



UNIVERSITY  
of HAWAII®

David Lassner  
President

## DEPT. COMM. NO. 170

December 13, 2022

The Honorable Ronald D. Kouchi,  
President and Members of the Senate  
Thirty-Second State Legislature  
Honolulu, Hawai'i 96813

The Honorable Scott Saiki, Speaker  
and Members of the House of Representatives  
Thirty-Second State Legislature  
Honolulu, Hawai'i 96813

Dear President Kouchi, Speaker Saiki, and Members of the Legislature:

For your information and consideration, the University of Hawai'i is transmitting one copy of the Annual Report on the Findings from the Hawai'i Physician Workforce Assessment Project (Act 18, Special Session Laws of Hawai'i 2009 (Section 5) as amended by Act 186, Session Laws of Hawai'i 2012 as amended by Act 40, Session Laws of Hawai'i 2017) as requested by the Legislature.

In accordance with Section 93-16, Hawai'i Revised Statutes, this report may be viewed electronically at: <https://www.hawaii.edu/offices/government-relations/2023-legislative-reports/>.

Should you have any questions about this report, please do not hesitate to contact Stephanie Kim at 956-4250, or via e-mail at [scskim@hawaii.edu](mailto:scskim@hawaii.edu).

Sincerely,

A handwritten signature in black ink that reads "David Lassner".

David Lassner  
President

Enclosure

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# UNIVERSITY OF HAWAI‘I SYSTEM ANNUAL REPORT



REPORT TO THE 2023 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 2022

## Hawai'i Physician Workforce Report

### Executive Summary

Of the 11,325 licensed physicians in Hawai'i (1,051 DO, 10,274 MD), only 3,510 are currently providing patient care to Hawai'i's population. Further, of those practicing, not all physicians practice full time, thus these 3,519 individuals provide approximately 2,962 Full Time Equivalents (FTEs) of active patient care. This number is 105 FTEs higher than in 2021. The demand model used to estimate how many physicians are needed is based on 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 3,551 FTEs of practicing physicians, indicating a statewide shortage of 589 FTE of physician services. However when the geographic realities of specialty coverage on different islands are addressed, the unmet need for physicians equals 776 FTEs statewide.

The greatest statewide shortage remains in primary care, with 162 FTEs needed total across all islands. The greatest subspecialty statewide shortages are: Pediatric Pulmonology; Pediatric Gastroenterology; Pediatric Endocrinology; Adult Pulmonology; Colorectal Surgery; Thoracic Surgery; Allergy and Immunology; and Adult Endocrinology.

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 and 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 (901 participants in 2022) and Project ECHO (4,000 people-hours of case-based education each year); providing Educational Loan Repayment to 76 individuals since 2012; 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 assisting in the administration of JABSOM scholarships which require payback for support of academic education through time practicing in Hawai'i. Activities introduced in 2021 include a free rural telecounseling program for rural Hawai'i ([hawaiiutelehealth.org](https://hawaiiutelehealth.org)), an online support group, and a new physician mentoring program. While the online support program has not been adequately used, new activities include the Bridge to Practice Program for young physicians to work with retiring physicians, the Young Physician Program for young doctors to get together for

social activities and other wellness support, and the House Poor No More Program to assist physicians with purchasing homes.

## **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.<sup>1</sup> 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.<sup>1</sup> The Federation of State Medical Boards in 2018 estimated that 30% of licensed physicians were already over the age of 60.<sup>2</sup> Furthermore, COVID is having a negative effect upon practicing physicians, both physically and psychologically.<sup>3</sup> Burn out, moral distress, and compassion fatigue are prevalent in physicians working with COVID patients.<sup>4</sup> 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 and 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 prediction 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 organization<sup>1</sup> 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

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

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

All data used in this model originate from sources before the COVID pandemic, so the data do not reflect the changes in physician use patterns because of 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 for the island geography, 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 percent of Emergency Department (ED) visits which were made by non-residents in each county. The hospital ED visit numbers were obtained for 2016-2019<sup>2</sup> 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

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<sup>2</sup> Hospital billing data archive of the Lauilima Data Alliance. Analyzed by Hawai'i Department of Health and provided to research team.

best practices,<sup>3,4</sup> 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 Big 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), and Hawai'i Island was estimated to need twice that due to geographic size (4.0 FTE). This year, nephrologists were also included in this calculation, as it is recommended that each Level III trauma center have nephrology coverage, however all islands had an adequate number of nephrologists, so no adjustments were needed. This method slightly increased estimated demand for adult critical care, cardiovascular and vascular care in Maui, 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 in fact, given physician reimbursement levels in Hawai'i, the market may not be able to support what is recommended here.

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.<sup>5</sup> This number is between the range of numbers estimated in different national publications of 3.9<sup>6</sup> to 25.9<sup>7</sup> 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. This is a new adjustment in 2022 and can be seen as a normalization of the demand curve in Figure 1.

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<sup>3</sup> 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.

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

<sup>5</sup> 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.

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

<sup>7</sup> 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>

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 percentage of shortage is then calculated by dividing this “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 was obtained from community contacts, internet search or the physician 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 2022, Hawai'i has approximately 2,962 FTEs of physicians caring for patients.

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

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

The demand model based on US average physician use when applied to Hawai'i's four counties indicates the State of Hawai'i needs 3,551 FTEs of practicing physicians. This indicates a shortage of 589 FTE of physician services. However, when island geography is considered (i.e., eliminating specialty overage), the estimated unmet need for physicians increases to 776 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	183 (187)	382 (344)	45 (43)	167 (158)	776 (732)
Percent	37% (40%)	15% (15%)	26% (26%)	40% (40%)	22% (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	12 (16)	106 (115)	0 (1)	44 (31)	162 (163)
Percent	9% (11%)	14% (15%)	0% (1%)	36% (27%)	15% (15%)

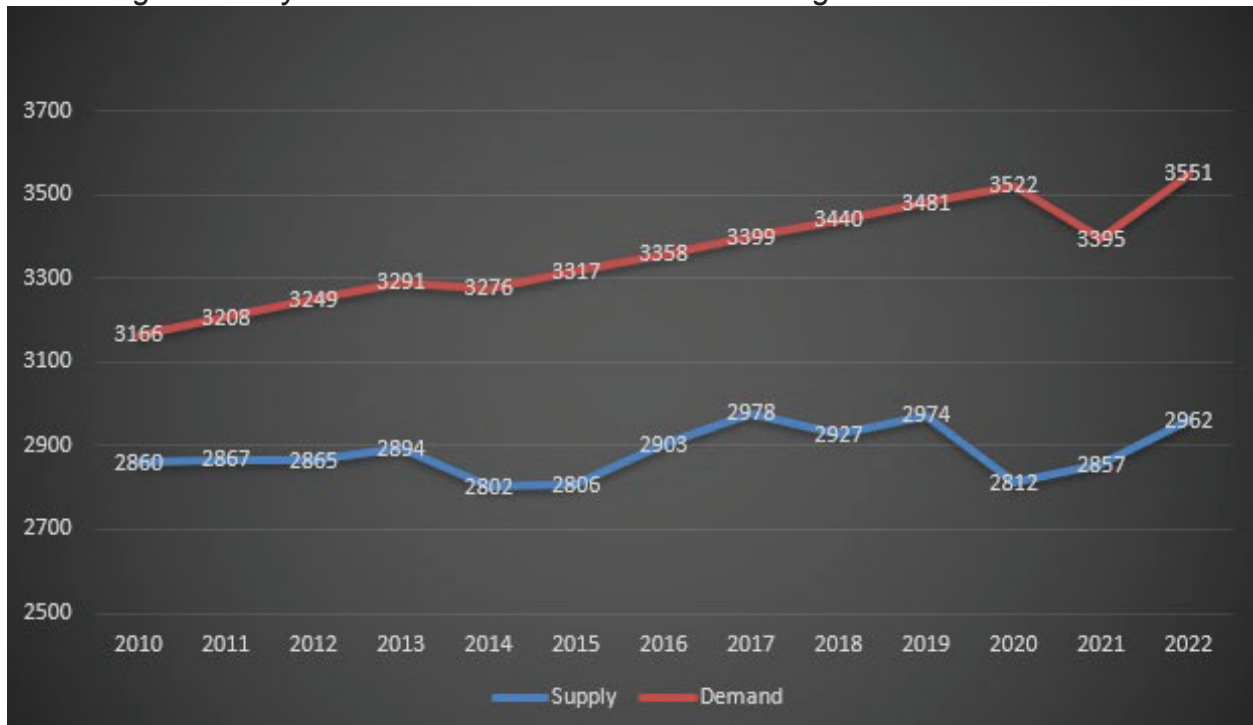
**Additional facts about the active physician workforce in Hawai'i**

- ▶ Average age is 53.3 years (compared to 53.2 US average) and down slightly from 54.6 in 2021
- ▶ Currently 21% of our physicians are already age 65 years or over (down slightly from 22% in 2021)
- ▶ Women make up 40% of the workforce (up from 38% in 2021)
- ▶ At least 60 physicians retired, 7 passed away, 84 moved out of state, 212 decreased work time, 90 increased time, 39 reopened practices, 10 are living in Hawai'i but working out of state exclusively, and over 200 new physicians began working in Hawai'i since 2021

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.*

Table 4: Greatest Subspecialty Shortages by Percentage, Statewide

Specialty	FTE Shortage	Percent short
Pediatric Pulmonology	4.2	75.8%
Pediatric Gastroenterology	5.7	69.5%
Pediatric Endocrinology	5.3	67.9%
Adult Pulmonology	37.5	65.4%
Colorectal Surgery	6.4	60.0%
Thoracic Surgery	11.7	57.1%
Allergy & Immunology	10.6	51.7%
Adult Endocrinology	14.1	50.3%

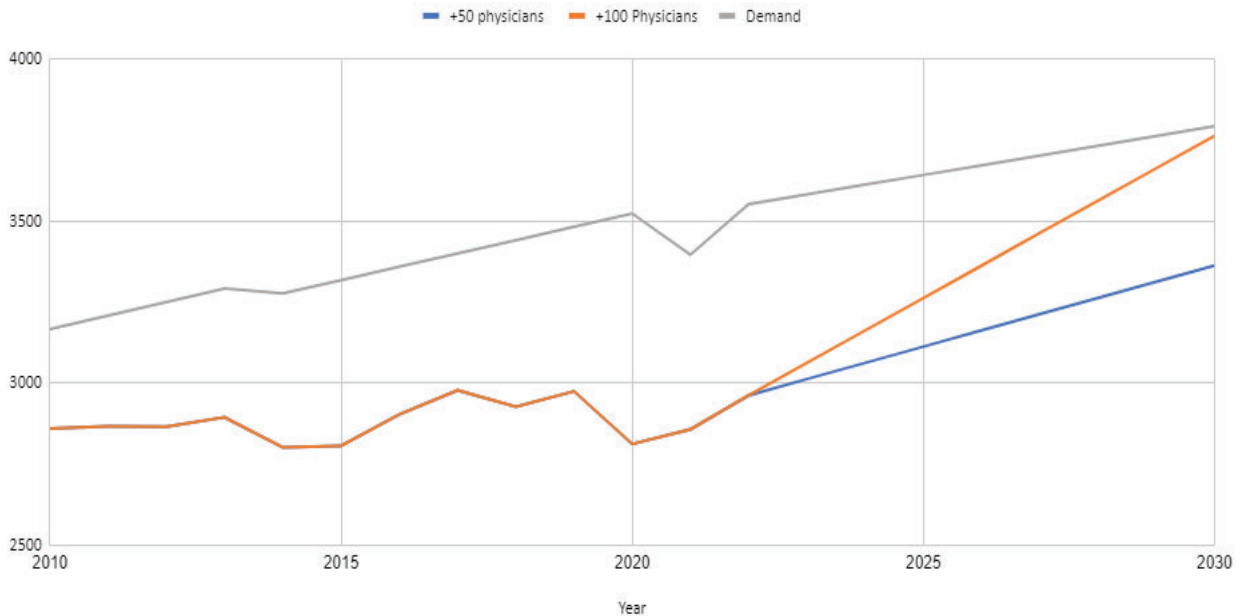
2022 Individual Specialty Shortages by County in Rank Order of Percent Shortage Estimates tables are included in Appendix 3.

### Future Trends

The demand model predicts our demand will increase by at least 30 FTE a year. If we only increase our workforce by 50 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 2030.

Figure 2: Physician Supply and Demand FTE Comparison Over Time Comparison of Increase of 50 FTEs/year compared to 100 FTEs/year

Projected Supply & Demand of Physicians



## **Solutions Being Implemented**

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

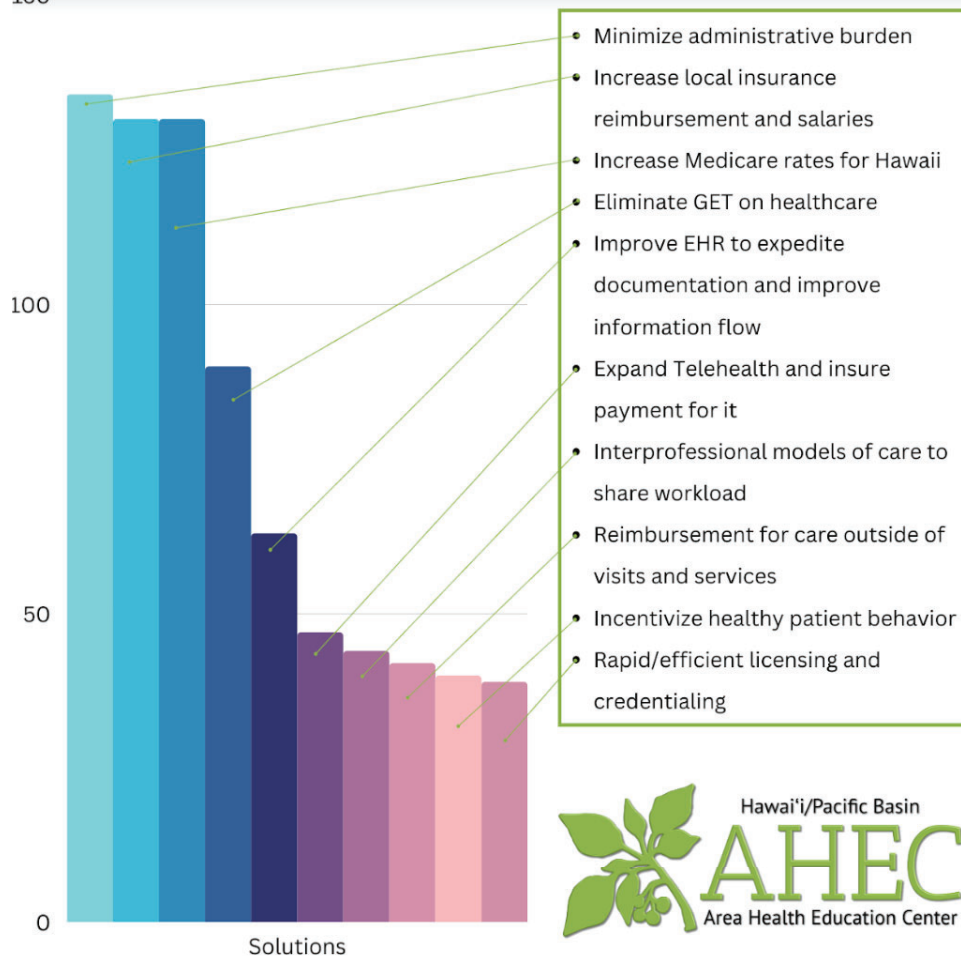
- ❖ **Recruit the Future Physician Workforce:** The AHEC team has contacted over 4,000 health professions students in the intervening year. Health career activities have been expanded to reach students on all neighboring islands. Through federal grant funding, AHEC provides mentoring, counseling support 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 2,415 students. More informatin 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 in order 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.
- ❖ **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.
- ❖ **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](http://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 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.

- ❖ 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 Hawai'i State Loan Repayment Program (HSLRP) has supported 76 loan repayment recipients since the program began in 2012. There are 23 active providers currently receiving support and an additional 9 providers applying for the program. Of the 44 Loan Repayment program completers to date, 35 are still in practicing in Hawai'i (80%), 26 are still working where they performed their loan repayment service (61%) and 28 are still providing care in the underserved communities where they performed their loan repayment services (65%). A total of 25 recipients' educational loan debt has been paid-in-full by HSLRP (33%). Many of the loan repayers who left their original service positions still work in areas of need, including Maui, Wai'anae, for the Queens Health System, Castle Medical Center, and Kalihi-Palama Health Center in Honolulu. More information available at: <https://www.ahec.hawaii.edu/physician-recruiter/resources-physicians/loan-repayment/>. A new program has been introduced to support providers in areas of need who do not meet federal criteria called the Innovative Loan Repayment Program.
- ❖ 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.
- ❖ Continuing Education: The 2022 Hawai'i Health Workforce Summit offered seven and a half hours of Continuing Education Credit to 901 participants in both in person and virtual format. The Summit addressed topics including: how to recruit and retain healthcare providers in Hawai'i, geriatric practice expertise, recognition and treatment of substance use disorder, and rural health practice implications, including the Access to Care Report. The participant evaluation demonstrated a high level of satisfaction with the event and improvement in knowledge. 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 addition, the ECHO Hawai'i project provided over 4,000 person-hours of continuing education between January 1 and November 21, 2021, covering the topics of Behavioral Health, Geriatrics and Pediatrics. The three options for case-based distance education through the supported Project ECHO in Hawai'i with information summarized at [www.hawaiiecho.info](http://www.hawaiiecho.info)

- Behavioral Health ECHO Every Tuesday noon to 1PM
- Geriatrics ECHO Every second Wednesday noon to 1PM
- Pediatrics ECHO Every first and third Wednesday noon to 1PM
- Limited Time ECHO: Medication for Opioid Use Disorder

❖ **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.

- ❖ 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 of 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. Because of this program, 43 new preceptors are teaching Hawai'i's pharmacy, nurse practitioner and residents/medical students since 2019. More information available at: <http://preceptortaxcredit.hawaii.edu/>.
- ❖ 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 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.
- ❖ 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.
- ❖ 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 available at: <https://hawaiiutelehealth.org/>.
- ❖ In addition to these activities, Dr. Withy serves on the Hawai'i Health Workforce Advisory Board. She also is assisting with 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 2022.

### **Next Steps**

The Physician Workforce Research Team will continue to conduct the research and implement the solutions described above. In addition, AHEC is conducting a survey of the most important steps to simplify administrative requirements for practices. The

largest health insurer in Hawai'i, Hawaii Medical Services Association (HMSA), has agreed to work on this important topic. The 2023 Health Workforce Summit on 9/9/23 will focus on Administrative Simplification and solutions being implemented.

Dr. Withy is working closely with 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.

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 health care need areas upon graduation and assist physicians who want to retire.

A new program is planned as well, a "Young Doctor's Hui" with regular social and professional activities to start on a quarterly basis, for collegial contact and potential educational opportunities associated with career networking for young physicians. This was put on hold due to the pandemic and will now be implemented.

Finally, in order 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. Discussion began at the 2022 Hawai'i Health Workforce Summit, and idea session meetings will follow.

More information on ongoing and upcoming activities is available at the AHEC website: [www.ahec.hawaii.edu](http://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](mailto: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](mailto: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]”**

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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 voicemail with name, reason for your call, best time to reach you, and 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.

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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 by County

*Table 5: Statewide Supply and Demand Estimates by Primary Care*

Specialty (Primary Care)	Demand	Supply	Difference	W/o overage	% Shortage
Family Medicine	432.9	345.7	87.2	96.2	22.2%
General Internal Medicine	404.3	324.3	80.0	80.0	19.8%
Geriatric Medicine	28.9	41.3	-12.4	5.5	19.0%
Pediatrics	230.8	223.4	7.4	7.5	3.2%
<b>Primary Care Total</b>	<b>1096.9</b>	<b>934.7</b>	<b>162.3</b>	<b>Not Calc<sup>^</sup></b>	<b>14.8%</b>

*Table 6: Statewide Supply and Demand Estimates by Medical Specialties*

Specialty (Medical Specialties)	Demand	Supply	Difference	W/o overage	% Shortage
Allergy & Immunology	20.6	10.0	10.6	10.6	51.7%
Dermatology	34.7	49.6	-14.9	0.7	2.0%
Infectious Diseases	38.5	20.8	17.7	17.7	45.9%
Neonatology	25.5	21.8	3.7	7.8	30.4%
Nephrology+	47.5	32.1	15.4	15.4	32.5%
Adult Cardiology	102.6	78.3	24.3	24.3	23.7%
Pediatric Cardiology	7.1	6.3	0.8	1.2	17.3%
Adult Critical Care+	19.1	41.4	-22.3	5.6	29.5%
Pediatric Critical Care	2.7	5	-2.3	0.8	29.6%
Adult Endocrinology	28	13.9	14.1	14.1	50.3%
Pediatric Endocrinology	7.8	2.5	5.3	5.3	67.9%
Adult Gastroenterology	63.7	57.2	6.5	8.7	13.7%
Pediatric Gastroenterology	8.2	2.5	5.7	5.7	69.5%
Adult Hematology & Oncology	44.2	27.8	16.4	16.6	37.6%
Pediatric Hematology & Oncology	7.3	6.3	1.1	1.8	24.7%
Adult Pulmonology	57.3	19.8	37.5	37.5	65.4%
Pediatric Pulmonology	5.5	1.3	4.2	4.2	75.8%
Adult Rheumatology	22.5	13.0	9.5	9.5	42.2%
Pediatric Rheumatology	1.3	2.2	-0.9	0.4	30.8%
<b>Medical Specialties Total</b>	<b>544.1</b>	<b>411.7</b>	<b>132.4</b>	<b>187.9</b>	<b>34.5%</b>

**Table 7: Statewide Supply and Demand Estimates by Surgical Specialties**

<b>Specialty (Surgery)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Colorectal Surgery	10.7	4.3	6.4	6.4	60.00%
General Surgery	93.9	93.4	0.5	6.8	7.2%
Neurological Surgery+	16.8	14	2.8	6.6	39.0%
Obstetrics & Gynecology	165.6	168.0	-2.4	4.4	2.68%
Ophthalmology	82.6	91.0	-8.4	12.7	15.4%
Orthopedic Surgery+	90.7	79.7	11.0	11.0	12.1%
Otolaryngology	37.6	27.0	10.6	10.6	28.1%
Plastic Surgery	29.9	24.7	5.2	6.7	22.4%
Thoracic Surgery+	20.5	8.8	11.7	11.7	57.1%
Urology+	36.4	31.0	5.5	6.1	16.6%
Vascular Surgery+	21.4	15.8	5.6	6.2	28.9%
<b>Surgery Total</b>	<b>606.1</b>	<b>557.7</b>	<b>48.4</b>	<b>89.0</b>	<b>14.7%</b>

**Table 8: Statewide Supply and Demand Estimates by Other Specialties**

<b>Specialty (Other)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Anesthesiology	174.6	159.9	14.7	20.3	11.6%
Emergency Medicine*	275.4	205.0	70.4	76.5	27.8%
Other Specialties***	146.9	111.9	35.0	36.9	25.1%
Pathology	63.9	36.5	27.4	27.4	42.9%
Physical Medicine & Rehabilitation	37.2	27.8	9.4	9.4	25.3%
Radiation Oncology	17.6	19.2	-1.6	0.7	4.0%
Radiology	98.1	86.3	11.8	20.1	20.5%
Adult Neurology	51.9	41.9	10.0	10.0	19.2%
Pediatric Neurology	6.5	5.9	0.6	2.3	35.4%
Adult Psychiatry**	226.7	124.2	102.6	102.6	45.2%
Child/Adolescent Psychiatry**	68.9	39.4	29.5	29.5	42.8%
<b>Other Total</b>	<b>1167.7</b>	<b>858.0</b>	<b>309.7</b>	<b>335.6</b>	<b>28.7%</b>
<b>Hospital Medicine</b>	<b>136.3</b>	<b>200.0</b>	<b>-63.7</b>	<b>1.1</b>	<b>0.8%</b>
<b>Grand Total</b>	<b>3551.1</b>	<b>2962.1</b>	<b>589.1</b>	<b>776.0</b>	<b>21.9%</b>

\*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

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

Sleep Medicine, Urgent Care, and Wound Care.

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

**Table 9: Hawai'i County Physician Supply and Demand Estimates by Primary Care**

Specialty (Primary Care)	Demand	Supply	Difference	W/o overage	% Shortage
Family Medicine	68.4	74.5	-6.1	0.0	0.0%
General Internal Medicine	43.0	26.1	16.9	16.9	39.4%
Geriatric Medicine	2.2	2.0	0.2	0.2	9.1%
Pediatrics	27.5	26.3	1.2	1.2	4.4%
<b>Primary Care Total</b>	<b>141.1</b>	<b>128.8</b>	<b>12.3</b>	<b>Not calc^</b>	<b>8.7%</b>

**Table 10: Hawai'i County Physician Supply and Demand Estimates by Medical Specialties**

Specialty (Medical Specialties)	Demand	Supply	Difference	W/o overage	% Shortage
Allergy & Immunology	2.2	1.1	1.1	1.1	51.4%
Dermatology	4.6	5.0	-0.4	0.0	0.0%
Infectious Diseases	5.4	1.0	4.4	4.4	81.5%
Neonatology	3.9	0.3	3.7	3.7	93.6%
Nephrology+	6.7	2.5	4.2	4.2	62.7%
Adult Cardiology	13.5	8.5	5.0	5.0	37.0%
Pediatric Cardiology	0.6	0.3	0.4	0.4	58.3%
Adult Critical Care+	4.0	0.4	3.6	3.6	90.8%
Pediatric Critical Care	0.4	0.0	0.4	0.4	100.0%
Adult Endocrinology	3.1	0.1	3.0	3.0	96.1%
Pediatric Endocrinology	1.1	0.0	1.1	1.1	100.0%
Adult Gastroenterology	7.0	4.1	2.9	2.9	41.4%
Pediatric Gastroenterology	0.5	0.0	0.5	0.5	100.0%
Adult Hematology & Oncology	5.9	0.3	5.7	5.7	95.8%
Pediatric Hematology & Oncology	0.9	0.0	0.9	0.9	100.0%
Adult Pulmonology	6.5	0.0	6.5	6.5	100.0%
Pediatric Pulmonology	0.4	0.0	0.4	0.4	100.0%
Adult Rheumatology	2.9	1.3	1.7	1.7	56.9%
Pediatric Rheumatology	0.2	0.0	0.2	0.2	100.0%
<b>Medical Specialties Total</b>	<b>69.8</b>	<b>24.6</b>	<b>45.2</b>	<b>45.5</b>	<b>65.2%</b>

**Table 11: Hawai'i County Physician Supply and Demand Estimates by Surgical Specialties**

Specialty (Surgery)	Demand	Supply	Difference	W/o overage	% Shortage
Colorectal Surgery	1.7	0.0	1.7	1.7	100.0%
General Surgery	17.1	12.4	4.7	4.7	27.3%
Neurological Surgery+	4.0	0.9	3.2	3.2	78.8%
Obstetrics & Gynecology	20.8	18.2	2.7	2.7	12.7%
Ophthalmology	12.5	4.6	8.0	8.0	63.6%
Orthopedic Surgery+	14.3	10.3	4.0	4.0	28.0%
Otolaryngology	5.0	1.6	3.4	3.4	68.0%

Plastic Surgery	3.9	0.5	3.4	3.4	87.2%
Thoracic Surgery+	4.0	0.0	4.0	4.0	100.0%
Urology+	5.1	2.0	3.1	3.1	60.8%
Vascular Surgery+	4.0	2.3	1.7	1.7	42.5%
<b>Surgery Total</b>	<b>92.4</b>	<b>52.7</b>	<b>39.7</b>	<b>39.7</b>	<b>43.0%</b>

*Table 12: Hawai'i County Physician Supply and Demand Estimates by Other Specialties*

<b>Specialty (Other)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Anesthesiology	25.6	9.5	16.1	16.1	63.0%
Emergency Medicine*	37.3	30.8	6.5	6.5	17.4%
Other Specialties	20.1	15.0	5.1	5.1	25.2%
Pathology	9.2	3.0	6.2	6.2	67.4%
Physical Medicine & Rehabilitation	7.3	1.3	6.0	6.0	82.2%
Radiation Oncology	2.3	2.4	-0.1	0.0	0.0%
Radiology	17.5	8.4	9.1	9.1	52.2%
Adult Neurology	6.2	1.1	5.1	5.1	81.9%
Pediatric Neurology	0.9	0.0	0.9	0.9	100.0%
Adult Psychiatry**	36.2	9.0	27.2	27.2	75.1%
Child/Adolescent Psychiatry**	5.4	2.4	3.0	3.0	55.9%
<b>Other Total</b>	<b>168</b>	<b>82.9</b>	<b>85.1</b>	<b>85.2</b>	<b>50.7%</b>
<b>Hospital Medicine</b>	<b>19.7</b>	<b>19.2</b>	<b>0.6</b>	<b>0.6</b>	<b>2.8%</b>
<b>Grand Total</b>	<b>491</b>	<b>308.1</b>	<b>182.9</b>	<b>183.3</b>	<b>37.3%</b>

\*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

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

Sleep Medicine, Urgent Care, and Wound Care.

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

**Table 13: Honolulu County Supply and Demand Estimates by Primary Care**

<b>Specialty (Primary Care)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Family Medicine	288.5	212.0	76.5	76.5	26.5%
General Internal Medicine	307.2	260.9	46.3	46.3	15.1%
Geriatric Medicine	20.7	37.3	-16.6	0.0	0.0%
Pediatrics	168	168.0	0.0	0.0	0.0%
<b>Primary Care Total</b>	<b>784.4</b>	<b>678.3</b>	<b>106.1</b>	<b>Not calc^</b>	<b>13.5%</b>

**Table 14: Honolulu County Supply and Demand Estimates by Medical Specialties**

<b>Specialty (Medical Specialties)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Allergy & Immunology	14.9	8.9	6.0	6.0	40.3%
Dermatology	23.5	37.7	-14.2	0.0	0.0%
Infectious Diseases	26.8	18.4	8.4	8.4	31.2%
Neonatology	17.5	21.6	-4.1	0.0	0.0%
Nephrology+	33.5	27.5	6.0	6.0	17.9%
Adult Cardiology	72.1	59.2	12.9	12.9	17.9%
Pediatric Cardiology	5.5	5.9	-0.4	0.0	0.0%
Adult Critical Care+	11.1	36.7	-25.6	0.0	0.0%
Pediatric Critical Care	1.9	5.0	-3.1	0.0	0.0%
Adult Endocrinology	20.7	12.6	8.1	8.1	39.1%
Pediatric Endocrinology	5.2	2.5	2.7	2.7	51.9%
Adult Gastroenterology	46.6	48.8	-2.2	0.0	0.0%
Pediatric Gastroenterology	6.7	2.5	4.2	4.2	62.7%
Adult Hematology & Oncology	29.0	23.2	5.8	5.8	19.9%
Pediatric Hematology & Oncology	5.5	6.3	-0.8	0.0	0.0%
Adult Pulmonology	41.4	18.2	23.2	23.2	56.0%
Pediatric Pulmonology	4.3	1.3	3.0	3.0	69.1%
Adult Rheumatology	15.9	11.5	4.4	4.4	27.6%
Pediatric Rheumatology	0.9	2.2	-1.3	0.0	0.0%
<b>Medical Specialties Total</b>	<b>383.0</b>	<b>350.0</b>	<b>33.0</b>	<b>84.6</b>	<b>22.1%</b>



**Table 15: Honolulu County Supply and Demand Estimates by Surgical Specialties**

<b>Specialty (Surgery)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Colorectal Surgery	7.1	4.0	3.2	3.2	44.4%
General Surgery	59.5	65.6	-6.1	0.0	0.0%
Neurological Surgery+	8.8	12.6	-3.8	0.0	0.0%
Obstetrics & Gynecology	118.1	123.8	-5.7	0.0	0.0%
Ophthalmology	56.8	77.8	-21.0	0.0	0.0%
Orthopedic Surgery+	59.3	56.0	3.3	3.3	5.6%
Otolaryngology	24.9	21.0	3.9	3.9	15.5%
Plastic Surgery	19.2	20.7	-1.5	0.0	0.0%
Thoracic Surgery+	12.2	7.8	4.4	4.4	36.1%
Urology+	24.7	24.3	0.4	0.4	1.6%
Vascular Surgery+	13.2	10.7	2.5	2.5	19.2%
<b>Surgery Total</b>	<b>403.8</b>	<b>424.2</b>	<b>-20.4</b>	<b>17.7</b>	<b>4.4%</b>

**Table 16: Honolulu County Supply and Demand Estimates by Other Specialties**

<b>Specialty (Other)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Anesthesiology	118.3	119.4	-1.1	0.0	0.0%
Emergency Medicine*	195.3	138.4	56.9	56.9	29.1%
Other Specialties	102.6	76.0	26.6	26.6	25.9%
Pathology	44.1	31.2	12.9	12.9	29.3%
Physical Medicine & Rehabilitation	24.4	23.8	0.6	0.6	2.7%
Radiation Oncology	11.8	13.8	-2.0	0.0	0.0%
Radiology	61.7	70.0	-8.3	0.0	0.0%
Adult Neurology	37.8	36.0	1.8	1.8	4.8%
Pediatric Neurology	4.2	5.9	-1.7	0.0	0.0%
Adult Psychiatry**	153.5	99.5	54.0	54.0	35.2%
Child/Adolescent Psychiatry**	51.7	31.5	20.2	20.2	39.0%
<b>Other Total</b>	<b>805.4</b>	<b>645.5</b>	<b>159.9</b>	<b>173.0</b>	<b>21.5%</b>
<b>Hospital Medicine</b>	<b>94.1</b>	<b>158.8</b>	<b>-64.7</b>	<b>0.0</b>	<b>0.0%</b>
<b>Grand Total</b>	<b>2470.7</b>	<b>2256.7</b>	<b>214.0</b>	<b>381.5</b>	<b>15.4%</b>

\*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

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

Sleep Medicine, Urgent Care, and Wound Care.

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

*Table 17: Kaua'i County Supply and Demand Estimates by Primary Care*

<b>Specialty (Primary Care)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Family Medicine	23.7	26.7	-3.0	0.0	0.0%
General Internal Medicine	15.0	13.7	1.4	1.4	9.0%
Geriatric Medicine	0.7	2.0	-1.3	0.0	0.0%
Pediatrics	9.7	7.0	2.8	2.8	28.4%
<b>Primary Care Total</b>	<b>49.1</b>	<b>49.3</b>	<b>-0.1</b>	<b>Not Calc^</b>	<b>0.0%</b>

*Table 18: Kaua'i County Supply and Demand Estimates by Medical Specialties*

<b>Specialty (Medical Specialties)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Allergy & Immunology	0.7	0.0	0.7	0.7	100.0%
Dermatology	1.5	0.8	0.7	0.7	46.7%
Infectious Diseases	1.8	1.4	0.4	0.4	22.2%
Neonatology	1.3	0.0	1.3	1.3	100.0%
Nephrology+	2.3	0.0	2.3	2.3	100.0%
Adult Cardiology	4.6	2.0	2.6	2.6	56.5%
Pediatric Cardiology	0.2	0.0	0.2	0.2	100.0%
Adult Critical Care+	2.0	0.0	2.0	2.0	100.0%
Pediatric Critical Care	0.1	0.0	0.1	0.1	100.0%
Adult Endocrinology	1.0	0.0	1.0	1.0	100.0%
Pediatric Endocrinology	0.4	0.0	0.4	0.4	100.0%
Adult Gastroenterology	2.4	1.4	1.0	1.0	41.7%
Pediatric Gastroenterology	0.2	0.0	0.2	0.2	100.0%
Adult Hematology & Oncology	1.9	2.1	-0.2	0.0	0.0%
Pediatric Hematology & Oncology	0.3	0.0	0.3	0.3	100.0%
Adult Pulmonology	2.2	0.4	1.8	1.8	81.8%
Pediatric Pulmonology	0.2	0.0	0.2	0.2	100.0%
Adult Rheumatology	1.0	0.0	1.0	1.0	100.0%
Pediatric Rheumatology	0.1	0.0	0.1	0.1	100.0%
<b>Medical Specialties Total</b>	<b>24.2</b>	<b>8.1</b>	<b>16.1</b>	<b>16.3</b>	<b>67.4%</b>

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

<b>Specialty (Surgery)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Colorectal Surgery	0.6	0.1	0.5	0.5	86.7%
General Surgery	5.8	6.0	-0.2	0.0	0.0%
Neurological Surgery+	2.0	0.0	2.0	2.0	100.0%
Obstetrics & Gynecology	7.4	8.5	-1.1	0.0	0.0%
Ophthalmology	4.3	4.4	-0.1	0.0	0.0%
Orthopedic Surgery+	5.0	4.0	1.0	1.0	20.0%
Otolaryngology	1.7	1.0	0.7	0.7	41.2%
Plastic Surgery	1.3	0.0	1.3	1.3	100.0%
Thoracic Surgery+	2.0	0.0	2.0	2.0	100.0%
Urology+	2.0	2.6	-0.6	0.0	0.0%
Vascular Surgery+	2.0	0.1	2.0	2.0	97.5%
<b>Surgery Total</b>	<b>34.1</b>	<b>26.6</b>	<b>7.5</b>	<b>9.5</b>	<b>27.8%</b>

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

<b>Specialty (Other)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Anesthesiology	8.8	13.3	-4.5	0.0	0.0%
Emergency Medicine*	13.7	19.9	-6.2	0.0	0.0%
Other Specialties	7.0	8.9	-1.9	0.0	0.0%
Pathology	3.2	0.5	2.7	2.7	84.4%
Physical Medicine & Rehabilitation	2.5	0.3	2.3	2.3	90.0%
Radiation Oncology	0.8	1.0	-0.2	0.0	0.0%
Radiology	5.8	3.0	2.8	2.8	48.3%
Adult Neurology	2.1	1.0	1.1	1.1	52.4%
Pediatric Neurology	0.3	0.0	0.3	0.3	100.0%
Adult Psychiatry**	13.0	3.8	9.3	9.3	71.2%
Child/Adolescent Psychiatry**	2.1	1.9	0.3	0.3	11.9%
<b>Other Total</b>	<b>59.3</b>	<b>53.4</b>	<b>5.9</b>	<b>18.7</b>	<b>31.5%</b>
<b>Hospital Medicine</b>	<b>6.7</b>	<b>6.5</b>	<b>0.2</b>	<b>0.2</b>	<b>3.0%</b>
<b>Grand Total</b>	<b>173.4</b>	<b>143.9</b>	<b>29.5</b>	<b>44.6</b>	<b>25.7%</b>

\*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

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

Sleep Medicine, Urgent Care, and Wound Care.

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

**Table 21: Maui County Supply and Demand Estimates by Primary Care**

<b>Specialty (Primary Care)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Family Medicine	52.3	32.6	19.7	19.7	37.6%
General Internal Medicine	39.1	23.7	15.4	15.4	39.5%
Geriatric Medicine	5.3	0.0	5.3	5.3	100.0%
Pediatrics	25.6	22.1	3.5	3.5	13.8%
<b>Primary Care Total</b>	<b>122.3</b>	<b>78.4</b>	<b>43.9</b>	<b>Not calc^</b>	<b>35.9%</b>

**Table 22: Maui County Supply and Demand Estimates by Medical Specialties**

<b>Specialty (Medical Specialties)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Allergy & Immunology	2.8	0.0	2.8	2.8	100.0%
Dermatology	5.1	6.2	-1.1	0.0	0.0%
Infectious Diseases	4.5	0.0	4.5	4.5	100.0%
Neonatology	2.8	0.0	2.8	2.8	100.0%
Nephrology+	5.0	2.1	3.0	3.0	59.0%
Adult Cardiology	12.4	8.7	3.8	3.8	30.2%
Pediatric Cardiology	0.8	0.1	0.7	0.7	85.0%
Adult Critical Care+	2.0	4.3	-2.3	0.0	0.0%
Pediatric Critical Care	0.3	0.0	0.3	0.3	100.0%
Adult Endocrinology	3.2	1.2	2.0	2.0	62.5%
Pediatric Endocrinology	1.1	0.0	1.1	1.1	100.0%
Adult Gastroenterology	7.7	2.9	4.8	4.8	62.7%
Pediatric Gastroenterology	0.8	0.0	0.8	0.8	100.0%
Adult Hematology & Oncology	7.4	2.2	5.2	5.2	70.3%
Pediatric Hematology & Oncology	0.6	0.0	0.6	0.6	100.0%
Adult Pulmonology	7.2	1.2	6.0	6.0	83.3%
Pediatric Pulmonology	0.6	0.0	0.6	0.6	100.0%
Adult Rheumatology	2.7	0.3	2.5	2.5	90.7%
Pediatric Rheumatology	0.1	0.0	0.1	0.1	100.0%
<b>Medical Specialties Total</b>	<b>67.1</b>	<b>29.0</b>	<b>38.1</b>	<b>41.5</b>	<b>61.8%</b>

**Table 23: Maui County Supply and Demand Estimates by Surgical Specialties**

<b>Specialty (Surgery)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Colorectal Surgery	1.3	0.3	1.1	1.1	80.8%
General Surgery	11.5	9.4	2.1	2.1	18.3%
Neurological Surgery+	2.0	0.6	1.4	1.4	70.0%
Obstetrics & Gynecology	19.3	17.5	1.8	1.8	9.2%
Ophthalmology	9.0	4.3	4.8	4.8	52.8%
Orthopedic Surgery+	12.1	9.5	2.6	2.6	21.8%
Otolaryngology	6.0	3.4	2.6	2.6	43.3%
Plastic Surgery	5.5	3.5	2.0	2.0	36.4%
Thoracic Surgery+	2.3	1.0	1.3	1.3	56.5%
Urology+	4.6	2.1	2.6	2.6	55.4%
Vascular Surgery+	2.2	2.8	-0.6	0.0	0.0%
<b>Surgery Total</b>	<b>75.8</b>	<b>54.2</b>	<b>21.6</b>	<b>22.2</b>	<b>29.2%</b>

**Table 24: Maui County Supply and Demand Estimates by Other Specialties**

<b>Specialty (Other)</b>	<b>Demand</b>	<b>Supply</b>	<b>Difference</b>	<b>W/o overage</b>	<b>% Shortage</b>
Anesthesiology	21.9	17.8	4.2	4.2	18.9%
Emergency Medicine*	29.1	16.0	13.1	13.1	45.1%
Other Specialties	17.2	11.9	5.3	5.3	30.6%
Pathology	7.4	1.8	5.6	5.6	75.7%
Physical Medicine & Rehabilitation	3.0	2.5	0.5	0.5	16.7%
Radiation Oncology	2.7	2.0	0.7	0.7	25.9%
Radiology	13.1	5.0	8.2	8.2	62.2%
Adult Neurology	5.8	3.8	2.0	2.0	34.5%
Pediatric Neurology	1.1	0.0	1.1	1.1	100.0%
Adult Psychiatry**	24.0	11.9	12.1	12.1	50.4%
Child/Adolescent Psychiatry**	9.7	3.7	6.0	6.0	62.2%
<b>Other Total</b>	<b>135.0</b>	<b>76.3</b>	<b>58.7</b>	<b>58.7</b>	<b>43.5%</b>
<b>Hospital Medicine</b>	<b>15.8</b>	<b>15.5</b>	<b>0.3</b>	<b>0.3</b>	<b>1.9%</b>
<b>Grand Total</b>	<b>416.0</b>	<b>253.3</b>	<b>162.7</b>	<b>166.6</b>	<b>40.0%</b>

\*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

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

Sleep Medicine, Urgent Care, and Wound Care.

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

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### Appendix 3: Greatest Subspecialty Shortages

*Table 25: Greatest Statewide Subspecialty Shortages*

<b>Specialty</b>	<b>Statewide Demand</b>	<b>Supply</b>	<b>FTE Short</b>	<b>% Shortage</b>
Pediatric Pulmonology	5.5	1.3	4.2	75.8%
Pediatric Gastroenterology	8.2	2.5	5.7	69.5%
Pediatric Endocrinology	7.8	2.5	5.3	67.9%
Adult Pulmonology	57.3	19.8	37.5	65.4%
Colorectal Surgery	10.7	4.3	6.4	60.0%
Thoracic Surgery	20.5	8.8	11.7	57.1%
Allergy & Immunology	20.6	10.0	10.6	51.7%
Adult Endocrinology	28.0	13.9	14.1	50.3%

*Table 26: Hawai'i County Supply Greatest Subspecialty Shortages*

<b>Specialty</b>	<b>Hawai'i Demand</b>	<b>Supply</b>	<b>FTE Short</b>	<b>% Shortage</b>
Pediatric Critical Care	0.4	0.0	0.4	100.0%
Pediatric Endocrinology	1.1	0.0	1.1	100.0%
Pediatric Gastroenterology	0.5	0.0	0.5	100.0%
Pediatric Hematology & Oncology	0.9	0.0	0.9	100.0%
Adult Pulmonology	6.5	0.0	6.5	100.0%
Pediatric Pulmonology	0.4	0.0	0.4	100.0%
Pediatric Rheumatology	0.2	0.0	0.2	100.0%
Colorectal Surgery	1.7	0.0	1.7	100.0%
Thoracic Surgery	4.0	0.0	4.0	100.0%
Pediatric Neurology	0.9	0.0	0.9	100.0%
Adult Endocrinology	3.1	0.1	3.0	96.1%
Adult Hematology & Oncology	5.9	0.3	5.7	95.8%
Neonatology	3.9	0.3	3.7	93.6%
Adult Critical Care	4.0	0.4	3.6	90.8%
Plastic Surgery	3.9	0.5	3.4	87.2%
Physical Medicine & Rehabilitation	7.3	1.3	6.0	82.2%
Adult Neurology	6.2	1.1	5.1	81.9%
Infectious Diseases	5.4	1.0	4.4	81.5%
Neurological Surgery	4.0	0.9	3.2	78.8%
Adult Psychiatry	36.2	9.0	27.2	75.1%
Otolaryngology	5.0	1.6	3.4	68.0%
Pathology	9.2	3.0	6.2	67.4%
Ophthalmology	12.5	4.6	8.0	63.6%
Anesthesiology	25.6	9.5	16.1	63.0%

Nephrology	6.7	2.5	4.2	62.7%
Urology	5.1	2.0	3.1	60.8%
Pediatric Cardiology	0.6	0.3	0.4	58.3%
Adult Rheumatology	2.9	1.3	1.7	56.9%
Pediatric Psychiatry	5.4	2.4	3.0	55.9%
Radiology	17.5	8.4	9.1	52.2%
Allergy & Immunology	2.2	1.1	1.1	51.4%

*Table 27: Honolulu County Greatest Subspecialty Shortages*

Specialty	Honolulu Demand	Supply	FTE Short	% Shortage
Pediatric Pulmonology	4.3	1.3	3.0	69.1%
Pediatric Gastroenterology	6.7	2.5	4.2	62.7%
Adult Pulmonology	41.4	18.2	23.2	56.0%
Pediatric Endocrinology	5.2	2.5	2.7	51.9%
Colorectal Surgery	7.1	4.0	3.15	44.4%
Allergy & Immunology	14.9	8.9	6.01	40.3%

*Table 28: Kaua'i County Greatest Subspecialty Shortages*

Specialty	Kaua'i Demand	Supply	FTE Short	% Shortage
Allergy & Immunology	0.7	0.0	0.7	100.0%
Neonatology	1.3	0.0	1.3	100.0%
Nephrology	2.3	0.0	2.3	100.0%
Pediatric Cardiology	0.2	0.0	0.2	100.0%
Adult Critical Care	2.0	0.0	2.0	100.0%
Pediatric Critical Care	0.1	0.0	0.1	100.0%
Adult Endocrinology	1.0	0.0	1.0	100.0%
Pediatric Endocrinology	0.4	0.0	0.4	100.0%
Pediatric Gastroenterology	0.2	0.0	0.2	100.0%
Pediatric Hematology & Oncology	0.3	0.0	0.3	100.0%
Pediatric Pulmonology	0.2	0.0	0.2	100.0%
Adult Rheumatology	1.0	0.0	1.0	100.0%
Pediatric Rheumatology	0.1	0.0	0.1	100.0%
Neurological Surgery	2.0	0.0	2.0	100.0%
Plastic Surgery	1.3	0.0	1.3	100.0%
Thoracic Surgery	2.0	0.0	2.0	100.0%
Pediatric Neurology	0.3	0.0	0.3	100.0%
Vascular Surgery	2.0	0.1	2.0	97.5%
Physical Medicine & Rehabilitation	2.5	0.3	2.3	90.0%
Colorectal Surgery	0.6	0.1	0.5	86.7%



Pathology	3.2	0.5	2.7	84.4%
Adult Pulmonology	2.2	0.4	1.8	81.8%
Adult Psychiatry	13.0	3.8	9.3	71.2%
Adult Cardiology	4.6	2.0	2.6	56.5%
Adult Neurology	2.1	1.0	1.1	52.4%

*Table 29: Maui County Greatest Subspecialty Shortages*

<b>Specialty</b>	<b>Maui Demand</b>	<b>Supply</b>	<b>FTE Short</b>	<b>% Shortage</b>
Allergy & Immunology	2.8	0.0	2.8	100.0%
Geriatric Medicine	5.3	0.0	5.3	100.0%
Infectious Diseases	4.5	0.0	4.5	100.0%
Neonatology	2.8	0.0	2.8	100.0%
Pediatric Critical Care	0.3	0.0	0.3	100.0%
Pediatric Endocrinology	1.1	0.0	1.1	100.0%
Pediatric Gastroenterology	0.8	0.0	0.8	100.0%
Pediatric Hematology & Oncology	0.6	0.0	0.6	100.0%
Pediatric Pulmonology	0.6	0.0	0.6	100.0%
Pediatric Rheumatology	0.1	0.0	0.1	100.0%
Pediatric Neurology	1.1	0.0	1.1	100.0%
Adult Rheumatology	2.7	0.3	2.5	90.7%
Pediatric Cardiology	0.8	0.1	0.7	85.0%
Adult Pulmonology	7.2	1.2	6.0	83.3%
Colorectal Surgery	1.3	0.3	1.1	80.8%
Pathology	7.4	1.8	5.6	75.7%
Adult Hematology & Oncology	7.4	2.2	5.2	70.3%
Neurological Surgery	2.0	0.6	1.4	70.0%
Adult Gastroenterology	7.7	2.9	4.8	62.7%
Adult Endocrinology	3.2	1.2	2.0	62.5%
Radiology	13.1	5.0	8.2	62.2%
Child/Adolescent Psychiatry	9.7	3.7	6.0	62.2%
Nephrology	5.0	2.1	3.0	59.0%
Thoracic Surgery	2.3	1.0	1.3	56.5%
Urology	4.6	2.1	2.6	55.4%
Ophthalmology	9.0	4.3	4.8	52.8%
Adult Psychiatry	24.0	11.9	12.1	50.4%