO Every Tuesday noon to 1 PM
 - Geriatrics ECHO Every second Wednesday noon to 1 PM
 - Pediatrics ECHO Every first and third Wednesday noon to 1 PM
- ❖ Malpractice Improvement: Assistance with the Medical Inquiry and Conciliation Panel (MICP) is offered for finding medical specialists and other physicians to serve on this required element of the State malpractice system. The MICP provides a kinder, gentler system of malpractice for physicians working in Hawai'i than was previously available. Dr. Withy regularly participates and finds specialists to work with the attorney representative on MICP panels.
 - ❖ Preceptor Tax Credit: AHEC is instrumental in implementing the Hawai'i Health Preceptor Tax Credit for preceptors offering professional instruction, training, and supervision to students and residents in medicine, advanced practice nursing, and pharmacy. In 2019, the first year of implementation, \$371,000 in tax credit was provided to 181 providers, and in 2020, 185 providers received \$368,000 in tax credit. In 2021, \$559,000 of tax credits were provided to 253 Preceptors. In 2022, 301 preceptors received a total of \$645,000 in tax credits. Because of this program, 57 new preceptors have been teaching Hawai'i's pharmacy, nurse practitioners, medical students, and medical residents since 2019. More information is available at: <http://preceptortaxcredit.hawaii.edu/>.
 - ❖ Physician Resiliency: Dr. Withy has held a monthly Balint group for providers interested in sharing about work stress in a safe environment. While individual organizations provide support groups, we are searching for additional resources for wellness support. Therefore,

providers are being offered free anonymous counseling support if needed.

- ❖ **Free Telepsych for Rural Areas:** In collaboration with Hawai'i State Rural Health Association, AHEC is supporting a network of behavioral health and addiction providers who offer telecounseling and support to all rural individuals as requested, to include free computers, computer training, and internet if needed. More information is available at: <https://hawaiiutelehealth.org/>.
- ❖ In addition to these activities, Dr. Withy serves on the Hawai'i Health Workforce Advisory Board. She is also assisting with the Health Professional Shortage Area designations for additional areas of Hawai'i and has provided informational sessions on workforce shortage, as well as provided de-identified data to multiple organizations during 2023.

Next Steps

The Physician Workforce Research Team will continue to conduct the research and implement the solutions described above.

Dr. Withy is working closely with the University of Hawai'i Center for Rural Health Research and Policy and the Hawai'i Physician Shortage Crisis Task Force, a group of 60 physicians and community members who, along with local and federal lawmakers, seek to improve conditions for physicians. Efforts include working toward an improved Medicare fee schedule and lifting of state general excise tax requirements associated with Medicare and Medicaid patient visits, which physicians must pay out of the insurance payments received. For Medicare and Medicaid, physicians are not allowed to pass these required charges (taxes) on to patients so must pay them out of the billings received. Progress has been slow but steady.

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. It is hoped that this program will encourage physician residents and fellows to practice in healthcare need areas upon graduation and assist physicians who want to retire.

A new program, "Young Doctor's Hui", will begin with quarterly social and professional activities to build collegial networks and potential educational opportunities associated with careers for young physicians. This was put on hold during the pandemic and will now be implemented.

Finally, to retain physicians, AHEC is working with economists, banks, donors, and investors to create methods for physicians and other healthcare workers to be able to purchase a home with a manageable mortgage. The discussion began at the 2022 Hawai'i Health Workforce Summit, and a workgroup specific to housing that can generate multiple options for physicians is forming as well as the workgroups mentioned previously. The hope is that if a physician can receive loan repayment and buy a house, they will be more likely to work and stay in Hawai'i.

More information on ongoing and upcoming activities is available at the AHEC website: www.ahec.hawaii.edu or call (808) 692-1060. Dr. Kelley Withy may be reached at (808) 692-1070 or via email withy@hawaii.edu.

Appendix 1: Physician Research Telephone Script

Please review each entry before calling. Physician offices may be busy, especially under current circumstances. You want to be prepared for any changes to data or sudden disruptions during the call. Among the various details we're confirming and updating, the most important are FTE, physician specialty, contact information, and address.

"Hi, I'm _____ with the UH Medical School Area Health Education Center doing physician workforce research."

(If they ask about our research: The purpose of this research is to identify where the largest shortages are so we can develop programs to recruit providers such as loan repayment programs).

"I'm calling to see if _____ works here."

(If YES) "I have a few questions regarding this physician to update our database, would you or Dr. _____ be able to assist us in our research?"

(If the receptionist doesn't feel comfortable, ask for an office manager. Otherwise, ask if you can leave a message or if there is a better time to call back)

"Does Dr. _____ work full time?" (If they ask, full time is 40+ hours per week) (If NO) "How many hours at this office?"

"I wanted to confirm Dr. _____'s specialty. Is it **[insert found specialty]**?"

"Is this the best **contact phone number** for the office/Dr. _____?"

"I have the office/hospital **address** as _____. Is this correct?"

"Does s/he work at any **other clinic locations**?" (If YES) "Would you happen to have the location and/or phone number?" You'll call this second location to confirm FTE and other practice details. Some physicians may have more than two locations. Add any additional information to the 'Notes' column. Be sure to confirm FTE at every location you find.

"How many **other physicians** work at this location?" This is group size.

"Thank you very much for your time and for supporting our work!"

ALWAYS BE POLITE AND THANK THEM FOR THEIR TIME. If they have any further questions that you don't know the answers to, you can direct them to me. My email is withy@hawaii.edu, or they may call at 808-692-1070.

"I'm not sure, but I can give you the contact of my supervisor! The Area Health Education Center's Director is Kelley Withy, and you can reach her at **[insert email or phone number or both, whichever they request]**"

If busy:

1. Would I be able to send an email or fax our survey?

2. Is there a better time to call back, or someone else available I can talk to?

3. Leave a voicemail with your name, the reason for your call, the best time to reach you, and your contact number. Repeat this a second time in case they didn't hear the first time. You may want to create your own voicemail script to help with leaving messages.

If the health professional doesn't work there anymore:

Would you happen to know if they moved practice locations, moved out of state, or retired?
(obtain new address if moved)

Appendix 2: Supply and Demand Tables Statewide and by County

Table 6: Statewide Supply and Demand Estimates by Primary Care

Specialty (Primary Care)	Demand	Supply	Difference	% Shortage
Family Medicine	437.3	351.4	85.9	20%
General Internal Medicine	410.6	363.3	47.3	12%
Geriatric Medicine	30	42.7	-12.7	0%
Pediatrics	232.4	230.2	2.2	1%
Primary Care Total	1110.3	987.6	122.7	11%

Table 7: Statewide Supply and Demand Estimates by Medical Specialties

Specialty (Medical Specialties)	Demand	Supply	Difference	W/o overage	% Shortage
Allergy & Immunology	20.7	11.4	9.3	9.3	45%
Dermatology	35.3	56.7	-21.4	0.8	2%
Infectious Diseases	39.1	22.1	17	17	43%
Neonatology	25.6	23.8	1.8	8	31%
Nephrology+	48.2	33.1	15.1	15.1	31%
Adult Cardiology	104.9	76.7	28.2	28.2	27%
Pediatric Cardiology	7.1	6.4	0.7	1.2	17%
Adult Critical Care+	19.3	37.1	-17.8	6	31%
Pediatric Critical Care	2.7	5	-2.3	0.8	30%
Adult Endocrinology	28.4	11.4	17	17	60%
Pediatric Endocrinology	7.8	2.8	5	5	64%
Adult Gastroenterology	64.2	55.7	8.5	10.8	17%
Pediatric Gastroenterology	8.3	2.8	5.5	5.5	66%
Adult Hematology & Oncology	44.9	28.3	16.6	16.6	37%
Pediatric Hematology & Oncology	7.4	5.8	1.6	1.6	22%
Adult Pulmonology	58	26.5	31.5	31.5	54%
Pediatric Pulmonology	5.5	2	3.5	3.5	64%
Adult Rheumatology	22.8	12.3	10.5	10.5	46%
Pediatric Rheumatology	1.3	2.2	-0.9	0.4	31%
Medical Specialties Total	551.5	422.1	129.4	188.8	34%

Table 8: Statewide Supply and Demand Estimates by Surgical Specialties

Specialty (Surgery)	Demand	Supply	Difference	W/o overage	% Shortage
Colorectal Surgery	10.8	3.9	6.9	6.9	64%
General Surgery	95.1	97.3	-2.2	7.9	8%
Neurological Surgery+	16.9	14	2.9	6.7	40%
Obstetrics & Gynecology	165.6	170.4	-4.8	2.5	2%
Ophthalmology	84	91.1	-7.1	16.2	19%
Orthopedic Surgery+	91.6	83	8.6	8.6	9%
Otolaryngology	38.1	30.2	7.9	7.9	21%
Plastic Surgery	30.3	25.2	5.1	6	20%
Thoracic Surgery+	20.6	9.3	11.3	11.3	55%
Urology+	37	31.4	5.6	6.2	17%
Vascular Surgery+	21.6	17.1	4.5	4.5	21%
Surgery Total	611.6	572.9	38.7	84.7	14%

Table 9: Statewide Supply and Demand Estimates by Other Specialties

Specialty (Other)	Demand	Supply	Difference	W/o overage	% Shortage
Anesthesiology	176.2	151.2	25	27.9	16%
Emergency Medicine*	277.8	204.1	73.7	77.6	28%
Other Specialties***	148.4	99	49.4	49.8	34%
Pathology	64.8	38	26.8	26.8	41%
Physical Medicine & Rehabilitation	37.7	30.6	7.1	9.1	24%
Radiation Oncology	18	19.7	-1.7	0.8	4%
Radiology	99	87.8	11.2	21	21%
Adult Neurology	52.5	44.6	7.9	8	15%
Pediatric Neurology	6.7	6.4	0.3	2.4	36%
Adult Psychiatry**	228.4	133.4	95	95	42%
Child/Adolescent Psychiatry**	69.4	38.1	31.3	31.3	45%
Other Specialties Total	1178.9	852.9	326	349.7	30%
Hospital Medicine	138.4	187.8	-49.4	11.1	8%
Grand Total (Statewide)	3,590.7	3,023.3	567.4	757	21%

*Increase in demand to reflect non-resident increase in utilization on each island.

**Calculated 20.5 per 100,000 population divided between adult & pediatric specialists as indicated by the population-based IHS model.

***Other Specialties include: Concierge, Complimentary/Alternative Medicine, Medical Genetics, Occupational Medicine, Palliative Care, Pain Medicine, Preventive Medicine, Sleep Medicine, Urgent Care, and Wound Care.

+All residents should be within 60 minutes of care, so each island has at least 2 providers, and Hawai'i Island has a minimum of 4 providers.

^ Not calculated as primary care can cover other primary care in most cases.

Table 10: Hawai'i County Physician Supply/Demand Estimates by Primary Care

Specialty (Primary Care)	Demand	Supply	Difference	W/o overage	% Shortage
Family Medicine	69.3	74.3	-5	-5	0
General Internal Medicine	43.9	26	17.9	17.9	41
Geriatric Medicine	2.3	1.8	0.5	0.5	22

Pediatrics	28	24.9	3.1	3.1	11
Primary Care Total	143.5	127	16.5	Not Calc^	12

Table 11: Hawai'i County Physician Supply/Demand Estimates Medical Specialties

Specialty (Medical Specialties)	Demand	Supply	Difference	W/o overage	% Shortage
Allergy & Immunology	2.2	1.1	1.1	1.1	50%
Dermatology	4.7	5.2	-0.5	0	0%
Infectious Diseases	5.5	1	4.5	4.5	82%
Neonatology	3.9	0	3.9	3.9	100%
Nephrology+	6.7	2.5	4.2	4.2	63%
Adult Cardiology	13.8	7	6.8	6.8	49%
Pediatric Cardiology	0.6	0.3	0.3	0.3	50%
Adult Critical Care+	4	0	4	4	100%
Pediatric Critical Care	0.4	0	0.4	0.4	100%
Adult Endocrinology	3.1	0.1	3	3	97%
Pediatric Endocrinology	1.1	0	1.1	1.1	100%
Adult Gastroenterology	7	4.1	2.9	2.9	41%
Pediatric Gastroenterology	0.5	0	0.5	0.5	100%
Adult Hematology & Oncology	6	1.5	4.5	4.5	75%
Pediatric Hematology & Oncology	0.9	0.3	0.6	0.6	67%
Adult Pulmonology	6.6	0	6.6	6.6	100%
Pediatric Pulmonology	0.4	0	0.4	0.4	100%
Adult Rheumatology	3	1.3	1.7	1.7	57%
Pediatric Rheumatology	0.2	0	0.2	0.2	100%
Medical Specialties Total	70.6	24.4	46.2	46.7	66%

Table 12: Hawai'i County Physician Supply/Demand Estimates Surgical Specialties

Specialty (Surgery)	Demand	Supply	Difference	W/o overage	% Shortage
Colorectal Surgery	1.7	0	1.7	1.7	100%
General Surgery	17.4	13	4.4	4.4	25%
Neurological Surgery+	4	0.9	3.1	3.1	78%
Obstetrics & Gynecology	21	18.5	2.5	2.5	12%
Ophthalmology	12.8	3.1	9.7	9.7	76%
Orthopedic Surgery+	14.5	11.3	3.2	3.2	22%
Otolaryngology	5.1	2.2	2.9	2.9	57%
Plastic Surgery	4	1.5	2.5	2.5	63%
Thoracic Surgery+	4	0	4	4	100%
Urology+	5.2	2	3.2	3.2	62%
Vascular Surgery+	4	2.5	1.5	1.5	38%
Surgery Total	93.7	55	38.7	38.7	41%

Table 13: Hawai'i County Physician Supply and Demand Estimates-Other Specialties

Specialty (Other)	Demand	Supply	Difference	W/o overage	% Shortage
Anesthesiology	26	7	19	19	73%
Emergency Medicine*	37.8	30.4	7.4	7.4	20%
Other Specialties	20.4	12.4	8	8	39%
Pathology	9.4	3	6.4	6.4	68%
Physical Medicine & Rehabilitation	7.4	1.4	6	6	81%
Radiation Oncology	2.4	1.9	0.5	0.5	21%
Radiology	17.7	7.2	10.5	10.5	59%
Adult Neurology	6.3	1.1	5.2	5.2	83%
Pediatric Neurology	0.9	0	0.9	0.9	100%
Adult Psychiatry**	37.7	10	27.7	27.7	73%
Child/Adolescent Psychiatry**	5.7	1.7	4	4	70%
Other Total	171.7	76.1	95.6	95.6	56%
Hospital Medicine	20.1	11.8	8.3	8.3	41%
Grand Total	499.6	294.3	205.3	205.8	41%

*Increase in demand to reflect non-resident increase in utilization on each island.

**Calculated 20.5 per 100,000 population divided between adult & pediatric specialists as indicated by the population-based IHS model.

***Other Specialties includes: Concierge, Complimentary/Alternative Medicine, Medical Genetics, Occupational Medicine, Palliative Care, Pain Medicine, Preventive Medicine, Sleep Medicine, Urgent Care, and Wound Care.

+All residents should be within 60 minutes of care, so each island has at least 2 providers, and Hawai'i Island has a minimum of 4 providers.

^ Not calculated as primary care can cover other primary care in most cases.

Table 14: Honolulu County Supply and Demand Estimates by Primary Care

Specialty (Primary Care)	Demand	Supply	Difference	W/o overage	% Shortage
Family Medicine	290.9	222.4	68.5	68.5	24%
General Internal Medicine	311.5	296.6	14.9	14.9	5%
Geriatric Medicine	21.4	38.4	-17	0	0.0%
Pediatrics	168.9	176.3	-7.4	0	0.0%
Primary Care Total	792.7	733.7	59	Not calc^	7%

Table 15: Honolulu County Supply and Demand Estimates by Medical Specialties

Specialty (Medical Specialties)	Demand	Supply	Difference	W/o overage	% Shortage
Allergy & Immunology	15	10.3	4.7	4.7	31%
Dermatology	23.8	44.2	-20.4	0	0%
Infectious Diseases	27.1	19.7	7.4	7.4	27%
Neonatology	17.6	23.8	-6.2	0	0%
Nephrology+	34.1	28.5	5.6	5.6	16%
Adult Cardiology	73.6	59.6	14	14	19%
Pediatric Cardiology	5.5	6	-0.5	0	0%
Adult Critical Care+	11.3	32.5	-21.2	0	0%
Pediatric Critical Care	1.9	5	-3.1	0	0%
Adult Endocrinology	20.9	10.7	10.2	10.2	49%

Pediatric Endocrinology	5.2	2.8	2.4	2.4	46%
Adult Gastroenterology	47	49.3	-2.3	0	0%
Pediatric Gastroenterology	6.7	2.8	3.9	3.9	58%
Adult Hematology & Oncology	29.4	24.5	4.9	4.9	17%
Pediatric Hematology & Oncology	5.6	5.5	0.1	0.1	2%
Adult Pulmonology	41.9	24.5	17.4	17.4	42%
Pediatric Pulmonology	4.3	2	2.3	2.3	53%
Adult Rheumatology	16.1	10.6	5.5	5.5	34%
Pediatric Rheumatology	0.9	2.2	-1.3	0	0%
Medical Specialties Total	387.9	364.5	23.4	78.4	20%

Table 16: Honolulu County Supply and Demand Estimates by Surgical Specialties

Specialty (Surgery)	Demand	Supply	Difference	W/o overage	% Shortage
Colorectal Surgery	7.2	3.5	3.7	3.7	44%
General Surgery	60.1	69.1	-9	0	0%
Neurological Surgery+	8.9	12.7	-3.8	0	0%
Obstetrics & Gynecology	117.8	123.7	-5.9	0	0%
Ophthalmology	57.6	80.9	-23.3	0	0%
Orthopedic Surgery+	59.8	58.7	1.1	1.1	6%
Otolaryngology	25.1	23.1	2	2	16%
Plastic Surgery	19.4	20.3	-0.9	0	0%
Thoracic Surgery+	12.3	8.8	3.5	3.5	36%
Urology+	25.1	24.8	0.3	0.3	2%
Vascular Surgery+	13.4	12.6	0.8	0.8	19%
Surgery Total	406.7	438.2	-31.5	11.4	3%

Table 17: Honolulu County Supply and Demand Estimates by Other Specialties

Specialty (Other)	Demand	Supply	Difference	W/o overage	% Shortage
Anesthesiology	119.1	115.1	4	4	3%
Emergency Medicine*	196.6	141.3	55.3	55.3	28%
Other Specialties	103.5	67.3	36.2	36.2	35%
Pathology	44.6	32.5	12.1	12.1	27%
Physical Medicine & Rehabilitation	24.7	26.7	-2	0	0%
Radiation Oncology	12	14.3	-2.3	0	0%
Radiology	62.2	72	-9.8	0	0%
Adult Neurology	38.1	38.2	-0.1	0	0%
Pediatric Neurology	4.3	6.4	-2.1	0	0%
Adult Psychiatry**	152	109.5	42.5	42.5	28%
Child/Adolescent Psychiatry**	51.4	32.2	19.2	19.2	37%

Other Total	808.5	655.5	153	169.3	21%
Hospital Medicine	95.2	155.7	-60.5	0	0%
Grand Total	2,491	2347.6	143.4	318.1	13%

*Increase in demand to reflect non-resident increase in utilization on each island.

**Calculated 20.5 per 100,000 population divided between adult & pediatric specialists as indicated by the population-based IHS model.

***Other Specialties includes: Concierge, Complimentary/Alternative Medicine, Medical Genetics, Occupational Medicine, Palliative Care, Pain Medicine, Preventive Medicine, Sleep Medicine, Urgent Care, and Wound Care.

+All residents should be within 60 minutes of care, so each island has at least 2 providers, and Hawai'i Island has a minimum of 4 providers.

^ Not calculated as primary care can cover other primary care in most cases.

Table 18: Kaua'i County Supply and Demand Estimates by Primary Care

Specialty (Primary Care)	Demand	Supply	Difference	W/o overage	% Shortage
Family Medicine	24	21.4	2.6	2.6	11.0%
General Internal Medicine	15.3	14.7	0.6	0.6	4.0%
Geriatric Medicine	0.8	2.5	-1.7	0	0.0%
Pediatrics	9.8	5.6	4.2	4.2	4.2%
Primary Care Total	49.9	44.2	5.7	Not Calc[^]	11%

Table 19: Kaua'i County Supply and Demand Estimates by Medical Specialties

Specialty (Medical Specialties)	Demand	Supply	Difference	W/o overage	% Shortage
Allergy & Immunology	0.7	0	0.7	0.7	100%
Dermatology	1.6	0.8	0.8	0.8	50%
Infectious Diseases	1.9	1.4	0.5	0.5	26%
Neonatology	1.3	0	1.3	1.3	100%
Nephrology+	2.3	0	2.3	2.3	100%
Adult Cardiology	4.7	2	2.7	2.7	57%
Pediatric Cardiology	0.2	0	0.2	0.2	100%
Adult Critical Care+	2	0	2	2	100%
Pediatric Critical Care	0.1	0	0.1	0.1	100%
Adult Endocrinology	1.1	0	1.1	1.1	100%
Pediatric Endocrinology	0.4	0	0.4	0.4	100%
Adult Gastroenterology	2.4	1.4	1	1	42%
Pediatric Gastroenterology	0.2	0	0.2	0.2	100%
Adult Hematology & Oncology	1.9	0.6	1.3	1.3	68%
Pediatric Hematology & Oncology	0.3	0	0.3	0.3	100%
Adult Pulmonology	2.2	0.8	1.4	1.4	64%
Pediatric Pulmonology	0.2	0	0.2	0.2	100%
Adult Rheumatology	1	0	1	1	100%
Pediatric Rheumatology	0.1	0	0.1	0.1	100%
Medical Specialties Total	24.6	7	17.6	17.6	72%

Table 20: Kaua'i County Supply and Demand Estimates by Surgical Specialties

Specialty (Surgery)	Demand	Supply	Difference	W/o overage	% Shortage
Colorectal Surgery	0.6	0.1	0.5	0.5	83%
General Surgery	5.9	7	-1.1	0	0%
Neurological Surgery+	2	0	2	2	100%
Obstetrics & Gynecology	7.4	8.6	-1.2	0	0%
Ophthalmology	4.4	3.9	0.5	0.5	11%
Orthopedic Surgery+	5	3.5	1.5	1.5	30%
Otolaryngology	1.8	1.5	0.3	0.3	17%
Plastic Surgery	1.3	0	1.3	1.3	100%
Thoracic Surgery+	2	0	2	2	100%
Urology+	2	2.6	-0.6	0	0%
Vascular Surgery+	2	0.3	1.7	1.7	85%
Surgery Total	34.4	27.5	6.9	9.8	28%

Table 21: Kaua'i County Supply and Demand Estimates by Other Specialties

Specialty (Other)	Demand	Supply	Difference	W/o overage	% Shortage
Anesthesiology	8.9	11.8	-2.9	0	0%
Emergency Medicine*	13.9	17.8	-3.9	0	0%
Other Specialties	7	7.4	-0.4	0	0%
Pathology	3.2	0.5	2.7	2.7	84%
Physical Medicine & Rehabilitation	2.5	1	1.5	1.5	60%
Radiation Oncology	0.8	1	-0.2	0	0%
Radiology	5.8	3.9	1.9	1.9	33%
Adult Neurology	2.2	1	1.2	1.2	55%
Pediatric Neurology	0.3	0	0.3	0.3	100%
Adult Psychiatry**	13.2	3.5	9.7	9.7	73%
Child/Adolescent Psychiatry**	2.1	1.9	0.2	0.2	10%
Other Total	59.9	49.8	10.1	17.5	29%
Hospital Medicine	6.9	5.5	1.4	1.4	20%
Grand Total	175.7	134	41.7	52	30%

*Increase in demand to reflect non-resident increase in utilization on each island.

**Calculated 20.5 per 100,000 population divided between adult & pediatric specialists as indicated by the population-based IHS model.

***Other Specialties includes: Concierge, Complimentary/Alternative Medicine, Medical Genetics, Occupational Medicine, Palliative Care, Pain Medicine, Preventive Medicine, Sleep Medicine, Urgent Care, and Wound Care.

+All residents should be within 60 minutes of care, so each island has at least 2 providers, and Hawai'i Island has a minimum of 4 providers.

^ Not calculated as primary care can cover other primary care in most cases.

Table 22: Maui County Supply and Demand Estimates by Primary Care

Specialty (Primary Care)	Demand	Supply	Difference	W/o overage	% Shortage
Family Medicine	53.1	33.3	19.8	19.8	37%
General Internal Medicine	39.9	26	13.9	13.9	35%
Geriatric Medicine	5.5	0	5.5	5.5	100%

Pediatrics	25.7	23.4	2.3	2.3	9%
Primary Care Total	124.2	82.7	41.5	Not calc [^]	33%

Table 23: Maui County Supply and Demand Estimates by Medical Specialties

Specialty (Medical Specialties)	Demand	Supply	Difference	W/o overage	% Shortage
Allergy & Immunology	2.8	0	2.8	2.8	100%
Dermatology	5.2	6.5	-1.3	0	0%
Infectious Diseases	4.6	0	4.6	4.6	100%
Neonatology	2.8	0	2.8	2.8	100%
Nephrology+	5.1	2.1	3	3	59%
Adult Cardiology	12.8	8.1	4.7	4.7	37%
Pediatric Cardiology	0.8	0.1	0.7	0.7	88%
Adult Critical Care+	2	4.6	-2.6	0	0%
Pediatric Critical Care	0.3	0	0.3	0.3	100%
Adult Endocrinology	3.3	0.6	2.7	2.7	82%
Pediatric Endocrinology	1.1	0	1.1	1.1	100%
Adult Gastroenterology	7.8	0.9	6.9	6.9	88%
Pediatric Gastroenterology	0.9	0	0.9	0.9	100%
Adult Hematology & Oncology	7.6	1.7	5.9	5.9	78%
Pediatric Hematology & Oncology	0.6	0	0.6	0.6	100%
Adult Pulmonology	7.3	1.2	6.1	6.1	84%
Pediatric Pulmonology	0.6	0	0.6	0.6	100%
Adult Rheumatology	2.7	0.4	2.3	2.3	85%
Pediatric Rheumatology	0.1	0	0.1	0.1	100%
Medical Specialties Total	68.4	26.2	42.2	46.1	67%

Table 24: Maui County Supply and Demand Estimates by Surgical Specialties

Specialty (Surgery)	Demand	Supply	Difference	W/o overage	% Shortage
Colorectal Surgery	1.3	0.3	1	1	77%
General Surgery	11.7	8.2	3.5	3.5	30%
Neurological Surgery+	2	0.4	1.6	1.6	80%
Obstetrics & Gynecology	19.4	19.6	-0.2	0	0%
Ophthalmology	9.2	3.2	6	6	65%
Orthopedic Surgery+	12.3	9.5	2.8	2.8	23%
Otolaryngology	6.1	3.4	2.7	2.7	44%
Plastic Surgery	5.6	3.4	2.2	2.2	39%
Thoracic Surgery+	2.3	0.5	1.8	1.8	78%
Urology+	4.7	2	2.7	2.7	57%
Vascular Surgery+	2.2	1.7	0.5	0.5	23%
Surgery Total	76.8	52.2	24.6	24.8	32%

Table 25: Maui County Supply and Demand Estimates by Other Specialties

Specialty (Other)	Demand	Supply	Difference	W/o overage	% Shortage
Anesthesiology	22.2	17.3	4.9	4.9	22%
Emergency Medicine*	29.5	14.6	14.9	14.9	51%
Other Specialties	17.5	11.9	5.6	5.6	32%
Pathology	7.6	2	5.6	5.6	74%
Physical Medicine & Rehabilitation	3.1	1.5	1.6	1.6	52%
Radiation Oncology	2.8	2.5	0.3	0.3	11%
Radiology	13.3	4.7	8.6	8.6	65%
Adult Neurology	5.9	4.3	1.6	1.6	27%
Pediatric Neurology	1.2	0	1.2	1.2	100%
Adult Psychiatry**	25.5	10.4	15.1	15.1	59%
Child/Adolescent Psychiatry**	10.2	2.3	7.9	7.9	77%
Other Total	138.8	71.5	67.3	67.3	48%
Hospital Medicine	16.2	14.8	1.4	1.4	9%
Grand Total	424.4	247.4	177	181.1	43%

*Increase in demand to reflect non-resident increase in utilization on each island.

**Calculated 20.5 per 100,000 population divided between adult & pediatric specialists as indicated by the population-based IHS model.

***Other Specialties includes: Concierge, Complimentary/Alternative Medicine, Medical Genetics, Occupational Medicine, Palliative Care, Pain Medicine, Preventive Medicine, Sleep Medicine, Urgent Care, and Wound Care.

+All residents should be within 60 minutes of care, so each island has at least 2 providers, and Hawai'i Island has a minimum of 4 providers.

^ Not calculated as primary care can cover other primary care in most cases.

Appendix 3: Greatest Subspecialty Shortages by Island

Table 26: Hawai'i County Supply Greatest Subspecialty Shortages

Specialty	Demand	Supply	Difference	W/o overage	% Shortage
Neonatology	3.9	0	3.9	3.9	100%
Adult Critical Care	4	0	4	4	100%
Child Critical Care	0.4	0	0.4	0.4	100%
Child Endocrinology	1.1	0	1.1	1.1	100%
Child Gastroenterology	0.5	0	0.5	0.5	100%
Adult Pulmonology	6.6	0	6.6	6.6	100%
Child Pulmonology	0.4	0	0.4	0.4	100%
Child Rheumatology	0.2	0	0.2	0.2	100%
Colorectal Surgery	1.7	0	1.7	1.7	100%
Thoracic Surgery	4	0	4	4	100%
Child Neurology	0.9	0	0.9	0.9	100%
Adult Endocrinology	3.1	0.1	3	3	97%
Adult Neurology	6.3	1.1	5.2	5.2	83%
Infectious Diseases	5.5	1	4.5	4.5	82%
Physical Medicine & Rehabilitation	7.4	1.4	6	6	81%
Neurological Surgery	4	0.9	3.1	3.1	78%
Ophthalmology	12.8	3.1	9.7	9.7	76%
Adult Hematology & Oncology	6	1.5	4.5	4.5	75%
Anesthesiology	26	7	19	19	73%
Adult Psychiatry	37.7	10	27.7	27.7	73%
Child Psychiatry	5.7	1.7	4	4	70%
Pathology	9.4	3	6.4	6.4	68%
Child Hematology & Oncology	0.9	0.3	0.6	0.6	67%
Nephrology	6.7	2.5	4.2	4.2	63%
Plastic Surgery	4	1.5	2.5	2.5	63%
Urology	5.2	2	3.2	3.2	62%
Radiology	17.7	7.2	10.5	10.5	59%
Adult Rheumatology	3	1.3	1.7	1.7	57%
Otolaryngology	5.1	2.2	2.9	2.9	57%
Child Cardiology	0.6	0.3	0.3	0.3	50%
Allergy & Immunology	2.2	1.1	1.1	1.1	50%

Table 27: Honolulu County Greatest Subspecialty Shortages

Specialty	Honolulu Demand	Supply	FTE Short	% Shortage
Child Gastroenterology	6.7	2.8	3.9	58%
Child Pulmonology	4.3	2	2.3	53%
Colorectal Surgery	7.2	3.5	3.7	51%
Adult Endocrinology	20.9	10.7	10.2	49%
Child Endocrinology	5.2	2.8	2.4	46%
Adult Pulmonology	41.9	24.5	17.4	42%

Table 28: Kaua'i County Greatest Subspecialty Shortages

Specialty	Kauai Demand	Supply	FTE Short	% Shortage
Allergy & Immunology	0.7	0	0.7	100%
Neonatology	1.3	0	1.3	100%
Nephrology	2.3	0	2.3	100%
Child Cardiology	0.2	0	0.2	100%
Adult Critical Care	2	0	2	100%
Child Critical Care	0.1	0	0.1	100%
Adult Endocrinology	1.1	0	1.1	100%
Child Endocrinology	0.4	0	0.4	100%
Child Gastroenterology	0.2	0	0.2	100%
Child Hematology & Oncology	0.3	0	0.3	100%
Child Pulmonology	0.2	0	0.2	100%
Adult Rheumatology	1	0	1	100%
Child Rheumatology	0.1	0	0.1	100%
Neurological Surgery	2	0	2	100%
Plastic Surgery	1.3	0	1.3	100%
Thoracic Surgery	2	0	2	100%
Child Neurology	0.3	0	0.3	100%
Vascular Surgery	2	0.3	1.7	85%
Pathology	3.2	0.5	2.7	84%
Colorectal Surgery	0.6	0.1	0.5	83%
Adult Psychiatry	13.2	3.5	9.7	73%
Adult Hematology & Oncology	1.9	0.6	1.3	68%
Adult Pulmonology	2.2	0.8	1.4	64%
Physical Medicine & Rehabilitation	2.5	1	1.5	60%
Adult Cardiology	4.7	2	2.7	57%
Adult Neurology	2.2	1	1.2	55%
Dermatology	1.6	0.8	0.8	50%

Table 29: Maui County Greatest Subspecialty Shortages

Specialty	Maui Demand	Supply	FTE Short	% Shortage	Specialty
Geriatrics	5.5	0	5.5	5.5	100%
Allergy & Immunology	2.8	0	2.8	2.8	100%

Infectious Diseases	4.6	0	4.6	4.6	100%
Neonatology	2.8	0	2.8	2.8	100%
Child Critical Care	0.3	0	0.3	0.3	100%
Child Endocrinology	1.1	0	1.1	1.1	100%
Child Gastroenterology	0.9	0	0.9	0.9	100%
Child Hematology & Oncology	0.6	0	0.6	0.6	100%
Child Pulmonology	0.6	0	0.6	0.6	100%
Child Rheumatology	0.1	0	0.1	0.1	100%
Child Neurology	1.2	0	1.2	1.2	100%
Child Cardiology	0.8	0.1	0.7	0.7	88%
Adult Gastroenterology	7.8	0.9	6.9	6.9	88%
Adult Rheumatology	2.7	0.4	2.3	2.3	85%
Adult Pulmonology	7.3	1.2	6.1	6.1	84%
Adult Endocrinology	3.3	0.6	2.7	2.7	82%
Neurological Surgery	2	0.4	1.6	1.6	80%
Adult Hematology & Oncology	7.6	1.7	5.9	5.9	78%
Thoracic Surgery	2.3	0.5	1.8	1.8	78%
Colorectal Surgery	1.3	0.3	1	1	77%
Child Psychiatry	10.2	2.3	7.9	7.9	77%
Pathology	7.6	2	5.6	5.6	74%
Ophthalmology	9.2	3.2	6	6	65%
Radiology	13.3	4.7	8.6	8.6	65%
Nephrology	5.1	2.1	3	3	59%
Adult Psychiatry	25.5	10.4	15.1	15.1	59%
Urology	4.7	2	2.7	2.7	57%
Physical Medicine & Rehabilitation	3.1	1.5	1.6	1.6	52%
Emergency Medicine	29.5	14.6	14.9	14.9	51%