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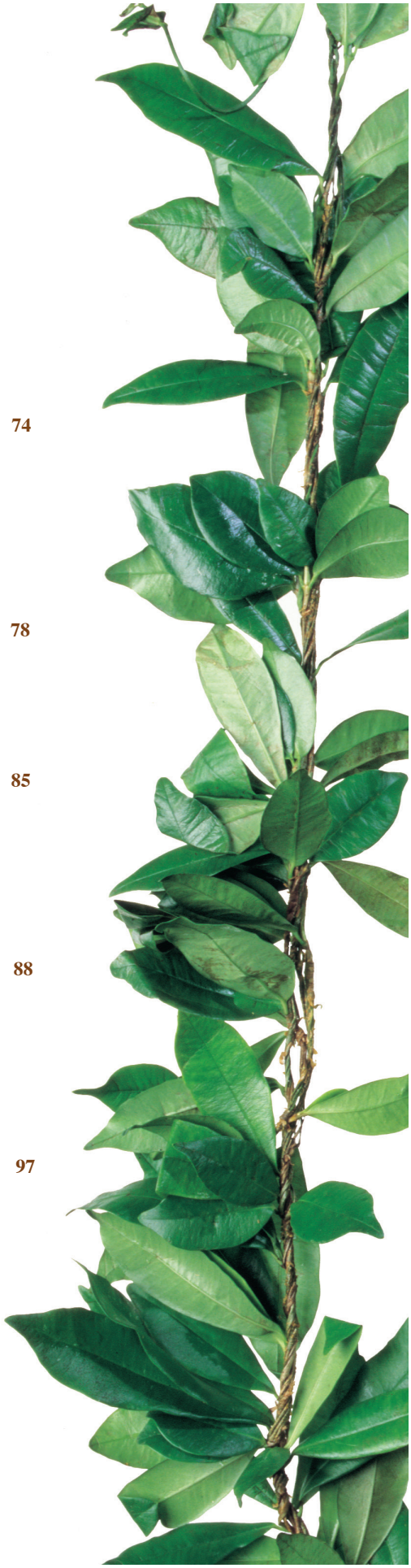

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Aim:

The aim of the Hawai‘i Journal of Health & Social Welfare is to advance knowledge about health and social welfare, with a focus on the diverse peoples and unique environments of Hawai‘i and the Pacific region.

History:

In 1941, a journal then called The Hawai‘i Medical Journal was founded by the Hawai‘i Medical Association (HMA). The HMA had been incorporated in 1856 under the Hawaiian monarchy. In 2008, a separate journal called the Hawai‘i Journal of Public Health was established by a collaborative effort between the Hawai‘i State Department of Health and the University of Hawai‘i at Mānoa Office of Public Health Studies. In 2012, these two journals merged to form the Hawai‘i Journal of Medicine & Public Health, and this journal continued to be supported by the Hawai‘i State Department of Health and the John A. Burns School of Medicine.

In 2018, the number of partners providing financial backing for the journal expanded, and to reflect this expansion the name of the journal was changed in 2019 to the Hawai‘i Journal of Health & Social Welfare. The lead academic partners are now the six units of the UH College of Health Sciences and Social Welfare, including the John A. Burns School of Medicine, Office of Public Health Studies, the Thompson School of Social Work & Department of of Public Health Sciences, School of Nursing and Dental Hygiene, the UH Cancer Center, and the Daniel K. Inouye College of Pharmacy other partners are the Hawai‘i State Department of Health. The journal is fiscally managed by University Health Partners of Hawai‘i.

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The HJH&SW is financially supported by the academic units within the UH College of Health Sciences and Social Welfare, the UH Office of the Vice Chancellor for Research, the Hawai‘i State Department of Health, and by advertising. However, the journal’s editorial board maintains editorial independence from these entities for the acceptance and publication of research articles. All editorial decisions regarding the selection and editing of research articles are made by the members of the journal’s editorial board. The decisions of the editorial board are not influenced by nor subject to the approval of these entities.

The aim of the columns of the HJH&SW is to provide a space for the entities that financially support the HJH&SW to diseminate information regarding their research, programs, goals, or current issues facing their respective fields. Columns are edited by the HJH&SW contributing editors, who are employees of the agencies that support the HJH&SW.

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Guest Editors' Message: Hawai'i's Public Health Workforce

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Dear Readers,

This Special Issue on the public health workforce (PHW) in Hawai'i was envisioned as a consolidated, scholarly resource to support, enrich, and grow the PHW in the state of Hawai'i. It was conceived in response to the extraordinary efforts, the deep value, and the capacity strains of the PHW during the COVID-19 pandemic and the opportunities that arose following this moment to augment, develop, and grow this workforce to reflect our communities and their needs.[1]

As this Special Issue goes to publication, the landscape for public health has dramatically changed and will continue to change.[2-9] The mission of public health is currently under threat in myriad ways in the state and in the country, from misinformation, to science denial, to data suppression, to reduction in funding and personnel and programs to essential public health activities.[10-13] Governmental public health locally, nationally, and globally is in crisis.[14,15] As the federal government plays a core role in non-governmental public health training, research, data, and organizational support, these entities are also under threat.[16-18] There has been a recent sea change on the foundation of which government public health has been built over the last century.[19] This is in a landscape in which public trust in public health institutions and science was already falling; the lack of trust especially in the face of misinformation is a dire situation that needs to be changed, as is the dismantling of the core expertise in the institutions that provide this guidance.[20] Much of our public health training has focused on preventing disease—not on confronting misinformation, information suppression, or cuts to the public health workforce—yet these have become critical threats to our mission.

The multiple authors of this editorial recognize the information collected in the Special Issue at this moment may feel more historical than timely. While times have changed, this Special Issue is being shared as a reminder of the evergreen value of the mission of public health and the continued need to support, grow, and recognize the PHW and to achieve health equity. The information in this Special Issue is important to capture now to document and understand these conversations, initiatives, and values as well as the collaborative efforts of so many over time. The editorial board hopes this document may serve as a useful scholarly resource to both current and future endeavors to augment, support, and rebuild the PHW. These efforts may include bringing back those who have gone to the private sector or left the field entirely and rebuilding pathways to engage them. It may include sharing the value and meaning of public health with new audiences and new settings.

The current threats to public health do not change the core essential role of public health in all of our lives and our communities. A healthy public health workforce is vital for a healthy economy. Each one of us depends every day on the work of public health to ensure safe air to breathe, safe water to drink, safe food to eat, and safe places for recreation. We depend on public health to make it safe for us to interact with each other at work, at school, socially, and in public places. Without a strong public health infrastructure, the risk of engaging in all of these activities will inevitably increase. This Special Issue can now serve, in part, as a roadmap for strengthening and rebuilding these critical public health functions in the face of current threats. To this goal, as in so much of public health, the editorial board will continue to work together with dedication, commitment, and collaboration towards collective goals for community health and wellbeing across our sectors and roles. And will continue to build and support the workforce that makes this possible in this moment of uncertainty – and beyond.

These are personal views and they do not necessarily represent Hawai'i Department of Health, the University of Hawai'i, or other institutions of employment.

On March 4, 2025, the Office of Public Health Studies (OPHS) in the Thompson School of Social Work & Public Health at the the University of Hawai'i at Mānoa was renamed the Department of Public Health Sciences to better identify as an academic department and to emphasize leadership in advancing the science of public health in Hawai'i and beyond. Most articles for this Special Issue were already completed and do not reflect this name change. The article focused on the department as well as author affiliations in the editorials have been updated to reflect this change.

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Sentell T, Irvin L, Rodericks R, Marshall J. Issue Overview: Public Health Workforce Development in Hawai'i: Building a Post Pandemic Future to Achieve Health Equity. *Hawaii J Health Soc Welf*. 84(7):77-83. doi:10.62547/TTGY5303

Issue Overview: Public Health Workforce Development in Hawai'i: Building a Post Pandemic Future to Achieve Health Equity

Tetine Sentell, PhD[1], Lola Irvin, MEd[2], Rebekah Rodericks, MSc[1], Jordan Marshall, MPH[1]

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Abbreviations

CDPHPD = Chronic Disease Prevention and Health Promotion Division
DOH = Department of Health
DPHS = Department of Public Health Sciences
EH = environmental health
HIPHI = Hawai'i Public Health Institute
PHW = public health workforce
UH = University of Hawai'i

Column

This Special Issue – *Public Health Workforce Development in Hawai'i: Building a Post Pandemic Future to Achieve Health Equity* – was envisioned as a collaborative resource including actionable evidence for the public health workforce (PHW) in Hawai'i now and in the future. It was designed to build and support efforts to support, grow, and nurture this workforce following the capacity strain during the COVID-19 pandemic. While this Special Issue was in development, the state of Hawai'i also experienced other devastating crises, including the Maui wildfires, with public health impacts in both the short and long term. Today is a moment of new crisis for public health for the state, nation, and the world.[1-3] While this Special Issue was developed in another time and political environment, the authors believe the effort to build a robust PHW that supports health and health equity for our communities remains essential.

The PHW in the state of Hawai'i is vital to the state's collective health and wellbeing. This workforce is also under strain.[4] In a recent hearing, the Hawai'i State Department of Health (DOH) Director shared that 43% of DOH employees (compared to 36% of other state employees) said they were very or somewhat likely to make a genuine effort to find a new job with another employer within the next 12 months.[4] Work was the second leading significant source of stress for DOH employees compared to third for other state employees.[4] In spring of 2024, over a quarter (27%) of DOH employees reported 14+ days in the past month when their mental health was not good.[5-7] Thirty percent of DOH employees said more staffing and resources would help address their challenges.[4]

Public health nationally has been chronically underfunded with public health and prevention accounting for less than 5% of the health spending and often a target for cuts.[8] Even during the COVID-19 pandemic, only 5.4% of $4.1 trillion of national health spending in 2020 went towards public health and prevention.[9] At the moment of this writing, public health is under considerable threat directly and indirectly in ways that are almost unfathomably broad. The impacts of this will have consequences that are heartbreakingly specific and deeply local as well as global, with impacts that will likely ripple beyond the lifetimes of those alive today.[10-12]

This Special Issue began as a collaborative visioning and set of resources for building a post-pandemic future to achieve health equity. This Special Issue is the product of a collaboration with the editorial board, authors, and reviewers who have brought incredible expertise across diverse areas of public health practice and engagement during the long process it took to bring this Special Issue to print amidst so many other responsibilities and activities in public health.

As Guest Editors, we especially want to acknowledge the wonderful editorial board (listed in detail below) who supported this process with their expertise and insights. We also are grateful to the peer reviewers, the journal, and all the authors for their time, wisdom, hard work, and patience. Articles in this Special Issue range across many areas, describing the PHW and related professions in the state along with challenges and opportunities. This issue also provides frameworks, examples, data, and strategic ideas to support research on, practice in, and advocacy for the Hawai'i PHW in the future.

The 3 columns and 7 articles in this Special Issue highlight areas across the scope of the needs for this interdisciplinary workforce in Hawai'i along with innovative potential future directions to address these needs. Health equity is woven across these goals, now and in the future. Following the 10 Essential Public Health Services model,[13] equity is central to the fundamental goals of the articles as a bridge between challenges and solutions.[14] As the nonpartisan, non-profit American Public Health Association (APHA) that represents more than 23 000 individual members, who reside in all 50 states, the District of Columbia, and Puerto Rico recently stated as a plaintiff in a lawsuit to combat the indiscriminate ending of federal funds, "working to achieve equity in health status is essential not only to APHA's own mission but to the discipline of public health itself."[15]

Editorial

The special edition begins with a letter from the editors addressing the moment in which we find ourselves publishing this Special Issue. It is followed by a column by Scott Mu-

rakami, the Public Health Infrastructure Grant director at the State of Hawai'i DOH, on the value of this workforce. As he states, coming into this role at the DOH: "has nurtured a deeper appreciation for the efforts that it takes to sustain our island way of life today and into the future, a future that ensures we all thrive together as a community."[16]

Gaps and Challenges

The first set of articles calls attention to PHW gaps and challenges. **Quantifying the Public Health Workforce for Hawai'i: Current Data, Measurement Complexities, and Conceptual Frameworks for Next Steps by Sentell et al**,[17] gives an overview of ways to quantify existing needs in this workforce. As the PHW is interdisciplinary by nature, it can be challenging to identify the full scope of needs, and there may not be full agreement on the boundaries of what types of jobs to count and which data to include in considering this workforce. This article considers that complexity and gives data that can be useful to policymakers in addressing gaps from a variety of perspectives with room for future funding in this area.[17] The authors conclude: "The public health workforce [PHW] is vital to community well-being. PHW enumeration is not only an academic exercise – it is a practical necessity for ensuring Hawai'i has a robust PHW."[17]

The next article describes the environmental PHW needs in Hawai'i. **The Environmental Health Workforce in Hawai'i: Current Status and Recommendations for Improvement by Weldon & Pirkle**[18] considers environmental health (EH) issues and priorities in Hawai'i and how to strengthen the EH workforce and infrastructure in EH, areas of high interest to communities and students. These are critical topics that reach across many systems of care and needs across the state. To address these issues, the authors state: "Various discipline and skill levels are needed to supply the environmental health [EH] workforce, but students may not be aware of EH career paths. Internships and traineeships are needed to introduce students to EH and prepare the future EH workforce."[18]

Strategies for Building a Dementia-Capable Workforce in Hawai'i by Nishita & Kawamoto[19] considers the needs of *kūpuna* (elders) and links with dementia caregiving and workforce capacity. They share insights regarding this work and conclude: "Funding dementia care and the building of a dementia-capable workforce is a challenge that must likewise be approached from multiple angles involving both public and private funding sources and new and existing programs."[19]

Social Work Workforce, Licensing and Hawai'i: An Overview by Arndt et al[20] from the Department of Social Work at the Thompson School of Social Work & Public Health at University of Hawai'i considers the workforce needed to address the behavioral health needs that have only been exacerbated by the COVID-19 pandemic and other developments. The authors share: "Social workers engage in prevention and intervention work, contributing to public health through advocacy, disaster response, grief counseling, and health promotion efforts. Additionally, social workers respond to health equity issues by advocating for policy changes to improve health care access, including issues related to reproductive rights, advanced-care planning, and behavioral health parity. These activities support public health generally and are often part of public health programs in a variety of settings.[20]

Innovative Solutions

The second half of this issue highlights some innovative efforts to address these gaps and challenges. **Assuring the "Public" in "Public Health": Developing Workforce Capacity, Diversity, and Connectedness at the Department of Public Health Sciences by Sugimoto-Matsuda et al**[21] describes the work of the Department of Public Health Sciences (DPHS), formerly the Office of Public Health Studies, in the Thompson School of Social Work & Public Health,[22] including current strategic goals. Authors share: "Public health's unique approach to population health, combined with its aspirational yet critical goal of health equity and social justice, requires a robust workforce grounded in both technical skills and dedication to community. DPHS leverages its unique position as an academic unit which centers around students and community, to conduct teaching, research, and service that flexes to workforce and public needs."

An Evaluation of the Native Hawaiian and Indigenous Health Summer Health Academy by Antonio et al[23] describes the Native Hawaiian and Indigenous Health (NHIH) Summer Health Academy program, a DPHS Strategic Initiative through the flagship NHIH program that aims to increase the number of underrepresented and disadvantaged students who join and are prepared to join public health. This program will successfully contribute to diversity in the PHW from a strengths-based approach by considering Indigenous knowledge, building capacity, and experience among students from Hawai'i and the Pacific. As the authors remind us: "Indigenous ways of knowing center on balance and holism, with an emphasis of learning through ancestral and intergenerational knowledge, which continue to be revitalized as a demonstration of the ongoing resilience of Indigenous Peoples."[23]

Building the Future of Public Health Workforce: Comprehensive Intern Training at Hawai'i Public Health Institute by Kuhaulua & Yamauchi[24] provides ideas regarding practical pipelines and training programs from the Hawai'i Public Health Institute (HIPHI), a statewide nonprofit organization that is the first and only public health institute serving Hawai'i.[25] Their work includes food and agriculture, transportation and public safety, oral health, healthy eating + active living (HEAL), drug and alcohol prevention, tobacco, COVID-19 response efforts, and workforce development with a goal to shift public health goals from focusing primarily on treating disease to the promotion of preventing it. These authors share: "A holistic strategy involving stakeholder collaboration, leadership development, evaluation, and ongoing workforce assessment is essential for developing a robust PHW capable

of promoting health, preventing disease, reducing mortality, and responding effectively to future crises."[24]

Conclusions

Taken together and individually, the articles in this Special Issue can be a resource for information to continue to support, grow, and advocate for this vital workforce in our state in this time and in the future. This Special Issue can also provide ideas, discussions, and considerations for the future to address the diverse array of public health challenges that confront this workforce — from the importance of addressing infectious diseases and attacks on core public health values on issues such as loneliness, tobacco, water quality, misinformation, and climate change[26,27] to the promise and challenges of artificial intelligence and new data science tools within aging infrastructure.

Public health is often working best when it is invisible, highlighting prevention and collective well-being over time. This can also hide underinvestment in this workforce — until it is too late. Innovative conversations are happening about the future of the public health system and the PHW nationally. Hawai'i has been innovative in many ways and should remain at the forefront in this moment of crisis and complexity and beyond.

This edition shares the critical work being done by so many, including the authors, to expand and strengthen Hawai'i's PHW, with special attention to addressing community needs, long-term impact, collaboration, strengths-based approaches, and interprofessional teamwork. These manuscripts inspire practitioners, researchers, and advocates to continue this work for better health in Hawai'i, the Pacific, and the world.

Acknowledgement

We are grateful to so many who helped support this Special Issue, including Julia Finn, Simone Schmid, Carrie Soo Hoo and the many who inspire, perform, and support this work. This Special Issue was supported in part by funds from the Hawai'i State Department of Health Chronic Disease Prevention & Health Promotion Division.

researcher, dedicated to understanding and communicating health prevention efforts for all populations. She has a relentless passion for ground-breaking education strategies that assist vulnerable communities. Dr. C has served as board President for the Hawai'i Public Health Association (HPHA), Chair for the Hawai'i State West O'ahu Planning Committee, and board member of the HIPHI.

Janet M. Berreman

Janet Berreman, MD, MPH is the Kaua'i District Health Officer for the Hawai'i DOH. She practiced pediatrics in American Samoa before joining the Waianae Coast Comprehensive Health Center. After more than 15 years of clinical practice serving primarily Pacific Islander and Native Hawaiian communities, Dr. Berreman transitioned into public health. She served as the City of Berkeley's Health Officer for 10 years before returning to Hawai'i in 2017. Teaching has been an integral part of Dr. Berreman's career, both in clinical pediatrics and in public health. Issues of health equity and the impacts of systemic racism on health are core to Dr. Berreman's work. Her current position brings together Dr. Berreman's experiences in rural Pacific Island primary care and local public health, and her commitment to equity and workforce development.

Lance Ching

Lance Ching, PhD, MPH received his doctorate in Pathobiology from the University of Washington School of Public Health, and MPH in epidemiology from Emory University's Rollins School of Public Health. He has more than 10 years of experience developing and testing next generation vaccines against the human immunodeficiency virus (HIV), *Mycobacterium tuberculosis* (Mtb), and influenza. Before joining the Hawai'i DOH as its lead chronic disease epidemiologist, he served as an epidemiologist with the Centers for Disease Control & Prevention's Arctic Investigations Program in Anchorage, Alaska, where he examined the association between Hepatitis B Virus (HBV) genotypes and the development of hepatocellular carcinoma among Alaska Native people. In his current appointment, he provides technical and epidemiological support to diverse programs in the DOH's Chronic Disease Prevention & Health Promotion Division (CDPHPD). Dr. Ching's efforts are focused primarily on policy, systems, and environmental change in various settings (ie, schools, communities, worksites, health care) and at all levels of government. He has co-authored numerous peer-reviewed publications and currently serves as an Associate Editor for the *Hawai'i Journal of Health & Social Welfare*.

Kelley Withy

Kelley Withy, MD, PhD, is Professor of Family Medicine and Community Health at UH John A. Burns School of Medicine and the Director of the Hawai'i/Pacific Basin Area Health Education Center (AHEC). Her research focuses on health workforce assessment, health careers development, rural health, telehealth and substance use prevention. Dr. Withy has over 100 presentations, publications and funded grants for projects on predoctoral training, rural health disparities, health careers recruitment, provider retention, cultural factors in medicine, distance learning methods, telehealth, opioid prevention and treatment and community health education. Dr. Withy is the primary physician workforce researcher in Hawai'i and has developed the only statewide database of supply and demand for physician services as well as a statewide telehealth network called Hawai'i UTelehealth. She has designed training programs around health workforce pathways for all years of schooling that are being employed with more than 4000 students a year.

Alden Henderson

Alden Henderson, PhD, MPH, is an epidemiologist with roles at the Hawai'i DOH and as part of the Hawai'i Public Health Workforce Catalyst Lab at UH DPHS. Dr. Henderson uses his academic training and professional experience to train public health professionals how to identify unusual occurrences of diseases and the source and route of disease transmission so that actions can be taken to control spread of the disease. He began his public health career in 1983 with the Hawai'i DOH and in 1992 joined the Epidemic Intelligence Service at the CDC. Over the next 30 years, he responded to outbreaks of toxic hepatitis in North Dakota, Rift Valley fever in Kenya, cholera in Vietnam, avian influenza in Thailand, Ebola in Sierra Leone, and COVID-19 in the US. He participated in the public health responses to Hurricanes Andrew, Iniki, Mitch, Opal, and Katrina, the World Trade Center attack, the civil war in Brazzaville, and refugee crisis in Tanzania, Kenya, and Thailand.

Simone Schmid

Simone Schmid, PhD, MPH, MSc, currently a post-doctoral researcher, working for both the UH DPHS at the Thompson School of Social Work & Public Health and the CDPHPD at Hawai'i DOH. Dr. Schmid received her PhD in 2021 from the University of Hawai'i at Mānoa. Her vision is to connect academia and health practitioners to design applicable, research-based, innovative solutions and policies improving health equity by supporting populations prone to health disparities to reach their full potential.

Julia Finn

Julia Finn, BS, has worked with the UH DPHS, the Thompson School of Social Work & Public Health, and the Healthy Hawai'i Evaluation Team on several public health research and program evaluation projects. She has also partnered with external organizations such as the Hawai'i Department of Education (DOE) and the Hawai'i DOH on chronic disease prevention and health promotion initiatives.

Eric Hurwitz

Eric Hurwitz, DC, PhD, is Professor and Graduate Chair of Epidemiology and Chair of the DPHS in the Thompson School of Social Work & Public Health at the University of

Hawai‘i at Mānoa. His research portfolio includes comparative effectiveness, health services, patient-centered outcomes, and epidemiologic studies using a variety of experimental and observational research designs and large clinical and population-based databases to study conventional and complementary and alternative interventions, including chiropractic care and spinal manipulation for managing back and neck pain. Dr. Hurwitz has published 170+ peer-reviewed articles.

Jermy Domingo

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Editors

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Tetine Sentell, PhD, MA is the Chin Sik & Hyun Sook Chung Endowed Chair in DPHS at UH and the Principal Investigator of the Hawai‘i Public Health Workforce Catalyst Lab.[28] Her research focuses on untangling the complex relationship between health inequities and multi-layered factors of influence, including how community-level strengths can achieve public health goals and how social networks can support and sustain health literacy. An internationally recognized scholar, Dr. Sentell has published over 125 papers and led projects from the National Institutes of Health, the Hawai‘i DOH, and the Agency for Healthcare Research and Quality among other funders.

Lola Hiroko Irvin

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Becky Rodericks, MSc, is research faculty at the UH DPHS. She serves as a lead investigator or project director for several research and evaluation projects including the Hawai‘i Health Data Warehouse, the Healthy Hawai‘i Evaluation Team, and most recently the Hawai‘i Public Health Workforce Catalyst Lab, where she has collaborated closely with Hawai‘i DOH. Her research interests have focused primarily on evaluating programs that promote physical activity, nutrition, and tobacco-free lifestyles. She also enjoys the innovative and exploratory work of the Catalyst Lab, where she helps coordinate workforce initiatives to help strengthen the PHW in Hawai‘i.

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Importance of Building the Public Health Workforce: Commentary by the Hawai'i Public Health Infrastructure Grant Workforce Director to Introduce the Special Issue on Public Health Workforce Development in Hawai'i

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Commentary Overview

This brief, personal commentary is included to introduce the importance of this Special Issue "*Public Health Workforce Development in Hawai'i: Building a Post-Pandemic Future to Achieve Health Equity*" and the public health workforce generally for the state of Hawai'i. This commentary describes the perspective of the Public Health Infrastructure Grant (PHIG) Workforce Director and Principal Investigator with contextualizing details and perspectives around the public health workforce.

Abbreviations

PHIG = Public Health Infrastructure Grant
DOH = State of Hawai'i Department of Health

Public Health Infrastructure Grant Workforce Background

My role is the PHIG Workforce Director and Principal Investigator. The PHIG is an investment by the Centers for Disease Control and Prevention to ensure that every US community has the necessary skilled people, services, and systems to promote and protect health. It aims to accomplish this through efforts of data modernization, recruitment and retention of the public health workforce, and by addressing longstanding public health infrastructure needs.

My Journey to Public Health

I joined the State of Hawai'i Department of Health (DOH) with no domain knowledge in public health. In the past 9 months, I am beginning to learn how incredibly diverse the Department's responsibilities are and the immense role our employees play in ensuring the wellbeing of our community. As a lifelong resident of Hawai'i, I have taken much for granted… clean air, clean water, the beauty in our natural and built environments, access to quality health care, stable family life, and a high degree of confidence in the food we eat. Since joining the Department, I have learned just how much I have taken these things for granted. My short time at the Department has given me a deeper appreciation for the quiet, vigilant watch our employees hold in safeguarding our community and how their efforts have made my life much richer.

I have had the honor of serving in a variety of roles in service to the residents of Hawai'i. I am always impressed by the dedication of my colleagues who choose careers that protect the public interest and wellbeing. I truly believe that our employees' dedication to public service is a binding agent that links a robust social network of other state agencies, health care partners, environmental partners, and other community stakeholders who collectively contribute to meeting our Department's mission of promoting and protecting the physical, psychological, and environmental health of the people of Hawai'i through assessment, policy development, and assurance.

Vision for the public health workforce in Hawai'i now and in the future

In the coming year, I think it is important to lay a strong foundation of partners working together to create an ecosystem that supports an agile, adaptable, and vibrant public health workforce. This ecosystem will contribute to and support a public health workforce that embraces the application of new technologies; is accepting of the risks that accompany innovative solutions; is emboldened to solve complex problems that do not exist today; and accomplishes this with the same passion, commitment, and purpose of our current workforce.

A strong foundation is important because similar ecosystems are emerging in many other competing industries. Industries such as, Accommodations/Food Service, Health Care/Social Assistance, Professional/Scientific/Technical Services, and Retail are seeing business, education, and community partners joining forces to develop a similar ecosystem that supports greater competition for a decreasing market of skilled, adaptable, and agile labor. Organized public health partners working together to strengthen both the current and future workforce serves as the foundation of an ecosystem that ensures that we can continue to attract and retain the best and brightest workers who are dedicated to protecting the health and wellbeing of our community.

Hawai'i will remain a highly desirable place to live, work, and play over the next 5 to 20 years. As work becomes more global and technology solutions fill both talent and labor gaps, I think Hawai'i will face market conditions including higher cost of living and increased competition for limited number of jobs, that make it even harder for people who are dedicated to public service including public health, to live and work in Hawai'i. The resulting effect could be an even

faster rate of emigration of working aged adults to states with lower costs of living and/or higher wages, accelerating the loss of skilled labor. The June 27, 2024, release of US Census Data on Hawai'i, shows a decline of 16 043 residents overall from July 1, 2020, to July 1, 2023.[1] What's more concerning is the larger decrease of 26 533 people among working aged adults between the ages of 15 to 64 years during the same period.[1] Simultaneously, the population of residents ages 65 through 85+ increased by 22 965.[1]

This cursory view of the Census data suggests a growing demand for specialized care of senior residents served by a decreasing labor force. This is intuitive to most residents of Hawai'i who provide or pay for the care and support of our *Kūpuna* (older adults). When you add in other environmental factors such as climate change as well as social-economic factors such as international travel returning to pre-pandemic levels, and equitable access to health care, there is increasing strain on our public health services. This is why having a strong ecosystem that supports Hawai'i's public health workforce is critically important. The ecosystem must allow for quality pathways for recruitment and an equally impactful and vibrant professional development opportunities. It must also be adaptable enough to ensure the timely shifts in the public health services that reflect Hawai'i's changing population as well as other social, environmental, and community wellbeing needs.

Resources, conversations, and collaborations

Along with many other workforce initiatives, the conceptualization, development, and implementation of the Hawai'i Public Health Workforce Catalyst Lab is a great collaboration to build momentum to support the workforce. Events such as the Hawai'i Public Health Workforce Stakeholder Meeting, partnership for the inclusion of a public health track in the 2024 Hawai'i Health Workforce Summit, and this Special Issue are vital to increasing awareness and developing a comprehensive understanding of the labor market conditions and the current and future public health workforce needs.

Continuing to work closely with our public and private education partners through joint curriculum development efforts, increasing work-based learning, and professional development opportunities for our incumbent public health workforce increases our probability of fostering agility in our workforce. Tough funding and management discussions and decisions that support investments in our current and future public health workforce that address root-cause issues and focus on result-based solutions that increase productivity, will be critical to sustaining our island way of life.

Conversation around the larger labor market that extends beyond industry sectors and sub-populations of both Hawai'i and the nation's workforce are extremely important. Conversations and policy discussions that focus on federal programs that support returning unemployed workers (3% to 7% of the labor force, the U3-U6 levels of labor underutilization which include short and long term unemployed, discouraged, marginally attached, and underemployed workers) back to work remain important.[2] We need to also have conversations around the 93% to 97% of the workforce that we rely on for our community's wellbeing including, responsible and equitable economic growth, environmental protection, social harmony, and health and wellness.

Programs that help to reduce the cost of living in Hawai'i for high worker shortage areas such as the Governor's loan repayment program for health care workers, and the workforce housing pilot program administered by the Hawai'i Housing Financing and Development Corporation are extremely important initiatives that help to position Hawai'i as a competitive and attractive location for retaining working aged professionals.

Conclusions

I love living in Hawai'i. Joining the DOH, learning more about the great work our employees do, and how their efforts contribute directly to the wellbeing of our community gives me a sense of pride and purpose as a member of the DOH *'ohana* (family) and a small contributor to the public health workforce ecosystem. But more than that, it has nurtured a deeper appreciation for the efforts that it takes to sustain our island way of life today and into the future, a future that ensures we all thrive together as a community. This Special Issue "*Public Health Workforce Development in Hawai'i: Building a Post-Pandemic Future to Achieve Health Equity*" provides useful evidence to help make this goal possible.

Disclaimer: The opinions expressed in this document are those of the author and do not reflect the official position of the State of Hawai'i Department of Health.

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Quantifying the Public Health Workforce for Hawai‘i: Current Data, Measurement Complexities, and Conceptual Frameworks for Next Steps

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Keywords: workforce, public health, governmental, Hawai'i, Pacific

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Abstract

The public health workforce is critical to community well-being and too often overlooked. The goal of public health is to prevent disease, promote health, and protect the public from current and emerging health threats. This work is vital to the health, safety, security, and prosperity of all communities and requires an adequate workforce. Despite the well-articulated gaps in the clinical health care workforce, Hawai'i's public health workforce needs and capacities are not as well understood. Public health workforce enumeration is complex. The field lacks a consistent definition of its full workforce and agreed-upon mechanisms for measuring it. Resolving these issues is an active area of scholarship and action, particularly given the COVID-19 pandemic-induced workforce capacity strain. This article reviews existing literature on public health workforce enumeration as a step toward filling this knowledge gap for practical use in the state of Hawai'i. Specifically, using a critical literature review method, this article (1) consolidates existing data about Hawai'i's public health workforce, (2) summarizes public health workforce measurement challenges, (3) shares existing frameworks and models for quantifying the public health workforce, and (4) discusses next steps to provide actionable information for ensuring Hawai'i's public health workforce can fulfill its mission. The article confirms that core public health functions as articulated in the (a) updated 10 Essential Public Health Services framework and (b) Foundational Public Health Services framework provide useful guidance for public health workforce enumeration in Hawai'i. The article also concludes that the US Department of Health and Human Services (HHS) definition of public health workers provides comprehensive framing for this enumeration. Based on this literature synthesis, a descriptive figure of the public health workforce in Hawai'i was developed to guide future work and prioritization.

Abbreviations/Acronyms

ASTHO = Association of State and Territorial Health Officials
CBO = community-based organizations
CDC = Centers for Disease Control and Prevention
DHRD = Hawai'i State Department of Human Resources
EPHS = Essential Public Health Services
FPHS = Foundational Public Health Services
HDOH = Hawai'i State Department of Health
HHS = US Department of Health and Human Services
NGO = non-governmental organizations
PH = public health
PHW = public health workforce
PH WINS = PH Workforce Interests and Needs Survey

Introduction

The goal of public health (PH) is to prevent disease, promote health, and protect the population from current and emerging health threats.[1] This work is vital to the health, safety, security, and prosperity of all communities and requires an adequate number of competent PH workers. The United States' public health workforce (PHW) has long been undervalued, underfunded, and/or understaffed, with numerous calls for substantial additional investments and innovations.[2] These calls escalated in the wake of the COVID-19 pandemic.[2]

While Hawai'i's clinical health care workforce needs and shortages are well documented,[3,4] those in the PHW are less understood. Comprehensive enumeration of the PHW is challenging,[1,5,6] both due to the lack of a consistent definition of the workforce, which can be both dynamic and wide-ranging, and the lack of an established methodology for PHW enumeration. Yet quantifying the PHW is critical to understanding current and future needs and gaps in order to ensure the PHW is capable of meeting its mission.

An understaffed PHW, like an under-staffed clinical health care system, puts the health and well-being of Hawai'i at risk. Some examples of an understaffed PHW include delayed or inadequate responses in communicable disease control, environmental health threats, delayed public communication, or slowing the advancement of health equity in our state.

This article reviews the literature on PHW enumeration to address this knowledge gap for the state of Hawai'i. Specifically, this article: (1) consolidates existing data about Hawai'i's PHW, (2) summarizes PHW measurement challenges, (3) shares existing frameworks and models for quantifying the PHW, and (4) discusses next steps to pro-

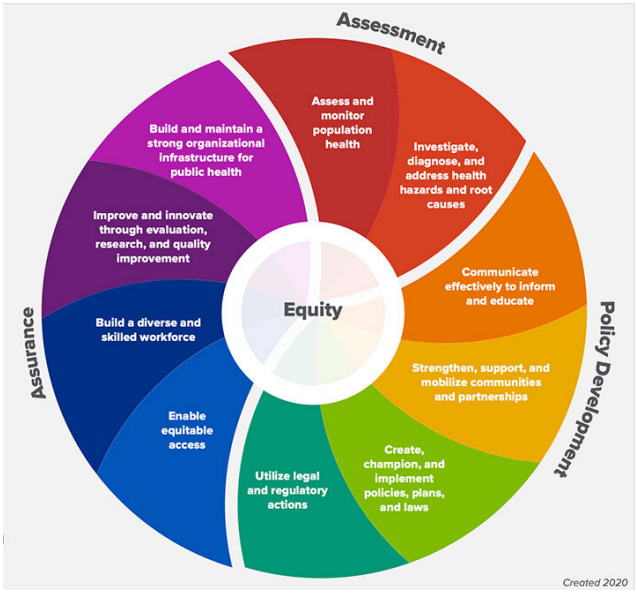

Figure 1. Revised 10 Essential Public Health Services Framework[9]

vide actionable information for ensuring an adequate PHW in Hawai‘i, now and in the future.

Methods

The authors conducted a critical literature review[7] utilizing 3 types of sources to the date of December 2024. First, PubMed was used to identify relevant articles in 2 categories: (1) literature on this topic in Hawai‘i and (2) state-of-the-art PHW enumeration models, frameworks, or data. Second, as this topic engages applied PH, which may prioritize resources other than peer-reviewed publications, the grey literature was searched using relevant keyword Google searches. Finally, the authors drew upon the interdisciplinary, applied expertise of the authorship team and their professional networks.

To delineate the PHW, a PHW definition was needed to reliably and clearly encompass those whose roles, expertise, and place of employment contribute to core PH functions both in governmental agencies, such as state health departments, and in non-governmental sectors such as community-based organizations (CBOs), academia, and health care. Although much PH enumeration prioritizes governmental PH, it is critical to quantify PH workers in all sectors.[8] The scope of PH was defined using 2 widely-used frameworks that articulate core PH functions. The 10 Essential PH Services (EPHS) takes a broad perspective of the PHW across settings and specifies assurance, assessment, and policy development as essential service areas, with equity at the center (**Figure 1**).[9] The Foundational PH Services (FPHS) framework[10] focuses on governmental PH. FPHS separates foundational areas from foundational capabilities, again identifying equity as cross-cutting (**Figure 2**).[10]

Results

Existing Data on the PHW in Hawai‘i

As summarized in **Table 1**, limited recent data quantifies the full PHW in Hawai‘i. Most data sources focus exclusively on governmental PH. One source looks at the PHW broadly, including non-governmental PH. Even when describing the same workforce, the data sources use different definitions for the PHW, count positions differently, and describe different time periods, resulting in variations. This underscores the complexity of this measurement process.

Hawai‘i State Department of Health (HDOH) Size and Vacancy Information: According to a HDOH report, as of November 2023, there were 2 927 funded positions at HDOH, including 860 vacancies (29% vacancy rate).[11] This source lists vacancies by roles, reporting high numbers of vacancies in mental health and laboratory technicians, social workers, behavioral health, and managers. This variety showcases the complexity of using a single domain, such as job title, to identify the PHW when there are many additional factors to consider.

Hawai‘i State Department of Human Resources (DHRD) Vacancy Report: DHRD is mandated to provide vacancy data to the state legislature on state departments and agencies, including HDOH. Public sector employees in Hawai‘i in permanent positions have defined retirement benefit packages by age, service period, and date of hire that can be used to estimate eligibility for retirement. The most recent report (December 2023) notes 2 389 HDOH employees in the DHRD personnel system, of which 27.3% are eligible to retire by June 2028.[12] This report is not designed to enumerate the full PHW, but it is useful for consideration in a critical review of this process as a regular report that quantifies upcoming anticipated gaps on this workforce.

Association of State and Territorial Health Officials (ASTHO) State PH System Profile. ASTHO creates regular profile reports of state PH systems. From 2022 data (last updated in December 2023), ASTHO's Hawai‘i profile estimated there were 2 168 employees (excluding vacancies, temporary or contract workers).[13] ASTHO 2022 data estimated that 476 out of 2 644 positions (18%) were vacant, putting the state in the highest quartile of percent vacancies.[13] ASTHO noted HDOH had a temporary to regular staff ratio of 2.9 to 10, ranking Hawai‘i as the third-highest quartile of state health departments for temporary workers.[13] The ASTHO profile further states that the number of PH employees in Hawai‘i decreased from 189.8 per 100 000 population in 2019 to 150.5 per 100 000 population in 2022.[13]

Hawai‘i PHW generally. A peer-reviewed paper by Braden et al (published in 2017 with data collected in 2015) estimated the total Hawai‘i PHW, including non-governmental sectors, had between 3 429 to 3 846 workers, depending on how the PHW was defined.[14] Authors estimated that a range of 317 to 502 will be needed but that when adjusting for undercounting, a range of 1005 to 1664 PH employees would be needed in the 5 years following the publication to ensure an adequate local PH system.[14] The publication pro-

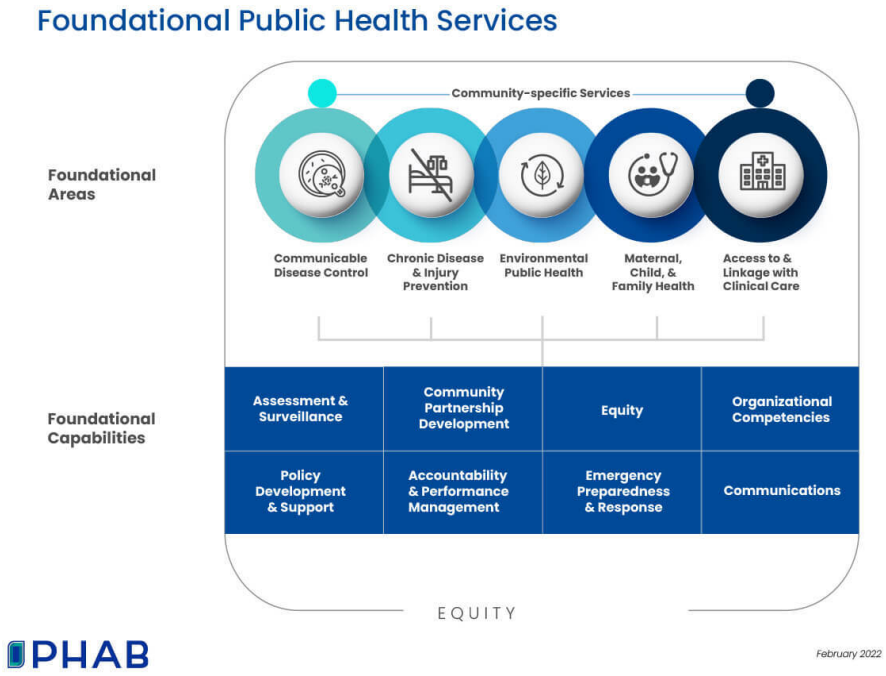

Figure 2. The Foundational Public Health Services[10]

Table 1. Existing Recent Evidence on Public Health Workforce (PHW) Size in Hawai'i

Source	Type of Position	Date of Estimate	Estimated Number of Positions	Vacancies	Vacancy Rates
HDOH[11]	HDOH permanent positions	2023	2927	860	29% unfilled
DHRD[12]	HDOH Employees in DHRD personnel system	2023	2389	652 eligible to retire by 6/30/2028	27.3% eligible to retire
ASTHO[13]	HDOH positions (non-temporary or contract)	2022	2644	476	18% unfilled
ASTHO[13]	HDOH temporary positions	2022	766.8 (2.9 to every 10 regular positions)	N/A	N/A
Braden et al PHW Survey[14]	PHW generally	2015	3429 – 3846	317-502 estimated from reported and projected vacancies, but could be as high as 1005-1664.	9%-46% estimated relative to needs

ASTHO = Association of State and Territorial Health Officials
DHRD = Hawai'i Department of Human Resources Development
HDOH = Hawai'i Department of Health
N/A = Not applicable

vided an estimated gap range for the PHW between 9-46%, depending on the definition of future need.

PHW Interests and Needs Survey (PH WINS).[15] The PH WINS national survey (conducted in 2014, 2017, 2021 and 2024) measures "strengths and gaps to inform future investments in funding, training, recruitment, and retention" in the governmental PHW. PH WINS is the only national, individual-level survey of the governmental PHW. Hawai'i has participated in PH WINS since 2017 and is in the Region IX and the state health department aggregated data reports. From these distinct measures, the vacancy rates and

projected needs indicate strains in this workforce and reinforce the need for detailed enumeration to identify specific gaps and prioritize solutions. State-level detail for Hawai'i (not previously reported) will be reported from 2024 data, contingent on adequate response rates. Of relevance to Hawai'i, this report provides detail on the need for greater diversity in this workforce to better represent the communities served, including the stark underrepresentation of Native Hawaiians and Pacific Islanders in this workforce.[15]

PH Workforce Measurement Complexities

Given current and anticipated vacancy rates as well as the critical responsibilities of the PHW, improved enumeration is needed. However, defining the boundaries of the PHW is challenging.[14,16-20] The authors discuss these complexities in 3 categories: defining the workforce, establishing an appropriate sampling frame, and dynamic considerations (**Table 2**).

Defining the PHW. In contrast to many health care professions, no licensures or job titles readily define the workforce that performs essential PH services. While models and methods exist for enumeration, the PHW full scope and scale, including all relevant roles and sectors, is not counted or classified nationally. For instance, a Centers for Disease Control and Prevention (CDC) career website indicates more than 170 PH job categories, including biologists, epidemiologists, audio-visual production specialists, web developers, and health informatics specialists.[19] All have distinct training pathways and markers of expertise. While some have PH educational degrees, others have varied educational pathways, making counting complex. In fact, PH WINS showed less than 20% of governmental PHW nationwide completed a degree in PH.[15]

Given this, the profession or job function may not match formal academic training or licensure. For example, a Registered Nurse (RN) could provide direct clinical care or could lead disease outbreak control in a health department. Including all RNs in the PHW would lead to an overestimate. Roles such as public administrator or communications specialist are critical to PH functions, but only a minority of those employed in these job titles are in the PHW. Omitting them would lead to undercounting. Physicians and public relations specialists may join the PHW temporarily (eg, in a disaster response). This work is part of essential PH functions, but these temporary roles are captured with difficulty. Most labor data sources primarily focus on employed job title. This complicates identifying a distinct PH identity, as well as where best to measure this workforce. Using credentials or academic degrees poses similar challenges.

It is also important to distinguish the PHW from the health care workforce, though they may overlap. Both EPHS and FPHS identify core PH functions as access to health care services, rather than health care services themselves. Enumeration of the PHW must make this distinction in gathering data from health care service providers, to capture only the "PH portion" of their health workforce. Yet there are also important areas of overlap, partnership, and collaboration across these sectors, both at baseline and in PH emergencies. At baseline, governmental PH, to varying degrees, provides direct health care services (especially behavioral health services), blurring the lines between governmental PH and health care. An enumeration methodology must be robust to these considerations as well as the dynamic grey areas between these sectors.

The authors thus believe it is more fruitful to use the federal US Department of Health and Human Services (HHS) definition of PH workers as "all those responsible for providing the essential services of PH regardless of the organization in which they work."[18] This casts a broad enough net to include academia, CBOs, and other governmental and non-governmental organizations (NGOs), as well as relevant components in health care, and is from an authoritative source. This definition includes all those performing the functions identified in the EPHS and FPHS models in Hawai'i.

Sampling considerations. A sampling frame must be identified to enumerate the workforce. The government sector is the core but not the entirety of the PHW. Nonprofits and academia have long-standing PH roles and governmental PH regularly contracts with partner agencies for some of its core functions. Additionally, there are newly emerging roles in adjacent settings (such as health care, health insurance) with particular focus on equitable access to health care that intersect with the PHW.[20] These roles often focus on "population health" which is not synonymous with "public health."[20,23,24] While some of these roles within these organizations perform essential PH functions (as per EPHS/FPHS), the vast majority falls outside of core PH.

Dynamic considerations. Emergency preparedness and response is a foundational PH function, including activation of emergency response personnel.[9] The COVID-19 pandemic produced a temporary PHW surge. This can be interpreted as an indication that baseline PH capacities nationwide were inadequate to perform a core PH function—controlling infectious diseases—and/or that, in rare but foreseeable PH disasters, the PHW will need temporary increased capacity. Enumerating the PHW, especially determining an adequate or ideal PH capacity, is made more challenging by the dynamic nature of the work and thus of the workforce.

Federal/Regional/Other Capacity. Often most visible in PH emergencies but engaged also in routine operations, PH capacity also includes federal and regional components. These can occur as part of governmental PH as well as non-governmental contracts, grants, and other formalized relationships. One important example is the roles of the CDC and CDC Foundation in COVID-19. Congress provides routine and emergency funds for CDC operations to support state/local governmental PH. The CDC Foundation was established by Congress as a non-profit that supports the CDC and its core missions. In the COVID-19 pandemic, surge capacity was delivered to local health departments through the CDC Foundation, including hiring over 3000 PH workers across the US to fill workforce gaps.[25] The role of integrated federal and regional PH workforce into state functions in routine operations and emergencies is important

Table 2. Summary of Measurement Challenges with PHW in the State of Hawai'i

Measurement Challenge	Measurement Implications
How to measure	
• No licensure or job title readily defines the workforce. • No pre-requisite educational degree to work in PH. • Diverse training modalities exist for learning PH competencies, skills, and perspectives. • Functional activities may not match training nor job title. • Part time and full time roles, permanent and temporary roles vary in benefits and career advancement and measurement.	• Self-identification may over and undercount workforce. • Individuals could self-identify as part of the PHW (or not) because of their activities or training or place or work (eg, at DOH).
Where to measure	
• The government sector is core but only part of the plausible PHW. • Nonprofits and academia have longstanding PH roles. • Newly emerging roles in clinical care and health insurance with a population health focus could be considered.	• Wide scope may make measurement too complex to be comprehensive. • Narrow scope may miss workforce. • How to decide what to include and who decides.
Dynamic consideration	
• The pandemic impacted the roles of increased need for, and loss of, governmental PH workers. • COVID-19 resulted in creation of PH positions which were temporary and thus don't represent sustained improvement. • PHW must be elastic to respond to emergencies as well as responsive to changing long-term demographic and population health needs. • Short term grant funding, in non-emergency times, often necessitates temporary or contracted PH workers. • Intermittent grant funding is a long-standing feature of PH. Temporary workers are part of the baseline landscape of the PHW but vary and may be missed in PHW enumeration.	• Decrease is probably an underestimate of the true decrease in permanent staffing. • Optimal staffing may vary and need ways to count this elasticity also.
Global considerations	
• Federal, regional, and even international entities may be relevant in PHW enumeration. • Strength of PH is in the scale, scope, and cross-sector, interdisciplinary approach to support population health. • This complicates not only measurement but also advocacy and ownership of measurement.	• Who advocates for counting this workforce? • Who defines the boundaries (government vs. academia vs other)? • Complexity of blurry boundaries may complicate a distinct PH identity and reduce advocacy and funding.
Hawai'i considerations	
• Calculators designed for local PH departments are not designed to be useful to centralized structures (like that of the Hawai'i Department of Health).[21,22] • Behavioral health services fall under the umbrella of PH.	• Could try to modify output from calculators. • Calculation data useful to prioritize hires. • There is a complexity delineating clinical services in core PH, but it is important to understand this nuance.

DOH = Department of Health
PH = Public Health
PHW = Public Health Workforce

to recognize in enumeration. While most of the CDC workforce is counted in the PH workforce definition, if not specified for inclusion in a sampling frame, only state-level FTEs may be counted.

Hawai'i-specific considerations. Hawai'i has a centralized governmental department of health (HDOH). Arguably, this facilitates PHW enumeration at the governmental level, as enumeration engages 1 governmental agency rather than many city, county, or regional agencies. HDOH includes the Behavioral Health Administration with its state mental health hospital and the associated direct clinical care workforce. This complicates enumeration in that HDOH includes staff who fall outside of the HHS definition of PHW. While neither of these features is unique to Hawai'i, they are important considerations in moving forward with enumeration.

Measurement Frameworks

The PHW could be defined based on job function (linking to HHS), setting (government, academia, NGO, health care), training (degree or credential), job classification (epidemiologist, community health worker (CHW), or some combination of these.[18,21]

Job Function. While the HHS definition focuses on the essential services of PH,[18] previous research in Hawai'i defined a PH worker more broadly as "anyone who works with groups and/or communities to protect, promote, or advance health/wellness."[14] This definition, which casts a wide net, is the source of one of the few recent enumeration sampling frames for the Hawai'i PHW and is thus included here for comparison purposes.

Setting/Employers. Most research in this area focuses on governmental PH,[18] although academia, NGOs, CBOs, and health care all have functions that fall within the HHS definition.[14] Those employed in health care settings such as hospitals, Federally Qualified Health Centers (FQHC), and insurers would largely fall outside of the PHW, with exceptions for those positions focused on fulfilling essential PH services. Previous research in Hawai'i using a broad definition of the PHW found the HDOH to be the largest employer of PH workers in the state, followed by FQHCs, educational institutions, non-profits, and CBOs.[14]

Training. Academic degrees in PH present complexities in delineating the PHW as the vast majority of those with academic PH degrees do not enter the governmental PHW and the vast majority of those who work in governmental PH do not have academic PH degrees.[26] For example, a recent study of Bachelor of Arts in Public Health (BAPH) graduates in Hawai'i found that only 1 of 98 graduates reported employment in local governmental PH.[27] More common were employment in local NGOs and health care organizations in roles such as program coordination or support staff, which may fall outside the HHS definition. National trends for academic degrees in governmental PH are similar. The 2021 PH WINS data show that nationally 17.4% of the governmental PHW has a PH degree at any level.[28] A recent study found that only 17% of employed recent PH graduates nationally were in government PH.[26]

Multidimensional Model

Given the complexities described above, a single tool is unlikely to adequately enumerate the PHW. A practical approach likely begins with prioritization of which parts of the PHW to measure given finite time, resources, and needs and clarity about what is being included in each count. Multiple phases could be useful for considering and enumerating Hawai'i's PHW.[18] As noted above, the authors believe the HHS definition best incorporates EPHS and FPHS models, while drawing appropriate boundaries around the PHW.

Table 3 synthesizes these considerations in a basic table template to support this process for the state that includes the building blocks that can be filled in with relevant information. Local government PH on the far left is the largest sector with other local sectors flowing across and regional and national relationship supporting from below. The figure provides a way to visualize overlap and collaboration between government and non-governmental sectors in core PH functions. Enumeration numbers could be added to the figure as this information is collected and/or this figure could also be filled in with specific organization or project names by classification to provide a scoping of the PHW ecosystem. It could also be used to display this information just for specific islands, topic areas, issues, or moments in time.

Discussion

Enumeration of the PHW in Hawai'i is critical for ensuring that core PH functions can be met. Enumeration includes measures of the current workforce, gaps in that workforce, and projected future needs. This information is critical to planning and implementing PH educational opportunities, job creation, and recruitment and retention throughout the PHW. This paper, with its template table, provides a framework to support future enumeration efforts, grounded in core PH functions. This is a critical time due to the attention on the PHW, including state and national investment and visioning by stakeholders for the future of PH.[26,29]

The authors have several practical recommendations. The first is to devote resources to comprehensively enumerating the Hawai'i PHW, building from national experience and the definitions provided here. Other states worked with local PH jurisdictions, other state agencies, universities, and PH institutes to quantify their local PHWs.[10, 26] Hawai'i is well-positioned for such a collaboration. PH in Hawai'i can benefit from annual updates on its workforce, as clinical health care benefits from such data.[3,4] A starting point is to build a survey instrument, modified from existing tools, to identify the landscape of the PHW from the perspective of relevant employers.[13] Hawai'i-focused enumeration tools should be designed to address significant identified data gaps, including fuller information about workforce diversity and enumeration of parts of the workforce often identified as ancillary or marginalized such as CHWs. In addition, consideration for how technology, future emergencies, politics, and need for surge capacities impact the future PHW should be included. Furthermore, location is an essential consideration when planning the PHW. Portability could be included to address future PH issues, as the fire in Lahaina demonstrated.

Previous recommendations for better enumeration included creating a public database of organizations that identify or affiliate with the PH community, convening a dedicated group tasked with the implementation of a standard classification scheme for their PH workers, and the creation of a regular data collection system for the PHW for advocacy, workforce policy and planning, and impact assessment.[13,18] Using the HHS definition of the PHW can help address these concerns.

There are many factors to consider besides simply numbers of workers, including information about diversity (eg, race/ethnicity/language/Lesbian, Gay, Bisexual, Transgender, Queer or questioning+ [LGBTQ+]). National data reveals limited racial/ethnic diversity of the national PH workforce generally and specifically in representation of Native Hawaiians and Pacific Islanders.[15] It is important to identify gaps and mark progress towards a goal of building an inclusive, representative, and culturally competent PH workforce, including supportive pathways, programs, and pipelines to PH.[27,30]

The critical review method was a strong fit for this project as it is, by design, a search informed by expertise in order to synthesize information and identify gaps and next steps from existing evidence on a focused research question. However, the critical review search is also, by design, non-comprehensive given its focus on dominant themes and reliance on professional expertise for evidence prioriti-

Table 3. Template for Visualization of Building Blocks of the Public Health Workforce (PHW) in the State of Hawai'i.[a]

Core Public Health Functions						
Government Public Health Positions			Non-Gov Public Health Positions			
	Permanent	Temporary/ Surge	Community Based Organizations	Healthcare	Academia	Other
State						
Local						
Regional						
National						

[a]This template is based on the US Department of Health and Human Services (HHS) definition of public health workers at "all those responsible for providing the essential services of public health regardless of the organization in which they work."[18] Enumeration numbers could be added to the figure as this information is collected and/or this figure could also be filled in with specific organization or project names by classification to provide a scoping of the public health workforce ecosystem. It could also be used to display this information just for specific islands, topic areas, issues, or moments in time.

zation and synthesis. Thus, relevant work in this area may have been missed.

The PHW is vital to community well-being. PHW enumeration is not only an academic exercise—it is a practical necessity for ensuring Hawai'i has a robust PHW. Hawai'i's PH system is under strain. Workforce questions posed before the pandemic[14] remain relevant today. These may grow as temporary workers exit and eligible workers retire. This paper provides context and practical options to consider for the important work of PHW enumeration to understand, support, and grow this vital workforce.

Disclaimer for JB

Views expressed are those of the author and not necessarily those of the Hawai'i Department of Health.

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Weldon RH, Pirkle C. The Environmental Health Workforce in Hawai'i: Current Status and Recommendations for Improvement. *Hawaii J Health Soc Welf*. 84(7):96-105. doi:10.62547/WXTF9814

The Environmental Health Workforce in Hawai'i: Current Status and Recommendations for Improvement

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Abstract

Environmental health (EH) is a critical branch of public health that addresses current and emerging health threats related to issues such as climate change and pollution. The state of Hawai'i faces distinct EH challenges, including air pollution from volcanic activity, widespread vulnerability to sea level rise, wildfire, exposure to pollution from accidental spills from military sites, and a tropical environment that contributes to heat-related illness and that is conducive to mosquito-borne illnesses. A robust EH workforce is essential to respond to these concerns. This article uses a combination of targeted literature review and qualitative interview methods to synthesize evidence relevant to the issue for the state of Hawai'i. Such a workforce includes professionals in state and federal agencies, academia, and the non-profit and community sectors. Many academic disciplines and professionals can contribute to the EH workforce, including environmental scientists and epidemiologists, toxicologists, exposure assessment scientists, risk characterization scientists, environmental policy and communication experts and community-based EH workers. Currently, there is an insufficient EH workforce in Hawai'i and addressing this gap will require strategic investments in academia and the Hawai'i Department of Health, as well as expanded collaboration. Training programs are also critical, in particular cross-sector ones. Finally, a proficient EH workforce in Hawai'i needs to be able to communicate effectively with the diverse populations of the state and demonstrate commitment to and understanding of the unique populations of the state and their EH concerns.

Abbreviations

DOH = State of Hawai'i Department of Health
EH = environmental health
EHA = Environmental Health Administration
EPA = Environmental Protection Agency
HEER = Hazard Evaluation and Emergency Response
PFAS = per- and polyfluoroalkyl substances

Introduction

Hawai'i has distinct environmental exposures from volcanic activity and the impacts of climate change in a tropical environment which lead to specific environmental health (EH) needs. The recent devastating wildfires in Maui have underscored the importance of understanding climate change in the state and the environmental and health consequences of the hundreds of resulting contaminants.[1,2] In addition, the media attention on releases of jet fuel and per- and polyfluoroalkyl substances (PFAS) at the United States (US) Navy Red Hill Bulk Fuel Storage Facility on O'ahu have spotlighted critical EH issues in Hawai'i.[3] Residents also need to be safeguarded from the health effects of potential environmental exposures experienced in daily life through diminished air or water quality, pests, exposure to pesticides and other industrial chemicals, and the associated psychological stress factors that negatively impact human health.[4]

The work needed to conduct research; promote, monitor and remediate environmental quality; develop policies to reduce exposures; address inequities in harm from environmental degradation (environmental justice); and effectively confront environmental disasters requires a considerable workforce of environmental technicians, environmental scientists, environmental epidemiologists, ecotoxicologists, exposure assessment scientists, risk characterization scientists, environmental policy and communication experts, and community-based EH workers.

According to the American Public Health Association, "Environmental health is the branch of public health that: focuses on the relationships between people and their environment; promotes human health and well-being; and fosters healthy and safe communities."[5] One of the earliest public health interventions, the removal of London's Broad Street water pump handle to decrease cholera transmission in 1854, was an EH breakthrough.[6] Water and air quality are so vitally important to human health that 2 federal laws, the Clean Water Act and the Clean Air Act, were passed in the 1970s to ensure basic quality standards and regulate discharges of pollutants.[7,8] An individual's environment can affect their health in many ways and some populations may be more vulnerable than others due to personal factors such as genes, age, medical history, and social factors such as discrimination and living in marginalized communities.[9,10] Environmental exposures are often higher in areas where the population is likely to be disenfranchised leading to environmental justice and health equity issues.[11]

In Native Hawaiian culture, the environment is more than the natural elements (land, water, wind, wildlife); rather, each is considered an interdependent family member that requires *mālama* (care) and *kia'i* (guardianship).[12] This belief and the outdoor lifestyle that many residents of Hawai'i enjoy translates into an important respect for the environment. According to some rankings, Hawai'i is one of the "greenest" states in the US based on environmental quality, eco-friendly behaviors, climate-change contributors and habits.[13,14] In fact, exposure to "blue spaces", like

the ocean, is associated with numerous positive mental and physical health outcomes.[15] Yet, maintaining a healthy environment takes dedicated work. Factors such as a global economy and associated climate change, worldwide pollution of the oceans, and the persistence of many chemicals challenge health promotion and environmental stewardship.

EH is critical to understanding human health, and EH professionals are faced with the difficult tasks of understanding: the toxicity of pollutants; exposures to humans; dose/response relationships; individual susceptibility; associations and interactions between pollutants and disease states; risks and benefits to humans; environmental justice; and community resources and action. Given these complexities, the objectives of this article are to discuss the EH workforce in Hawai‘i, structures of EH organizations, and recommendations for improvement.

Methods

This article synthesizes relevant practical considerations on this issue from a targeted review of the relevant scholarly and applied literature. Ideas for this article were formed after discussions with 10 representatives from the US Environmental Protection Agency (EPA) and the State of Hawai‘i Department of Health (DOH) who prefer to remain anonymous. It is also informed by the authors' engagement in 2 EH interagency working groups.

Environmental Health Organizations in Hawai‘i

Federal, state, county and private institutions in Hawai‘i engage in EH. Hawai‘i is a small state and the majority of agencies are located on the island of O‘ahu in Honolulu; these factors allow for personal connections and relatively easy collaboration and sharing of information.

Federal

The EPA was established by President Nixon in 1970 to protect human health and the environment by implementing and enforcing laws passed by Congress.[16] Laws such as the Clean Water Act; the Clean Air Act; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) set limits on certain types of exposures, including PFAS, air pollution, pesticides and many more contaminants, that could impact public health.[7,8,17,18] The EPA collaborates with states to develop work plans with environmental goals; states execute the work and provide progress reports to the EPA.

Hawai‘i sits within EPA's Region 9 which oversees the Pacific Southwest states including California, Arizona, Nevada, Pacific Islands and 148 Tribal Nations.[19] The Region 9 headquarters is located in San Francisco, and a local field office in Honolulu helps with the logistics of overseeing programs in Hawai‘i and Pacific territories. This field office has a small staff of 3-10 employees with a broad scope necessitating a highly-skilled local workforce. The workforce within EPA is generally fluid; staff always have their main tasks and workload, but when a crisis arises, they are sent to help address the environmental issues as needed.

The federal government dictates funding for EPA's and states' environmental programs. In 2021 the Bipartisan infrastructure Law and the Inflation Reduction Act were passed by Congress to strengthen water infrastructure, address climate change and work towards an equitable future.[20] These new laws have created employment opportunities, but require a qualified EH workforce.

State

One of the 3 main administrations of DOH is the Environmental Health Administration (EHA). Within EHA are several departments as shown in **Figure 1**.[21] The fact that Hawai‘i's EHA sits within the DOH is unusual. In the 1970s, when the US EPA was established, most states elected to mirror the federal government's structure and create standalone entities to govern EH issues. For example, California created CalEPA which houses several agencies including the California Air Resources Board, Department of Toxic Substances Control, Department of Pesticide Regulation, Office of Environmental Health Hazard Assessment, State Water Resources Control Board, and the Department of Resources Recycling and Recovery.[22] In addition to the DOH EHA, Hawai‘i's Department of Land and Natural Resources and Department of Agriculture also ensure compliance with federal environmental regulations, especially those pertaining to pesticide use.[23,24]

The majority of EH work in Hawai‘i focuses on meeting regulatory limits set by EPA or by the state. Hawai‘i's limits are often more stringent than EPA's.[25] An example of an enforceable regulatory limit related to drinking water is the maximum contaminant level (MCL) which is the "highest level of a contaminant that is allowed in drinking water."[26] Hawai‘i's Environmental Management Division (**Figure 1**) and Hazard Evaluation and Emergency Response (HEER) Office have several branches whose work involves monitoring environmental chemicals (in air, water, and waste), managing releases, and enforcement. These activities aim to prevent hazardous exposures and protect the environment and human health. Environmental monitoring is particularly important for ensuring that exposures to humans do not exceed regulatory limits. The work performed within the EH Services Division is concerned with vector control, indoor environmental quality, and food and drug safety. This work is often conducted by environmental professionals rather than public health professionals or scientists, but both are imperative to protect human health.

In Hawai‘i, many people are working to monitor and improve the environment, but a focus on studying the effects of the environment on human health is lacking. Historically, Hawai‘i's DOH had no environmental epidemiologist on staff, but it has begun making changes. Recently, the state of Hawai‘i created and filled an environmental epidemiologist position after an extensive search. DOH has also established a Climate and Health Program and an Of-

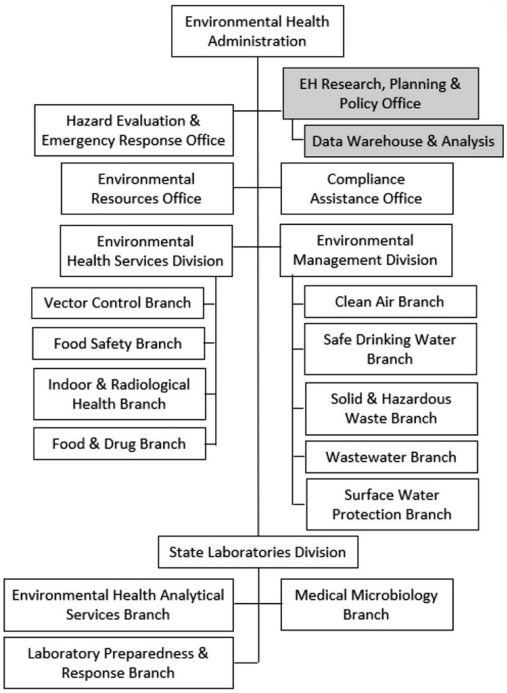

Figure 1. Proposed Organizational Chart for the State of Hawai'i Department of Health, Environmental Health Administration

Current organizational chart of the Hawai'i Department of Health, Environmental Health Administration (unshaded, adapted from 2024 Department of Health organization chart.[21]) and proposed Environmental Health Research, Planning and Policy Office (shaded) in place of the former Environmental Planning Office.

fice of Health Equity, which would ideally have a section dedicated to environmental justice. However, finding the right individuals to work in these new positions or in existing vacancies (approximately 25% currently) can be challenging. Also, many EHA staff are approaching retirement (personal communication). EH positions demand advanced, specialized training that require years of schooling and compensation at DOH is low compared to the private sector. The high cost of living in Hawai'i also makes retention of local talent and recruitment of qualified individuals from the continental US difficult (personal communication).

The workload carried by EHA to meet state and federal laws is extensive and there is little capacity to take on extra work including grant writing, research, health surveillance, data tracking, and strategic planning. Although funding for state-level biomonitoring programs and for research to study effects of environmental exposures in humans is available through the Centers for Disease Control and Prevention (CDC), EPA, the National Institute of Environmental Health Sciences, and private entities, planning for research proposals, developing relationships, and writing and formatting proposals all take time, as does carrying out and disseminating the research results. In late 2022, strategic planning workshops were held to discuss EHA's future. Plans have not yet been finalized because of several EH emergencies, but these workshops led to several potential areas of growth including ways to engage the community to encourage sustainability and addressing climate change and environmental justice issues.

Environmental epidemiological research also requires accessible environmental monitoring data in a format that can be easily transformed into a dataset. Hawai'i lacks such a program, but 31 states are currently funded by the CDC's National Environmental Health Tracking Program to have public-facing dashboards of environmental monitoring data along with illnesses associated with environmental exposures. For example, California's dashboard contains information on a myriad of indicators, including air quality, asthma, birth defects, cancer, carbon monoxide poisoning, childhood lead poisoning, climate change, and many more.[27] The Hawai'i Health Data Warehouse contains tracking and surveillance data on some health indicators in Hawai'i and a few environmental indicators, such as air quality and climate factors (eg, UV and drought), are available in its Hawai'i Health Matters site at the county level.[28] In 2015 EHA's HEER Office began transitioning to a searchable online database (iHEER) of incidents of hazardous substance releases. However, the transition is not yet complete and, in many cases, the environmental monitoring data are only available in PDF format, thus requiring extra work to be useful for research and surveillance purposes.[29] EHA's Clean Air Branch also has a database of air quality monitoring data that can be queried for dates, locations and air pollutants. Still, the number of monitors statewide is limited: 1 on Kaua'i, 3 on O'ahu, 2 on Maui, and 10 on the island of Hawai'i.[30] EHA also maintains a portal called EHAConnect that is searchable for real-time data from several of EHA's programs.[31] As of 2019, Hawai'i's Department of Agriculture began requiring pesticide applicators to annually report use of restricted use pesticides, but the data available on their website are aggregated by active ingredient per island and a special data request is required for more detailed location of use.[32] A single environmental health data portal and the staff to write grant proposals, manage research and maintain a database would be beneficial to researchers and the public. In addition, environmental justice can only be ensured with statewide data and dedicated analysis.

Education

Table 1 provides an overview of EH-related training at institutes of higher education in Hawai'i. Universities and community colleges are often the pipeline to Hawai'i's DOH and prepare students for the workforce. Academic faculty have the skills to develop proposals for and direct scientific EH research that provides students with hands-on experience and training in the field. Research grants also support the EH workforce. Increasing publicity of EH in Hawai'i, and widespread concern about climate change among youth[33] have led to more university-level students seeking to learn how to protect the population from environmental threats. In particular, the perspectives of students who are Native Hawaiian or long-time residents and/or who have a connection to the islands are critically needed. As these students enter the workforce, they may also be more likely to want to stay in Hawai'i, thus bolstering the EH workforce. Finally, these students have connections to the community

that may help bridge language or cultural barriers to communicating EH concerns to authority figures or to being a part of decisionmaking processes.

Specific EH degrees are important, but not necessary to fill EH labor gaps. Other areas of study including chemistry, biology, geology, engineering, law, business, planning and political science may also translate to opportunities in EH. Internships and other training opportunities with potential employers are needed to help students connect theoretical concepts learned in school and practical skills needed by the EH workforce.

However, appreciation for and care of the environment must be taught much earlier than young adulthood. Several public and private schools of all grades have already begun to train the next generation of environmental stewards through sustainability curricula and partnerships with nonprofit organizations such as Pop-Up Labs for STEAM (science, technology, engineering, arts, and mathematics).[34] Hawai'i's youngest *keiki* (children) are learning about climate change, air and water pollution, and the effects of chemicals on the environment and in humans. More importantly, youth are also starting to think about how to solve and mitigate effects of these EH issues.[35] These early life lessons will encourage youth to protect the environment and health.

Other Organizations

Numerous non-profit organizations are committed to protecting Hawai'i's environment and ecosystems, but few focus on how environment impacts health. Sierra Club of Hawai'i is an exception.[36] Through litigation, advocacy, political action and physically connecting people to the environment, the Sierra Club communicates EH issues to the public. Another organization, Kupu Hawai'i, is a youth mentorship program for individuals aged 16-24 years to gain experience in green economy sectors.[37] This program which hosts the Hawai'i Youth Sustainability Challenge is currently focused on sustainability and environmental education, but could be expanded to include EH with the right partnerships.

Lastly, there is also a role for private businesses in EH. Laboratories throughout the US may be contracted to assist with analysis of environmental samples. In addition, businesses could provide resources or funding to support sustainability and other EH programs.

Hawai'i's Environmental Health Issues in the Post-COVID-19 Era

COVID-19 is a reminder of the importance of EH. Research has shown how air pollution increased susceptibility to COVID-19 viral infection and death.[38,39] When quarantine orders were in effect, indoor air quality and exposures from basements, fireplaces, natural gas appliances, cookware, furniture, and personal care products became concerns.[40] Efforts to make homes airtight for energy efficiency contradicted recommendations for increased ventilation to reduce COVID-19 transmission.[41] COVID-19 severity may also be affected by exposure to PFAS, which appears to alter immune response leading to dampened vaccine efficacy and increased disease severity.[42,43]

There were a few silver linings of the pandemic. Increased use of video conferencing allowed for more collaboration between EH organizations and better access to EH leaders, especially when meetings were recorded and transcripts were made public (Amy Miller, JD, oral communication, May 12, 2023).[44] In addition, lock-down policies had temporary beneficial effects on the environment including improvements in air and water quality, and reductions in greenhouse gas emissions and noise pollution.[45] This natural experiment may present an opportunity for EH scientists and epidemiologists to examine potential benefits of reduced exposures on population health.

The pre-pandemic EH concerns in Hawai'i remain: monitoring for air pollution, particularly from volcanic activity and wildfire; water quality; and pesticide use. In addition, legacy contaminants such as agricultural chemicals, lead and industrial contaminants, and recent contaminants such as PFAS require monitoring and surveillance to assess trends in the environment and in humans. Climate change will impact weather patterns and sea levels. Hawai'i's EHA must plan for the future in terms of infrastructure and population health. This work has begun as exemplified by the wastewater treatment plant at Sand Island in Honolulu.[46] This plant required an upgrade and EHA determined that its location near the ocean was vulnerable. Thus, this plant was built several feet higher than it had been previously to ensure effective operation in the setting of rising seas to avoid potential health impacts from improperly treated sewage releases.

Discussion

Clean air, water, and land are vital to the health and sustainability of our communities. The day-to-day regulatory compliance EH work in Hawai'i is immense and requires a workforce that ranges from relatively unskilled field workers to highly skilled doctoral-level scientists. There is currently a shortage of EH labor as demonstrated by the vacancies in DOH's EHA and there are concerns of further shortages due to retirement. Moreover, the myriad environmental emergencies in recent years in Hawai'i (Red Hill fuel spills, volcanic eruptions, and the Maui wildfire) have strained the current workforce.

Hawai'i's youth are interested in protecting the environment for themselves and future generations. This could lead to improved EH overall and potentially lead to more interest in EH jobs. Various disciplines and skill levels are needed to supply the EH workforce, but students may not be aware of EH career paths. Internships and traineeships are needed to introduce students to EH and prepare the future EH workforce.

Recommendations

The EH workforce in Hawai'i is critical to ensuring that environmental standards are met to protect public health.

Further improvements are needed; the authors make the following recommendations as detailed in **Table 2**.

1. EHA should replace the former Environmental Planning Office with an Environmental Health Research, Planning and Policy Office (**Figure 1**) with a data warehouse.
2. EHA and the Office of Health Equity should collaborate to assess whether certain populations are disproportionately exposed. Also, communities must be able to express EH concerns and actively participate in policy decisions to build trust and impact sustainability efforts.[47]
3. Collaboration between federal and state agencies, universities and nonprofit organizations should be increased for both training and research.
4. Hawai'i's universities must develop specialized EH programs and train individuals who have a connection to Hawai'i.
5. Medical and environmental health professionals should work together to ensure appropriate assessment of symptoms of environmental exposures or chemical poisonings.
6. Easily understandable EH data must be publicly available.
7. EH research must be conducted in Hawai'i.

Conflict of Interest

None of the authors identify a conflict of interest.

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Table 1. Institutes of Higher Education in Hawai'i with Environmental Health (EH)-Related Programs

	Undergraduate educational opportunities	**Graduate educational opportunities**
University of Hawai'i at Mānoa[48]	Cross-disciplinary degree between the Department of Oceanography and the Office of Public Health Studies that offers a Bachelor of Science in Global Environmental Science, whereby 1 track is EH 15-credit One Health Interdisciplinary Undergraduate Certificate, which integrates coursework with a supervised practicum	Two EH courses offered by the Office of Public Health Studies: Fundamentals to One Health and Environmental Determinants of Health No graduate degree specializing in EH
Hawai'i Pacific University[49]	Public health bachelors degree that requires EH courses No EH specific tracks	Masters degree that requires EH courses No EH specific tracks
Chaminade University of Honolulu[50]	Bachelor of Science degree in Community and Public Health with a specialization in EH	Unavailable

Table 2. Recommendations to Build and Sustain an Environmental Health (EH) Workforce in Hawai'i

Entity/ group	Recommendation	Considerations
Department of Health (DOH)	1. EHA should replace the former Environmental Planning with an Environmental Health Research, Planning and Policy Office (Figure 1) where environmental epidemiologists, climate change researchers, data analysists and policy experts could work collaboratively along with professionals in the Office of Health Equity, HEER and other DOH entities.	Ideally, this proposed office would also house a data warehouse that could be used for EH research purposes in combination with health indices that are available at the state level. Federal or state funding and possibly a legislative mandate would be needed to implement and support such a data warehouse.
	2. Collaboration between EHA and the Office of Health Equity is needed to assess whether certain populations are disproportionately exposed to pollutants and infectious agents.	Affected communities should be given a voice to express EH concerns and actively participate in policy decisions regarding community and EH.
Universities	3. Increased collaboration with federal and state agencies, as well as non-profits, is needed in the training of the EH workforce, such as through internships, as well as in the classroom.	Internships at federal, state or nonprofit agencies would allow for mentors to impart real-world skills to students so that they are adequately prepared when they arrive in the workforce. Guest lectures by representatives from EPA and Hawai'i's EHA and facilitated meetings between representatives and students could foster relationships and generate research ideas.
	4. Training programs specializing in EH are needed to prepare a local workforce to address diverse EH threats (eg, natural, climate-related, or from human error).	As the largest public university in the state, the University of Hawai'i system should offer a graduate degree program in EH so that the state's future EH leaders will understand the cultural and environmental nuances of performing EH work in the state and will be more likely to apply for and continue working in jobs in Hawai'i.
Health care sector	5. Collaboration between medical professionals and EH professionals is needed to ensure that symptoms of environmental exposures or chemical poisonings are appropriately assessed.	Increased training in EH at the medical school and in nursing programs would be beneficial.
Community	6. The public must have access to information that is explained in a manner that is easy to understand, available in a variety of languages and reflective of the diversity and culture of the target population.	Entities engaging with community groups need to tailor their efforts to communities and assure at a minimum to communicate in languages spoken by community members
University, federal and state agencies	7. Much more EH research should be conducted in Hawai'i. Critically, this research should be sensitive to and inclusive of the diverse groups present in the state.	Research should be conducted with the trust and input of the community, cultural sensitivity, and a willingness to listen rather than making assumptions to minimize the possibility of jeopardizing future studies

Abbreviations: DOH=Department of Health, EH=environmental health, EHA=Environmental Health Administration, EPA=Environmental Protection Agency, HEER=Hazard Evaluation and Emergency Response

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Strategies for Building a Dementia-Capable Workforce in Hawai'i

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Abstract

Health care workers with specialized knowledge and skills to work with people living with symptoms of dementia are needed in all sectors of the health care industry in Hawai'i as the number of people in the population diagnosed with Alzheimer's disease and related dementias (ADRD) is expected to increase along with the overall number of older adults (ages 65+). This article provides a scoping review of relevant population data that suggest an urgency to address this need even as the state contends with an overall shortage of workers throughout the public health and health care industry. The authors then provide practical solutions, recommending a multi-pronged approach to introduce or enhance dementia-care competencies at various levels of education – from high school to graduate or professional studies – and through continuing education and professional development programs for practicing health professionals. Consistent with the public health philosophy of health equity, the authors propose that providing quality care to persons living with dementia is a social justice goal that can be achieved through this multi-pronged approach.

Abbreviations and Acronyms

ADRD = Alzheimer's disease and related dementias
CDC = Centers for Disease Control and Prevention
BOLD = Building Our Largest Dementia Infrastructure
CNAs = Certified Nurse Assistants
HBI = Healthy Brain Initiative
UH = University of Hawai'i

Background and Introduction

The risk of developing Alzheimer's disease, vascular dementia, frontotemporal dementia, Lewy Body dementia, and other diseases that cause symptoms of dementia such as memory loss, difficulty communicating, and impaired judgment increases with age.[1] Hawai'i's older adult (ages 65+) population is increasing. Currently estimated to be just under 20% of the total state population, these numbers will continue to increase as the baby boom generation ages into older adulthood.[2] Population aging is expected to result in growing numbers of people living with dementia. The Alzheimer's Association projects that 35 000 people in Hawai'i will be living with Alzheimer's disease in 2025, a 21% increase from 2020.[3]

Because older adults use far more health services than younger age groups, and because older adults are at greater risk for developing symptoms of dementia, it is critical that the public health and health care workforce in Hawai'i be dementia-capable through a variety and continuum of dementia care educational opportunities both within formal educational structures as well as in community and paraprofessional settings.

This article provides a scoping review of relevant population data that suggest an urgency to address the need for a dementia-capable workforce even as the state contends with an overall shortage of workers throughout the public health and health care industry. The authors then provide practical solutions, recommending a multi-pronged approach to introduce or enhance dementia-care competencies at various levels of education – from high school to graduate or professional studies – and through continuing education and professional development programs for practicing health professionals.

Methods

The scoping review method was used to cast a wide net and capture a large number of resources (eg, peer reviewed scholarship, news reports, websites, etc) on preparing a dementia-capable workforce through existing curriculum modules developed by a range of different types of organizations with a particular focus on core competencies. Consistent with this method, the authors reviewed and synthesized their findings around relevant population data, trends, and practical solutions for developing a dementia-capable workforce in the state of Hawai'i.

Demographics Trends: United States and Hawai'i

Numerous demographic shifts are impacting the family structure and the availability of family to care for aging relatives. For example, the general fertility rate (GFR), which has been declining for decades in the United States (US), reached a record-low in 2023, at 54.4 births per 1000 females between the ages of 15-44.[4] The GFR in Hawai'i was 59.3 births per 1000 females between the ages of 15-44 in 2022 and has been in steady decline over the years.[5] For example, as a point of comparison, it was 69.2 births per 1000 females between the ages of 15-44 in 2005.[5] Moreover, recent US Census research has shown that a growing number of elders have no biological children. Childlessness is more prevalent among elders in the 55 to 64 age cohort than in the over 65 age category.[6] Adults ages 55-64 years will age into a period of time when care needs tend to increase. Also, life expectancy has been rising since the mid-1950s, although deaths due to the COVID-19 pandemic resulted in a life expectancy decline.[7] Hawai'i's life expectancy is the highest in the nation at 80.7 years in 2020.[8] This confluence

Table 1. Examples of Core Competencies in Dementia Care Organizations

Organization	The Georgia Alzheimer's and Related Dementias Collaborative, Workforce Development Committee.[10]	Illinois Department of Public Health.[11]	Agency for Integrated Care (Singapore). Dementia Care Competency Framework 2016.[12]
Core Competencies	Targeted toward educators and trainers of direct care workers: 1. Understanding Dementia 2. Person-Centered Care 3. Communication 4. Reduction of Preventable Hospitalization 5. Dining and Nutrition 6. Pain Management 7. Prevention and Reporting of Abuse 8. Empowering the Person and Enriching Their Life 9. Palliative and End-of-Life Care	Targeted toward anyone who works with or inter- acts with persons living with dementia, including their "care partners": 1. Knowledge of Dementia 2. Person-Centered Care 3. Communication 4. Understanding Behaviors 5. Safety 6. Palliative Care	Targeted toward health and social care workers in intermediate and long-term care: 1. Dementia Knowledge 2. Person-Centered Care 3. Care Interaction with Persons with Dementia 4. Behaviors of Concern 5. Enriching Lives 6. End-of-Life Dementia Care 7. Care for Self and Caregivers 8. Capability Building

of demographic factors will result in ever growing numbers of elders and their advocates seeking acute, long-term, and home-based care.

These demographic shifts will have repercussions for eldercare, since family caregivers have provided most of the long-term services and supports for elders who need assistance with their activities of daily living and instrumental activities of daily living.[9] In the absence of family caregivers, those services and supports will need to be provided by paid caregivers such as personal care aides and nursing assistants, placing an even greater burden on the health care workforce as hospitals, long-term care facilities, community-based residential care homes, homecare agencies, and other institutions compete for paraprofessional support. Taken together, these demographic shifts signal a critical need and urgency for a skilled dementia-capable workforce.

Dementia Care Education

Core Competencies

Ensuring an appropriate and effective dementia-capable workforce requires the development of core competencies as well as a standardized and widely available dementia curricula. Models of both already exist and can be expanded and culturally tailored for use in Hawai'i with its diverse population of paid and unpaid caregivers, care recipients, and interested community members.

Various organizations have identified what they consider to be core competencies for dementia care education. Examples in **Table 1** show 3 different types of organizations – 2 in the US and 1 in Singapore – that developed competencies targeted toward different learner cohorts. Their core competencies are similar to each other with some deviations shared to provide possible prototypes for dementia training curricula core competencies.

Key stakeholders in Hawai'i need to convene to develop core competency standards for Hawai'i that are culturally competent to meet the needs of our diverse communities. These standards would apply across different health care sectors, professions, and settings. A model, comprehensive curriculum that aligns with these standards will lead to a more dementia-capable workforce. Hawai'i can build upon existing dementia curriculum from trusted sources.

Dementia Care Education: Model Curriculum

An excellent example of a "ready-made" curriculum is a joint production of the Alzheimer's Association, Centers for Disease Control and Prevention (CDC), and Emory University Rollins School of Public Health called "A Public Health Approach to Alzheimer's Disease and Other Dementias."[13] It is intended to increase awareness of the impact of Alzheimer's disease and related dementias (ADRD), a term that encompasses neurological disorders that result in symptoms of dementia, as well as the role of public health. This curriculum addresses cognitive health, cognitive impairment, and ADRD and is for use by undergraduate faculty in schools and programs of public health. The curriculum has 4 modules that are designed to be used individually or as a whole. Additional support for teachers and trainers includes a faculty guide, list of learning objectives, competencies, discussion questions, learning activities, slide guide with talking points, sample test questions, case studies, video resources, references, PowerPoint slides, novel approaches for implementing the curriculum. The descriptions of each module in **Table 2** are taken directly from the curriculum's outline as made freely available on the CDC's website.[13]

This curriculum is an example of a widely available and reputable dementia curriculum. Any dementia education curriculum, regardless of the learning community, should include appropriate evaluation activities that attempt to measure not only changes in competency level, and also solicit honest feedback from learners about curriculum content, organization, and delivery with the goal of improving the training and education programs through an assess-

Table 2. Sample Dementia Care Curriculum: A Public Health Approach to Alzheimer's Disease and Other Dementias[13]

Module 1	**"Alzheimer's Disease – A Public Health Crisis"** frames Alzheimer's disease and dementia as a public health epidemic with a large and rapidly growing burden that has a significant impact on the nation. Alzheimer's disease is felt at a national, state, and local level through financial burdens, resource needs, and profes- sional requirements.
Module 2	**"Alzheimer's and Other Dementias – The Basics"** provides background information on Alzheimer's disease and other dementias. It lays a foundation for what cognitive health is and how changes within the brain may lead to cognitive aging, cognitive impairment, and Alzheimer's disease and other dementias. The module then shifts to focus more specifically on Alzheimer's disease. Learners gain a general understanding about the stages of Alzheimer's disease, risk factors, and how the disease is diagnosed and treated. The module also addresses unique aspects of Alzheimer's disease (including financial hardship, stigma, and vulnerability to abuse) and the role of caregivers and caregiving impacts.
Module 3	**"What is the Role of Public Health?"** briefly describes the Alzheimer's disease epidemic in the US, followed by a discussion of 4 tools of public health that may play significant roles in mitigating the Alzheimer's disease crisis. These 4 public health intervention tools include: (1) surveillance/monitoring; (2) primary preven- tion; (3) early detection and diagnosis; and (4) ensuring safety and quality of care. Each tool is described and applied to the context of a public health response to Alzheimer's disease and dementia. Progress to date and challenges associated with each tool are addressed.
Module 4	**"Dementia Capable Systems and Dementia Friendly Communities"** addresses the public health response to the Alzheimer's disease epidemic at the state and community levels. The module describes the concepts of "dementia-capable" systems and dementia friendly communities, both of which involve accommodat- ing the needs of a population with memory loss, and a variety of related physical, cognitive, and behavior symptoms, as well as other co-morbidities. Module 4 explores how public health may support the development of such systems at the state and local levels through support services and programs, workforce training, and the creation of dementia friendly communities.

ment of learners' performance and insights. More evaluation data are needed to better understand the outcomes from currently available dementia education programs. It is possible that these evaluations exist but have not been made publicly available at this time.

The sample curriculum also illustrates the need for dementia curriculum that strengthens the public health workforce. There are multiple targets for dementia education, not only those who provide direct care but the public health workforce as well, in order to create a dementia-capable state.

Interventions and Recommendations: A Multi-Pronged Approach

A multi-pronged approach to delivering this education is needed to reach the diverse audiences. This approach should be ethcally grounded. A common principle in the code of ethics of all health care professionals is the commitment to competent care and adherence to the standards of professionalism, compassion, and patient rights. Considered through a social justice lens, people living with dementia may not be as able to fully advocate on their own behalf due to the nature of their cognitive impairments. They deserve to be treated by competent health care providers who understand at least the basics of their disease and – minimally – engage in interactions that demonstrate effective interpersonal communication, cultural awareness, and evidenced-based best practices whenever possible.

The development of a dementia-capable health care workforce in Hawai'i is a public health goal consistent with the philosophy of health equity that requires a multi-pronged approach across health sectors.

First, there is no "one-size-fits-all" solution and no single curriculum that can be used for all learners in the health field. Second, the ambitious goal of achieving a dementia-capable workforce across all the health sectors is one that has to be undertaken incrementally to be realistic. For example, an initial goal can be to start with 1 or 2 definable categories of potential learners such as care home operators and gerontological social work students. Third, buy-in from leadership in constituent organizations is essential. In certain cases, changes to an organization's existing curriculum need to be approved by multiple people in the management structure. Fourth, varying degrees of intensity and complexity of instruction should be built into a "master curriculum" – ie, a vast and organized collection of teaching and learning resources made readily available for incorporation into a class, seminar, or workshop. And fifth this master curriculum along with supplemental resources such as sample lesson plans, blank lesson plans, discussion topics, question bank for composing tests and quizzes, readings, websites, video resources, and so forth should be housed, supported, and maintained by a leading organization in gerontological education and elder advocacy.

Because different learning communities have different training needs, there is no recommendation to develop a standardized curriculum across the board. Instead, core competencies can be developed for Hawai'i learners based on learning modules already in use outside of Hawai'i and customized to reflect Hawai'i's particular social and cultural milieu. For example, cultural informants across ethnic communities in Hawai'i can contribute insights about family dynamics, trusted community resources, and effective communication practices relevant to specific ethnic groups (or sub-categories such as generational cohorts within ethnic groups). In the interest of achieving health equity, underserved populations with high dementia burden (includ-

ing those at risk of developing dementia due to high rates of certain chronic diseases) should be reached with culturally and linguistically informed programs and services aimed both at prevention and intervention. Dementia care education in Hawai‘i should blend broadly accepted core competencies derived from national or international dementia care curricula with culturally tailored content as appropriate and delivered through 3 models (Infusion, Professional Continuing Education, and Community Education) of dementia-care education (**Table 3**).

Workforce Development Initiatives in Hawai‘i

Hawai‘i has a window of opportunity to implement dementia education models to strengthen the dementia capability of our workforce. The CDC's Healthy Brain Initiative (HBI) seeks to improve understanding of brain health as a central part of public health practice. The initiative creates and supports partnerships, collects and reports data, increases awareness of brain health, supports populations with a high burden of ADRD. The HBI's Road Map series provides actionable steps to promote brain health, address cognitive impairment, and address the needs of caregivers. In addition, the HBI supports the development of a dementia-capable workforce.[18] With funding from the CDC to align with the HBI, Hawai‘i's Building Our Largest Dementia Infrastructure (BOLD) initiative engaged in a 2-year planning process to produce "Hawai‘i 2035: State Strategic Plan on Alzheimer's Disease and Related Dementias", which includes strategies for building a dementia-capable workforce in Hawai‘i (**Table 4**).

Led by the state Executive Office on Aging, the Hawai‘i BOLD initiative has built a strong network of organizations and educational institutions that can be mobilized to develop and implement dementia care education. Many organizations are resources for dementia-care education in Hawai‘i and can be integrated into this initiative including the Alzheimer's Association, American Association of Retired Persons (AARP), John A. Burns School of Medicine's Department of Geriatric Medicine, UH Center on Aging, UH West O‘ahu's Health Sciences and Long-Term Care programs, the various community college programs that offer health care career training (eg, Kapiolani Community College's CNA and Community Health Worker programs), St. Francis Healthcare System of Hawai‘i (which offers community education classes), and others. With its 5-year grant from the CDC to implement the State Strategic Plan, Hawai‘i can take tangible steps toward creating a dementia-capable workforce.

There are parallel efforts among various key stakeholders in Hawai‘i to improve and sustain the recruitment, retention, and placement of direct care workers, including a long-term care task force convened by Hawai‘i state Senator Sharon Y. Moriwaki; the study and reporting of Hawai‘i's direct care workforce needs with possible policy solutions proposed by the UH Center on Aging and the state's Executive Office on Aging; the continuing training and education efforts by the John A. Burns School of Medicine's Geriatrics Workforce Enhancement Program; and other health care-related workgroups. The task ahead is for these groups to work in collaboration and concert to meaningfully develop our workforce and strengthen the long-term care system.

Discussion and Conclusion

The multi-pronged approach to dementia care education addresses training needs in both formal educational settings as well as in community-based and paraprofessional settings. It would be particularly valuable for those on the front lines caring for persons living with dementia such as direct care workers in home care as well as acute and long-term care establishments.

The challenge of developing a dementia-capable workforce is part of a larger national challenge to build a sufficient and high-quality geriatric workforce at all levels from direct care workers to geriatric physicians.[19,20] This challenge is not new, but the urgency for a dementia-capable workforce is more pronounced given demographic shifts in the population. The American Public Health Association (APHA) is at the forefront of dementia-capable workforce advocacy as dementia care is increasingly framed as a public health concern.[21] The topic is gaining traction as major national organizations such as AARP, the Milken Institute, and the American Geriatrics Society focus critical attention on the problem.[22-24]

Direct care workforce challenges include low wages; inconsistent, often part-time hours; lack of fringe benefits (eg, paid sick leave); lack of affordable health care and vehicles for retirement savings; outdated, insufficient, poorly enforced training; risks and stress of COVID-19; disrespect and isolation; sexism, racism and xenophobia; workforce shortages; high turnover; underprepared workers; disconnection from health care and social service delivery systems; little capacity to exert organized political influence; and lack of portability of existing certifications across care settings.[25] These challenges may not affect every community in the same way, but are factors that should be recognized and addressed in developing policy solutions and public health strategic communication campaigns. Competition from other industries such as tourism and retail for employees is also a major factor. Those engaged in the recruitment, retention, and placement of direct care workers should emphasize the non-tangible rewards to be gained from highly personal dementia-capable direct care, a practice in which professional competence and altruism intersect.

Workforce shortages at acute care and long-term care facilities have been well-publicized in Hawai‘i.[26,27] The situation may be particularly pronounced on the island of Hawai‘i since Hawai‘i County has the highest percentage of older adults of all 4 counties in the state, and health care positions tend to be harder to fill on neighbor islands.[28] Initiatives such as the Geriatrics Workforce Enhancement Program targeted its training efforts on all Hawai‘i islands as well as the US Affiliated Pacific Islands.[29]

Table 3. Three Models to Deliver Dementia Care Education

	Infusion	Professional Continuing Education	Community Education
Description	Infusion of dementia curricula in existing post-secondary community college, undergraduate, graduate, and professional degree levels, adjusted accordingly to fit the needs and abilities of the learners. Dementia content can also be delivered to high school students interested in healthcare careers.	Professional continuing education in dementia care provided to working professionals and paraprofessionals who are already working with older adults.	Education provided to anyone in the community who is interested in dementia education. The purpose of the open community education model is not for formal training or credentialing but for the pursuit of knowledge, information, and assistance in a more informal and casual setting.
Current Context	This approach can be modeled after an Advanced Gero Social Work Practice Guide[14] developed by the Council on Social Work Education and the John A. Hartford Geriatric Social Work Initiative. A comprehensive curriculum on gerontological education was offered to social work programs across the nation for "infusion" into existing social work courses to use in conceptualizing specialized practice in aging and infusing aging within their curricula.	Most, if not all, of the allied healthcare professions have a requirement for enhanced or updated learning for working professionals and paraprofessionals in their respective fields of practice as a condition of relicensing. This learning may revolve around knowledge, skills, values, ethics, professionalism, advocacy, and so forth. Licensed social workers, for example, must complete 45 credit hours of continuing education (CE) prior to every triennial renewal, provided 3 of those credits are in ethics.[15]	Community education and training provided by organizations such as the Alzheimer's Association Aloha Chapter and the Geriatrics Workforce Enhancement Grant target broad sectors in the community to reduce stigma and raise awareness on dementia.
Opportunities for Workforce Development	A dementia education master curriculum could be geared toward post-secondary students at the community college, undergraduate, graduate, and professional degree levels, and adjusted accordingly to fit the needs and abilities of the learners. The content in the dementia master curriculum could also be used for high school students interested in health care careers, such as students in health pathway-type programs in high schools. Application in non-credit courses that could result in a certificate of completion or a dementia-capable micro-credential such as "digital badges" that could be displayed on a person's website, signature line in an e-mail, or social media presence.	Because of CE requirements for relicensing, dementia-care education should be a widely publicized and available option to fulfill those requirements since an incentive is already present to seek out these classes. Additional resources for further learning about dementia can be included in the courses for self-study after the course is completed. Well-trained educators and CE courses revolving around various aspects of dementia care need to be available for this model to succeed, and gerontological organizations can support this effort. In most cases, courses will need to be approved by a professional organization for appropriate, relevant content and to verify the credentials of the teacher. CE can also be offered to care home operators as evidence of their good standing with vari-ous oversight organizations and agencies.	Dementia training would include seminars, workshops, and presentations that target different sectors of the community that could potentially interact with persons with dementia in the community. These could include banks, law enforcement agencies, recreational businesses, postal employees, libraries, restaurants, veterans organizations, and caregiver support groups
Current Programs in Hawai'i	Kapi'olani Community College students in the Community Health Worker program receive instruction on dementia basics. Students in select high school health academies have received dementia education as part of a larger eldercare curriculum through a local initiative called Punahele Pathways, in collaboration with the UH Center on Aging.	John A. Burns School of Medicine, Geriatrics Workforce Enhancement Program has provided training on Alzheimer's Disease and related dementias to health care professionals and paraprofessionals statewide. Federal Administration for Community Living grants were awarded to the University of Hawai'i Center on Aging, the Executive Office on Aging, and Catholic Charities with common goal of providing professional and paraprofessional training statewide on a range of dementia-related topics.[16] The digital video recordings from these online presentations can be incorporated into classroom or CE learning modules where appropriate.	Dementia Friends Hawai'i is part of a national and global movement to help people better understand what dementia is, and then turn that understanding into action. Dementia Friends Hawai'i "champions" lead live, interactive sessions with community members of all ages to enlist their help in creating dementia-friendly communities in Hawai'i. The Hawai'i Alzheimer's Disease Initiative website features dementia-related cultural resources in Marshallese, Pohnpeian, Samoan, and Tagalog.[17]

Solutions to the general health care staffing shortage in Hawai'i are complex, multifaceted, and an area of active policy activity. These involve increased funding from federal and state governments for capital improvements, expansion of services, and innovative recruitment and retention strategies addressing the state's high cost of living. Other solutions include the initiation or continuation of rural health training programs, more attractive medical reimbursement rates, and favorable tax incentives for health care providers, scholarships for students interested in pursuing careers in health care, student loan forgiveness in the health care fields, career-track enhancement programs, and more. A lack of certified nurse assistants (CNAs), for example, has motivated some health care facilities to train employees on the job rather than try to recruit nurse assistants who are already trained. Scholarships for CNA stu-

Table 4. Strategies for Building a Dementia-Capable Workforce in Hawai‘i

Education • Develop, maintain, and publicize a master dementia-related curriculum to use as a comprehensive resource for educators and trainers in age-related subject areas. • Help to publicize continuing or enhanced educational and training opportunities. • Do outreach and support to high school students considering careers in healthcare. • Help publicize financial aid incentives.
Public Awareness and Education • Engage in public messaging on recruitment and retention of a direct care workforce. • Promote and participate in community engagement efforts and public service messaging in both traditional and social media, and explore other innovative pathways of public communication. • Frame chronic illness and cognitive decline, including Alzheimer's disease and related dementias, as a public health issue that impacts most, if not all, healthcare specializations that treat chronic diseases. • Discuss an ethical decision-making framework for those who work with people living with dementia. • Maintain and update a directory of dementia-related specialists in Hawai‘i.
Policies and Programs • Monitor developments in the dementia-capable workforce public policy and healthcare/social services arena. • Study and promote innovative models of worker compensation. • Strengthen collaborations among key age-related organizational and networking centers. • Identify, deliberate, and disseminate solutions for paying for dementia care services and supports. • Consider recommending a government-supported recruitment of dementia-capable workers from outside Hawai‘i.

dents have also been awarded at various training sites. One innovative example is the CNA to Licensed Practical Nurse (LPN) Bridge Program – a partnership between Maui's Hale Makua Health Services and UH Maui College. The program helps working CNAs at Hale Makua and other Ohana Pacific Health facilities transition to licensed practical nurses, increasing the number of LPNs annually.[30]

Funding dementia care and the building of a dementia-capable workforce is a challenge that must likewise be approached from multiple angles involving both public and private funding sources and new and existing programs. During the 2023 legislative session, bills were introduced at the Hawai‘i State Legislature to raise public awareness about dementia and to support dedicated staffing to coordinate ADRD services, as well as to fund health care workforce development initiatives. Guided by the aforementioned state strategic plan on ADRD with both federal and state support, the state's Executive Office on Aging and its ADRD Services Coordinator, hired in 2023, can serve as a hub for information, networking, and coordination, using its networking capacity and dedicated website to connect key stakeholders and other interested members with a broad array of resources as well as strengthening community-clinical linkages that enhance public health in general and brain health in particular.[31,32] With key stakeholders networked and working together, and in the spirit of promoting public health equitably for all Hawai‘i residents, it is hoped that the state's population can collectively and effectively address the complex and progressive impacts of dementia at all levels of society and implement thoughtful, culturally aware, and effective solutions.

Conflict of Interest

None of the authors identify a conflict of interest.

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Social Work Workforce, Licensing, and Hawai'i: An Overview

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Abstract

Social work is an academic and professional discipline that has been part of the Hawai'i social service workforce since the late 1800s. As the largest provider of mental health services in the United States, social work is a regulated profession in Hawai'i, but current information about the size and scope of the profession is limited by significant data issues stemming from varying definitions at state and federal levels. However, the need for more social work professionals in the state, which is already experiencing a social work workforce shortage, is clear. In addition, opportunities to support the social work workforce exist through advocacy efforts and policy changes that would increase education and training opportunities as well as increase providers to meet the demands of the community.

Abbreviations

ASWB = Association of Social Work Boards
DCCA = Hawai'i Department of Commerce and Consumer Affairs
HRSA = Health Resources and Services Administration
LBSW = Licensed Bachelor Social Worker
LCSW = Licensed Clinical Social Worker
LSW = Licensed Social Worker

Introduction

Hawai'i, both as a territory and a state, has a long history of social service provision, focused on providing high-quality social welfare support by utilizing trained social workers. Although social workers are engaged across many practice settings, including medicine, behavioral health, child welfare, the justice system, social policy, social advocacy, and more, many people are unfamiliar with the profession. Similarly, information about the current social work workforce, nationally and particularly in Hawai'i, is limited.[1] This is despite the profession's continued growth and its focus on addressing the significant challenges in many of the most vulnerable communities. Through their work on health equity issues and advocacy, social workers are critical to the public health workforce.[2]

Method

Using a scoping review method, this article highlights the types of activities social workers engage in, summarizes current state and federal social work workforce data, and identifies opportunities for the profession to enhance its primary and interdisciplinary practice spaces within the state of Hawai'i. The authors drew from the peer reviewed literature, government reports and data, and the expertise across diverse areas of social work represented on the authorship team.

Social Work Profession

As with many practice-based professions, social work is an academic discipline that "promotes social change and development, social cohesion, and the empowerment and liberation of people."[3] Rooted in a social justice framework, social work relies on the application of values, principles, and techniques to address social ailments at the micro (eg, with individuals and families), mezzo (eg, with groups, agencies/organizations, small communities), and macro levels (eg, advocacy and intervention with large communities, government, and other systems). Social work is an umbrella term that encompasses professionals in various specialized areas of practice, including clinical social work, child and family welfare, forensic social work, community organizing, lobbying, policy advocacy, and social service administration, among others. In some instances, these professionals have "social work" in their position title, while in others, they may not be called social workers, but their knowledge, skills, abilities, and functional work align with the profession. Social work holds its roots in the legacy of community mutual aid with the profession's earliest roots dating back to the late 1800s through the creation of nongovernmental charitable organizations primarily focused on helping individuals who were immigrants, those in poverty, and those impacted by health disparities and social injustices.[4] As cities, states, and the federal government created more infrastructure and policies to increase the social welfare of their constituents, social work also became essential to developing key social welfare programs, such as in assisting in the writing of the Social Security Act, leading early federal agencies like the Children's Bureau, and in being an important force behind the creation of the juvenile justice system to address juvenile offenders differently than adults.[5]

The professional practice skills of social workers are utilized in various settings and are complementary to other professions while still having a unique knowledge base and practice approach. Truly interdisciplinary, social workers collaborate with lawyers and judges within child welfare systems, in schoolbased settings, adult protective services, and in the criminal justice system, among other settings. They are also integral to health care teams working alongside physicians, nurses, and pharmacists; nationally, clini-

cal social workers are the largest provider of mental health services.[6] Social workers engage in prevention and intervention work, contributing to public health through advocacy, disaster response, grief counseling, and health promotion efforts.[7] Additionally, social workers respond to health equity issues by advocating for policy changes to improve health care access, including issues related to reproductive rights, advanced-care planning, and behavioral health parity.[2] These activities support public health generally and are often part of public health programs in a variety of settings.[8]

Defining Social Work in Hawai'i

Social work in Hawai'i is regulated through the Department of Commerce and Consumer Affairs (DCCA) and is governed by Hawai'i Revised Statute §467E Social Workers.[9] There are 3 license types: (1) LBSW - licensure for those who hold a Bachelor's in Social Work (BSW) degree from an accredited program and who successfully pass the Association of Social Work Boards (ASWB) basic licensure exam; (2) LSW - licensure for those who hold a Master's Degree in Social Work (MSW) from an accredited program and who successfully pass the ASWB licensure exam; and (3) LCSW - licensure for those who hold a Master's Degree in Social Work from an accredited program and who successfully pass the ASWB clinical licensure exam after accruing at least 3000 hours under supervision by an Licensed Clinical Social Worker (LCSW). An LCSW's scope of practice includes diagnosis and psychotherapy, services that psychologists also provide, and their communications with clients are considered privileged and treated the same as a psychologist-client privilege, which fall under Rule 504.1 of the Hawai'i Rules of Evidence.[9,10] Clinical social workers are also included in several statutes in Hawai'i, including the Our Care, Our Choice Act, which requires a counseling referral to determine if the patient is making an informed decision.[11] They are also listed in Hawai'i law §571-46.4[12] pertaining to who is eligible to serve the courts as a child custody evaluator. To use the title social worker, an individual must be licensed as outlined by the statute unless an individual falls under one of the allowable exemptions, including those employed in federal, state, or county positions titled social work.[9] In general though, licensing requirements and scope of practice are state-specific, and variations can occur.[13]

Counting Social Workers in Hawai'i

Identifying the number of social workers practicing in the state is an ongoing challenge due to the variety of fields where social workers can be found and inconsistencies in professional title and licensure requirements. Exemptions in the law regulating social work provide an additional challenge as not all individuals who call themselves social workers are required to be licensed, and a review of existing data sources shows additional ways of identifying social workers including by job title and training.

Table 1. Active Licensed Social Workers in Hawai'i, Hawai'i Department of Commerce and Consumer Affairs[14,15]

Profession	Number of Active Licenses 2004	Number of Active Licenses 2022
Licensed Clinical Social Worker	166	1141
Licensed Social Worker	1351	826
Licensed Bachelor Social Worker	0	17
Total	1517	2321

The DCCA provides a yearly report of active licensed social workers in the state (LBSW, LSW, and LCSW) referenced in **Table 1**.[14,15] In the September 24, 2022, *Number of Current Licenses by Geographic Area Report*[15] there were 2321 social workers, most of whom were LCSWs. While the state averages around 128 social workers per 100,000 people, there are clear discrepancies between the counties. Typically, non-rural locations have a higher per capita number of social workers than rural locations. When examining the number of active licensed social workers inclusive of all license levels across the state, Honolulu has the highest per capita concentration at about 136 social workers for 100 000 people, while Kaua'i and Hawai'i counties each have approximately 92 social workers per 100 000 people.[1] In addition, these numbers are still lower than the national average; consequently, Hawai'i ranks in the lower half of states in terms of the number of social workers per person.[16]

In addition to identifying social workers in the state by the number of people with an active license, identifying the number of people in official social work positions within the state government assists in further enumeration as these individuals are exempted from the licensing requirement as outlined in Hawai'i Revised Statute §467E.[9] In 2022, there were an additional 629 social workers identified as employed within the Hawai'i State Judiciary, Department of Health, Department of Human Services, Department of Public Safety, Department of Education, and Hawai'i Health Systems Corporation.[17] Within Hawai'i, state social work positions are most abundant in the Hawai'i State Judiciary. In 2005, Act 238 required that individuals holding a state position with the title "social worker" must have a degree in social work from an accredited social work program.[18] However, the Hawai'i State Judiciary and the Hawai'i Health Services Corporation were exempt from the provision of Act 238, solidifying a discrepancy in the definition where individuals who have not graduated from an accredited school of social work are able to be called a social worker.

National sources, such as the Health Resources and Services Administration (HRSA) and the US Bureau of Labor Statistics, indicate further variation in the estimate of social workers in Hawai'i. For example, as of 2022, the US Bu-

reau of Labor Statistics estimates 2730 social workers employed in Hawai'i, of whom 810 are in "healthcare social work."[19] In contrast, HRSA utilized American Community Survey data to estimate over 2000 social workers who were in "medical/health" field.[14] These estimates from to 2000 to 2730 social workers in 2022 vary widely and perpetuate the difficulty in understanding the current workforce.[19]

Nationally, the social work profession is projected to grow 9% over the next ten years, which is above the national average for growth.[19] Critical workforce shortage areas in social work settings such as behavioral health, health care, child welfare, and judiciary, are projected to increase dramatically over the next decade. For example, in 2021 the Projections Management Partnership, a nationwide program that integrates national, state, and county projections, estimated that the 10-year projected need for social work positions focused on child, family, and school social work will increase by 5%, in health care by 18%, and in mental health and substance abuse services by 22%.[20] Another study grading states by their *current* social work workforce shortage and state's *projected shortages in 2030* graded Hawai'i as a C+.[21] The study further predicts that Hawai'i's grade will drop to a C by 2030 because the need for social workers will continue to increase.

Social Work Salaries

Even though social workers fill multiple workforce needs, social workers' average salaries in Hawai'i are significantly lower than many of their interdisciplinary partners, such as psychologists, nurses, psychiatrists, lawyers, and doctors. Nationally, the US Bureau of Labor Statistics reported that the median pay for social workers in 2021 was $50 000.[18] By contrast, the national median pay in 2021 for psychologists was $81 000, $60 000 for counselors, and $77 000 for nurses. However, social work salaries vary by field of practice, with health care social workers reporting higher average salaries than those who provide services to children, families, and schools, or who provide mental health or substance use services. In addition, median social work salaries are slightly higher by a few thousand dollars a year in Hawai'i than the national average, but this does not take into account the higher cost of living in the state. As demonstrated in Arndt et al, the median social work salaries do not provide enough income for a living wage for a family of 4 to survive in the state without additional supports (such as nutrition assistance, housing vouchers, etc.), and it does not come close to high enough income to facilitate purchasing a home.[1] In a recent member study by the National Association of Social Workers (NASW) - Hawai'i Chapter, one of the main concerns identified by respondents were the low salaries in the profession, leading to higher rates of turnover, and difficulty attracting people to the profession.[22]

Opportunities for Advocacy

Advocating for workforce development in social work would be of strong value through policy changes related to professional policy innovations and innovations in education and training.

Innovation in Training and Education

With an increasing need for advanced, highly skilled practitioners, training is among the most valuable innovative approaches to address the current workforce shortage in social work and ensure a highly skilled future workforce. These initiatives include incentives to provide access to advanced degrees and training for child welfare-connected workers through the Hawai'i Child Welfare Education Collaboration, a partnership between the University of Hawai'i at Mānoa Thompson School of Social Work & Public Health[23] and the State of Hawai'i Department of Human Services-Child Welfare Services; the Hawai'i Interprofessional Program for Parity - Behavioral Health, a HRSA funded initiative; and other initiatives that provide stipends to students pursuing specific specialized areas of social work practice. Current incentive programs range from $10 000 to $18 000 per academic year, with some initiatives requiring a post-graduation employment requirement. With support from public/private funding, these models could be adopted for other high-need areas, such as developing an incentive program for students pursuing a social work career in the judiciary or establishing a stipend program to promote practitioners providing services related to substance use.

Students pursuing a BSW or MSW degree from an accredited social work program must complete field hours under the supervision of a practicing social worker in the community. Currently, social workers in the community are not compensated for their time mentoring and supervising students. Vital legislation was introduced in the 2023 legislative session, HB82 related to health care preceptors (another word for supervisors in an internship setting). HB82 would have expanded the definition of preceptor to include dieticians, physician assistants, and social workers. This bill would have provided preceptors with a state tax credit, to incentivize people to volunteer to supervise students in internship settings. HB82 indicated that those eligible for the tax credit must have a current social work license (LBSW, LSW, or LCSW) in the state of Hawai'i. This stipulation would have also been a strong incentive for social workers to pursue formal licensing. While the bill was unsuccessful during the 2023 session, this incentive likely would have opened doors to field placements and preceptors/field instructors in innovative and hard-to-service locations as well as social service settings.

Identifying how the social work workforce continues to professionalize, including through licensure attainment after obtaining a degree, is vital to ensure Hawai'i has the necessary credentialed social workers, particularly in rural areas or high-need practice settings. One component of the LCSW license requirements is attaining 3000 supervised hours post-graduation. It is of strong value to know how many individuals are in the process of attaining their LCSW, where they are engaged in service delivery, and what settings are providing the space for supervision. At present,

the state of Hawai‘i does not have a registry or process to track these efforts. LCSWs are the only members of the social work profession who are eligible to bill insurance for clinical service provision. A person pursuing their LCSW, under the supervision of an LCSW is not allowed to have those services billed for, despite being under the supervision of someone who can bill. This practice is a disincentive for LCSW's to provide supervision to individuals working to complete their hours. Similar laws exist in California and Washington. In 2023, the Hawai‘i State Legislature introduced a bill to help resolve this barrier. House Bill 1300 would have allowed for the creation of a provisional/associate-level license category. The provisional/ associate licensed individual would be under the supervision of an LCSW, giving both the supervisor and the person with the associate/provisional license working to obtain their LCSW, the ability to bill insurance providers and be paid for their services. However, this bill did not pass.

Profession Policy Innovations

As previous articles and reports have outlined, there remains a need for more robust data on the social work workforce and the projected need for services. Though the DCCA licensing data shows 2321 social workers licensed in the state of Hawai‘i, this number does not reflect whether the individuals are practicing in Hawai‘i, only if they hold an active license in the state. In addition, the current law governing social work licensure has exemptions that some consider problematic, including an exemption that social work positions within the state government require an accredited BSW/MSW social work degree but not a license, weakening the title protections in the law. Moreover, Act 238 established an additional exemption allowing individuals who do not hold social work degrees to practice under the title *social worker* in 2 state departments, the Hawai‘i State Judiciary and Hawai‘i Health Services Corporation. These exemptions create 2 large gaps in understanding the social work workforce, first by allowing non-licensed individuals to practice under the title *social worker* in state positions, and secondly, by creating an avenue for those who do not hold a social work degree to call themselves *social workers* in 2 state departments. Updating the law to eliminate these exemptions for federal, state, and county government employees would remove the double standard noted in 2000 by the State of Hawai‘i Auditor[24] and establish a single standard for all degreed social workers in the state of Hawai‘i would be held to.

In the US each state has its own social work licensing requirements; this means unlike other professions social work does not have license mobility. The Council of State Governments, partnering with the ASWB and the Department of Defense, recently released model language for states to adopt, establishing a social work licensure compact with other states.[25] Establishing the compact would allow for the mobility of licensed social workers to other state jurisdictions, allow social workers to practice telehealth with clients from other state jurisdictions, and reduce barriers created by social workers needing to be licensed in multiple states. Additionally, adopting the model language would support military families and increase access to services provided by social workers.[26] Currently, 2 states, Missouri and South Dakota, have enacted the compact legislation, and 29 states have introduced compact legislation. With Hawai‘i's large military population and isolated geographic location, participation in the compact would support social work and add options to the workforce, particularly for specialized providers, through social work and telebehavioral services.

Conclusion

Social work is a broad-based profession that provides services and support to the most vulnerable populations in Hawai‘i and the US. Though the need for social workers is anticipated to grow, challenges remain with counting the current workforce, limiting the ability to plan for future workforce growth and support opportunities for enhanced professionalization of the social work field. To address these challenges, advocacy and policy change are imperative, particularly in Hawai‘i. Legislation is needed to ensure social work title protections, ease licensing restrictions, increase license mobility, and facilitate post-graduate clinical placements, among other areas of improvement. These advancements would enhance the social work workforce to better meet the needs of Hawai‘i's communities.

Conflict of Interest

None of the authors identify a conflict of interest.

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Assuring the "Public" in "Public Health": Developing Workforce Capacity, Diversity, and Connectedness at the Department of Public Health Sciences

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Abstract

Public Health serves a critical role in ensuring and maintaining population health by recognizing that health is influenced by individual, social, economic, environmental, structural, and political factors. Despite the core role that public health plays in communities, the field's workforce faces shortages which were already dire pre-pandemic. The Department of Public Health Sciences (DPHS) at the University of Hawai'i at Mānoa (UHM) provides bachelor, masters, and doctoral degrees and serves as an essential training ground for the public health workforce in Hawai'i. The purpose of this paper is to describe some of the ways DPHS is meeting the ever-growing demand for qualified health professionals, in local and global government and community health departments and organizations. Since the first graduating class in 1967, more than 7000 individuals have earned accredited degrees through DPHS, including over 500 diverse undergraduate and graduate alumni since Fall 2015. The quality of DPHS' program and instruction are consistently highly rated by students and alumni. The curriculum is continually enhanced through innovative programs, and actively engages students in advancing public health practice and gaining applied research skills through all steps of scholarship including publications. DPHS is proud to be part of the movement towards building and revitalizing the public health workforce through teaching, research, and service and continues to strive to foster practitioners who will represent and serve local communities, engage in meaningful research and service, and bridge connections across disciplines and geographies.

Abbreviations

BAPH = bachelor of arts in public health
DE = distance education
DPHS = Department of Public Health Sciences
HDOH = Hawai'i State Department of Health
HHDW = Hawai'i Health Data Warehouse
HHET = Healthy Hawai'i Evaluation Team
IOM = Institute of Medicine
MPH = master of public health
MS = master of science
NHIH = Native Hawaiian and Indigenous Health
OPHS = Office of Public Health Studies
PhD = doctor of philosophy
UHM = University of Hawai'i at Mānoa

Introduction

The importance of public health, and for well-trained public health professionals, has never been greater.[1] While the pandemic highlighted some of public health's key functions, the field's workforce shortages were already dire pre-pandemic.[1] In the absence of workforce development initiatives, it is estimated that as much as half of the governmental public health workforce will be lost to separations and retirements by 2025.[2] Of particular importance is for the field of public health to reflect the public and community, in terms of priorities and approaches, and most especially in the diversity of its workforce.[3,4]

Public health is not alone in the pursuit of health equity, being a natural ally and collaborator with social work, nursing, medicine, and other fields. The discipline's uniqueness stems from its approaches to investigation and action, community engagement, prevention/wellness, and population health. Public health is comprehensive, recognizing that health is influenced by individual, social, economic, environmental, structural, and political factors,[5-7] and that preventive action must include primary prevention (intervening before illness/events occur, promoting wellness), secondary prevention (identifying and addressing illness/events early), and tertiary prevention (managing illness/events after they occur). The purpose of this paper is to describe some of the ways the Department of Public Health Sciences (DPHS – recently renamed from the Office of Public Health Studies) at the University of Hawai'i at Mānoa (UHM) is addressing workforce needs in Hawai'i, the Pacific, and beyond.

History

Public health training started at UHM in 1962, and was accredited as a School of Public Health from 1965 to 2000.[8] In 2000, the unit became a department and moved under the John A. Burns School of Medicine. In 2016, DPHS faculty, staff, and stakeholders voted to be reorganized under the Myron B. Thompson School of Social Work, with a shared vision for health equity and social justice.[9] In 2021, the Myron B. Thompson School of Social Work was renamed the Thompson School of Social Work and Public Health (Thompson School), housing DPHS, the Department of Social Work, and the Center on Aging.[10] DPHS has continuously maintained accreditation under the Council on Education for Public Health (CEPH) throughout these

transitions, and the current accreditation period runs through 2030.

As the major institution of higher learning in Hawai'i, UHM has a responsibility to train a robust health workforce and meet the dynamic education needs of local communities. Accordingly, DPHS' mission is to advance and protect the health and well-being of the peoples of Hawai'i, the Pacific, Asia, and Indigenous communities. This mission is pursued through teaching, discovery, innovation, community engagement, inclusion, and leadership. The pride of DPHS continues to be the students and trainees, and meeting the ever-growing demand for qualified health professionals, in government and community-based health services, locally and globally. The focus on students is complemented by the centrality of community in all activities, aligning with the vision of DPHS' founders to link university instruction and research with Hawai'i's health services.[8] At the same time, DPHS monitors and accounts for the workforce's changing needs, including those that became more prominent during the pandemic.

Table 1. University of Hawai'i at Mānoa, Department of Public Health Sciences, Enrollment and Graduation Metrics, Fall 2014–Spring 2025.

Level of Study	Current Enrollment Estimate (2024-2025 academic year)	Graduates – Last 10 Years (fall 2014 to spring 2024)
Bachelor's level (BAPH)	164	483
Master's level (MPH or MS)	74	248
Doctoral level (PhD epidemiology or PhD/DrPH public health)*	38	53
Totals	276	784

*In 2018, the DrPH was changed to the PhD in Public Health

Teaching and Training Activities

The most direct way DPHS bolsters the public health workforce is through teaching current and future generations of public health practitioners, researchers, and administrators.[11] Degrees currently offered include the bachelor of arts in public health (BAPH), master of public health (MPH), master of science (MS) in public health (epidemiology focus), doctor of philosophy (PhD) in public health, and PhD in epidemiology. There are 4 specializations within the MPH program: epidemiology, health policy and management (including a distance education option), Native Hawaiian and Indigenous Health (NHIH), and social and behavioral health sciences. There is also a minor in public health for UHM undergraduate students. Since the first graduating class in 1967, more than 7000 individuals have earned accredited degrees through DPHS. Recent estimates for enrollment and graduation metrics are summarized in **Table 1**.

Undergraduate and graduate students have consistently indicated they are "very satisfied" or "satisfied" with the quality of DPHS' programs and instruction, with 100% of undergraduate and 94% of graduate students agreeing with this metric in the Spring 2023 survey of graduating students.[12] Results from alumni surveys over the years affirm students' positive experiences during their time at DPHS. Among data collected on 224 BAPH graduates, 44% were employed and 30% were pursuing advanced education, with about half of these graduates further pursuing public health.[13] About 83% agreed or strongly agreed that the coursework provided them with useful public health skills, and 68% replied that DPHS did a good or excellent job in preparing them for their current positions. Looking at graduate students, the majority receive financial or research support through scholarships and graduate research assistantships, with 91% receiving support in 2022-2023.[12] Among a survey of 110 graduate student alumni, 64% described their current status as employed in a new position (60% within Hawai'i), and most started their positions within 3 months after graduation. Looking specifically at PhD in Public Health graduates, about 55% are working in academia with the rest in international or local government, health care facilities, or research centers.[14] Every PhD respondent felt the program prepared them for their current position to some degree.

Examples of Teaching Initiatives

To assure that teaching/training remains aligned with the DPHS mission, core educational programs and strategies are actively reviewed and evolved.[15] Many courses provide experiential learning opportunities to emphasize applied learning, with 67% of courses involving community-based public health practitioners. Three programs added in the past 12 years include the BAPH program, the world's only NHIH MPH, and a distance education MPH.

Bachelor of Arts in Public Health (BAPH). Public health training has historically been relegated to the graduate level, with students first pursuing undergraduate degrees in the natural and social sciences. However, national trends saw a rapid increase of undergraduate programs in the early 2000s, fueled by an Institute of Medicine (IOM)[11] recommendation that undergraduates have access to public health education, support from CEPH (the nationally recognized accrediting body for public health schools and programs),[16] and crises such as 9/11 and the 2001 anthrax attacks.[16] At DPHS, undergraduate courses were launched in 2014, with the first students graduating in 2015. The BAPH degree builds students' foundational skills/knowledge earlier, thus preparing students to enter the public health workforce more quickly, and also building a pipeline into graduate public health training.[17,18] It has also attracted more students into the field by raising awareness at the undergraduate level of public health as a career choice, particularly for students interested in health promotion and community engagement, but who often matriculate

into biological or clinical sciences due to unfamiliarity with public health.

Today, DPHS' BAPH program confers a myriad of employable skills upon its students including: public health practice skills (policy analysis, behavior change, epidemiology); global perspectives with emphasis on local relevance; applied practice, through 100-120 hours of service-learning or research experience; and written and oral communication.[19] BAPH courses also benefit students from other majors/professions (eg, medicine, nursing, law, business), providing a solid foundation about individual, community, and global health. Many BAPH students and their accomplishments have since been featured in local media and peer-reviewed literature.[19-23] DPHS is currently bolstering awareness of public health among prospective students even earlier, through efforts such as collaborations with community colleges and local high schools. One example is the Community Health Scholars Summer Program which launched in 2022.[24] Designed for high school sophomores, juniors, and graduating seniors accepted into a UH campus, the 6-week program builds students' enthusiasm for public health, introduces college skills (eg, goal planning, team building, cultural awareness), and allows participating students to earn undergraduate college credits upon completion.

Native Hawaiian & Indigenous Health (NHIH). DPHS' NHIH Specialization launched in 2013, as a pathway within the MPH degree. While Indigenous health programs have cropped up within universities around the world, the NHIH specialization is the only MPH program focused on Native Hawaiian communities.[25] This focus reflects the prioritization of Native Hawaiian history, culture, and epistemology within DPHS and public health in Hawai'i, and acknowledges the importance of research and health strategies developed with and for Native Hawaiian communities.[26] The NHIH specialization aims to eliminate health disparities among Native and Indigenous peoples in 3 major ways: (1) putting focus on the inequities faced by these communities and contextualizing health determinants within historical and political frameworks; (2) leveraging the strengths and ways of knowing of Native and Indigenous peoples to inform health programs, policies, and strategies; and (3) building a more robust public health workforce that serves these communities, and intentionally recruiting students that come from Native and Indigenous backgrounds, with the goal of having scholars return to their home communities to develop community driven and sustainable solutions.[25,27]

Distance Education (DE). Distance learning has become an increasingly promising method of public health training, as it enhances learning opportunities for professionals with limited access to classroom learning.[28] In 2022, DPHS launched its DE program for MPH students focusing on health policy and management. Though there had been previous interest in DE modalities, the pandemic increased demand for online education options from UHM.[29] Faculty expertise coupled with assistance from the Outreach College Instructional Design team resulted in this degree offering, which follows best practices of asynchronous online education. MPH-DE students must meet the same degree requirements as students enrolled in the campus-based degree pathway. Students have praised the program's flexibility, interactivity (which is noteworthy, considering it is a fully asynchronous program), and its emphasis on Native/Indigenous peoples and other under-researched communities.[30]

Research, Scholarship, and Service

Though the most visible role of academia is teaching, faculty research and service endeavors also substantially contribute to the capacity of the public health workforce.[31] Strong faculty-conducted research, especially when partnered with and grounded in local communities, expands and elevates the knowledge base relevant to priority populations and health topics. Translational research, another hallmark of public health and strength of DPHS faculty scholarship, ensures the application of sound evidence to the design and real-world implementation of interventions, and dissemination of evidence-based interventions into widespread practice.[32]

DPHS faculty, staff, and students are involved in various research projects that span a wide range of public health topics, from infectious to chronic disease, maternal/child health to gerontology, microbiology to environmental health, and health promotion/prevention to treatment and services.[33,34] Researchers collaborate with nearly all branches of the Hawai'i State Department of Health (HDOH), and with individuals from 70+ universities and organizations nationally and internationally. Faculty have garnered extramural funding from local, national, and global sources, including foundations such as the Robert Wood Johnson Foundation, and federal agencies such as the National Institutes of Health, Centers for Disease Control and Prevention, Health Resources and Services Administration, and Substance Abuse and Mental Health Services Administration, totaling over $20 million since 2020. The majority of faculty projects employ student research assistants, volunteers, and interns, who gain hands-on and real-time research experience. In fact, reflecting on the last 5 years, all primary instructional and research faculty have engaged at least 1 student in their research as co-authors on publications and presentations and/or through employment as a research assistant. Findings and recommendations are disseminated through community and refereed publications, training and presentations, and media outlets, with many involving students.

Service endeavors further connect teaching and research activities to the workforce. Aside from direct benefits to partner organizations and localities, service provided by the academic community also contributes to the public health knowledge base and overall health of the community.[31] Service and collaboration result in better teaching (eg, instructors can involve partners in course activities, service/practical skills-building may be incorporated into coursework) and research (eg, projects are enhanced when conducted by a multi-disciplinary team and engage the community). Community partners also serve as mentors for

field education opportunities, at sites which then become potential agencies for post-graduation employment. Thus, DPHS uses a multi-pronged strategy of bolstering the public health workforce, through both effective teaching, and establishing and maintaining connections and processes to efficiently move learners along training-to-employment pathways.[2]

DPHS faculty and staff perform a broad array of services that draw on their professional expertise and contribute to their fields and communities at local, state, national, and international levels. Examples of service activities include membership in community/agency advisory committees and boards; leadership positions in peer-reviewed journals and professional societies; provision of technical and other kinds of support to public health departments, social service agencies, schools, and neighborhoods; analysis and written and oral testimony in legislative and judicial bodies or governmental agencies; and guidance related to program announcements and requests of applications, and review of grant applications.[34]

Examples of Innovative Research and Service Projects

The Healthy Hawai'i Evaluation Team (HHET) and Hawai'i Health Data Warehouse (HHDW). HHET is one of DPHS' flagship collaborations with the HDOH that advances evidence-based strategies to improve nutrition, physical activity, tobacco, and community clinical linkages across Hawai'i. DPHS faculty/staff/students engaged in HHET provide evaluation and research support aimed at reducing chronic disease and improving the health of communities in Hawai'i.[35] The long-term success of HHET can be attributed to factors such coalition-building, data-sharing for planning and decision-making, and shared values among stakeholders.[36] The DOH-HHET partnership has helped develop the public health workforce in Hawai'i, and many students that work with HHET move on to UH faculty or HDOH positions. HHET has also trained coalition members, grantees, and other partners on best practices in evaluation, socio-ecological models, and interventions addressing chronic disease prevention.

The HHDW project also supports the work of HDOH and many other local programs and researchers. Created in 2001, HHDW facilitates access to standardized data elements across health surveillance systems in Hawai'i.[37] Currently, HHDW houses population-based data from the Behavioral Risk Factor Surveillance System (BRFSS), Pregnancy Risk Assessment Monitoring System (PRAMS), Youth Tobacco Survey (YTS), Youth Risk Behavior Survey (YRBS), and Vital Statistics. HHDW also maintains a companion site, Hawai'i Health Matters (HHM), a user-friendly resource with high-level contextualized health data for over 700 indicators from more than 60 separate data sources. The HHDW team works with HDOH staff and partners to facilitate data-driven decision-making by creating indicators and trackers, coordinating record-level data requests with HDOH data owners, creating custom reports, and teaching users how to access data within the online systems.

Strategic research initiatives. To increase scholarly collaboration and strategic alignment, DPHS launched a Strategic Research Initiative in spring 2021. Four topics were identified as core areas for investment and future growth through strategic planning with faculty, staff, community partners, and students: (1) Native Hawaiian and Indigenous health; (2) ocean and human health; (3) epidemiology in the Pacific; and (4) Filipino and immigrant health. Junior faculty were paired with senior faculty members to promote mentorship and cross-disciplinary collaboration within DPHS, and all projects have also engaged graduate and undergraduate students.

Projects are underway at various phases of progress, and have engaged multiple students and community stakeholders. For example, Initiative 2 (Ocean and Human Health) held listening sessions and system-mapping workshops with various community and organizational stakeholders. The resulting maps depict how oceans and humans work together, with the goal of better understanding the relationship between humans and the environment, identifying leverage points where collective change can occur, developing new collaborative partnerships in this area, and engaging community in the work.[38] Initiative 4 (Filipino and immigrant health) has continued to be advanced by several Filipino researchers and practitioners from DPHS, the Thompson School, and other local agencies. Self-titled the "Pinerds," the cadre of Filipino researchers hopes to more closely collaborate to share one another's research, facilitate a collective research/practice agenda to address health disparities faced by the Filipino community, and promote programming and interventions that are rooted in and relevant for Filipino culture.[39] Focus on this population has also become more prominent among students who identify as Filipino, and who have dedicated themselves to advancing the health of the Filipino community. These students' interests are being cultivated through coursework within and beyond DPHS (eg, some dually majoring in Public Health and Philippine Language and Culture), as well as projects with DPHS faculty.[40]

Service learning. The integration of service learning into public health education benefits not only the student and partnering mentor/organization, but also accelerates overall progress towards health equity and social justice.[41] DPHS students participate in service learning at the undergraduate, masters, and doctoral levels, ensuring immersion with external agencies and communities before graduation. All experiences require students to be mentored by a field/research expert who is not a core advisor, supervisor, or faculty. Undergraduate students experience an integrative 3-course series, including a preparatory course in which students conduct a literature review on a topic of interest, 100-120 hours of service learning, and a capstone course to integrate didactic and service-learning experiences.[42]

MPH students complete a 240-hour practicum to apply academic knowledge in the real world, to learn practical skills in a public health-related setting, and to develop problem-solving skills in a supervised environment. MS and PhD students complete hands-on mentored research during the course of their program, beyond just the thesis

or dissertation. These research practica target the development of students' research skills to: (1) provide research experience through participation in a supervised project prior to the thesis/dissertation; (2) involve and engage students in active research early in their studies; (3) increase students' research skills, capacity, and innovation; and (4) develop skills in writing for publication and oral dissemination.

Discussion and Future Endeavors

DPHS is proud to be part of the movement towards building and revitalizing the public health workforce through teaching, research, and service.[43] DPHS strives to foster practitioners who will represent and serve local communities, engage in meaningful research and service, and bridge connections across disciplines and geographies.

Diversity in the Public Health Workforce

Efforts are ongoing to build the capacity and diversity of DPHS among the trainees who will represent and serve local communities, as well as among the faculty/staff mentoring these trainees. There is clear consensus within the department that Native Hawaiians and other Indigenous Peoples, Pacific Islanders, and Filipinos are priority populations. The Hawai'i archipelago at large and rural communities are also prioritized. These efforts are codified in the DPHS Diversity Plan,[44] and are monitored annually. For example, in 2022-2023, the majority of PhD (68%), Masters (69%), and BAPH (59%) students were Hawai'i residents.[12] In addition, over half of PhD (57%), Masters (58%), and BAPH (52%) students identified as Native Hawaiian, Pacific Islander, Indigenous, and/or Filipino. With respect to enhancing the diversity of faculty, 67% of the current faculty body are from communities of color, and 90% identify as female with many holding leadership positions within the unit. The DPHS' Diversity, Equity, and Inclusion (DEI) Committee, composed of faculty and students, provides oversight for implementation of the Diversity Plan. Ongoing conversations are held about student and faculty recruitment, while collectively enhancing the faculty's capacity to integrate topics of diversity and cultural humility into their teaching, advising, and research, including bringing in experts to lead trainings and compiling a library of resources, readings, and online trainings.

DPHS also supports the university's goal to foster UH as an Indigenous-serving institution and a Native Hawaiian Place of Learning.[45] This is reflected at UH through the prioritization of Indigenous populations and services across multiple campuses and within the administration. At DPHS, an early signal of commitment to this goal was the integration of a welcoming *oli* or chant (*Welina Mānoa*) into department events and monthly faculty meetings to acknowledge the importance of and *kuleana* (responsibility, privilege, and birthright) with respect to Indigenous land. Various initiatives have spurred ongoing conversations among faculty to increase departmental knowledge about the history of Hawai'i and Native Hawaiian values and transform the spaces of public health. For instance, DPHS has engaged in UHM's Truth, Racial Healing, and Transformation (TRHT) Initiative, which aims to create leaders to break down racial hierarchies and focus on how healing may occur from the disconnects caused by racism and settler colonialism.[46] Two faculty members participated in the TRHT program during the summer of 2019 and have since facilitated discussions with DPHS faculty and staff on Hawaiian values and practices in teaching, research, and service.

Conclusion

Public health's unique approach to population health, combined with its aspirational yet critical goal of health equity and social justice, requires a robust workforce grounded in both technical skills and dedication to community. DPHS leverages its unique position as an academic unit which centers around students and community, to conduct teaching, research, and service that flexes to workforce and public needs. In fact, DPHS embraces this positionality and strives to rise to these great challenges through the advancement of community and Indigenous knowledge while pushing the boundaries of innovation. DPHS is proud to be part of the movement towards building and revitalizing the public health workforce, and continues to train practitioners who will represent and serve local communities.

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An Evaluation of the Native Hawaiian and Indigenous Health Summer Health Academy

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Abstract

Indigenous ways of knowing center on balance and holism, with an emphasis of learning through ancestral and intergenerational knowledge, which continue to be revitalized as a demonstration of the ongoing resilience of Indigenous Peoples. The Native Hawaiian and Indigenous Health (NHIH) Summer Health Academy (SHA) program was developed and implemented with an objective of increasing diversity, equity, and inclusion in higher education, fostering relationships at multiple levels, addressing gaps in education and academia, preparing students to work with and for Native and Indigenous communities, and changing the narrative of health and healing to better align with Native Hawaiian and Indigenous worldviews of health. Program activities included individualized mentoring, critical self-reflections through activities such as Indigenous photovoice, experiential opportunities to learn about social determinants of health, and community-engaged research projects. Overarching themes from the critical self-reflections included holistic and relational health, the importance of ʻohana (family), intergenerational relationships, and thriving ʻĀina (land) as thriving health. Results of the pre and post-test surveys demonstrated the promise and success of the NHIH SHA course, with a statistically significant change in knowledge related to cultural humility, community-based research, Indigenous methodologies, and Indigenous frameworks of health. This program demonstrates the importance of creating a pathway of success for Native Hawaiian and Indigenous students to address gaps and disparities in higher education for Native Hawaiian and Indigenous communities at large, while increasing the pursuit of health-related fields by Native Hawaiian and other Indigenous students.

Abbreviations

CBPR= community-based participatory research
IDP=individual development plan
KOOKA=Ke Ola O Ka ʻĀina
MMNHWG=missing and murdered Native Hawaiian women and girls
MPH=Masters of Public Health
NHIH=Native Hawaiian and Indigenous Health
SHA=Summer Health Academy
OPHS=Office of Public Health Studies

Introduction

Indigenous Peoples comprise approximately 476 million people across the globe.[1,2] Despite efforts to advance the health of Indigenous Peoples, their lifespan is on average a decade less than non-Indigenous counterparts, a social injustice that disparately affects these communities.[3] Many of these health disparities stem from oppression and sociocultural determinants of health including colonization, historical trauma, and assimilative policies that contribute to erasures of Indigenous epistemologies and ontologies.[3-7] In contrast with western epistemology, Indigenous epistemology centers on relationality between living beings, the natural environment, and the spiritual world. Similarly, Western ontology views land as an extractable resource, one of the many strategies used to justify colonization, which contrasts the ontology of *Kānaka Maoli* (Native Hawaiians), the Indigenous Peoples of Hawaiʻi, who view land as a revered being essential to the health of the People.

Native Hawaiians share a narrative of experiencing health inequities with other Indigenous communities worldwide. Despite adversities stemming from the long-standing impact of colonization and intergenerational trauma, Native Hawaiian and Indigenous ways of knowing, which centers relationships, holistic ways of learning, and ancestral knowledge, continue to be revitalized, a demonstration of the resilience of Indigenous Peoples.[8] For instance, the Hawaiian renaissance paved the way for education and academia to re-privilege Hawaiian ways of knowing and being in educational settings.[9,10]

The Native Hawaiian and Indigenous Health (NHIH) Master of Public Health (MPH) program at the Office of Public Health Studies (OPHS) at the University of Hawaiʻi at Mānoa (UHM) was the first global program of its kind to develop an MPH-accredited program with the goal of eliminating health disparities through collaborative cross-cutting research and training with, for, and by Indigenous

communities.[11] The NHIH MPH program aims to provide students with the knowledge and skills necessary to develop, analyze, and advocate for health services and policies to improve the health and wellbeing of Indigenous Peoples by privileging Native Hawaiian and Indigenous frameworks of health, epistemologies, pedagogies, values and concepts. For instance, students learn to embrace *kuleana* (deep responsibility, privilege, and birth right) to Native Hawaiian and Indigenous communities, while exploring their positionality and biological and intellectual *mo'okū'auhau* (genealogy). Other important components of the NHIH program include *aloha 'Āina* (deep love and affection for land and that which nourishes); *'ike kūpuna* (honoring ancestral knowledge and wisdom); education and research that promotes mixed methods including *mo'olelo* (storytelling); and *ma ka hana ka 'ike* (through doing one learns). Honoring these ways of knowing values the perpetuation of Native Hawaiian and Indigenous knowledge, thereby dismantling structural racism embedded within health and academic institutions, which ultimately promotes wellness.

One of the original intentions of the NHIH MPH program was to foster pathway programs and (re)vision measures of educational success that better align with Native Hawaiian and Indigenous priorities and worldviews. Through strategic initiatives supported by the leadership of the UHM OPHS and in collaboration with university and community partners, the NHIH Summer Health Academy (NHIH SHA) was developed and implemented with an objective of increasing diversity, equity, and inclusion in higher education, specifically in public health. Goals of the NHIH SHA include: fostering relationships at multiple levels; addressing critical gaps in academia and health care settings; preparing students to work with and for Native and Indigenous communities; drawing on the commitment to be an Indigenous-serving Institute; and changing the narrative of health and healing.

The NHIH MPH program integrates community-engaged research approaches to ensure graduates are prepared to engage ethically and effectively with communities in finding solutions to health inequities. Thus, an important component of the NHIH SHA includes a community-engaged research project, where students gain hands-on experience. Community-engaged research is grounded in long-term commitments to establish research pathways that redress the distrust and inherent power imbalances of the research enterprise by cultivating equitable community-academic partnerships.[12-14] This approach engages communities to identify research priorities that are beneficial and meaningful. Relationship and trust building are recognized as essential aspects of community-engaged research, which aims to rectify the history of harmful, extractive, and unethical research, particularly in historically marginalized communities including experimentation done without consent to Hansen's disease patients in Kalaupapa, Hawai'i and nuclear bomb testing in the Pacific.[15-17]

Purpose

This paper describes the activities and evaluative outcomes of the NHIH SHA course piloted in Summer 2022. The methodological approach of this culturally-grounded evaluation honors the voices of Indigenous students, faculty, and community partners, which highlights the importance of the relational aspects of education. This paper first provides a detailed description of the program followed by the evaluation methods and outcomes followed by a discussion with lessons learned.

NHIH SHA 2022

Program Participants

The NHIH SHA was piloted in Summer 2022 with the intention to continue offering the academy in the future. The course that was paired with the SHA was provided as a 6-week elective summer school course and widely advertised. Undergraduate and graduate students from all disciplines who were interested in NHIH were eligible to apply, with an intentional emphasis on undergraduate students to create an educational pathway. Because tuition for the course was waived through departmental funds, interested students were required to submit a brief application that described their interest in the course and how the course aligned with their professional and personal values and goals. Fourteen students expressed interest in the course and completed the application, including 8 undergraduate, 4 master-level, and 2 doctoral students. Out of the 14 students, 9 enrolled.

The course consisted of: (1) community-based research projects; (2) a 1-week intensive curriculum about cultural humility, Indigenizing research, community-based participatory research (CBPR), NHIH frameworks of health, and social determinants of health; (3) additional curriculum to promote critical reflections and professional skills in presentations and research papers; and (4) a virtual summit. Additional opportunities were provided to enhance networking and mentorship. A copy of the NHIH SHA Road Map and program activities for all student scholars is provided in **Figure 1**.

Program Activities

The curriculum was designed to provide mentorship and guidance to promote success in higher education, experiential opportunities to learn about social determinants of health, and photovoice activities that promoted critical reflections and (re)visioned health and healing. Program activities of the NHIH SHA included: (1) individualized mentoring, including individualized development plans (IDPs); (2) networking opportunities with scholars passionate about NHIH; (3) critical self-reflections through assignments and photovoice activities; (4) community-engaged research projects. A copy of the IDP is provided as an appendix.

Students participated in community-engaged research with 3 primary project-based sites: Ke Ola O Ka 'Āina

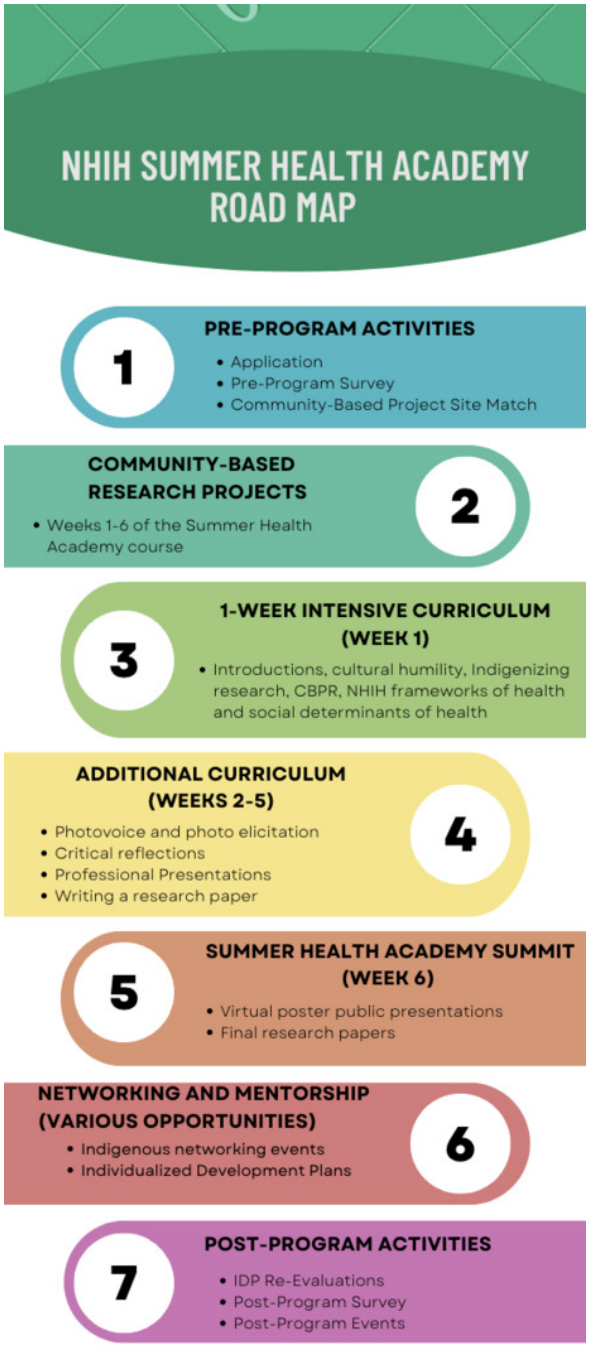

Figure 1. Native Hawaiian and Indigenous Health Summer Health Academy (NHIH SHA) Road Map

(KOOKA) (loosely translated as life of the land), Indigenous Photovoice, and Missing and Murdered Native Hawaiian Women and Girls (MMNHWG). A series of workshops were provided to facilitate research-related skills for community-engaged projects. Workshop topics were driven by priorities identified by community project sites and student interests, which ranged to include workshops that focused on online databases, ethical research, and Institutional Review Board (IRB) applications, qualitative methods, and survey research. Community workdays were integrated in the class to foster Indigenous epistemologies of health including *Mālama ʻĀina* (care for the land).

Evaluation Methods and Measures

IDPs

To encourage students to reflect on their professional pathway, students were guided throughout the course to complete an IDP. The purpose of the IDP was to motivate students to identify their personal and professional goals as well as the resources that would be needed to achieve these goals. Because success can be conventionally defined by external benchmarks and societal expectations, discussions on the importance of community support and cultural strengths were integrated into this exercise.

Indigenous Photovoice

Because images are a powerful part of storytelling for Indigenous Peoples, Photovoice was incorporated throughout the NHIH SHA to enhance class lectures, discussions, and reflections. Photovoice is a qualitative methodology developed by Wang and Burris (1997) to provide an opportunity for participants to become active researchers and reclaim their own narratives.[18] Throughout the NHIH SHA, students were trained in Indigenous Photovoice and explored their health and healing in relation to community and *ʻĀina*.[19,20] Students, faculty, and staff collectively reflected on questions such as: *"What does Native Hawaiian and Indigenous health mean to you?"* and *"What does health and healing mean to you?"* and took photos to answer these questions throughout the course. At the conclusion of the NHIH SHA, students, faculty, and staff shared their photos as a class and used the following questions to guide them in engaging in a critical dialogue: "*What were you feeling when you took your photo?*" and "*What does this photo mean to you in relation to your* kuleana *to be an agent of change for Indigenous health and to transform Health and Health Care Systems?*"

Pre-Post Surveys

Students were asked to complete an online survey to identify changes in their knowledge and for students to provide feedback on the course. The survey was administered before the course began and during the last week of the SHA course. Eight of the 9 students completed the pre and post survey. Demographic variables were collected in the pre-survey. Using a 10-point Likert scale, students were asked to rate their levels of confidence and knowledge in NHIH research. First, students were asked to rate their knowledge in cultural humility, community-based research, Indigenous methodologies, and Indigenous frameworks of health. Next, students were asked to rate their confidence to identify a topic prioritized by Indigenous communities, engage in a community-based project, conduct a literature review, identify relevant statistics and databases for research, conduct qualitative and quantitative research, and apply research findings to health care settings or policies. Levels in confidence and knowledge were re-measured in the post-survey. The surveys included open-ended questions, which asked students to identify topics they were most interested

in, workshop sessions that they attended, and feedback about the NHIH SHA.

Results

Community-Engaged Research Project Outcomes

Outcomes for students at each of the 3 primary project-based sites are described below.

MMNHWG

Pursuant to H.C.R. 11, the Hawai'i State Commission on the Status of Women and the Office of Hawaiian Affairs convened a Task Force to study MMNHWG and generate a report for the Hawai'i State Legislature. Students partnered with the Principal Investigator of the MMNHWG report to conduct historical and systems analyses and formulate recommendations to address the crisis of MMNHWG. Contributions of NHIH SHA student scholars were integrated into the report that urged Hawai'i's legislature to respond with increased attention, resources, and laws to prevent violence against Native Hawaiian women and girls.

KOOKA

KOOKA is a research project that demonstrates the role of *'Āina* connectedness in Native Hawaiian health and resilience. Students who participated in the KOOKA research project learned to analyze qualitative data by coding and analyzing interviews previously conducted with cultural practitioners. Students also learned about survey data and conducted data analyses with KOOKA survey data using statistical software.

Indigenous Photovoice

All students participated in the photovoice process. Select student scholars explored the Indigenous Photovoice process more deeply through their Indigenous Photovoice project. Indigenous Photovoice focused on teaching students a methodology that re-prioritizes Indigenous peoples' stories, experiences, and knowledge, and positions participants as active researchers.

Additional projects

During the academy, students had the opportunity to partner with multiple community-engaged research projects. For instance, one of the scholars integrated Indigenous knowledge and cultural practices with federally funded nutrition programs like Women, Infants and Children (WIC) and Supplemental Nutrition Assistance Program (SNAP). Two additional scholars visioned their future work by proposing community-engaged approaches. One of the projects focused on betel quid consumption and the sociocultural perspective of Indigenous undergraduate students in Papua, Indonesia. The second project focused on obesity in American Samoa.

IDPs

All students completed an IDP for career and professional goals that helped to re-define their own measures of success. Students formulated immediate, short-term, and long-term indicators for themselves (**Table 1**). During the NHIH SHA, a staff member met with students to solidify immediate goals. The program incorporated optional opportunities to promote personal and professional goals based on priorities identified by the student scholars. Given the focus of the supportive pathway over time, the same staff member met with students 6-months and 1-year after the program to assess "successful" achievement of immediate and short-term goals.

Indigenous Photovoice and Critical Reflections

Through critical reflections, students actively reflected on health and healing from Native Hawaiian and Indigenous worldviews as well as their roles as agents of change in health care systems. Sample Photovoice images are provided in **Figures 2 and 3**. Major themes from the Photovoice activity included holistic and relational health, the importance of *'ohana* (family) and intergenerational relationships, and *'Āina* as thriving health. Aligned with Native Hawaiian concepts of health, the students defined health as holistic and being mentally, physically, spiritually, and culturally well. Scholars emphasized the interconnectedness nature of our wellbeing and the importance of relationships to our friends, family, communities, and *'Āina*.

Evaluative Survey Data

The results of the pre- and post-surveys demonstrated the promise and success of the NHIH SHA course. A Paired samples t-test was conducted to determine the effect of confidence to engage in research-related tasks and knowledge of pertinent concepts related to CBPR and Indigenous research (**Table 2**). The results indicated a favorable change for each indicator and a statistically significant increase in confidence to conduct a literature review (M=1.13, SD=.99); [t(7)=3.21, *P*=.01]; identify relevant databases for a research project (M=1.38, SD=1.92); [t(7)=2.02, *P*= 04] and a statistically significant increase in knowledge of cultural humility (M=2.88, SD=2.53); [t(7)=3.21, *P*= 01]; CBPR (M=2.13, SD=3.09); [t(7)=1.95, *P*=.05]; Indigenous methodologies (M=2.88, SD=3.27); [t(7)=3.35, *P*= 01], and Native Hawaiian and Indigenous frameworks of health (M=3.50, SD=2.73); [t(7)=3.63, *P*<.01].

Qualitative feedback from the post-survey further validated the importance of the NHIH SHA workshops and their synergy with community-based research projects. For instance, one scholar described the workshops as *"super insightful and highly important topics for students in every academic step of their journey."* Others described the NHIH SHA as *"excellent, inspiring, empowering, interesting, compelling, mind blowing."* One student stated, *"I loved loved loved having other Pacific Island scholars sharing their work and passions...we need so much more of this!"* Another student scholar indicated that *"this (program) really creates and*

Table 1. Individualized Development Plan Indicators Identified by NHIH SHA Scholars

	Immediate: 6-month indicators	**Short-term: 1-4 year indicators**	**Long-term: 5-10 year indicators**
Professional	• Participate in other fellowships • Identify scholarships for schooling • Apply for professional or graduate school programs • Gain additional experience in research • Conduct public presentations • Gain leadership skills	• Graduate from college (undergraduate), masters program, and/or doctoral program • Be admitted to professional or graduate school program • Gain additional experience in research, public presentations, and leadership • Start professional career	• Graduate from professional/ graduate school • Complete research publications • Have a sustainable job with a livable wage • Employ other Native Hawaiian and Indigenous scholars
Personal	• Good health for self and *ʻohana* • Take care of *ʻohana* (parents and children) • Start planning for financial wellness	• Good health for self and *ʻohana* • Community involvement • Settle down with significant other • Stable housing • Begin savings and developing financial wellness	• Own a house and set roots in Hawaiʻi • Good health for self and *ʻohana* • Enjoy time with *ʻohana* (Married, children, parents) • Volunteer and other community involvement • Financial wellness: Savings, investment portfolio • Vacationing and traveling

Figure 2. Indigenous Photovoice Example 01: Kalo Planting.

The image above is in response to the Indigenous Photovoice activity, where students reflected on health, healing, and wellbeing for Native Hawaiians and Indigenous Peoples. After captioning this photo as "Kalo Planting," the scholar also provided the following reflection: "For me personally, health means the balance of physical, mental and spiritual wellbeing. I think that to be able to live healthy, we have to be able to balance these 3 factors in our lives. This feeling can be expressed through this picture. I took this picture after we finished with our kalo planting today. At that time, I felt so much joy, happiness, satisfaction, and tiredness in myself. It was the moment I realized that our hard work today will serve other people in the future. I remember before our activity started, we were asked to put our energy (physical, mental and spiritual) into the activity because what we planted today can be transferred to the kalo and even the people who will consume it later. I think this is very important message because sometimes we do not realize that our energy can affect people directly and indirectly...Serving community with the right and pure intention is necessary, so that what we do can impact our community in a positive way."

maintains the essential qualities of Indigenous and research scholarship."

Discussion

The NHIH SHA is a strategic effort that takes a strengths-based and holistic approach to health and education by enhancing Indigenous ways of knowing and representation.

Figure 3. Indigenous Photovoice Example 02: Thriving Health.

The image above is in response to the Indigenous Photovoice activity, where students reflected on health, healing, and wellbeing for Native Hawaiians and Indigenous Peoples. After captioning this photo as "Thriving Health," the scholar also provided the following reflection: "When I think of what health means to me, I think of the multiple aspects of *mauli ola* and how its balance translates to total alignment with your *na'au* (guts), *kūpuna* (ancestors), and *'Āina* (land). This concept of thriving health is what I envision for my *lāhui* (Hawaiian nation). In reference to the photo I chose, I feel that the picture itself is a manifestation of *mauli ola*."

Table 2. Paired-Samples T-Test of Pre/Post Survey Measures of Summer Health Academy Participants (n=8)

	Mean	SD	T	*P*-value
Student scholar confidence to identify a topic related to their interests	.75	1.39	1.53	.09
Student scholar confidence to identify a topic that is prioritized by Indigenous communities	.50	1.60	.88	.20
Student scholar confidence to engage in a community-based project	.50	2.56	.55	.30
Student scholar confidence to conduct a literature review	1.13	.99	3.21	.01
Student scholar confidence to identify relevant statistics for a research project	.625	1.69	1.05	.16
Student scholar confidence to identify relevant databases for a research project	1.38	1.92	2.02	.04
Student scholar confidence to conduct qualitative research	.25	3.10	.23	.41
Student scholar confidence to conduct quantitative research	.13	3.31	.11	.46
Student scholar confidence to apply research findings to healthcare settings or policies	.38	2.77	.38	.36
Student scholar knowledge of cultural humility	2.88	2.53	3.21	.01
Student scholar knowledge of community-based research	2.13	3.09	1.95	.05
Student scholar knowledge of Indigenous methodologies	2.88	3.27	3.35	.01
Student scholar knowledge of Indigenous frameworks of health	3.50	2.73	3.63	<.01

Major outcomes of this initiative include increased confidence and knowledge among students from all levels who are interested in careers in NHIH. There is a variety of evidence that demonstrates the growth in the students' learning and engagement with NHIH research. For example, the photos and reflections from the Photovoice project demonstrates a deeper understanding of health that is grounded in Indigenous ways of knowing. The survey results indicated favorable changes in their knowledge and confidence to engage in research using Indigenous ways of knowing and Indigenous framework of health. Following up with these students in the future would provide additional insights on the impacts of the NHIH SHA.

The incentive of enrolling in a tuition-free course, networking with Indigenous scholars and public health faculty, and receiving mentorship address barriers that may occur

in higher education, particularly for students from historically marginalized groups.[21,22] The NHIH SHA aligns with other Indigenous-centered programs and Hawai'i-based programs such as 'Imi Ho'ōla, the Native Hawaiian Interdisciplinary Health Program, and Eia Mānoa Summer Institute, which demonstrates the importance of pathway programs that aims to address gaps and disparities in higher education for Native Hawaiian and Indigenous communities at large.[23-27] Short- and long-term outcomes of this initiative include the promotion of future health academies and the integration of Indigenous-centered learning to promote health and social equity. Throughout the academy, students continuously reflected on their truths, experiences, and realities, while connecting their reflections to positions of relationality and goals of serving community. These pedagogical approaches aim to decolonize historically western academic spaces and privilege Indigenous ways of knowing by centering relationships and Indigenous values, which has been found to be a support in Indigenous students' academic success.[28] Thus, the NHIH SHA has the potential to be one of many ways to address and transform educational and health equities.

In addition to the strengths of the NHIH SHA, many lessons were learned through this process. The curriculum itself was implemented as a 6-week intensive course during the summer. Although students were exposed to community-engaged research projects and Indigenous frameworks of health, including the opportunity to foster their own sense of *mauli ola* (optimal health and wellbeing), the quick timeframe often presented challenges, such as limited time to experience all phases of community-engaged research. Student tuition and other costs of the NHIH SHA were supported through departmental strategic initiatives funds, which speaks to the importance of academic leadership who support advancing the health of Native Hawaiian and Indigenous communities. However, departmental funds and additional extramural funding are often subject to changes, which may limit program sustainability.

Future pathway courses and programs, such as the NHIH SHA, may consider expanding to ensure a true, authentic relationship is formed between students and community partners. Potential ways to sustain the efforts of the NHIH SHA includes partnering with other health sciences programs at the university as well as engaging with high school students, especially Native Hawaiian-serving schools, to expose them to public health as a potential education and career pathway. Concurrent with the NHIH SHA, other OPHS faculty members launched a similar high school pathway program called Community Health Scholars Program, which aims to recruit high school juniors, seniors, and incoming first-year students at any University of Hawai'i campus.[29] Collaborating with Native Hawaiian-serving community-based organizations with established trust and rapport is another approach that may help to sustain these efforts. These collaborative approaches are aligned with Indigenous practices that decolonize and Indigenize the individualistic nature of academia. Ultimately, this initiative serves an example of reframing education as an achievable goal for Native Hawaiian and Indigenous students and communities at large.

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Appendix

The purpose of an Individual Development Plan (IDP) is to support individuals and provide an opportunity to set goals, identify strategies, and identify resources that will be helpful to achieve these goals. The IDP is intended to be a self-tracking tool that may facilitate communication and discussions around expectations, personal goals, and professional goals.

Part 1: Use the following questions to guide your development of the IDP.

1. What are your ultimate goals
   1a. What are your ultimate goals of your community-based project?
   1b. What are your ultimate goals of the summer health academy?
   1c. What are your ultimate goals in the next 6 months (immediate)?
   1d. What are your ultimate goals in the next 1-4 years (short-term)
   1e. What are your ultimate goals in the next 5-10 years (long-term)?
2. What skills, competencies, activities, or resources will you need to be successful?
   2a. What skills, competencies, or activities will you need? For instance, will you need additional coursework, research skills, professional skills, leadership skills?
   2b. What kinds of resources and support will you need? For instance, family support, mentors, professors, financial support?

Part 2: Sometimes it is helpful to chart your immediate, short-term, and long-term goals and match these goals with required competencies/skills, activities/experiences, and resources/support. Complete the following chart to help you better understand what is needed for you to achieve your goals.

Goals	Competencies, Skills, and Activities	Assessment of Progress	Resources and Support
Immediate (6mo-1y)			
Short-term (2-4y)			
Long-term (5-10y)			

Part 3: Additional resources are provided for scholars to explore professional development skills in relation to their work values, skills, interests, and long-term visions.

Kuhaulua R, Yamauchi J. Building the Future of Public Health Workforce: Comprehensive Internship Program at Hawai'i Public Health Institute. *Hawaii J Health Soc Welf*. 84(7):138-142. doi:10.62547/FLOJ3448

Building the Future of Public Health Workforce: Comprehensive Internship Program at Hawai'i Public Health Institute

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Keywords: practicum, applied learning, internship, training, workforce development, apprenticeship, public health careers

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Abstract

The United States public health workforce is facing a critical shortage, with a significant exodus of professionals from state and local health departments. This column discusses the importance of internship programs in developing a sustainable pipeline for new generations of public health professionals. The Hawai'i Public Health Institute's internship program is examined as an example to provide insights for organizations seeking to establish or enhance their internship programs. From 2020 to 2023, HIPHI received 258 applications and accepted 119 interns, with an acceptance rate of 46%. Interns were mostly bachelor's level students (69%), followed by master's level students (24%). Most interns (66%) were public health majors, with others from related fields. The program offered diverse placements across various public health areas and provided training opportunities including orientation, webinars, and field excursions. Recommendations for workforce development include fostering stakeholder collaboration, supporting practicum host sites and job supervisors, sharing information and best practices, and promoting leadership development. A holistic strategy involving stakeholder collaboration, leadership development, evaluation, and ongoing workforce assessment is essential for developing a robust public health workforce capable of promoting health, preventing disease, reducing mortality, and responding effectively to future crises. Program evaluation is a necessary next step to understand how best to assist interns and early career professionals during their practicums.

Abbreviations

HIPHI = Hawai'i Public Health Institute

Introduction

The United States public health workforce faces a critical juncture, with a significant exodus of professionals from state and local health departments. The 2021 Public Health Workforce Interests and Needs Survey (PH WINS) revealed that 49% of employees in local and state health departments have left their positions,[1] with 1 in 3 considering leaving their organization.[2] The 2021 PH WINS results show that the workforce crisis is particularly acute among younger professionals and those with shorter tenures, with employees aged 35 and younger and individuals with less than 5 years of experience more likely to leave their positions in 2021.[2]

The reasons for this exodus are multifaceted and complex. The prolonged stress of the global COVID-19 pandemic has taken a significant toll on public health professionals.[3] Additionally, public health workers have faced unprecedented levels of hostility and criticism from segments of the public, eroding job satisfaction and morale.[2]

Furthermore, the public health sector has experienced a series of successive crisis events beyond the pandemic, such as natural disasters and emerging health threats, which have further strained the workforce.[4] The Maui wildfires of 2023, for instance, required rapid response and long-term recovery efforts from public health professionals, adding to the cumulative stress on the workforce post-pandemic.

Another contributing factor to the workforce crisis is the downsizing of job positions and funding opportunities that were initially expanded during the pandemic. As emergency funding has decreased and budgets have tightened, many public health departments have been forced to reduce staff or eliminate positions, leading to job insecurity and further attrition.[4]

These challenges underscore the urgent need to develop a sustainable pipeline for new generations of public health professionals. Without concerted efforts to recruit, train, and retain talented individuals in the field, the public health infrastructure in the United States risks further erosion, potentially compromising the nation's ability to respond effectively to future health crises, prevent illness, and reduce mortality.

Internship programs play a crucial role in this effort by providing opportunities for students and early-career professionals to gain practical experience and develop essential skills.[5] Experiential learning helps interns adapt to dynamic professional environments and develop the practical skills necessary for success in public health careers.[6] Internships offer a unique opportunity for aspiring public health professionals to apply theoretical knowledge in real-world settings, develop professional networks, and gain insights into the diverse career paths available within public health.[5]

This column aims to share insights from the Hawai'i Public Health Institute's (HIPHI) internship program, detailing how the organization has worked to build a learning experience for students and early-career professionals in the public health field. Internship is a broad term that includes practicums and applied learning opportunities that can last from a few weeks up to a year. HIPHI's program is examined to contribute to the broader conversation on public health workforce development and offer valuable insights for other organizations seeking to establish or enhance their internship programs.

HIPHI's Internship Program

Founded in 1996 as the Coalition for a Tobacco-Free Hawai'i, HIPHI has been at the forefront of efforts to improve public health in Hawai'i through strategies that address health equity and cross-sector collaboration. Initially focused on tobacco and vape prevention, HIPHI expanded its scope to encompass various health areas such as nutrition, physical activity, oral health, food and agriculture, and COVID-19. This diversity of focus areas provides interns with exposure to a wide range of public health issues and approaches during orientation and training sessions.

During the COVID-19 pandemic, HIPHI significantly scaled up its internship program, leveraging increased program funding and staffing to create more opportunities for students and early-career professionals. The number of applications and interns increased when comparing the number before the pandemic (2019) and during the pandemic (2020). The total number of applications received increased from 4 applications in 2019 to 50 applications in 2020, and the total number of interns rose from 4 interns in 2019 to 15 interns in 2020. This expansion was a natural response to the increased interest in public health careers among students and professionals from various backgrounds during the pandemic.

Intern Characteristics

HIPHI implemented a unified system for gathering and processing applications and internship paperwork in 2020. These included an online application form, structured interviews with candidates, orientation, and agreement form for new interns. This system has allowed for more efficient management of the internship program and better tracking of applicant and intern data, which is crucial for program evaluation and improvement. The following information pertains to applications and intern characteristics from January 2020 to December 2023.

Applicants

HIPHI received 258 individual applications, of which 119 individuals became interns, resulting in an acceptance rate of 46%. Applicants were predominantly bachelor's level students (62%), master's level students (30%), and associates or doctoral level students (8%). About 62% of applicants were from public health programs and 38% from other disciplines, indicating that the program also appeals to those who may be considering a transition into public health and broadening the talent pool for the sector.

Interns

Between 2020 and 2023, 69% of interns were in bachelor's level programs, while 24% were in master's programs. Interns completed practicum hours based on their university's program requirements, with bachelor's level interns typically completing 80 to 150 hours (53%) and master's level students completed between 150 and 250 hours (78%). Two-thirds of interns identified as public health majors (66%) and from one-third from related fields (34%) such as biology, kinesiology, political science, community health, nutrition and dietetics, and nursing.

Interns were placed across various programs within HIPHI, reflecting the organization's diverse areas of focus: food and agriculture (32% of interns); tobacco and vape prevention (27%); physical activity and nutrition (14%); policy and advocacy (8%); oral health (7%), and drug and alcohol prevention (4%). The remaining 8% of interns were placed with other programs such as COVID-19 response and *Kūpuna* coalitions serving older adults. Interns were exposed to a range of public health issues and intervention strategies. Diverse placements such as these can help interns identify areas of particular interest and inform their future career choices within the broad field of public health.

Interns indicated 1 or 2 competency areas they wanted to learn or practice in their application form, including policy and development skills (37 interns), community skills (33), analytical and assessment skills (22), communications (6), financial skills (5), and some chose not to answer (16). This information helps HIPHI staff to understand the intern's training needs and serves as a basis for offering projects that best match the competency areas that interns wish to practice or learn during their internship. **Table 1** describes typical activities for each competency area.

Close to three-quarters of interns (73%) completed internships for credit towards graduation, highlighting the important role that such programs play in complementing academic curricula and meeting degree requirements. This integration of practical experience with academic learning is crucial for developing well-rounded public health professionals who are prepared for the challenges of the field. The remainder (27%) were gaining experiences and networking within the public health field, during holidays and post-graduation. One of the benefits of developing work experience for interns is to gain references for future employment and adding a portfolio of work products to their resume. The beneficial relationship is mutual – interns also contribute to the valuable work for the organization, while providing supervision opportunities for staff.

A notable characteristic of HIPHI's internship program is its strong local focus. Approximately 87% of interns had connections to Hawai'i. For instance they attended universities in the state of Hawai'i (79%), lived in Hawai'i and attended online programs (5%), or returned to Hawai'i to complete their internship (16%). This local emphasis is particularly important in the context of Hawai'i, where cultural competence and understanding of local health issues are crucial for effective public health practice. By providing opportunities for local students and residents, HIPHI is contributing to the development of a public health workforce that is connected to and invested in the communities it serves.

Training Opportunities

HIPHI provides diverse training opportunities to help interns build a solid foundation in public health practice. These opportunities are designed to complement academic

Table 1. Types of Internship Projects for Each Competency Area

Competency Area	Description of Competency	Examples of HIPHI Internship Projects
Policy and development skills	Program and policy planning, implementation, monitoring, and evaluation.	• Compiling studies and information about buffer zone laws in the US and creating a brief summary of findings for lawmakers and coalition members. • Creating program monitoring tools for a statewide meal distribution program.
Community skills	Relationship building, collaborating with partners, community engagement, and advocacy work.	• Presenting information to middle and high school students teen vaping epidemic. • Tabling at community events and speaking to community members to increase awareness about healthy eating and active living. • Attending coalition meetings and developing a list of projects to support coalition goals.
Analytical and assessment skills	Data collection, analysis, assessment, evidence-based decision making, and ethical use of data.	• Assisting team with data collection and analysis during a community needs assessment and environmental scans. • Analyzing data on nutritional content and client demographics for a food distribution program for children and families.
Communications skills	Written and oral communications, disseminating information, influencing behavior, and facilitating meeting.	• Creating materials with appropriate messaging and design around healthy eating, physical activity, and oral health. • Promoting a food assistance program benefit by creating a brochure on how to use the program to purchase more fruits and vegetables.
Financial skills	Understanding funding mechanism and developing a program budget.	• Searching and compiling list of potential funders for a community garden coalition. • Providing recommendation on program sustainability by exploring funding sources.

learning with practical skills and real-world exposure to public health work. The training components include orientation, webinars, and opportunity to attend field excursions.

Internship orientation is a 1-hour session covering HIPHI's mission, vision, values, program areas, policies, and procedures. This orientation ensures that interns have a comprehensive understanding of the organization and its role in Hawai'i's public health landscape. It also sets clear expectations for the internship experience and introduces interns to HIPHI's organizational culture.

Between 2021 and 2022, HIPHI staff facilitated webinars on crucial topics such as the policy process, grant writing/nonprofit management, youth engagement, and coalition building. These sessions, lasting 1 to 2 hours each, were led by HIPHI staff who not only presented on the topics but also shared insights from their own career paths in public health. This approach provides interns with both practical knowledge and valuable career guidance. Interns also have an opportunity to attend free monthly webinars through the Public Health Training Hui and quarterly Perspectives on Community Health field trips. Perspectives trips were on hiatus during the pandemic and began again in 2023. These webinars and excursions offer opportunities to observe and participate in community-based health interventions, providing a real-world context for the concepts and skills learned in academic settings.

Interns learn not only about specific health issues but also about the broader skills necessary for effective public health practice, such as policy and advocacy, community engagement, and program management. This holistic approach to training helps to produce well-rounded professionals who are prepared to address complex public health challenges from multiple angles.

Recommendations for Workforce Development and Conclusion

The diminishing public health workforce necessitates creating a robust pipeline for new professionals. Drawing from HIPHI's internship program and broader trends, we propose the following recommendations:

1. Foster stakeholder collaboration: Foster regular conversations among public health stakeholders to address funding and resources for training, mentoring, and supervising early career professionals and interns.
2. Support practicum host site and job supervisors: Provide resources to maximize intern experiences and improve organizations' capacity to host and mentor interns. Provide support to supervisors on how to recruit, retain, mentor, and supervise professionals in the younger age range and/or who have less work experience.
3. Share information: Conduct program evaluations and workforce assessments and share information with stakeholders for further discussion on how to best support interns to be ready for employment in the

public health field. Share best practices and data on workforce development issues in the state of Hawai‘i.

4. Promote leadership development: Incorporate leadership training for interns in Hawai‘i and promote programs such as AmeriCorps[7] and Public Health Associates Program[8] (CDC) as entryways to public health professions.
5. Include interns in relevant meetings to provide their perspectives around workforce development issues.

These recommendations aim to create a comprehensive approach to workforce development, addressing both immediate needs and long-term sustainability. Fostering collaboration, employer/ supervisor support, and addressing systemic challenges, can build a resilient and skilled public health workforce.

HIPHI's internship program collected very limited evaluation response from interns between 2020 to 2023 (27% response rate). HIPHI plans to conduct program evaluation and assessment of internship alumni in the near future. Such information could be helpful when shared with other sites to understand how best to support interns as they transition to professional work.

A holistic strategy involving stakeholder collaboration, leadership development, evaluation, and ongoing workforce assessment is essential. Developing a robust public health workforce is a national imperative requiring sustained commitment from all stakeholders. Only through concerted efforts to ensure that communities have the infrastructure and expertise to promote health, prevent disease, and respond effectively to future crises.

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Hawai'i Journal of Health & Social Welfare
General Recommendations on Data Presentation and Statistical Reporting (Biostatistical Guideline for HJH&SW)

[Adapted from Annals of Internal Medicine & American Journal of Public Health]

The following guidelines are developed based on many common errors we see in manuscripts submitted to HJH&SW. They are not meant to be all encompassing, or be restrictive to authors who feel that their data must be presented differently for legitimate reasons. We hope they are helpful to you; in turn, following these guidelines will reduce or eliminate the common errors we address with authors later in the publication process.

Percentages: Report percentages to one decimal place (eg, 26.7%) when sample size is >=200. For smaller samples (<200), do not use decimal places (eg, 27%, not 26.7%), to avoid the appearance of a level of precision that is not present.

Standard deviations (SD)/standard errors (SE): Please specify the measures used: using "mean (SD)" for data summary and description; to show sampling variability, consider reporting confidence intervals, rather than standard errors, when possible, to avoid confusion.

Population parameters versus sample statistics: Using Greek letters to represent population parameters and Roman letters to represent estimates of those parameters in tables and text. For ex ample, when reporting regression analysis results, Greek symbol (ß), or Beta (b) should only be used in the text when describing the equations or parameters being estimated, never in reference to the results based on sample data. Instead, one can use "b" or ß for unstandardized regression parameter estimates, and "B" or ß for standardized regression parameter estimates.

***P* values:** Using *P* values to present statistical significance, the actual observed *P* value should be presented. For *P* values between .001 and .20, please report the value to the nearest thousandth (eg, *P* = .123). For *P* values greater than .20, please report the value to the nearest hundredth (eg, *P* = .34). If the observed *P* value is great than *.999*, it should be expressed as "*P* > *.99*". For a *P* value less than .001, report as "*P* < .001". Under no circumstance should the symbol "NS" or "ns" (for not significant) be used in place of actual *P* values.

"Trend": Use the word trend when describing a test for trend or dose-response. Avoid using it to refer to *P* values near but not below .05. In such instances, simply report a difference and the confidence interval of the difference (if appropriate), with or without the *P* value.

One-sided tests: There are very rare circumstances where a "one sided" significance test is appropriate, eg, non-inferiority trials. Therefore, "two-sided" significance tests are the rule, not the ex ception. Do not report one-sided significance test unless it can be justified and presented in the experimental design section.

Statistical software: Specify in the statistical analysis section the statistical software used for analysis (version, manufacturer, and manufacturer's location), eg, SAS software, version 9.2 (SAS Institute Inc., Cary, NC).

Comparisons of interventions: Focus on between-group differ ences, with 95% confidence intervals of the differences, and not on within-group differences.

***Post-hoc* pairwise comparisons**: It is important to first test the overall hypothesis. One should conduct *post-hoc* analysis if and only if the overall hypothesis is rejected.

Clinically meaningful estimates: Report results using meaningful metrics rather than reporting raw results. For example, instead of the log odds ratio from a logistic regression, authors should transform coefficients into the appropriate measure of effect size, eg, odds ratio. Avoid using an estimate, such as an odds ratio or relative risk, for a one unit change in the factor of interest when a 1-unit change lacks clinical meaning (age, mm Hg of blood pressure, or any other continuous or interval measurement with small units). Instead, reporting effort for a clinically meaningful change (eg, for every 10 years of increase of age, for an increase of one standard deviation (or interquartile range) of blood pressure), along with 95% confidence intervals.

Risk ratios: Describe the risk ratio accurately. For instance, an odds ratio of 3.94 indicates that the outcome is almost 4 times as likely to occur, compared with the reference group, and indicates a nearly 3-fold increase in risk, not a nearly 4-fold increase in risk.

Longitudinal data: Consider appropriate longitudinal data analyses if the outcome variables were measured at multiple time points, such as mixed-effects models or generalized estimating equation approaches, which can address the within-subject variability.

Sample size, response rate, attrition rate: Please clearly indicate in the methods section: the total number of participants, the time period of the study, response rate (if any), and attrition rate (if any).

Tables (general): Avoid the presentation of raw parameter estimates, if such parameters have no clear interpretation. For instance, the results from Cox proportional hazard models should be presented as the exponentiated parameter estimates, (ie, the hazard ratios) and their corresponding 95% confidence intervals, rather than the raw estimates. The inclusion of *P*-values in tables is unnecessary in the presence of 95% confidence intervals.

Descriptive tables: In tables that simply describe characteristics of 2 or more groups (eg, Table 1 of a clinical trial), report averages with standard deviations, not standard errors, when data are nor mally distributed. Report median (minimum, maximum) or median (25th, 75th percentile [interquartile range, or IQR]) when data are not normally distributed.

Figures (general): Avoid using pie charts; avoid using simple bar plots or histograms without measures of variability; provide raw data (numerators and denominators) in the margins of meta-analysis forest plots; provide numbers of subjects at risk at different times in survival plots.

Missing values: Always report the frequency of missing variables and how missing data was handled in the analysis. Consider add ing a column to tables or a footnote that makes clear the amount of missing data.

Removal of data points: Unless fully justifiable, all subjects included in the study should be analyzed. Any exclusion of values or subjects should be reported and justified. When influential observations exist, it is suggested that the data is analyzed both with and without such influential observations, and the difference in results discussed.

Hawai'i Journal of Health & Social Welfare
Case Reports

Aim and Description:

The HJH&SW publishes case reports with the aim of providing our readership with a meaningful educational experience, and it is required that the case report pertains to the peoples or environment of Hawai'i or the Pacific Islands. Case reports may be submitted by professionals working in many fields, including medicine, nursing, social work, pharmacology, or public health.

We seek cases that:

- illustrate a novel diagnostic, clinical management, or ethical challenge
- hold particular relevance to health care providers and researchers who work with the populations of Hawai'i and the Pacific Islands
- describe an unusual side effect, an unexpected presentation of a disease, diagnosis and/or management of an emerging disease, or an unexpected event during treatment
- detail a significant social work case, a public health experience, or an observation about the need for new practice standards in the management of a medical condition
- are original, interesting, and contribute significantly to the scientific knowledge of health or social welfare

For complete instructions to authors please go to:
https://hawaiijournalhealth.org/docs/MedicalCaseReport_AuthorGuidelines-Sep23.pdf

Hawai‘i Journal of Health & Social Welfare
Style Guide for the Use of Native Hawaiian Words and Diacritical Markings

The HJH&SW encourages authors to use the appropriate diacritical markings (the ‘okina and the kahakō) for all Hawaiian words. We recommend verifying words with the Hawaiian Language Dictionary (http://www.wehewehe.org/) or with the University of Hawai‘i Hawaiian Language Online (http://www.hawaii.edu/site/info/diacritics.php).

Authors should also note that Hawaiian refers to people of Native Hawaiian descent. People who live in Hawai‘i are referred to as Hawai‘i residents.

Hawaiian words that are not proper nouns (such as keiki and kūpuna) should be written in italics throughout the manuscript, and a definition should be provided in parentheses the first time the word is used in the manuscript.

Examples of Hawaiian words that may appear in the HJH&SW:

‘āina	**Kaua‘i**	**O‘ahu**
Hawai‘i	**Lāna‘i**	**‘ohana**
kūpuna	**Mānoa**	**Wai‘anae**

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