

Papa Ola Lōkahi

E OLA MAU A MAU

THE NEXT GENERATION OF NATIVE HAWAIIAN HEALTH

MEDICAL REPORT

E OLA MAU A MAU – THE NEXT GENERATION OF NATIVE HAWAIIAN HEALTH

Copyright © 2019. Papa Ola Lōkahi. All Rights Reserved.

No part of this report may be reproduced or transmitted in whole or in part in any form without the express written permission of Papa Ola Lōkahi.

Suggested Citation:
Papa Ola Lōkahi. (2019). E Ola Mau A Mau – The Next Generation of Native Hawaiian Health. Honolulu, HI: Papa Ola Lōkahi.

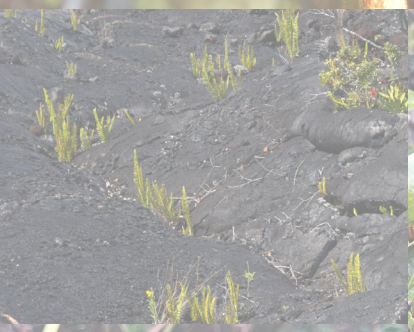
For the electronic version and additional resources on Hawaiian health and well-being please visit: www.papaolalokahi.org





















Chapter Three:
Medicine

Medicine

Martina L. Kamaka, Selene LeGare, Heather Haynes
Kapuaola Gellert, Laura Arcibal, Donna-Marie Palakiko
Elizabeth Keali‘ikuaaina Tam, Alika Maunakea, Andrea Hermosura
May Okihiro, Christina Minami, Anaeliz Colon, Blane Garcia, Kamuela Werner

Executive Summary

Increased Understanding

- Prevalence of chronic disease remains higher for Native Hawaiians compared to Hawai‘i statewide rates.
- Mortality rates for Native Hawaiian babies remain high.
- Early prevention efforts, such as intense lifestyle interventions, can reduce the risk for developing diabetes.
- Research examining the social determinants of health now documents the impact of economic and cultural stressors on our health outcomes.
- Epigenetics has now begun to explain the intergenerational transmission of health risks.
- The impact of climate change and the rapid increase in our elder population provide new challenges for health care in the future.
- Cultural competency and cultural humility among health care providers results in a broader recognition of the importance of a wholistic approach to improving Native Hawaiian health.
- A wholistic approach towards Native Hawaiian health must include place-based and land-based interventions to improve Native Hawaiian spiritual well-being, mental health, and physical health status.
- Western health care functions in silos. Increased communication, collaboration and coordination could remedy this while improving patient experience and population health as well as reduce costs, also known as the Triple Aim approach.
- An organization (such as Papa Ola Lōkahi) would be needed to oversee and be held responsible for the systemic change required in this “Triple Aim” approach.

Effective and Promising Approaches

- Evidence for the effectiveness of culturally adapted health interventions exists; much of the information has been the result of Community Based Participatory Research initiatives in partnership with Native Hawaiian communities, the Native Hawaiian Health Care Systems and the University of Hawai‘i John A. Burns School of Medicine Department of Native Hawaiian Health.
- The Native Hawaiian Health Care Systems have established effective models of service delivery that integrate community outreach and traditional healing practices.
- The Patient-Centered Medical Home Model of primary care, which provides interdisciplinary team-based care coordination, including Case Managers and Community Health Workers, shows promise in addressing the social determinants of health and providing more wholistic, patient-centered, accessible and effective care.
- Place-based and culturally adapted health promotion and disease management interventions tap into the strengths of the Native Hawaiian community.
- Telehealth and technology can help address primary care and specialist provider shortages in medically underserved areas.

Gaps

- Data: A complete picture of Native Hawaiian health status is only possible with disaggregated data specific to the Native Hawaiian population, inclusive of Native Hawaiians residing on the continental U.S., specific to all major diseases and disease risks, and inclusive of those who are not accessing medical care.
- Lack of a Native Hawaiian Institutional Review Board which specifically protects the rights and welfare of human subjects involved in Native Hawaiian research projects.

- Access to care: While gains have been made, gaps remain in affordability, availability and acceptability.
- Access to technology: The advantages of telehealth are limited by access to that technology.
- Economic and cultural stressors: High rates of poverty and homelessness and low rates of post-secondary education disproportionately affect our communities. These stressors are strongly linked to health risk behaviors and poor health outcomes.

Recommendations for Impact

- **Ensure accurate data are available to assess health risks, status and outcomes.**
- **Expand the availability of disaggregated data.**
- **Support data-sharing agreements among agencies and programs.**
- **Support longitudinal data collection on education and employment, including vocational education.**
- **Further explore genetic influences on disease.**
- **Explore telehealth solutions and other innovative technologies.**
- **Increase understanding of the available technology and how it can be utilized to increase health care access and support community and team-based care.**
- **Draw upon Native Hawaiian traditional practices.**
- **Improve access to care by continuing to improve acceptability of care and integrating traditional healing practices.**
- **Allocate resources for prevention programs aimed at youth and younger adults.**
- **Increase resources to develop and support a Native Hawaiian culturally adapted primary care system:**
  - Inclusive of traditional healing practices.
  - Inclusive of Community Health Workers and patient navigators.
- **Prioritize incorporation of collaborative integrative care approaches as well as cultural competency training in training programs for health care teams.**
- **Increase reliance on community-based health care teams and technology.**
  - These measures also require resources to assist in coordination of team care, data and records such as electronic medical records.
  - Align resources to account for the expansion of telehealth.
  - Ensure that culturally tailored telehealth programs are developed.
- **Increase support for place-based care, incorporating communities and environments in which people live.**

Introduction

O kau ola e ke akua.	*Give life, o god.*
E nana mai kau mau pulapula;	*Look to your descendants;*
E ola a kanikoʻo, a haumakaʻiole.	*(Give me) life until I walk with a staff, and blear-eyedeyed as a rat,*
A palalauhala, a kau i ka puaaneane;	*Yellowed as hala leaves, and reach extreme old age;*
Alaila, lawe aku oe iaʻu i ke alo o Wakea.	*Then take me to the presence of Wakea.*

Ke Pule Nei Kanaka: The People Pray
From *Na Pule Kahiko*
(Gutmanis, 1983)

This traditional pule[1] highlights the desire for a long and fruitful life. It also captures the value of not only using innovation and Western approaches, but also integrating cultural values and community to reduce health disparities among Native Hawaiians and ensure our kūpuna[2] thrive in old age.

The *E Ola Mau* report (Native Hawaiian Health Research Consortium, 1985) documented that Native Hawaiians experience a lower life expectancy than other ethnic groups in Hawaiʻi due to injury, deaths, and chronic diseases including diabetes, heart disease, and cancer. Native Hawaiians had higher rates than

[1] prayer

[2] elders

other racial groups in Hawai‘i of developing risk factors associated with diabetes, heart disease, and hypertension. One explanation for this disparity at the time was that Native Hawaiians seemed to be less knowledgeable than other racial groups about chronic disease symptoms.

The report also revealed a higher prevalence of infant mortality, low birth weight, and congenital abnormalities among Native Hawaiians than other groups. Native Hawaiians had higher rates of teen pregnancy and illegitimate births than other groups. Pregnant Native Hawaiian women received less prenatal care than was recommended.

Although systematic evidence about the utilization of other health services was sparse, the literature suggests that Native Hawaiians received fewer health services. Native Hawaiians appeared to participate less than other groups in health education, health promotion, and screening and referral programs, even when made available, free of charge, to communities with high proportions of Native Hawaiian residents. Furthermore, some Native Hawaiians entered medical treatment at the late stages of disease, often when self-care and traditional practices had not brought sufficient relief. The reasons for under-utilization were thought to stem from lack of accessibility due to financial barriers, and even more importantly, lack of acceptability of services to Native Hawaiians due to cultural differences. Of note, the principal recommendations of this updated report address the need to alter the manner in which health services are delivered.

When you look at E Ola Mau – E Ola Mau, *even though it's broad – we're talking about the health of Native Hawaiians. We're also focused because this is the place where funding for Native Hawaiians came from.* E Ola Mau *report was one of the signature documents that informs people.*

Kamahanahokulani Farrar
Executive Director
Na Pu‘uwai
Native Hawaiian Health Care System

This medical task force report is structured to focus on the five most common health disparities impacting Native Hawaiians: cardiovascular disease, diabetes, obesity, cancer, and asthma as well as disparities associated with maternal and fetal health. The first three will be considered within the context of cardiometabolic health and disease. While we acknowledge the critically important role of the social and cultural determinants of health, much of this report focuses on improving clinical health care for the individual as well as the community. The report begins with our increased understanding of the evidence on, and successful evidence-based interventions to address, cardiometabolic disorders (e.g., obesity, diabetes, and cardiovascular diseases), cancer, asthma, and maternal/infant health. Of particular interest are those interventions that involve culturally adapted programs. Cultural adaptation appears to be a key component in programs that make a significant impact either as interventions or as prevention strategies.

Emerging trends have been identified which we expect will have significant impacts on future health care and health care systems. These include climate change, the rapidly aging population, and implications of epigenetics research that may change how we diagnose and treat disease in the future. We then examine selected promising approaches toward improving Native Hawaiian health. We believe these have the potential to contribute positively to Native Hawaiian health as they address community and cultural approaches to empowerment and health. However, most are programs that have not published findings and results in the traditional sense of Western evidence-based practice standards. Nevertheless, we argue that these interventions show promise and require financial support from governmental and community public health agencies in order to continue or expand their work, positively impact our communities, and eventually produce useful outcomes data.

Next, we address important gaps in the structure of systems, research, resources, and policy that contribute to Native Hawaiian health disparities. Some of these topics are covered in detail in other sections of this report. Each of these gaps is followed by specific recommendations. Finally, we conclude with overarching recommendations for addressing our health care disparities as well as envisioning a Native Hawaiian health care system that is developed for and controlled by Native Hawaiians, is strengths-based, and utilizes our cultural knowledge and values.

Increased Understanding

- **Prevalence of chronic disease remains higher for Native Hawaiians compared to Hawai‘i statewide rates.**

Since the 1985 *E Ola Mau* report, several studies have reported on the burden of health conditions that plague Native Hawaiians, particularly for chronic diseases. The findings of the past 30 years have generally been consistent with the health disparity revealed by the 1985 *Medical Task Force Report.* As broad indicators of health, Native Hawaiian adults in Hawai‘i have a lower life expectancy and report

overall poorer health (Hawai‘i Health Data Warehouse, 2014; Wu et al., 2017). Sadly, over the last 30 years, Native Hawaiians continue to have higher rates of chronic diseases such as cardiovascular disease, diabetes, and cancer. For example, while work has been done to address health disparities related to cardiovascular disease, Native Hawaiians are still almost 70% more likely to die from cardiovascular disease than Caucasians.

Cardiometabolic Health and Disease

The term *cardiometabolic health and disease* is meant to include a variety of clinical abnormalities that are known to cluster together and often manifest as one or more clinical disease states among high-risk populations, including cardiovascular disease and diabetes (Magge, Goodman, & Armstrong, 2017). As a global health issue, the definition of cardiometabolic syndrome, now called MetS, was updated by an international panel of experts in 2006 to facilitate global research efforts and information sharing to address the spectrum of people who are at high risk for MetS (Alberti, Zimmet, & Shaw, 2005). Individuals with MetS can present clinically in a variety of ways, and abnormalities may exist even prior to disease diagnosis. Some of these clinical abnormalities include increased abdominal obesity, hypertension, increased fasting glucose, hypertriglyceridemia, and increased HDL cholesterol (Grandinetti, Kaholokula, Mau, & Chow, 2010). This constellation of metabolic risk factors places people at an increased risk and makes them twice as likely to die from coronary heart disease (CHD) and three times more likely to have a heart attack or stroke, and gives them a five times greater lifetime risk of developing diabetes (Kelli, Kassas, & Lattouf, 2015; Saljoughian, 2016). While the relationship of these risk factors for MetS are generalizable to all populations, the magnitude and thresholds for how each risk factor contributes to health and disease is likely to be varied and diverse. It is well established that MetS is disproportionately increased among Native Hawaiians and other Pacific Islanders (NHOPI) (Mau, Sinclair, Saito, Baumhofer, & Kaholokula, 2009).

Since the last *E Ola Mau* report, several epidemiological studies have firmly established the increased prevalence of all features of MetS among NHOPIs (Aluli et al., 2010; Aluli, Reyes, & Tsark, 2007; Grandinetti et al., 2010; Maskarinec et al., 2009). Of note, a few well-designed studies among a representative sample of Native Hawaiian adults have confirmed that insulin resistance is a fundamental feature of MetS among Native Hawaiians, and this finding is consistent with other studies conducted among other high-risk indigenous populations in the U.S. (Mau et al., 1997; Saad et al., 1991). What remains largely unresolved is the precise underlying cause and mechanism of MetS among NHOPIs resulting in the populational persistence and pervasive disease risk observed.

In addition, several behavioral risk factors have also been associated with an increased risk of developing MetS, such as short sleep duration, increased screen time, dietary factors, decreased physical activity, tobacco smoke exposure, and socioeconomic factors (Magge et al., 2017). The association between MetS and social determinants of health has been successfully demonstrated in indigenous populations with a high burden of chronic disease, and treatment using culturally tailored adapted lifestyle interventions has been successful (Foulds, Shubhair, & Warburton, 2013; Siddiquil, Kurbasic, Lindblad, Nilsson, & Bennet, 2017).

Cardiovascular disease.

Cardiovascular disease refers to diseases of the heart and blood vessels, including such incidents as heart attacks and strokes. Cardiovascular mortality has been higher among Native Hawaiians compared to other racial and ethnic groups living in Hawai‘i since 1910 (Aluli, 1962; Aluli, Reyes, & Tsark, 2007). Using data from 2005-2006, Aluli and colleagues examined cardiovascular disease disparities in Native Hawaiians and found that, although statewide mortality from cardiovascular disease was lower compared to the U.S., cardiovascular disease mortality among Native Hawaiians was higher: 313.1 per 100,000, or 52.5% higher than the state, and 9% higher than the country as a whole. More specifically, mortality from coronary heart disease was 67% higher among Native Hawaiians and mortality from stroke was 31% higher compared to the state (Aluli et al., 2007; Aluli et al., 2010). Among the major race groups in Hawai‘i, Native Hawaiians also have the lowest mean age at death from cardiovascular disease (Panapasa, Mau, Williams, & McNally, 2010).

The higher burden of cardiovascular disease among Native Hawaiians is associated not only with higher mortality and morbidity but also with higher costs for medical care and hospitalizations (Benjamin et al., 2018). With this burden borne at younger ages, cardiovascular disease disparities in Native Hawaiians are a public health emergency. The alarming disparity

is also largely related to a high prevalence of preventable cardiovascular disease risk factors, also seen in MetS, including diabetes, obesity, hypercholesterolemia, and hypertension (Galinsky, Zelaya, Barnes, & Simile, 2017; Galinsky, Zelaya, Simile, & Barnes, 2017; Nakagawa, Ito, & King, 2017).

Type 2 diabetes.

The American Diabetes Association (2011) defines diabetes as "a group of metabolic diseases" associated with high blood sugars "resulting from defects in insulin secretion, insulin action, or both." Diabetes is the fourth leading cause of death in Native Hawaiians (Johnson, Oyama, LeMarchand & Wilkens, 2004). The prevalence of Type 2 diabetes is higher for Native Hawaiians compared to other racial groups in Hawai'i. Behavioral Risk Factor Surveillance System data indicate that for the years of 2012-2014, 11% of Native Hawaiians and 9% of other Pacific Islanders in Hawai'i reported having diabetes (Hawai'i Health Data Warehouse, 2016). The rate of Type 2 diabetes prevalence for Native Hawaiians is 22%, compared to 3% for Caucasians and 7% for Japanese. Native Hawaiians, on average, are also seven years younger when diagnosed with Type 2 diabetes compared to Caucasians and Japanese, and die from diabetes at a rate of 117 per 100,000 compared to 53 per 100,000 for other racial and ethnic groups (Sinclair et al., 2013). Native Hawaiians also have higher rates of obesity, a known risk factor for diabetes (King et al., 2012; Maskarinec et al., 2009).

There are significant physical, economic, and social costs associated with the huge burden of diabetes. Long-term complications of diabetes include damage to numerous organs including, for example, damage to the heart (heart attacks), eyes (blindness), kidneys (kidney failure), and blood vessels and nerves (poor wound healing and amputations) (American Diabetes Association, 2011). Treatment costs for diabetes can be overwhelming. The cost of care for a diabetic patient requiring dialysis ranges from $60,000 – $80,000 per person per year in Hawai'i (Kataoka-Yahiro et al., 2012). Sentell et al. (2013) examined diabetes-related preventable hospitalizations for working-age Native Hawaiians. Native Hawaiians were hospitalized at a younger mean age (48.2) than other ethnic groups and at rates twice that of Caucasians. In addition, Native Hawaiians had higher mortality rates with the longest average length of stay and the highest percentage of amputations. Hospitalizations involving amputation were more expensive than other diabetes-related hospitalizations including those for uncontrolled diabetes (Guo, Ahn, Juarez, Miyamura, & Sentell, 2015; Sentell et al., 2013) and may be a contributing factor in Native Hawaiians having the highest unadjusted median costs ($9,117) for preventable hospitalizations (Sentell, Ahn, Miyamura, & Juarez, 2015).

Native Hawaiians with diabetes can be subject to stressors such as social prejudice and workplace discrimination. Socioeconomic factors figure heavily when considering barriers to diabetes management. The ability to access and afford healthy foods, whether due to finances, family commitments, or transportation (including commuting distance), and the ability to find safe spaces to exercise, have been found to limit the ability to maintain a healthy lifestyle (Fukunaga, Uehara, & Tom, 2011; McEligot et al., 2010). These are critically important factors in light of the proven benefits of lifestyle changes in treating and preventing diabetes (American Diabetes Association, 2011; Aroda et al., 2015).

A few of the emerging areas of concern include dental complications and impacts on youth. Diabetes increases the risk of dental complications, with diabetic Native Hawaiians having the largest proportion (16.2%) of excess tooth loss (Deguchi, Mau, Davis, & Niederman, 2017). With regards to youth, increasing obesity rates are raising concerns for increased diabetes rates in children (Liu et al., 2009). Better and earlier access to primary care, preventive care, and chronic care management are needed to improve the rates of diabetes in Native Hawaiians (King et al., 2012; Sentell et al., 2013; Sentell et al., 2015).

Obesity and overweight.

Although Hawai'i is ranked as the U.S. state with the third lowest prevalence of obesity, 37% of Native Hawaiians in the state are considered obese, with a Body Mass Index (BMI) greater than or equal to 30, compared to only 28% of Caucasians (Galinsky et al., 2017; Galinsky et al., 2017). Native Hawaiian adults have a significantly higher mean BMI compared to Caucasians, with 76-90% of Native Hawaiians and other Pacific Islanders having excess body weight ("overweight" or BMI greater than or equal to 25) (Grandinetti et al., 2007; Kaholokula et al., 2014). Prior to Western contact, Native Hawaiians had very low prevalence of cardiovascular disease and obesity (Bushnell & Veith, 1994).

Western contact and colonization, and the historical cultural trauma that came with them, led to overwhelming changes in social structures and lifestyles which dramatically disrupted the traditional way of life for Native Hawaiians (Anderson et al., 2006; Else, 2004; Fujita, Braun, & Hughes, 2004; Shintani, Beckham, O'Connor, Hughes, & Sato, 1994). The impact on diet is a clear example. The

traditional Hawaiian diet was very healthy and consisted of 75-78% complex starch, 7-12% fat, and 12-15% protein, with a staple food being taro (Kittler & Sucher, 2001). As Native Hawaiians moved to a more Western diet, which consisted predominantly of processed foods, their health changed as well (Fitzpatrick-Nietshmann, 1983; Kittler & Sucher, 2001). The fact that large numbers of Native Hawaiians live in communities that are obesogenic, environments with limited access to healthy food and physical activity options, compounds the problem. Furthermore, Native Hawaiians report being alienated and discriminated against by Western-based medical and public health systems that promote lifestyle recommendations that are not consistent with Hawaiian cultural values (Kaholokula et al., 2017; Oneha et al., 2016; Whitbeck, Adams, Hoyt, & Chen, 2004).

While obesity is preventable through lifestyle modifications including diet and physical activity (Anand et al., 2015; Shen et al., 2015), it continues to be a global burden (Collaborators USBoD, 2013). Among Native Hawaiians, this burden is directly related to poor diets and long-standing overweight and obesity beginning in childhood (Novotny et al., 2012; Oneha et al., 2016). Native Hawaiian and Samoan children have the highest prevalence of obesity compared to children of other racial and ethnic groups living in Hawai‘i, and childhood obesity is associated with health problems that previously were not seen in children, such as the development of Type 2 diabetes (Novotny, Oshiro, & Wilkens, 2013). The national SEARCH for Diabetes in Youth study found that 100% of the Pacific Islander (mostly Native Hawaiian and Samoan) and Asian youth studied with Type 2 diabetes all had BMIs consistent with “adult ethnicity-specific definitions of obesity (Liu et al., 2012, King et al., 2012).”

Cardiometabolic Health and Disease: Summary and Highlights

- Compared to other racial and ethnic groups living in Hawai‘i, Native Hawaiians suffer from higher mortality from coronary heart disease, stroke, and diabetes.
- Native Hawaiians have a higher prevalence of diabetes.
- Native Hawaiians develop cardiovascular diseases and diabetes at younger ages.
- Native Hawaiians die from cardiovascular disease at a younger age.
- A key feature in MetS (cardiometabolic disease) in Native Hawaiians is insulin resistance.
- Higher rates of obesity in Native Hawaiians are a major cause of many of these cardiovascular disparities.
- Cardiovascular and diabetes related disparities are a result of a complex interplay of access to care, social determinants of health, and biological and environmental factors.
- Obesity begins in childhood and is associated with increases in childhood diabetes; lifestyle factors such as the post-contact Western diet play an important role.

Cancer

In the Native Hawaiian population, as in the U.S. population, cancer is the second leading cause of death. In 2013, 6,700 Hawai‘i residents were diagnosed with invasive cancer, of whom more than 2,200 died (Hawai‘i Tumor Registry, 2016). There are significant variations in both incidence and mortality among Hawai‘i’s five largest racial and ethnic groups; and similarly to the findings in 1985, Native Hawaiians suffer disproportionately from the burdens of cancer. Based on the most recent comprehensive cancer data, Native Hawaiian women have the highest cancer incidence and mortality, and Native Hawaiian men have the highest cancer mortality, as compared to Chinese, Filipinos, Japanese, and Caucasians.

The leading type of cancer in women in Hawai‘i is breast cancer, and Native Hawaiian women have the highest incidence, mortality, and proportion of cases diagnosed at an advanced stage (Hawai‘i Tumor Registry, 2016). The most frequent cancer in men in Hawai‘i is prostate cancer; and although Native Hawaiian men have a relatively low incidence compared to other groups, they have the highest mortality and proportion of cases diagnosed at an advanced stage. Across the state, lung cancer is the leading cause of cancer deaths, and Native Hawaiian men and women both have the highest incidence and mortality as compared to the other racial groups. Despite a lower incidence of colon and rectal cancer in the Native Hawaiian population compared with Japanese and Filipinos, our mortality and number of cases diagnosed at an advanced stage are the highest. Despite a lower incidence of numerous less common cancers such as leukemia, melanoma, and cancers of the bladder, kidney, liver, pancreas, stomach, and uterus, Native Hawaiian women and men consistently suffer from the highest mortality rates.

It is now recognized that cancer disparities exist with respect to incidence, prevalence, morbidity, mortality, survivorship, screening, and stage at diagnosis. Explanations for these disparities are complex and interrelated. Cancer health disparities are associated with access to care, social determinants of health, biological differences, and an interplay between genetic, environmental, and social factors (National Cancer Institute, 2016). Furthermore, lifestyle habits and cultural perceptions contribute to disparity (Polite et al., 2017).

Cancer: Summary and Highlights

- Native Hawaiians suffer disproportionately from numerous types of cancer.
- Health disparities exist with respect to cancer incidence, diagnosis at advanced stages, and mortality.
- Cancer disparities result from a complex interplay of access to care, social determinants of health, and biological and environmental factors.

Asthma

Asthma is a chronic respiratory illness which causes the airways to constrict and swell, restricting airflow (National Asthma Education and Prevention Program, 2007). More specifically, the Global Initiative for Asthma (2019) defines asthma as "a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory flow limitation."

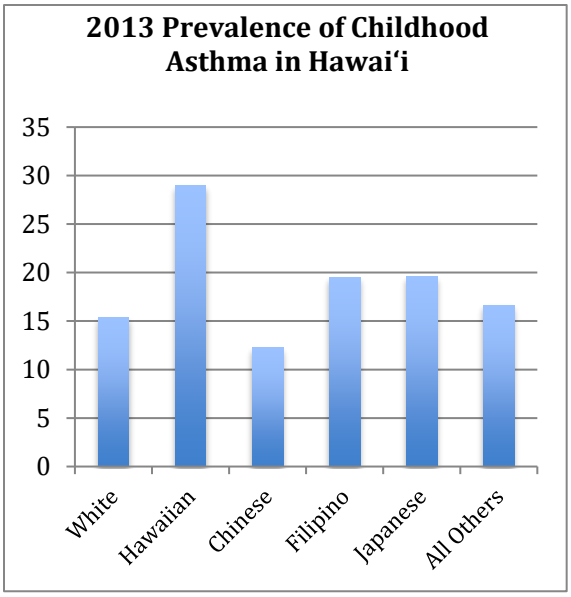
Native Hawaiians have a higher prevalence of asthma compared to both Hawai'i state and national averages, with 28% of Native Hawaiian adults diagnosed with asthma compared to the state average of 16% (Office of Hawaiian Affairs [OHA], 2017) and national average of 7.7% (Centers for Disease Control and Prevention, 2017; OHA, 2017). Hawaii's Behavioral Risk Factor Surveillance System (BRFSS) surveys, conducted among adults living in households with telephones in Hawai'i, indicate that between 2001 and 2010, Native Hawaiians and Other Pacific Islanders (NHOPI) had the highest prevalence of lifetime or current asthma, even after adjusting for age, BMI, educational attainment, smoking status, and survey year (Jessop, Li, Katz, & Hurwitz, 2019). Prevalence rates of lifetime (20.9%) and current (12.2%) asthma among NHOPI adults were at least 60% higher compared to Asian adults, who had the lowest rates of lifetime or current asthma in Hawai'i.

Known risk factors for asthma, including obesity and first- and second-hand exposure to tobacco smoke or nicotine, are disproportionately higher among NHOPI (Centers for Disease Control and Prevention, n.d.; Schweitzer, Wills, Tam, Pagano, & Choi, 2017; Wills, Pagano, Williams, & Tam, 2019). Exposure to tobacco is also linked to increases in asthma symptom frequency and severity, reduced lung function, and reduced efficacy of inhaled corticosteroid medications (Stapleton, Howard-Thompson, George, Hoover, & Self, 2011).

Asthma is one of the most common chronic medical disorders of childhood, affecting about one in every 10 children. Minority children and children living in poverty are more likely than Caucasian children to have asthma and also to have higher rates of emergency department use, hospitalization and mortality (Centers for Disease Control and Prevention, n.d.). It is a leading cause of school absenteeism which is closely linked to poor academic performance (Akinbami, Moorman, Garbe, & Sondik, 2009; Hsu, Qin, Beavers, & Mirabelli, 2016).

Some of the highest rates of childhood asthma in the nation are found in Hawai'i. In 2013, about 20% of Hawai'i children had asthma, while 29% of Native Hawaiian children had asthma (Hawai'i Health Data Warehouse, 2013). A 2002-2003 school-based study of 1,956 Hawai'i Island children (979 part-NHOPI) born between 1992 and 1994 indicated that 20% of NHOPI children had been told by their care provider that they had asthma. Adjusted for sex, BMI, participation in a federal school lunch program, and exposure to environmental tobacco smoke (ETS), volcanic air pollution, and mold, this reflected an adjusted relative risk of 2.54 (95% C.I. 1.61-4.01) compared to Caucasian children, who had a lifetime asthma prevalence rate of 7% (Tachibana, Orr, Davis, Heisman, & Tam, 2019; Tam et al., 2016). In this cohort, NHOPI children had significantly higher rates of obesity (23%), ETS exposure (24%), and participation in the school lunch program (41%) compared to other groups. Interestingly, there was no association between prevalence of lifetime asthma and chronic exposure to volcanic air pollution (vog), a unique local concern due to Kilauea's continuous emission of sulfur dioxide between 1983 and the fall of 2018.

A recent community needs assessment conducted to assess the barriers, impacts, and possible solutions



for improving asthma outcomes among children living along the Wai'anae Coast found:

- The prevalence of asthma was high (38%),
- 48% were considered to have poorly controlled asthma,
- 27% had received at least four courses of oral steroids over the past year, and
- 36% were chronically absent from school (>14 days).

Interview and focus group participants overwhelmingly agreed that childhood asthma took a significant physical, social, emotional, and academic toll on children. The impact extended to families, educators, health providers, and the community (Okihiro, Agustin, Garcia, Prothero, & Goebert, 2017).

It sucks to watch my kids when they cannot breathe good; it hurts me because I feel helpless. I always have to have their asthma pumps in my bag. Always. We never leave without it… They cannot do what they wanna do as kids – enjoy their childhood – because of asthma.

Parent of children with asthma
(Okihiro et al., 2017, p. 3)

Asthma Summary and Highlights

- ❖ Native Hawaiian adults and children have the highest prevalence of asthma when compared to other racial and ethnic groups in Hawai'i.

Maternal/Infant Health

- ❖ **Mortality rates for Native Hawaiian babies remain high.**

Native Hawaiians continue to suffer disproportionately from the poorest maternal and child health outcomes related to infant mortality (Hawai'i Department of Health, 2014) and low birth weight (Hawai'i Health Data Warehouse, 2015). The infant mortality rate among Native Hawaiian babies is more than double that of Caucasians and is a critical indicator of population health – a result of cumulative health impacts on a society's most vulnerable (Hirai, Hayes, Taualii, Singh, & Fuddy, 2013). Leading causes of infant death in Hawai'i are related to preterm birth, other perinatal issues, congenital malformations, sudden unexpected infant deaths, and maternal complications (Hayes, 2016). Infant mortality disparities for Native Hawaiians are primarily linked to inequalities in maternal education level, followed by younger maternal age and smoking (Hirai et al., 2013). Almost half of all births to adolescents aged 15-19 years in Hawai'i are Native Hawaiian compared to 27% of births to mothers of all ages (Hayes, 2016). Smoking in pregnancy is one of the largest health disparities for Native Hawaiian mothers in addition to obesity and low rates of breastfeeding (Hawai'i Health Data Warehouse, 2017). Native Hawaiian mothers, along with Filipino mothers, have the highest rates of preeclampsia in pregnancy (Nakagawa, Lim, Harvey, Miyamura, & Juarez, 2016). Native Hawaiian mothers are likely to use higher-risk infant sleep positions, and less likely to have the economic advantages of a postsecondary education or seek the early prenatal care that has been shown to decrease the risk of preterm births, low birth weights, infant mortality, long-term disability, and developmental delays (Hirai et al., 2013; Schempf, Mendola, Hamilton, Hayes, & Makuc, 2010).

Maternal/Infant Health Summary and Highlights

- ❖ Infant mortality is a critical indicator of population health.
- ❖ Mortality rates for Native Hawaiian babies are more than double those of Caucasians.
- ❖ Largest maternal health disparities amongst Native Hawaiian women are smoking, obesity and low breastfeeding which are linked to social determinants of health.
- ❖ Native Hawaiian women are less likely to seek early prenatal care.
- ❖ Native Hawaiian adults and children have the highest prevalence of asthma when compared to other racial and ethnic groups in Hawai'i.

Emerging Trends

- **Research examining the social determinants of health now documents the impact of economic and cultural stressors on our health outcomes.**

Social determinants of health have been recognized as critical factors in health and well-being. Social determinants of health are the societal, political, and economic forces that influence the social structure, hierarchy, and distribution of power, resources, and opportunities in society (Native Hawaiian Health Task Force & Kaholokula, 2016). These differential conditions include the presence or absence of discrimination in employment, education, housing, and health care; and whether one has a livable wage or lives in a safe neighborhood. A detailed description may be found in the Introduction chapter.

Social Determinants of Health Summary and Highlights

- Social determinants of health (societal, political, economic forces) are critical factors in health and well-being.
- Disparities around the social determinants of health must be addressed in order to achieve true health and well-being.

- **Epigenetics has begun to explain the intergenerational transmission of health risks.**

Deoxyribonucleic acid (DNA) is a fundamental building block of genes that provides instructions for making all parts of the human body. DNA and genes make up what is called the genome, which is identical in all cells of an individual; however, DNA is only part of the story. In cells, DNA is wrapped around special proteins that together make up chromatin. Both the DNA and these proteins are naturally covered with biochemical tags collectively known as an epigenome. Different cells in the body have different epigenomes, even though the DNA remains the same. Although one's genome is fixed for life, epigenomes are flexible and respond to signals from the environment, such as diet and stress. They turn genes on or off and instruct which parts of the DNA are recognized and used in the cell (Maunakea, Chepelev, Cui, & Zhao, 2013). They are regulated by processes, called epigenetics, which influence fundamental cellular activities including gene transcription and DNA replication and repair.

A number of environmental factors can influence epigenetic patterns, lead to a substantial degree of variation, and contribute to one's susceptibility to disease (Maunakea, Chepelev, & Zhao, 2010). For example, cancer risk may be decreased by turning on genes that may be protective of normal cell activities. Based upon this body of knowledge, treatments can be implemented using environmental factors, such as certain nutrients in a diet, to decrease an individual's susceptibility to diseases.

The extent to which epigenetic variability between individuals of different ethnic groups or populations accounts for health disparities, as in cancer and cardiometabolic diseases, remains largely unexplored. Recent technological advances, however, make it possible to address this question in clinical and community-based studies, suggesting that epigenetics play an important role in health disparities (Corley et al., 2016). While social determinants of health, sustainability, and environmental justice are all intimately linked with health disparities, epigenetic mechanisms present a critical interface between these extrinsic factors and an individual's risk of disease throughout the lifespan, with potential influences on trans-generational health (Lepule, 2014; Look, Trask-Batti, Agres, Mau, & Kaholokula, 2013). Therefore, an increased understanding of the involvement of epigenetic processes in normal development and disease is essential for a more comprehensive perspective on the etiology of health disparities. In addition to genetic data, epigenetic information can be viewed as a promising nexus of health care, measuring individual risk for disease and offering new avenues for risk stratification, early disease detection, diagnosis, treatment, and most importantly, prevention.

Epigenetics Summary and Highlights

- An epigenome exists and is impacted by environmental factors.
- Epigenetics may play a significant role in health disparities.
- Based upon knowledge of epigenetics, environmental changes can be used to improve health outcomes.

❖ **The impact of climate change and the rapid increase in our elder population provide new challenges for health care in the future.**

Climate change is anticipated to have significant negative impacts on Hawaii's health, economy, and environment. Scientific findings confirm that Hawai'i is experiencing increasing air temperature, decreasing trade winds, overall decline in rainfall, decreasing stream base flow, increasing sea surface temperatures, increasing ocean acidity, and rising sea level (University of Hawai'i at Mānoa Sea Grant College Program, 2014). As a result, coastal inundation, erosion and consequent hazards, beach loss, increasing damage to infrastructure in low-lying areas, and increasing frequency and intensity of tropical cyclones (hurricanes) are expected if not already occurring.

Subsequent public health threats forecast by the University of Hawai'i at Mānoa Sea Grant College Program (2014) involve increases in heat-induced illnesses, pathogens, and vector-borne diseases, as well as decreases in water quality and availability due to drought. Certain groups in Hawai'i are especially vulnerable, including children, the elderly, the sick, and the poor (United States Environmental Protection Agency, 2016). Native Hawaiians continue to be overrepresented in morbidity, poverty, adult and child disability, homelessness, overcrowded households, and structurally inadequate housing, and will be particularly susceptible to climate change-related health impacts (Hawaiian Community Assets, 2015; United States Department of Education, 2013; Look et al., 2013; Pobutsky, Hirokawa, & Reyes-Salvail, 2003).

Climate Change Summary and Highlights

❖ Due to socioeconomic conditions, Native Hawaiians are expected to bear an even greater health burden from climate change-related increases in heat-induced and vector-borne illnesses, rising sea levels, and infrastructure damage due to storms and erosion.

Aging Population

The year 2030 will mark a significant milestone for the country. By 2030, all baby boomers will have reached age 65 or older; consequently, in that year, one in five Americans will be 65 or older, up from one in seven in 2014 and one in seventeen in 1970 (Colby & Ortman, 2014). Hawaii's population is rapidly aging, and the elderly population in Hawai'i is growing at a faster pace than in the U.S. as a whole. Elders aged 60 and older made up 11.9% of the population in 1980. By 2010, that percentage had almost doubled to 21.4%. Of note, between 2000 and 2010 the growth rate for our elders aged 60 years and older was 10% higher than the national rate of growth for this age group, and it is estimated that this age group will make up 25% of Hawaii's population by 2020 (Hawai'i Department of Health, 2019). Recent census figures show a 25% increase in elders aged 65 and older between 2010 and 2016 ("Census: Hawaii's Older Population," 2017). In addition, Hawai'i's oldest elders, aged 85 and over, made up only 0.6% of the population in 1980 and now make up 2.3% of the population, and their growth rate from 2000-2010 was 72%. In comparison, nationally, this "oldest old" group makes up just 1.9% of the U.S. population, and their national growth rate was 29.4% during this same period (Hawai'i Department of Health, 2017; Yuan, Karel, & Yuen, 2007).

By 2035, it is estimated that those 60 and older will make up 29.7% of Hawaii's population. Of concern is that the percentage of working population (aged 19-64) is decreasing as compared to the elderly population as seen in the population age distribution structure – changing from that of a pyramid to one more closely resembling a square. In other words, by 2035 all age brackets will be coming closer in number (Hawai'i Department of Health, 2017; Yuan et al., 2007).

Native Hawaiians, in 2008, made up 13.2% of the state population of those aged 60-74 and 9.0% of those over 75 years of age (Hawai'i State Department of Health, 2017). While older adults in Hawai'i are generally healthier than they were in previous generations, significant disparities exist for Native Hawaiians, who are dying at younger ages than those in other ethnic groups. As depicted in Figure 1, life expectancy continues to be about 10 years shorter for Native Hawaiians (76.6 years) compared to Japanese and Chinese, and death rates before 70 are higher compared to Japanese, Filipino, and Caucasians (Braun, Kim, Ka'opua, Mokuau, & Browne, 2015; Wu et al., 2017).

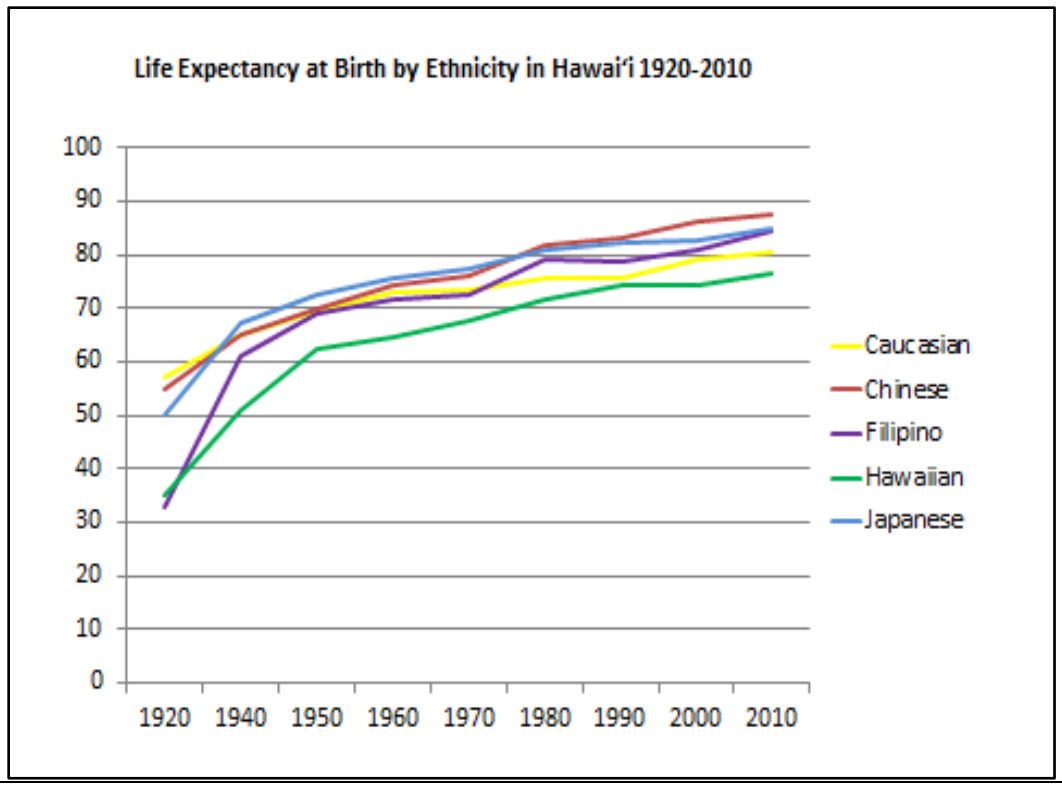


Figure 1. Life expectancy at birth by ethnicity in Hawai'i, 1920-2010.
(Public Health Reports / July–August 2009 / Volume 124 and
Hawai'i Journal of Medicine and Public Health, January 2017, Vol 76, No1.)

Considering the overall increase in the percentage of the elderly population and the inevitable increase in chronic disease, the associated health care resource use could be staggering. Compound this with a Native Hawaiian population with increased chronic diseases and poorer socioeconomic status, and careful planning and strategizing will be required to ensure that health and service needs are met.

Aging Summary and Highlights

- The population of elders in Hawai'i is rapidly increasing.
- Careful planning is needed to prepare for increased need for services.
- Native Hawaiian elders continue to be affected by health disparities and lower life expectancy.

In reviewing our increased understanding of persistent disparities affecting Native Hawaiian health, and emerging trends related to health outcomes and challenges, the following themes emerge:

- **Cultural competency and cultural humility among health care providers results in a broader recognition of the importance of a holistic approach to improving Native Hawaiian health.**
- **A wholistic approach towards Native Hawaiian health must include place-based and land-based interventions to improve Native Hawaiian spiritual health, mental health, and physical health status.**
- **Western Healthcare functions in many separate silos. Increased communication, collaboration and coordination could remedy this while improving patient experience and population health as well as reduce costs, also known as the Triple Aim approach.**
- **An organization (such as Papa Ola Lōkahi) would be needed to oversee and be held responsible for the systemic change required in this "Triple Aim" approach.**

Effective and Promising Approaches

This section includes reviews of some of the effective evidence-based approaches that have proved successful in addressing the previously mentioned health disparities affecting the Native Hawaiian population, and also includes a discussion of promising approaches.

- **Evidence for the effectiveness of culturally adapted health interventions exists; much of the information has been the result of Community Based Participatory Research initiatives in partnership with Native Hawaiian communities, the Native Hawaiian Health Care Systems (NHHCS) and the University of Hawaii John A. Burns School of Medicine Department of Native Hawaiian Health.**
- **The NHHCS have established effective models of service delivery that integrate community outreach and traditional healing practice.**

Cardiometabolic Health and Disease

In order to address cardiovascular disease disparities, Papa Ola Lōkahi (POL), the Native Hawaiian Health Care System (NHHCS), Native Hawaiian communities, and the Department of Native Hawaiian Health at the University of Hawai‘i John A. Burns School of Medicine have worked together to improve cardiovascular and diabetes outcomes and risk; and more effectively manage hypertension, diet, obesity, and physical activity through community-based participatory research approaches, community-generated and culturally relevant disease management and health promotion interventions, and partnerships and resource-sharing initiatives. In addition to these research-focused efforts, the NHHCS on the various Hawaiian Islands continue to develop and conduct community health promotion programs that focus on lifestyle modification. The training of Community Health Workers (CHWs) at each of the Native Hawaiian Health Care Systems and partnerships with Native Hawaiian Health Scholars (recipients of scholarships distributed by POL) have promoted this effort to reduce cardiovascular disease risk among Native Hawaiians.

Early disease management efforts, including the Staged Diabetes Management program implemented through a partnership between POL and the International Diabetes Center of Minneapolis, determined that improving outcomes for Native Hawaiians would require integrating resources and services to support patient behavior change and adapting the health care system to local community resources (Humphry & Reinhardt, 1998). Diabetes prevention and control initiatives, including the Pacific Diabetes Today Resource Center (PDTRC), a federally funded project of POL, were established to improve local capacity to address diabetes and work with communities to develop and deliver programs and activities. The PDTRC served Native Hawaiian homestead populations in Wai‘anae and Native Hawaiian communities on Maui and Moloka‘i, resulting in the creation of local coalitions and support groups (Aitaoto, Braun, Ichiho, & Kuhaulua, 2005).

More recent disease management and health promotion efforts include:

1. Partnership for Improving Lifestyle Intervention (PILI) ‘Ohana Project: The PILI ‘Ohana Project is a federally funded community-academic partnership that utilizes community-based participatory research principles to culturally adapt lifestyle and diabetes self-management programs for Native Hawaiian and other Pacific Islander communities. The partnership involves a university; two community health centers; one non-profit Native Hawaiian health care system; and two community groups, a Hawaiian civic club and a non-profit group based in a Hawaiian homestead community (Kaholokula et al., 2014).
    a. The PILI ‘Ohana Lifestyle Intervention project, a pilot project out of the PILI ‘Ohana project, was developed for Native Hawaiians after conducting focus groups and key informant interviews. This project was inspired by the findings from the national Diabetes Prevention Program Lifestyle Intervention (DPP-LI) program. The program showed that intense lifestyle intervention could reduce risk for developing diabetes as well as if not better in certain situations than medication (Aroda et al., 2015; Diabetes Prevention Program Research Group, 2009). The DPP-LI was the first national clinical trial to demonstrate that modest weight loss (5-7% weight loss) could prevent or postpone Type 2 diabetes onset. The PILI ‘Ohana Lifestyle Intervention pilot program focused on weight loss and was found to be feasible and effective. Participants showed a mean weight loss of 1.8 kg. In addition, improvement was seen in physical functioning, blood pressure, and diet. This project involved a close, collaborative partnership between the university and multiple communities (Mau et al., 2009; Mau et al., 2010).
    b. The PILI project expanded into to the PILI Lifestyle Program which featured a three-month weight loss program (Phase 1) with a six-month weight loss maintenance program

(Phase 2). Phase 2 focused on building social supports within the family and community. Adaptations involved input from focus groups, surveys, key informant interviews, and windshield tours, as well as consideration for culturally relevant diet and physical activities, and inclusion of local, vernacular terminology into educational material. The PILI Lifestyle Program showed success in weight loss (≥3%) as well as weight loss maintenance.

c. Since then, the PILI Lifestyle Program has expanded to an 18-month maintenance program and a 12-month "PILI@work" program (Kaholokula et al., 2014). Factors associated with the program's success include engagement of family and community supports and resources in the intervention, such as group facilitators from within the community. Of note, the study found that weight loss in the first three months was predictive of increased success at maintaining this weight loss at the 18-month follow-up (Kaholokula et al., 2013).

2. Partners in Care: Partners in Care is a culturally adapted, community-based diabetes self-management intervention for Native Hawaiians and other Pacific Islanders that is also part of the federally-funded PILI 'Ohana Project. The goal of the program is to reduce diabetes complications by improving patient understanding and self-management activities using peer educators. Adaptations to increase cultural relevance include educational sessions that are group oriented, led by Native Hawaiian community members, include a storytelling component, allow for group sharing, and feature local language and food. The program is low-tech and requires few healthcare resources. Results of a randomized controlled study of Partners in Care showed improvement in HbA1c and increased understanding and performance of diabetes self-management (Sinclair et al., 2013).
3. Stanford Chronic Disease Self-Management Program and Diabetes Self-Management Program. Through the efforts of the Hawai'i Healthy Aging Partnership, Hawai'i has also shown that both the Stanford Chronic Disease Self-Management Program and the Diabetes Self-Management Program can improve the health of Asian and Pacific Islanders (Tomioka, Braun, Ah Cook, Compton, & Wertin, 2014; Tomioka, Braun, Compton, & Tanoue, 2012). In these efforts, program evaluators noted the importance of culture and context, and the need to adapt evidence-based interventions to fit Native Hawaiian communities and ensure that the programs are both acceptable and effective. Programs modified to increase their cultural appropriateness resulted in significant improvements in communication with physicians, stretching and strengthening activities, and self-rated health (Tomioka et al., 2012), and significant improvements in physical activity, self-efficacy, BMI, HbA1c, total cholesterol, triglycerides, LDL, fasting blood glucose, and blood pressure. The culture-specific modifications did not affect the fidelity of the programs, but were critical for local acceptance and participant engagement (Tomioka et al., 2014).
4. The Kā HOLO project is a six-year federally funded research project utilizing community based participatory research and culturally based interventions to improve cardiovascular disease in Native Hawaiians (Kaholokula, Look, Wills, de Silva, Mabellos, & Seto, 2017).
   a. A pilot study, called Ola Hou i ka Hula, demonstrated that hula, the traditional dance of Hawai'i, can be used as a culturally relevant physical fitness activity to lower blood pressure. Of note, the METs (metabolic equivalents) achieved in hula can range from moderate to intense activity. This is important as increased physical activity is comparable to decreasing sodium intake and losing weight in terms of reducing blood pressure, ultimately decreasing risk of coronary heart disease and stroke (Kaholokula, 2015). Native Hawaiians frequently have difficulty engaging in the usual recommended fitness regimens due to socioeconomic barriers, and may find individual activities less appealing. Studies have shown that Native Hawaiians prefer culturally relevant physical activities that are consistent with their cultural values, such as activities that are group-based, are more holistic, and connect them to culture (Kaholokula, 2015; Maskarinec et al., 2015; Mau et al., 2009). The Ola Hou i ka Hula pilot study was able to demonstrate significant decreases in systolic blood pressure (decrease of 18.3 mmHg compared to a control decrease of 7.6 mmHG) as well as improved social functioning and decreased bodily pain (Kaholokula, 2015).
   b. Kā HOLO expanded this study into a larger intervention study funded by the National Institutes of Health. The program may be "easily adopted and sustained in any community where Native Hawaiians live" (Kaholokula et al., 2017).

Programs that have demonstrated success in reducing the burden of obesity and the downstream sequelae of obesity in Native Hawaiian communities have included the incorporation of foods eaten in Hawai‘i before the onset of Western influence – the Traditional Hawaiian Diet – as well as a transition-style diet that integrates traditional Hawaiian foods and modern food alternatives. Programs utilizing both diets have drawn upon Hawaiian values such as communal and family involvement, cultural activities, and spirituality (Fujita et al., 2004; Shintani et al., 1994). The first landmark study was The Moloka‘i Diet Study in 1987 which demonstrated that Native Hawaiian patients given the Traditional Hawaiian Diet, with the traditional ratios of carbohydrates, protein, and fats, were able to lower their glucose and cholesterol levels. Another diet modification or targeted lifestyle modification program set in the Native Hawaiian community was the Wai‘anae diet program (WDP) conducted in 1994, which also proved successful in promoting weight loss. It was subsequently adapted to accommodate foods from various cultures. Both programs demonstrated the importance of culturally relevant and community-generated approaches to developing lifestyle modification programs in Native Hawaiian communities (Fujita, et al., 2004; Shintani et al., 1994). Other programs in Native Hawaiian communities that have demonstrated reductions in risk for obesity and the associated cardiovascular disease outcomes include the Ke ‘Ano Ola project, which incorporated cultural and community-based methods to reduce obesity and other cardiovascular disease risk factors among Native Hawaiians (Gellert, Aubert, & Mikami, 2010).

In summary, efforts to reduce obesity and improve cardiovascular disease and diabetes outcomes among Native Hawaiians have demonstrated success through the incorporation of cultural components including family and community social supports, culturally relevant diet and physical activities, and culturally adapted health education materials. Community-based participatory research approaches can support communities in improving their health, as can culturally appropriate methods of program development and community-based interventions with special consideration for accessibility, reasonable cost, and sustainability in the community.

Cardiometabolic Health and Disease Summary and Highlights

- Efforts to reduce cardiometabolic risk factors and related disease outcomes among Native Hawaiians have demonstrated success through the incorporation of cultural components, including family and community social supports, culturally relevant diet and physical activities, and culturally adapted health education materials.
- Community-based interventions, including community-based participatory research approaches, can support communities in improving their health, as long as culturally appropriate methods of program development are included and special consideration is given to accessibility, reasonable cost, and sustainability in the community.

Cancer

Culturally adapted evidence-based interventions may have the potential to improve cancer outcomes for the Native Hawaiian population, considering the successes of such interventions with cardiovascular disease, obesity, and Type 2 diabetes. Although there are no outcomes data at this time, a feasibility study of a culturally tailored breast cancer screening intervention with rural Native Hawaiian women called Ka Lei Mana‘olana (“The Lei of Hope”), based in Hawaiian churches, showed increased retention and intent to pursue mammograms among participants (Ka‘opua, Park, Ward, & Braun, 2011). Culturally adapted educational programs also show promise, as demonstrated by the success of a project designed to build family capacity in women with breast cancer and their families, which resulted in improved self-efficacy and coping (Mokuau, Braun, & Daniggelis, 2012).

Cancer Summary and Highlights

- Culturally tailored cancer screening interventions can be effective with Native Hawaiians.
- Culturally tailored support programs improve self-efficacy and coping in Native Hawaiian breast cancer patients.

Asthma

Effective asthma management strategies include proper medical assessment and monitoring, patient education, control of environmental triggers, and medication adherence (National Asthma Education and Prevention Program [NAEPP], 2007). In addition to these known management strategies, the use of home remedies and cultural practices are well documented in the literature and need to be considered within our population (Bearison, Minian, & Granowetter, 2002; Horky, Kleinman, & Firth, 2007; Van Sickle, Morgan, & Wright, 2003; Van Sickle & Wright, 2001).

Since 1985, efforts have been made to address asthma among Native Hawaiians through collaborative workgroups and coalitions, including the Hawai‘i Asthma Initiative and Partners Against Asthma, which developed and disseminated an asthma education curriculum statewide in Hawai‘i. The community-friendly, low-tech asthma education material provides participants with information on asthma, asthma triggers, asthma symptoms, and management strategies, and the materials can be delivered in small and large group settings.

A pilot project at Wai‘anae Coast Comprehensive Health Center (WCCHC) also designed and tested a community-based asthma intervention focused on patient education, using Community Health Workers to provide culturally adapted in-home health education. The intervention was based on the National Asthma Education and Prevention Program guidelines (NAEPP, 2007) and successfully reduced emergency room visits, significantly decreased costs, and improved patients’ asthma symptoms and quality of life (Beckham, Kaahaaina, Voloch, & Washburn, 2004).

Even as researchers define new phenotypes, genotypes, and epigenetic signatures of this heterogeneous condition that promise new and targeted treatment protocols, our communities must continue to advocate and embrace proven policy and personal strategies to reduce known risk factors for asthma, including obesity and smoking.

Asthma Summary and Highlights

- Asthma can be well-managed with proper medical assessment and monitoring, patient education, control of environmental triggers, and medication adherence, as well as home remedies and cultural practices.
- Community-based asthma interventions using Community Health Workers can improve outcomes in high-risk communities.
- Community-friendly, low-tech materials aid in health education delivery.

Maternal/Infant Health

Home visiting services are effective at promoting safe sleep practices, as well as fostering positive maternal, child, and family social connections; promoting breastfeeding; engaging families in early childhood educational learning activities such as reading, communication, and play; increasing the family’s knowledge on child developmental milestones and positive parenting; reducing child maltreatment; and increasing family self-sufficiency (Yoshimoto, Robertson, & Hayes, 2014).

Maternal/Infant Health Summary and Highlights

- Home visitation programs are an effective tool for improving parenting and family functioning and positively impacting children’s health.

We have outlined above some effective, evidence-based approaches to addressing health disparities related to cardiovascular disease, cancer, maternal/infant health, and asthma. Below, we highlight some programs, projects, and concepts that we believe will have an important impact on Native Hawaiian health. Although most are tailored for Native Hawaiian patients and communities, we have also included some relevant approaches from other indigenous communities. This section is by no means comprehensive, but offers a few examples to support our belief that culturally tailored, community-based approaches appear promising for enhanced Native Hawaiian health and well-being.

[Health for Native Hawaiians] is the community – it's in the heart. If they have that kind of inner peace as well as that connectivity with their family, friends, and community, then they probably can do anything they want…If you look at the percentage of [Native] Hawaiians, they are in poverty. And that has a direct relationship with your ability to have a good well-being. So education is really important. I think people are really engaged in their community, and I always focus on community service. They build relationships that are lifelong. They contribute to the community. So that brings a sort of pride. It allows them to explore their talents. No matter what your position or disposition is, when you know what your gift is, you certainly can help and get into those career fields. If you're still a young person being able to explore all kinds of different things…So in order to thrive in the social context, in your work-related opportunities, in the service you do with others in your community, it's important.

Susie Chun-Oakland
Retired State Senator
Hawai'i State Legislature

- **The Patient-Centered Medical Home Model of primary care, which provides interdisciplinary team-based care coordination, including Case Managers and Community Health Workers (CHWs), shows promise in addressing the social determinants of health and providing more holistic, patient-centered, accessible, and effective care.**

The Medical Home model finds much of its roots in the efforts of Hawai'i's own Dr. Calvin Sia. In the late 1970s, Dr. Sia led a successful effort to have the Medical Home concept adopted by the state legislature. The key features of the Medical Home, as defined by the Hawai'i Child Health Plan, included family-centered care which was financially and geographically accessible; offered continuity and comprehensive, coordinated care; and involved the use of other related local resources (Sia, Tonniges, Osterhus, & Taba, 2004).

Current models, known as Patient Centered Medical Homes (PCMH), likewise aim to improve health care by transforming the organization and delivery of primary care (AHRQ, 2017). The idea behind a PCMH model was to shift the primary care practice model to one that augments the traditional principles of primary care by "enhancing coordination and communication among all players in the patient's health," and allows the patient more control "by providing the patient with more information, additional resources, and greater choice, ultimately providing improved patient autonomy" and decreased health care costs (Ray, 2011).

The fundamental components of PCMHs include: 1) Comprehensive care inclusive of prevention and wellness, acute care, and chronic care with a team of care providers; 2) Patient-centered care with partnerships between providers and the patient and family, requiring understanding and respect for individual needs, culture, values, and preferences; and recognizing patients and families as core members of the care team; 3) Coordinated care across all elements of the health care system with an emphasis on communication among all members of the care team; 4) Accessible services and receptivity to individual preferences regarding access; and 5) Quality and safety with a commitment to quality improvement (AHRQ, 2017).

The effectiveness of the PCMH model at providing quality health care, improving patient outcomes, and decreasing costs – particularly for prevention and chronic disease management – has been evaluated in numerous studies, and the model has been deemed a promising approach (Williams, Jackson, & Powers, 2012). Studies evaluating effectiveness in populations that experience health disparities have also been promising. An investigation examining the PCMH model with a targeted diabetes program confirmed that PCMH decreased disparities in care and improved diabetes outcomes (Lee, Palacio, Alexandraki, Stewart, & Mooradian, 2011). Another study evaluating the effectiveness of PCMH with Native Alaskans, an indigenous population that experiences poorer health outcomes than the overall U.S. population, demonstrated that PCMH was effective with respect to decreased emergency care use (Driscoll et al., 2013). Finally, PCMH offers an important opportunity to promote population health through systematically addressing the social determinants of health (Garg, Jack, & Zuckerman, 2013).

Modifications to better serve disparate populations factor in the inequities these patients and communities face in accessing high quality, effective, and culturally competent care – as well as addressing the ecological and social factors that impact their ability to maintain health (Wong, Anderson, Dankwa-Mullan, Simon, & Vega. 2012). Examples of modified PCMHs include facilities that invest in increased educational opportunities, access to affordable housing and legal services, and programs that promote urban farming and gardening (Wong et al., 2012). Implementing a comprehensive PCMH model with the aim of eliminating health disparities will take a concerted effort on many levels. These substantial changes entail redesigning the traditional

models and will require state and federal policies which focus on providing training, guidance, and reimbursement mechanisms that support the PCMH model (Anderson & Olayiwola, 2012).

The Alaska NUKA System of Care

The Alaskan Southcentral Foundation's NUKA System of Care began in the 1990s. NUKA is a comprehensive, customer-driven health care system developed by Alaska Native people seeking a new way to deliver health care as an alternative to the old Indian Health Service (IHS) system that was failing them. Holistic care, involving physical, mental, emotional, and spiritual wellness, is core to their mission and vision. The health care system serves over 60,000 Alaska Natives and American Indian people and is funded through third-party payments (49%), IHS contracts (43%), and grants (5%) (Southcentral Foundation, 2017).

Care is based on forming and maintaining relationships, especially those among the customer, their family, and the provider, and follows the standards outlined in the Patient Centered Medical Home model. Services include primary care, dentistry, behavioral health, traditional healing, complementary medicine, rural health, telehealth, optometry, physical therapy, audiology, social services, pharmacy, X-ray and lab, nutrition and fitness, health education, and cultural activities. Inpatient medical care is provided at a Native hospital (Alaska Native Medical Center) owned by Southcentral Foundation. Home visits and day and residential behavioral health treatments are offered. A high priority has been placed on collecting data to measure satisfaction, success and efficiency. Alaska Native culture, values, and beliefs are interwoven throughout.

Since the implementation of the NUKA System of Care, 95% of the Alaska Native population has a designated primary care provider, same-day access to appointments is available, hospital stays have decreased by 36%, ER and urgent care use has decreased by 42%, and specialty clinic visits have decreased by 58%. In addition, Healthcare Effectiveness Data and Information Set (HEDIS) measures are 75% or better, and patient satisfaction scores are at 94% for respect for culture and traditions (Gottlieb, 2013). This relationship-based system of care has successfully addressed barriers involving "space, attitude, language and time." The NUKA System of Care has received numerous awards, including the Malcolm Baldrige National Quality Award twice (2011, 2017), and is a role model for other health systems including one in Fife, Scotland and the Cherokee Indian Hospital (Gottlieb, 2013).

- **Place-based and culturally adapted health promotion and disease management interventions tap into the strengths of the Native Hawaiian community.**

Place-based care directly addresses the social determinants of health through addressing the ways in which "place influences health." Critical to this is the engagement of community in the development of community-level interventions (Smedley & Amaro, 2016). Place-based care transcends "institutional boundaries across a location to provide integrated care for individuals, families and communities. Energy, money and power shifts from institutions to citizens and communities…" (Selbie & Kippin, 2016). The intent is to shift the focus of health from institutions – including the placement of enormous resources into tertiary care facilities, many of them service "silos" – to communities, families, and individuals, focusing on prevention and "whole systems" of primary care within communities (Adebowale et al., 2016). We include here a wide variety of examples that incorporate what could be defined as place-based care through a more holistic lens, ranging from more traditional health care frameworks to technology and land-based care programs.

Home-Based Care

Culturally specific home visiting services have also shown promise for effectively improving Native Hawaiian health. Your 'Ohana, a current Department of Health, Maternal and Child Health Branch initiative targeting pregnant women and children through age five, utilizes a network of home-visiting providers who recruit and enroll children and prenatal women within at-risk, high-needs geographic areas. Two other programs designed for Native Hawaiian women and families, Kūlia i ka Nu'u and Pūlama i nā Keiki, also offer culturally specific home visiting services; outcomes of these programs have yet to be formally studied.

School-Based Care

Several promising approaches involving school-based health care exist in Hawai'i. School-based health care has been shown to improve attendance and thus holds potential to help improve school performance. Studies show that students who use school-based health centers are less likely to be absent and more likely to graduate. For example, school-based interventions involving direct observation of daily controller medication have been shown to improve asthma symptoms and school attendance, and reduce oral steroid use (Halterman et al., 2011; Halterman, Borrelli, Fisher, Szilagyi, & Yoos, 2008). Also, on-campus health centers increase students'

health knowledge as well as use of health care. An evaluation of students who attend schools with school-based health centers shows that students decreased their use of hospital emergency rooms for routine health care, helping local and state governments save significantly on medical expenses (National Assembly on School-Based Health Care, 2011; Young, D'Angelo, & Davis, 2001). Below are examples of school-based health care programs in Hawai'i.

- **Red Raider Health Center,** the first school-based clinic in Hawai'i, opened in 2012 at Kahuku High School. The intent was to allow students to see a health care provider at school, decreasing the amount of time they spent away from school. As an extension of the Ko'olauloa Community Health and Wellness Center, care is provided by Family Nurse Practitioners, dentists, and dental hygienists. Visits include immunizations, sick visits, simple procedures, and physical and dental exams ("Kahuku Health Center," 2014).
- **Hawai'i Keiki** started in 2014 as a partnership between University of Hawai'i at Mānoa School of Nursing and the Hawai'i State Department of Education (DOE) to develop a model framework for statewide school health nursing programs. The initial goal was to provide health care services to children in schools located in DOE complexes (geographic areas) of high need. Initial placements involved RNs and APRNs in five DOE school complexes; over the past two years, this has increased to 11 RNs and APRNs covering seven DOE complexes, all of whom are connected by "web-based health room management software." Nurses provide sick and emergency care, screening, and health education. Current services are grant-funded ("Hawai'i Keiki," 2014).
- **Wai'anae Intermediate and High School:** In 2016, federal grants paved the way for the opening of two health centers in schools in the rural community of Wai'anae. A nurse practitioner provides services ranging from sick care to vaccinations to physical exams. All students are eligible to be seen, including those without health insurance (Omaye, 2016).

'Āina[3]-Based Care

Place-based care in Hawai'i may be best appreciated in the multitude of 'āina-based programs within Native Hawaiian communities. These types of programs focus on reconnecting Native Hawaiians with their land and cultural practices, many of which involve sustainable land management, healthy food production, and physical activity. By utilizing cultural activities and cultural strengths, these programs also improve the physical, emotional, and spiritual health of Native Hawaiians and their communities. Examples include programs focusing on food systems such as taro cultivation or traditional aquaculture (loko i'a[4]) that exist on almost every major Hawaiian island. To date, these programs have not measured impact on health through traditional Western methodology.

The activism continued…in health research, in community-based participatory research. It's been our thing from 1978-9 – the thing that won Na Pu'uwai (attention)…from the very first and the only cardiovascular risk factors [study] in ethnic Hawaiians research to the Moloka'i diet… The participants said, make sure the water continues to flow to where the lo'i[5] are. And it still does. [So to] really pay attention to Native Hawaiian health, connect it to the land, you know. The land is religion. You take care of the land, the land will take care of you. Just look at all those practitioners, whether hunting, whether fishing, whether gathering, whether farming. Continue to learn from those practitioners even today who've learned from their uncles. Really inspiring.

Emmett Aluli, MD
Medical Executive Director
Moloka'i General Hospital

An example of an 'āina-based program measuring change in health is the Kalihi-based Ehuola 'Ohana Health Project. Ehuola is a program of the Kokua Kalihi Valley (KKV) community health center. KKV is a Federally Qualified Health Center (FQHC) that provides primary care to underserved communities. It is unique in Hawai'i in that it also has an agricultural campus in the back of one of Honolulu's valleys. Ehuola takes advantage of this by incorporating gardening and nutrition in its curriculum. It is an interdisciplinary, culturally based, prevention-oriented program emphasizing health within the family and community setting. The program weaves culture and cultural practices into the curriculum, which focuses on building a strong foundation for health and preventive health care. The program has two key components. One offers training for

[3] land
[4] fishponds
[5] taro patches

traditional birthing practices, and the other focuses primarily on elementary school-aged children whose families are required to participate. The latter utilizes community resources and family-based workshops which cover topics such as gardening, fishing, physical activity, nutrition, and cooking and preparing healthy food. Ehuola seeks to instill in participants such values as understanding their connection to place; understanding their responsibility to their past, present and future; utilizing the knowledge of their ancestors to lead healthy lifestyles, including healthy eating and physical activity; working harmoniously with each other; and striving to become the best that they can be (Kokua Kalihi Valley, n.d.).

Initial outcomes indicated that families developed increased confidence in making personal health choices, and participated in more cultural health practices. Changes with respect to diet, weight loss, and exercise were not at project goal; nonetheless, progress was observed, and families indicated that they valued the relationships formed through the program and the support they received in facing life challenges (Odom, Jackson, Derauf, Inada, & Aoki, 2019). Of note is that families knew what was needed to maintain health, which is aligned with the contemplation and preparation steps of the Stages of Change Model ("Stages of Change," 2017).

Cultural Competency Training for Providers

There are some fundamental values – aloha,[6] lōkahi,[7] 'ohana,[8] and maika'i loa[9] – that go back to being ocean voyagers going over long stretches of ocean in the really limited space of a voyaging canoe. Those spaces – when you think about it, when our ancestors first arrived in the islands, they had to go back and forth to settle the islands. There are chants, oral traditions, and actually, archaeological anthropology and even genetic studies that demonstrate that for at least the first 300 years after arriving in the islands, Hawaiians went back and forth on these voyaging canoes – back to Tahiti, back to the Marquesas, which are the two big island groups…where our ancestors came from. And that in going back and forth, if you think about it, the people on those canoes – they could not be old, they could not be fragile or feeble; they would have to be strong. If they were middle aged or even elders, they would have to be very, very strong to sustain that ocean voyage. They would also have to have values that would sustain them in sort of not getting into fights – to have harmony as much as possible, to have a mechanism through which they could resolve conflicts quickly, and to be supportive on this small island if you were going over these long stretches of ocean.

So, I think if you look at those values, they have something in common. They all have the commonality of basically putting the responsibility on each person as an individual to become a part of a communal being, a family. I think what Hawaiians did was when they made landfall, they literally took the values of that canoe and transported it onto the land. It makes sense. If you look at the concept of the ahupua'a, of how things sort of worked in each part of the ahupua'a, each part of the ahupua'a complemented each of the other parts of the ahupua'a. It is kind of like a canoe moved onto land as a metaphor for life – the way one lives… When you look at Polynesia, where the Hawaiians came from, the god of the ocean [does not really play] a major role; but suddenly, [when] he comes here, he has a major role. He's one of those four major gods such as Kū [and] Lono. Suddenly, Kanaloa becomes really important. But then it makes sense, because if you're going back and forth over the ocean, wouldn't you want to have as your patron deity Kanaloa who is the ruler of the ocean…to take you safely back? When I look at [Hawaiian] values, that's what I look at… We will still keep them alive because there is a resonance of practical value for us.

Naleen N. Andrade, MD
Professor, Department of Psychiatry
Director, Native Hawaiian & Pacific Peoples
Behavioral Health Research Programs
University of Hawai'i at Mānoa
John A. Burns School of Medicine

Medical practitioners and physicians must play a role in eradicating health care disparities, which requires that they deal compassionately, sensitively, and competently with patients from all backgrounds. However, as pointed out in the 2002 report of the Institute of Medicine, ("Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care"), "although myriad sources contribute to these disparities, some evidence suggests that bias, prejudice, and stereotyping on the part of health care

[6] love, affection, compassion, mercy, show of kindness, charity; used in greeting or farewell
[7] unity, agreement, accord, harmony; Native Hawaiian concept of health characterized by harmony and balance
[8] family
[9] excellence

providers may contribute to differences in care" (Institute of Medicine, 2002). Cultural competency training of health care providers is needed to address these biases, prejudices, and stereotypes.

In 2001, the Office of Minority Health first released the National Standards for Culturally and Linguistically Appropriate Services (CLAS) in health care (enhanced in 2013) in order to reduce health disparities by improving the quality of services to patients by providers and institutions (Office of Minority Health, 2001; Office of Minority Health, 2013). Other organizations such as the Liaison Committee on Medical Education (LCME), the accrediting organization for medical schools, now require curricular content that addresses cultural competency and health care disparities (Liaison Committee on Medical Education, 2016). Medical specialty boards such as the American Board of Family Medicine (American Board of Family Medicine, n.d.), and certain states such as California, New Jersey, New York, Ohio, and Washington, all require cultural competency training of physicians in order to maintain their medical licenses and their board status (National Consortium for Multicultural Education for Health Professionals, 2008).

Of note, there have been no strict guidelines on protocols for this type of training, allowing for the use of innovative approaches. At the Department of Native Hawaiian Health at the John A. Burns School of Medicine (JABSOM), the development of the cultural competency curriculum was guided by cultural values and input from focus groups, cultural consultants, and an interdisciplinary team of faculty known as the "C3 Team" (Kamaka, 2010). The goal was to develop a comprehensive cultural competency curriculum addressing provider factors and training to reduce health disparities affecting Native Hawaiians. Integral to these efforts was the understanding that health and wellness for Native Hawaiians must be holistic, addressing the balance of mind, body, and spirit as well as that of the individual, family, and community, and the environment and spiritual world (Kamaka, Wong, Carpenter, Kaulukukui, & Maskarinec, 2017).

A‘ole pau ka ike i ka halau ho‘okahi.

All knowledge is not learned in one school.

‘Ōlelo No‘eau #203
(Pukui, 1983, p. 24)

Another understanding of the interdisciplinary faculty team, called the "C3 team," was that culture-related curricula could not be taught via didactic lectures. Therefore, the JABSOM Native Hawaiian Health cultural competency curriculum utilizes a variety of teaching methodologies including didactics, role play, small group discussion, problem-based learning (PBL), workshops with hands-on demonstrations, culturally standardized patient experiences, and experiential learning such as cultural immersion. Preliminary evaluations are showing that these approaches are useful and relevant to the students. The success of the curriculum may be attributed not only to the faculty but in large part to the cultural practitioners and community partners involved.

Community Health Workers / Patient Navigation Services

Basically, our whole mission at Hui No Ke Ola Pono is to empower the Native Hawaiians to be their own health advocate. Hui No Ke Ola Pono is prevention education before the disease happens…We're in the community, we go, we set up the outreach to different communities, but the fact is Hawaiians are working, so the only time we can go get them is at 5 o'clock at night. And [many have] two jobs. So, we have to get into the offices and meet them where they are at.

Joseph Gonzales
Executive Director
Hui No Ke Ola Pono
(a Native Hawaiian Health Care System)

Health advocacy is central to health promotion and disease prevention. Providers serving the Native Hawaiian community have long noted that the mainstream, office-based health care system has not effectively served many of their patients. Alternative approaches such as the Diabetes Intervention Project, which utilized Community Health Workers (CHWs) to establish regular contact with patients at home and in the community, have been successful at reaching Native Hawaiian patients who have poor chronic disease management or high-risk pregnancies (Humphry, Jameson, & Beckham, 1997). CHWs serve as cultural experts who form a "bridge" connecting patients with a health care team, and provide a range of services in collaboration with that team. Perhaps most importantly, CHWs can establish positive relationships with patients and promote a family-centered approach, including key family members with caretaking roles. CHWs also address a range of barriers to care, including lack of transportation and cultural relevance (Rosenthal, Rush, & Allen, 2016).

Patient navigation programs are designed to assist patients as they proceed through the health care system. In an often fragmented system, these

programs can link patients to diagnostic tests and specialty providers, address barriers, and potentially reduce disparities (Allison et al., 2013; Domingo, Davis, Allison, & Braun, 2011). One such program serving Native Hawaiians was the Queen's Cancer Patient Navigation program, which has now expanded into a broader patient community navigation program. It was unique in that it acquired patients at any point, whether at initial testing, diagnosis, or completion of treatment.

Navigators deal with a wide variety of potential barriers and challenges, offering patients the varying levels of support they need. Examples of a high level of support include basic disease education; education about disease-related services; assistance with insurance; travel arrangements, including flights; linking patients to other care team members such as social workers, other specialists, and financial counselors; and linking the patient and family to community resources (Allison et al., 2013). Navigation is not limited to hospitals or clinical locations, and community navigators are frequently involved in helping the patient access screening, timely referrals, and emotional support and follow-up once treatment is completed (Domingo et al., 2011).

Another promising example of a navigation program is the PIKO[10] (Patient-Informed Knowledge to Optimize Outcomes) 'Ohana-Centered Health Care Navigation to Reduce Barriers to Care Initiative, which is being implemented at a primary care clinic on O'ahu to address the unique needs of Native Hawaiian patients. The present study proposes the addition of Community Health Navigators (CHNs, who constitute a type of Community Health Worker) to the interdisciplinary teams within clinics. The CHN is a member of the community served by a primary care clinic who has knowledge of relevant resources and services.

As part of the PIKO initiative, adult Native Hawaiian clinic patients with Type 2 diabetes and other comorbid conditions work with CHNs to develop an 'Ohana-Centered Treatment Plan (OCTP). The OCTP uses a Native Hawaiian cultural framework to help patients identify stressors and reduce barriers to care in terms of their three "PIKOs" (i.e., connection to the past, present, and future). The resulting OCTP is a coordinated plan developed by patients and their 'ohana[11] with specific objectives and goals of strengthening their capabilities to manage their health and well-being. The OCTPs are shared with the rest of the treatment team so that other providers have a better understanding of the system in which their patient is currently functioning and the patient's capacity to focus on health. The plan is monitored and reviewed regularly with the patient, to assess progress and celebrate successes. Ultimately, the PIKO initiative intends to address social determinants of health such as education, employment, sense of community (cultural, religious, etc.), employment, preventive services, and cultural services or practices.

Along with patient and community navigation services, culturally specific home visiting services have also shown promise for improving Native Hawaiian health. Your 'Ohana, a current Department of Health, Maternal and Child Health Branch initiative, targets pregnant women and children through age five, and utilizes a network of home visiting providers who recruit and enroll prenatal women and children within geographically at-risk, high needs areas. Two other programs designed for Native Hawaiian women and families, Kūlia I Ka Nu'u and Pūlama I Nā Keiki also offer culturally specific home visiting services. Evidence has yet to be gathered to evaluate the efficacy of these programs.

❖ **Telehealth and technology can help address primary care and specialist provider shortages in medically underserved areas.**

Telehealth will potentially transform the health care system, reduce costs, increase quality, increase patient-centered care, and increase patient satisfaction (Schwamm et al., 2017). It can make care both more accessible and more affordable, thus reducing disparities in access to care specifically related to geographic isolation or provider shortages, as experienced in Hawai'i, and may facilitate care for underserved patients in both rural and urban settings (Daniel & Sulmany, 2015; Schwamm et al., 2017; Withy, 2015). Indian Health Services has integrated telehealth, resulting in increased access to primary and specialty care for tribal communities, and many studies have demonstrated that telehealth is an effective strategy to improve health outcomes for specific medical conditions. Barriers to telehealth implementation include a lack of payment parity with in-person services, and provider costs related to secure data transmission; however, telehealth care has the potential to improve health outcomes for underserved (Daniel & Sulmany, 2015; Schwamm et al., 2017). Recent policy changes in Hawai'i with Senate bills 2469 and 2395 remove the malpractice coverage and reimbursement parity barriers in the state.

[10] Piko: literally, "navel"

[11] family

Mobile health (m-health), an aspect of telehealth that allows for the delivery of health care services via mobile devices, has strong potential to broadly impact communities and contribute to place-based care. M-health requires technology that is already in place in many patients' homes, such as smart phones, tablets, and Internet service. Applications include: 1) use of text messaging to encourage behavior modification, 2) data collection from medical devices such as sensors worn by patients for chronic care management, 3) education allowing access to electronic libraries for patients as well as professionals, 4) access to medical records including personal health records, and 5) professional consultation (Merrell & Doarn, 2014).

One promising m-health model is the iMOKO model developed in New Zealand. It utilizes an app to deliver health care services to schools, children, and parents in areas of need. Community members, especially childcare providers and teachers, are taught basic health assessment. Assessments are entered into a tablet or smartphone, and the information is transmitted to an off-site health team. Follow-up instructions can be given to teachers and prescriptions can be sent through the smart phone to the parent portal via the iMOKO parent app. The model allows for rapid treatment (requiring as little as eight minutes), and allows the child to remain at school, while reducing missed work time for parents (iMOKO, 2017).

There are a number of telehealth pilot projects in various stages in Hawai‘i. These include: 1) a school-based virtual clinic to reduce absenteeism in schools due to asthma (potential schools being considered are located in Wai‘anae and Kahuku), 2) CHWs working in coordination with local health care providers to operate virtual clinics within the Ka‘u district, and 3) a public safety telemedicine project.

Gaps

Structure of Systems

As we work to improve the health of our community through policy, systems, and environmental changes, the structure of our clinical and social services systems is critical. Unfortunately, for too many years, attempts to improve Native Hawaiian health have been made by programs or agencies functioning in silos. The danger is that the wheel gets reinvented. With scarce resources, it is imperative that programs and organizations work together not only to avoid duplication, but also to fill gaps efficiently. The following list gives examples of networks of organizations that serve Native Hawaiians: NHHCS (Native Hawaiian Health Care Systems), the Office of Hawaiian Affairs (OHA), the Ali‘i trusts (Queen's Hospital, Lunalilo Home, Kamehameha Schools, and Queen Liliu‘okalani Trust), health insurance companies, the University of Hawai‘i, the Hawai‘i State Department of Health, the federal government, Community Health Centers, and the non-profit sector.

Research

- **A complete picture of Native Hawaiian health status is only possible with disaggregated data specific to the Native Hawaiian population, inclusive of Native Hawaiians residing in the continental U.S., specific to all major diseases and disease risks, and inclusive of those who are not accessing medical care.**

Data on Native Hawaiian health are not consistently available. Native Hawaiians were traditionally aggregated with Asians or Other Pacific Islanders, which resulted in the masking of many health disparities. Although this situation is improving, as revealed through searches for Native Hawaiian data in the U.S. census databases, new complications have arisen with new census categories such as "mixed race." Since many Native Hawaiians fall in the mixed race category, how are they actually being counted in national databases? An example can be seen by examining data related to the shortage of Native Hawaiian physicians. National data from the Association of American Medical Colleges (AAMC) in 2017-2018 show that there were only 14 Native Hawaiian or Other Pacific Islanders enrolled at the John A. Burns School of Medicine; yet, internal medical school documents reveal that there were actually 37 Native Hawaiians enrolled. Are the other 23 medical school students "lost" in the AAMC's large mixed race category? (Association of American Medical Colleges, 2017; M. Kamaka, personal communication, May 4, 2018).

In addition, many sources fail to provide disaggregated data, particularly in a way that allows examination in relation to other social determinants of health (i.e., age, gender, geographical location, urban/rural setting, income, occupation, language, etc.). For national studies, the Native Hawaiian sample size is quite small, which creates challenges. An example may be found through searching for national data on obesity and Native Hawaiian children in the National Health and Nutrition Examination Survey (NHANES) database, which includes information on nutrition, demographics, socioeconomic status (SES), environment, and physical status (physical exams, labs, etc.). Although we have some local data pointing to an alarming rate of obesity in Native Hawaiian and other Pacific

Islander children, we are unable to mine the rich source of data available in NHANES for that population. In fact, the NHANES decided to oversample for Asians, but not Native Hawaiians and other Pacific Islanders (Novotny et al., 2013; National Center for Health Statistics, 2017). In the SEARCH for Diabetes in Youth study (SEARCH for Diabetes in Youth, n.d.), data were obtained for Asian, Asian Pacific Islanders and Pacific Islanders; however, Native Hawaiians were not disaggregated from the Pacific Islanders category.

In addition to addresses these challenging data-related issues, other important areas that require further research include the health impacts of our rapidly aging population, climate change, and emerging findings in the fields of genetics and epigenetics. Although we have evidence that culturally adapted and interventional programs utilizing Native Hawaiian methodologies are effective, research efforts must be greatly expanded to demonstrate that they can make a significant impact on Native Hawaiian health. Funding is required for larger culturally adapted and interventional studies in a wider range of communities; with additional disease states, such as with cancer; and across a variety of settings (e.g., community, home, hospital, and school). We need to explore whether the NUKA model can be effective in Hawai‘i, and the specific forms that telehealth or Patient-Centered Medical Homes might take in Native Hawaiian communities.

The impact and role of Native Hawaiian traditional healing practices within overall Native Hawaiian health also remain to be explored. While these practices and cultural considerations have begun to be integrated into some programs and intervention studies, there is a great depth of knowledge and wisdom that has not been documented or assessed by Western standards. However, consideration should be given to the possibility that traditional healing may never be measurable by Western standards, and it may not be appropriate to attempt such measurement. Nevertheless, funding should be allocated to allow inclusion of traditional healing practices in interventional and preventive programs. Additional discussion of these and other issues related to gaps in research may be found in Chapter 6: Data Governance.

Resources

- **Access to care: While gains have been made, gaps remain in affordability, availability, and acceptability.**
- **Access to technology: The advantages of telehealth are limited by access to that technology.**
- **Economic and cultural stressors: High rates of poverty and homelessness and low rates of post-secondary education disproportionately affect our communities. These stressors are strongly linked to health risk behaviors and poor health outcomes.**

[In the arena of] health coverage, I would bring up the cultural competency. It's like – people would say, "If I got sick in an automobile accident and I have no control over where I am and I would end up in a hospital," people would say, "I'd like to look over there and see somebody that feels, understands the background from which I come." That would be in an ideal world, but there are not enough, certainly not enough Native Hawaiian physicians. And there are probably not enough physicians that are culturally competent.

Is there a match between the provider and the person accessing the care? On the whole, they say it isn't the best. You know, sometimes that match doesn't occur, and I can tell you stories with my family… I would say that, especially in our older generation, Native Hawaiians do not trust the health care system. I can tell you stories. My parents would say that the hospital, the clinic – if you went into the hospital, they would believe that you would [not] come out, that you would probably die there, you know? That was real for many of our older people, and this belief exists today. There are gaps in our knowledge of current health care utilization practices of Native Hawaiians.

Nanette Judd, PhD, MPH, RN
Professor Emeritus
Department of Native Hawaiian Health
University of Hawai‘i at Mānoa
John A. Burns School of Medicine

Anecdotal information and outcomes data indicate that there are remaining availability, affordability, and acceptability barriers to accessing existing health care resources. For example, although the rate of Native Hawaiians with adequate commercial insurance has increased recently, Native Hawaiians are not utilizing services at comparable rates to other groups. In addition, those who seek health care services often rely on state and federally sponsored services (Hawai‘i Health Data Warehouse, 2011). Certainly, provider shortages exist throughout our state and are projected to worsen. For example, by 2020, it is estimated that Hawai‘i will be short 800-1500 physician FTEs (Full Time Equivalents; Withy, 2015). Primary Care Provider shortages are especially critical in our rural communities, many of which have high concentrations of Native Hawaiians (Creamer, 2017; Withy, 2015). This topic is discussed in more detail in Chapter 7: Workforce Development.

More data are required to quantify who is accessing primary care and basic preventive services as well as where in the community they prefer to access care. In addition to gaps in primary prevention, there are inconsistencies in chronic disease management services, as health care systems continue to focus on tertiary care – leading to costly emergency room overuse and preventable hospitalizations. Consideration must be given to the impact of some unique stressors experienced by Native Hawaiians that also act as barriers to care. What roles do mistrust, cultural conflict, cultural historical trauma, social and cultural determinants of health, and racism play in determining the acceptability of current health care resources that are still modeled on a Western system of care? Services provided to Native Hawaiian communities must be relevant to those communities. Relevance can be improved through simultaneous efforts to increase health literacy in the community and increase the appropriateness of health care services. Cultural competency training of all members of the health care team is essential. The importance of traditional healing cannot be overstated; traditional healing plays vital roles in collaborative care throughout the community, empowering those who seek care and affirming the necessity of holistic care for wellness and healing.

Policy

Gaps also remain in the Patient-Centered Medical Home model and place-based care approaches. There is a need for effective collaboration and referrals among primary care, specialty care, public health, behavioral health, traditional healers, and community resources. Collaboration is required on many levels, including training programs, clinics, hospitals, industry, and institutions. Truly team-based, collaborative care recognizes that patients are more than their diagnosis. They are connected to their community and their culture, and impacted by policy and systems as well as their social and physical environment.

Recommendations for Impact

Hili hewa ka manaʻo ke ʻole ke kūkākūkā.

Ideas run wild without discussion.

Discussion brings ideas together into a plan.

ʻŌlelo Noʻeau #993
(Pukui, 1983, pp. 106-107)

System Recommendations

- ❖ Strategic coordination is required to break down "silos," avoid duplication of efforts, and ensure collaboration and efficient use of resources.
- ❖ A new model of health care is needed. The current system is not working; in fact, it is failing Native Hawaiians.

It is noteworthy that efforts are currently underway to break down the "silos" within which various organizations work, integrating and balancing their resources, missions, and interests (Hawaiʻi Department of Health, 2016). Resources are required in order to maintain and improve coordination efforts. A single organization such as Papa Ola Lōkahi (POL), which is focused on health for all Native Hawaiians, should be designated as the lead organization. As such, it must be supported and expanded in order to:

- Monitor efforts of various agencies and programs for the purpose of preventing duplication of efforts.
- Guide funding towards gaps that are identified.
- Assist with additional support where indicated.
- Serve as the center for information and communication to promote collaboration and ensure efficient use of limited resources.

In addition, resources should be directed toward transitioning to a new model of health care for Native Hawaiians. Consideration should be given to

successful models that serve other indigenous populations, such as NUKA in Alaska.

Research Recommendations

- Increased research, including interventional studies, planned, directed, and disseminated by Native Hawaiian communities
- Increased research that promotes innovation and culturally relevant and appropriate Native Hawaiian methodologies, and is prepared for future challenges such as climate change

- **Ensure accurate data are available to assess health risks, status, and outcomes.**
- **Expand the availability of disaggregated data.**
- **Support data-sharing agreements among agencies and programs.**
- **Support longitudinal data collection on education and employment, including vocational education.**
- **Further explore genetic influences on disease.**

Increased research and funding for research are needed. For example, pathways to new and impactful innovations may lie within the use of information from genetic and epigenetic studies in partnership with culturally relevant interventional studies. Further interventional studies are needed utilizing Native Hawaiian methodologies, including traditional healing practices, across a wide range of health conditions. These efforts must include components of Community-Based Participatory Research such as the involvement of the Native Hawaiian community in planning, directing, and disseminating research protocols and findings. Future initiatives must be innovative and adaptable to advances in science. Research must be prepared to address not only ongoing disparities in health care, but also future disparities that may arise or be exacerbated by the impacts of climate change and rapid growth in Hawaii's elder population.

Resource Recommendations

- Native Hawaiian Health is significantly under-resourced.
- Increased resources would allow for the development of a more culturally relevant health care model to better serve Native Hawaiians.
- Prevention needs to start earlier and resources need to be accessible for youth and younger adults.

- **Explore telehealth solutions and other innovative technologies.**
- **Increase understanding of the available technology and how it can be utilized to increase health care access and support community and team-based care.**
- **Draw upon Native Hawaiian traditional practices.**
- **Improve access to care by continuing to improve acceptability of care and integrating traditional healing practices.**
- **Allocate resources for prevention programs aimed at youth and younger adults.**
- **Increase resources to develop and support a Native Hawaiian culturally adapted primary care system:**
  - **Inclusive of traditional healing practices.**
  - **Inclusive of CHWs and patient navigators.**

Native Hawaiian health care is under-resourced and should be funded at least on par with health care for other indigenous populations in the United States, such as Indian Health Services. An increase of funding to that level would allow for the development of a more successful health care model that addresses the needs of Native Hawaiians. Resources should be channeled toward better understanding of health care utilization practices of Native Hawaiians as opposed

to channeling them toward tertiary care. Preventive services, especially preventive care targeting youth and younger Native Hawaiians, should be prioritized along with the development of a culturally adapted health care model. This model could be a Native Hawaiian Patient-Centered Medical Home, but one that also includes health care delivered in place-based settings inclusive of traditional healing practices and community navigation services. Funding should demand an effective use of resources but be expansive enough to support additional innovation such as in telemedicine initiatives, cultural competency and interprofessional team training of our health care workforce, development of culturally based "health literate" programs and interventions, and incorporation of traditional healing, as well as outcomes-related research to support and justify all of these initiatives.

Policy Recommendations

- Native Hawaiian health and wellness care must be holistic, innovative, collaborative, integrative, and culturally based.
- Silos must be eliminated across the wide expanse of academia, government, institutions, insurance, and communities.

- **Prioritize incorporation of collaborative, integrative care approaches as well as cultural competency training in training programs for health care teams.**
- **Increase reliance on community-based health care teams and technology.**
  - **These measures also require resources to assist in coordination of team care, data, and records such as electronic medical records (EMRs).**
  - **Align resources to account for the expansion of telehealth.**
  - **Ensure that culturally tailored telehealth programs are developed.**
- **Increase support for place-based care, incorporating communities and environments in which people live.**

Future policies regarding Native Hawaiian health care need to focus on the provision of holistic, innovative, collaborative, integrative care that incorporates Native Hawaiian values, culture, and communities. Too many promising efforts have been lost to an unsustainable dependence on grants or a dizzying maze of silos (academia, community, institutions, government, insurance, etc.). A culturally adapted Patient-Centered Medical Home for Native Hawaiians will be doomed to failure if it is not given adequate resources or allowed to be innovative, holistic, and inclusive; and does not have at its core an expansive, transparent coordination of programs, data, and records (such as outcomes research and electronic medical records). An inclusive PCMH team would incorporate, for example, traditional healers and Community Health Care Workers as part of community-based health care. New models are needed; the way forward may lie in the provision of technologically and scientifically advanced place-based health and wellness care that incorporates the culture, communities, and environments in which people live.

CONCLUSION

Pūʻali kalo i ka wai ʻole.

Taro, for lack of water, grows misshapen.

Lack of caring for the land leads to illness.

ʻŌlelo Noʻeau #2705
(Pukui, 1983, p. 296)

Native Hawaiians, along with other indigenous and minority populations, suffer disproportionately from adverse health outcomes. Disparities exist across the spectrum of health conditions including the most prevalent conditions worldwide, such as cardiometabolic disorders including cardiovascular disease, diabetes, and obesity; as well as cancer, asthma, and poor maternal and infant outcomes. Ultimately, Native Hawaiians have the shortest life expectancy compared to other major ethnic and racial groups in Hawaiʻi (Wu et al., 2017). In addition to addressing inequalities in health outcomes, future efforts must focus on emerging trends impacting Native Hawaiian health, such as epigenetics, climate change, and the growing elderly population.

The underlying causes of these disparities are inter-related and multifactorial. Pivotal to understanding the fundamental causes is recognizing the impact of social determinants of health upon health

care availability, affordability, and acceptability, and ultimately, health outcomes. Despite the persistence of health disparities and inequalities, several promising trends have demonstrated positive impacts on Native Hawaiian health status, such as culturally tailored health interventions, cultural competency training for providers, and place-based care facilitated through the community, technology, and land-based programs. The incorporation of culturally tailored, culturally specific interventions has consistently demonstrated improved outcomes with respect to Native Hawaiian health.

Gaps in the current health care delivery model can be broadly categorized as structural deficits, research restrictions, resource limitations, and need for policy reform. Recommendations for impactful change to the health care delivery model and health outcomes specifically address each area of identified deficiency with respect to the Native Hawaiian population. As outlined in this report, while progress has been made in many areas, the current system does not serve Native Hawaiians well. In order to achieve health and well-being for Native Hawaiian communities, we need to conceive of health care differently and structure our systems accordingly, incorporating culture and community strengths throughout these systems at all levels.

References

Adebowale, V., Dorrell, S., Adamson, M., Burnell, A., Cooke, R., Dalton, S., …White, G. (2016). *Get well soon: Reimaging place-based health. The place-based health commission report.* London, UK: New Local Government Network. Retrieved from http://www.nlgn.org.uk/public/wp-content/uploads/Get-Well-Soon_FINAL.pdf

Agency for Healthcare Research and Quality. (2013). *National health care disparities report, 2013.* Retrieved from https://archive.ahrq.gov/research/findings/nhqrdr/nhdr13/index.html

Agency for Healthcare Research and Quality. (2017). *Defining the PCMH.* Retrieved from https://pcmh.ahrq.gov/page/defining-pcmh

Aitaoto, N. T., Braun, K. L., Ichiho, H. M., & Kuhaulua, R. L. (2005). Diabetes today in the Pacific: Reports from the field. *Pacific Health Dialog, 12*(1), 124-131.

Akinbami, L., Moorman, J., & Liu, X. (2011). Asthma prevalence, health care use, and mortality: United States, 2005-2006. *National Health Statistics Reports, U.S. Department of Health and Human Services*, *32,* 1-14.

Akinbami, L. J., Moorman, J. E., Garbe, P. L., & Sondik, E. J. (2009). The status of childhood asthma in the United States, 1980–2007. *Pediatrics, 123* (Suppl. 3), S131– S145.

Alberti, K. G. M. M., Zimmet, P., & Shaw, J. (2005). Metabolic syndrome: A new world-wide definition. A consensus statement from the International Diabetes Federation. *Diabetic Medicine, 23*, 469-480.

Allison, A. L., Ishihara-Wong, D. D. M., Domingo, J. B., Nishioka, J., Wilburn, A., Tsark, J. U., & Braun, K. L. (2013). Helping cancer patients across the care continuum: The navigation program at The Queen's Medical Center. *Hawai'i Journal of Medicine & Public Health, 72*(4), 116–121.

Aluli, N. E., Jones, K. L., Reyes, P. W., Brady, S. K., Tsark, J. U., & Howard, B. V. (2009). Diabetes and cardiovascular risk factors in Native Hawaiians. *Hawai'i Medical Journal*, *68*(7), 152–157.

Aluli, N. E., Reyes, P. W., Brady, S. K., Tsark, J. U., Jones, K. L., Mau, M., … Howard, B. V. (2010). All-cause and CVD mortality in Native Hawaiians. *Diabetes Research and Clinical Practice*, *89*(1), 65–71. doi:10.1016/j.diabres.2010.03.003

Aluli, N. E., Reyes, P. W., & Tsark J. U. (2007). Cardiovascular disease disparities in Native Hawaiians. *Journal of the Cardiometabolic Syndrome, 2*(4), 250-253.

American Board of Family Medicine. (n.d.). *Cultural competency methods in medicine modules*. Retrieved from https://portfolio.theabfm.org/MCFP/MCFPDoc.aspx?component=PART4&module=MIMM-CC&version=1&id=96

American Diabetes Association. (2011). Diagnosis and classification of diabetes mellitus. *Diabetes Care*, *34*(Suppl. 1), S62–S69. doi:10.2337/dc11-S062

Anand, S. S., Hawkes, C., de Souza, R. J., Mente, A., Dehghan, M., Nugent, R., …Popkin, B. M. (2015). Food consumption and its impact on cardiovascular disease: Importance of solutions focused on the globalized food system. A report from the workshop convened by the World Heart Federation. *Journal of the American College of Cardiology*, *66*(14), 1590-1614.

Anderson, I., Crengle, S., Kamaka, M. L., Chen, T., Palafox, N., & Jackson-Pulver, L. (2006). Indigenous health in Australia, New Zealand and the Pacific. *Lancet, 367,* 1775-1785.

Anderson, D. R., & Olayiwola, J. N. (2012). Community health centers and the patient-centered medical home: Challenges and opportunities to reduce health care disparities in America. *Journal of Health Care for the Poor and Underserved, 23*(3), 949-957.

Aroda, V. R., Christophi, C. A., Edelstein, S. L., Zhang, P., Herman, W. H., Barrett-Connor, E., …Ratner, R. E. (2015). The effect of lifestyle intervention and metformin on preventing or delaying diabetes among women with and without gestational diabetes: The Diabetes Prevention Program outcomes study 10-year follow-up. *The Journal of Clinical Endocrinology and Metabolism*, *100*(4), 1646–1653. doi:10.1210/jc.2014-3761

Association of American Medical Colleges. (2017). *Total enrollment by U.S. medical school and race/ethnicity, 2017-2018.* [*Table B-5*]. Retrieved from https://www.staging.aamc.org/download/321540/data/factstableb5.pdf

Bearison, D. J., Minian, N., & Granowetter, L. (2002). Medical management of asthma and folk medicine in a Hispanic community. *Journal of Pediatric Psychology, 27*(4), 385-392.

Beckham, S., Kaahaaina, D., Voloch, K., & Washburn, A. (2004). A community-based asthma management program: Effects on resource utilization and quality of life. *Hawai'i Medical Journal, 63*, 121-125.

Benjamin, E. J., Virani, S. S., Callaway, C. W., Chang, A. R., Cheng, S., Chiuve, S. E., … Muntner, P. (2018). Heart disease and stroke statistics—2018 update: A report from the American Heart Association. *Circulation*. doi: 10.1161/CIR.0000000000000558

Braun, K. L., Kim, B. J., Ka'opua, L. S., Mokuau, N., & Browne, C. V. (2015). Native Hawaiian and Pacific Islander elders: What gerontologists should know. *The Gerontologist*, *55*(6), 912–919. https://doi.org/10.1093/geront/gnu072

Bushnell, O., & Veith, I. (1994). The gifts of civilization: Germs and genocide in Hawai'i. *Bulletin of the History of Medicin*e, *68*(4), 722-723.

Census: Hawai'i's older population grew by 25 percent in 6 years. (2017, June 30). *Hawai'i News Now.* Retrieved from https://www.hawaiinewsnow.com/story/35791332/census-hawaiis-older-population-grew-by-25-percent-in-6-years/

Centers for Disease Control and Prevention. (n.d.). *Asthma in schools: Asthma facts.* Retrieved from https://www.cdc.gov/healthyschools/asthma/

Centers for Disease Control and Prevention. (n.d.). Hawai'i Youth Risk Behavior Survey – 2017 data. Retrieved from www.cdc.gov/HealthyYouth/yrbs/index.htm

Centers for Disease Control and Prevention. (2017). *Summary health statistics: National Health Interview Survey.* Retrieved from https://ftp.cdc.gov/pub/Health_Statistics/NCHS/NHIS/SHS/2017_SHS_Table_A-2.pdf

Colby, S. L., & Ortman, J. M. (2015). Projections of the size and composition of the U.S. population: 2014 to 2060, population estimates and projections. *Current Population Reports, P25-1143, U.S. Census Bureau*. Washington, DC: U.S. Department of Commerce. Retrieved from https://www.census.gov/content/dam/Census/library/publications/2015/demo/p25-1143.pdf

Corley, M. J., Dye, C., D'Antoni, M. L., Byron, M. M., Yo, K. L.-A., Lum-Jones, A., … Maunakea, A. K. (2016). Comparative DNA methylation profiling reveals an immunoepigenetic signature of HIV-related cognitive impairment. *Scientific Reports*, *6*, 33310.

Creamer, B. (2017). The doctor is not in. *Hawai'i Business Magazine.* Retrieved from https://www.hawaiibusiness.com/the-doctor-is-not-in/

Daniel, H., & Sulmasy, S. S. (2015). Policy recommendations to guide the use of telemedicine in primary care settings: An American College of Physicians position paper. *Annals of Internal Medicine, 163*(10)*,* 787-802.

Deguchi, M., Mau, M. K. L. M., Davis, J., & Niederman, R. (2017). Preventable tooth loss in Hawai'i: The role of socioeconomic status, diabetes, and dental visits. *Preventing Chronic Disease, 14,* E115. doi: 10.5888/pcd14.170214.

Diabetes Prevention Program Research Group. (2009). 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. *Lancet*, *374*(9702), 1677–1686. doi:10.1016/S0140-6736(09)61457-4

Dodgson, J. E., Codier, E., Kaiwi, P., Oneha, M. F. M., & Pagano, I. (2007). Breastfeeding patterns in a community of Native Hawaiian mothers participating in WIC. *Family & Community Health*, *30*(Suppl. 2), S46-S58.

Domingo, J. B., Davis, E. L., Allison, A. L., & Braun, K. L. (2011). Cancer patient navigation case studies in Hawai'i: The complementary role of clinical and community navigators. *Hawai'i Medical Journal, 70*(12), 257–261.

Driscoll, D. L., Hiratsuka, V., Johnston, J. M., Norman, S., Reilly, K. M., Shaw, J., …Dillard, D. (2013). Process and outcomes of patient-centered medical care with Alaska Native people at Southcentral Foundation*. The Annals of Family Medicine, 11*, S41-49.

Duggan, A., Windham, A., McFarlane, E., Fuddy, L., Rohde, C., Buchbinder, S., & Sia, C. (2000). Hawai'i's Healthy Start Program of home visiting for at-risk families: Evaluation of family identification, family engagement, and service delivery. *Pediatrics, 105*(1), 250-259. Retrieved from http://pediatrics.aappublications.org/content/105/Supplement_2/250

Else, I. (2004). The breakdown of the Kapu system and its effect on Native Hawaiian health and diet. *Hulili: Multidiciplinary Research on Hawaiian Well-Being, 1*, 241-253.

Fitzpatrick-Nietshmann, J. (1983). Pacific Islanders: Migration and health. *The Western Journal of Medicine, 139*(6), 848-853.

Foulds, H. J., Shubair, M. M, & Warburton, D. E. (2013). A review of the cardiometabolic risk experience among Canadian Metis populations. *Canadian Journal of Cardiology*, *29*(8), 1006-1013.

Fuddy, L., Hirai, C., & Kaiwi, H. (2010). *Hawai'i Healthy Start program.* Association of Maternal and Child Health Programs. Retrieved from http://www.amchp.org/AboutAMCHP/Newsletters/Pulse/Archive/2010/June2010/Pages/Feature3.aspx

Fujita, R., Braun, K. L., & Hughes, C. K. (2004). The traditional Hawaiian diet: A review of the literature. *Pacific Health Dialog*, *11*(2), 250-259.
Fukunaga, L. L., Uehara, D. L., & Tom, T. (2011). Perceptions of diabetes, barriers to disease management, and service needs: A focus group study of working adults with diabetes in Hawaii. *Preventing Chronic Disease*, *8*(2), A32.
Galinsky, A. M., Zelaya, C. E., Barnes, P. M., & Simile, C. (2017). Selected health conditions among Native Hawaiian and Pacific Islander adults: United States, 2014. *NCHS Data Brief, 277,* 1-8.
Galinsky, A. M., Zelaya, C. E., Simile, C., & Barnes, P. M. (2017). Health conditions and behaviors of Native Hawaiian and Pacific Islander persons in the United States, 2014. *Vital Health Statistics, 3*(40), 1-99.
Garg, A., Jack, B., & Zuckerman, B. (2013). Addressing the social determinants of health within the patient-centered medical home. *Journal of the American Medical Association, 309*(19), 2001-2002.
Gellert, K. S., Aubert, R. E., & Mikami, J. S. (2010). Ke ʻAno Ola: Molokai's community-based healthy lifestyle modification program. *American Journal of Public Health*, *100*(5), 779-783.
Global Initiative for Asthma. (2019). *Global strategy for asthma management and prevention.* Retrieved from https://www.ginasthma.org
Gottlieb, K. (2013). The Nuka system of care: Improving health through ownership and relationships. *International Journal of Circumpolar Health*, *72*(1). doi: 10.3402/ijch.v72i0.21118
Grandinetti, A., Kaholokula, J. K., Mau, M., & Chow, D. (2010). Detecting cardiometabolic syndrome using World Health Organization public health action points for Asians and Pacific Islanders. *Ethnicity and Disease*, *20*(2), 123-128.
Grandinetti, A., Kaholokula, J. K., Theriault, A., Mor, J., Chang, H., & Waslien, C. (2007). Prevalence of diabetes and glucose intolerance in an ethnically diverse rural community of Hawai'i. *Ethnicity and Disease, 17*, 250-255.
Guo, M. W., Ahn, H. J., Juarez, D. T., Miyamura, J., & Sentell, T. L. (2015). Length of stay and deaths in diabetes-related preventable hospitalizations among Asian American, Pacific Islander, and White older adults on Medicare, Hawai'i, December 2006–December 2010. *Preventing Chronic Disease*, *12*, 150092. doi: http://dx.doi.org/10.5888/pcd12.150092.
Gutmanis, J. (1983). *Na pule kahiko: Ancient Hawaiian prayers.* Honolulu, HI: Editions Limited.
Halterman, J. S., Szilagyi, P. G., Fisher, S. G., Fagnano, M., Tremblay, P., Conn, K. M., … Borrelli, B. (2011). Randomized controlled trial to improve care for urban children with asthma: Results of the School-Based Asthma Therapy trial. *Archives of Pediatrics & Adolescent Medicine*, *165*(3), 262–268. doi:10.1001/archpediatrics.2011.1
Halterman, J. S., Borrelli, B., Fisher, S., Szilagyi, P., & Yoos, L. (2008). Improving care for urban children with asthma: Design and methods of the School-Based Asthma Therapy (SBAT) trial. *The Journal of Asthma, 45*(4), 279-286. doi:10.1080/02770900701854908.
Hawai'i Department of Business, Economic Development & Tourism. (n.d.). *Population characteristics by detailed race (summary file 2).* Retrieved from http://census.hawaii.gov/Census_2010/SF2/
Hawai'i Department of Health. (2014). *Family Health Services division profiles 2014.* Retrieved from http://health.hawaii.gov/about/files/2015/01/FHSD_Profiles2014.pdf
Hawai'i Department of Health. (2016). *Hawai'i Department of Health strategic plan 2015-2018.* Retrieved from https://health.hawaii.gov/opppd/files/2013/04/Hawaii-Department-of-Health-Strategic-Plan-2015-2018-081616.pdf
Hawai'i Department of Health. (2017). *2017-2019 Hawaii state plan on aging.* Retrieved from https://www.hawaiiadrc.org/Portals/_AgencySite/StatePlan_Apr26.pdf
Hawai'i Department of Health. (2019). *2019-2023 Hawaii state plan on aging.* Retrieved from https://hawaiiadrc.org/Portals/_AgencySite/State%20Plan/2019-2023%20Hawaii%20State%20Plan%20on%20Aging%20rev%2005-17-19.pdf
Hawaiian Community Assets. (2015). *Recommendations to address Hawaii's homeless crisis.* Retrieved from http://www.hawaiiancouncil.org/wp-content/uploads/2015/11/2015-Native-Hawaiian-Housing-Recommendations.pdf
Hawai'i Health Data Warehouse. (2011). Access to health services [data file]. Retrieved from http://hhdw.org/health-reports-data/category/access-health-services/
Hawai'i Health Data Warehouse. (2013). *Lifetime and current asthma in Hawaii*. Retrieved from http://hhdw.org/wp-content/uploads/YRBS_ChronicDiseases_IND_00001.pdf

Hawai‘i Health Data Warehouse. (2014). *Health-general health status, for the State of Hawaii, for the Year(s) – 2011, 2012, 2013, 2014.* Retrieved from http://hhdw.org/wp-content/uploads/BRFSS_General-Health_IND_00001_20112.pdf

Hawai‘i Health Data Warehouse. (2015). Birth data. Retrieved from http://hhdw.org/health-reports-data/data-source/vital-statistics/birth-data/

Hawai‘i Health Data Warehouse. (2016). *Diabetes prevalence (Categorical).* Retrieved from http://hhdw.org/wp-content/uploads/BRFSS_Diabetes_IND_00001_2011.pdf

Hawai‘i Health Data Warehouse. (2017). *Pregnancy Risk Assessment Monitoring System PRAMS health indicator report 2007 - 2013.* Retrieved from http://hhdw.org/health-reports-data/data-source/prams-reports/

Hawai‘i Health Data Warehouse. (2017). *Infant deaths in Hawai‘i.* Retrieved from http://hhdw.org/wp-content/uploads/Vitals_Infant-Deaths_IND3.pdf

Hawai‘i Tumor Registry. (2016). *Hawai‘i cancer at a glance, 2009-2013.* Available from www.uhcancercenter.org/images/pdf/HTR_cancer_booklet.pdf

Hayes, D. (2016). *Trends in teen pregnancy and births in Hawai‘i* [PowerPoint presentation]. Family Health Services Division, Hawai‘i State Department of Health.

Heckler, M. (1985). *Report of the Secretary's taskforce on Black and minority health.* U.S. Department of Health and Human Services.

Hirai, A. H., Hayes, D. K., Taualii, M. M., Singh, G. K., & Fuddy, L. J. (2013). Excess infant mortality among Native Hawaiians: Identifying determinants for preventive action. *American Journal of Public Health, 103*(11), e88–e95.

Horky, S. C., Kleinman, S. H., & Firth, D. G. (2007). A comparison of parent and provider beliefs about asthma in children. *Pediatric Asthma, Allergy & Immunology, 20*(1), 36-47.

Hsu, J., Qin, X., Beavers, S. F., & Mirabelli, M. C. (2016). Asthma-related school absenteeism, morbidity, and modifiable factors. *American Journal of Preventive Medicine*, *51*(1), 23-32.

Humphry, J., Jameson, L. M., & Beckham, S. (1997). Overcoming social and cultural barriers to care for patients with diabetes. *Western Journal of Medicine, 167*(1), 138-144.

Humphry, J., & Reinhardt, T. L. K. (1998). Disease management: The interface between Hawaiian health and the Western health care system. *Pacific Health Dialog, 5*(2), 370-374.

iMOKO. (n.d.). Healthier Kids @ Your Fingertips. Retrieved from http://public.imoko.com/about/

Institute of Medicine. (2002). *Unequal treatment: Confronting racial and ethnic disparities in health care*. Washington, DC: National Academies Press.

Jessop, H., Li, D., Katz, A. R., & Hurwitz, E. L. (2019). Asthma prevalence disparities and differences in sociodemographic associations with asthma, between Native Hawaiian/Other Pacific Islander, Asian, and White adults in Hawai‘i: Behavioral Risk Factor Surveillance System (BRFSS), 2001-2010. *Ethnicity & Health, 24*(1), 1-23. doi:10.1080/13557858.2017.1297775

Johnson, D. B., Oyama, N., LeMarchand, L., & Wilkens, L. (2004). Native Hawaiians mortality, morbidity, and lifestyle: Comparing data from 1982, 1990, and 2000. *Pacific Health Dialog, 11*(2), 120-130.

Kaholokula, J. K. (2015). Patient perspectives on the Hula Empowering Lifestyle Adaptation Study: Benefits of dancing hula for cardiac rehabilitation. *Health Promotion Practice, 16*(1), 109–114.

Kaholokula, J. K., Crabbe, K. M., Irvin, L., Kim, L., Aluli, N. A., Kekauoha, P., …Paishon-Duarte, M. (2016). *Native Hawaiian Health Task Force: 2017 preliminary report and recommendations.* Report to the Twenty-Ninth Legislature, State of Hawai‘i. Honolulu, HI: Hawai‘i Public Health Institute and the University of Hawai‘i.

Kaholokula, J. K., Dillard, A., Yoshimura, S., Palakiko, D. M., Hughes, C., & Townsend, C. (2014). The PILI 'Ohana Project: A community-academic partnership to achieve metabolic health equity in Hawai‘i. *Hawai‘i Journal of Medicine and Public Health, 73*(12 Suppl. 3), 29-33.

Kaholokula, J. K., Look, M. A., Wills, T. A., de Silva, M., Mabellos, T., Seto, T. B., …Kā-HOLO Project. (2017). Kā-HOLO Project: A protocol for a randomized controlled trial of a native cultural dance program for cardiovascular disease prevention in Native Hawaiians. *BMC Public Health*, *17*(1), 321. doi:10.1186/s12889-017-4246-3

Kaholokula, J. K., Nacapoy, A. H., Grandinetti, A., & Chang H. K. (2008). Association between acculturation modes and Type 2 diabetes among Native Hawaiians. *Diabetes Care, 31*(4), 698-700.

Kaholokula, J. K., Townsend, C. K. M., Ige, A., Sinclair, K. A., Mau, M. K., Leake, A., & Hughes, C. (2013). Socio-demographic, behavioral, and biological variables related to weight loss in Native Hawaiians and other Pacific Islanders. *Obesity, 21*(3), E196–E203.

Kahuku Health Center handy to hundreds of campus patients. (2014, February 19). *Midweek.* http://www.midweek.com/kahuku-health-center-handy-hundreds-campus-patients-2/

Kamaka, M. L. (2010). Designing a cultural competency curriculum: Asking the stakeholders. *Hawai'i Medical Journal*, *69*(6 Suppl. 3), 31–34.

Kamaka, M., Wong, V., Carpenter, D., Kaulukukui, M., & Maskarinec, G. (2017). Kakou: Collaborative cultural competency. In W. K. Mesiona Lee and M. A. Look (Eds.), *Ho'i hou ka mauli ola: Pathways to Native Hawaiian health. Vol. 5, Hawai'inuiākea.* Honolulu, HI: Hawai'inuiākea School of Hawaiian Knowledge and University of Hawai'i Press.

Ka'opua, L. S., Park, S. H., Ward, M. E., & Braun, K. L. (2011). Testing the feasibility of a culturally tailored breast cancer screening intervention with Native Hawaiian women in rural churches. *Health & Social Work*, *36*(1), 55-65.

Kataoka-Yahiro, M. R., Wong, K. A., Tamashiro, J., Page, V., Ching, J., & Li, D. (2012). Evaluation of the National Kidney Foundation of Hawaii's Kidney Early Detection Screening program. *Hawai'i Journal of Medicine & Public Health: A Journal of Asia Pacific Medicine & Public Health*, *71*(7), 186–192.

Kelli, H. M., Kassas, I., & Lattouf, D. M. (2015). Cardiometabolic syndrome: A global epidemic. *Journal of Diabetes and Metabolism, 6*(3), 513.

King, G. L., McNeely, M. J., Thorpe, L. E., Mau, M. L., Ko, J., Liu, L. L., …Chow, E. A. (2012). Understanding and addressing unique needs of diabetes in Asian Americans, Native Hawaiians, and Pacific Islanders. *Diabetes Care*, *35*(5), 1181–1188. doi:10.2337/dc12-0210

Kittler, P., & Sucher, K. (2001). *Food and Culture* (3rd ed.). Belmont, CA: Wadsworth/Thomson Learning.

Kokua Kalihi Valley. (n.d.). *Ehuola.* Retrieved from https://www.rootskalihi.com/ehuola-1/

Lee, K., Palacio, C. Alexandraki, I., Stewart, E., & Mooradian, A. D. (2011). Increasing access to health care providers through medical home model may abolish racial disparity in diabetes care: Evidence from a cross-sectional study. *Journal of the National Medical Association, 103*(3), 250-256.

Lepule, T., & Kwoh, S. (2014). *A community of contrasts: Native Hawaiian and Pacific Islanders in the United States.* Los Angeles, California: Empowering Pacific Islander Communities. Retrieved from https://advancingjustice-la.org/what-we-do/policy-and-research/demographic-research/community-contrasts-native-hawaiians-and-pacific

Liaison Committee on Medical Education. (2016). *Functions and structure of a medical school: Standards for accreditation of medical education programs leading to the MD degree*. Retrieved from https://med.virginia.edu/ume-curriculum/wp-content/uploads/sites/216/2016/07/2017-18_Functions-and-Structure_2016-03-24.pdf

Liu, L. L., Yi, J. P., Beyer, J., Mayer-Davis, E. J., Dolan, L. M., Dabelea, D. M., …SEARCH for Diabetes in Youth Study Group. (2009). Type 1 and Type 2 diabetes in Asian and Pacific Islander U.S. youth: The SEARCH for Diabetes in Youth study. *Diabetes Care*, *32*(Suppl. 2), S133–S140. doi:10.2337/dc09-S205

Look, M. A., Trask-Batti, M. K., Agres, R., Mau, M. L., & Kaholokula, J. K. (2013). *Assessment and priorities for health & well-being in Native Hawaiians & other Pacific peoples.* Honolulu, HI: Center for Native and Pacific Health Disparities Research, University of Hawai'i at Mānoa.

Magge, S. N., Goodman, E., & Armstrong, S. C. (2017). *The metabolic syndrome in children and adolescents: Shifting the focus to cardiometabolic risk factor clustering.* American Academy of Pediatrics Clinical Report.

Maskarinec, G., Grandinetti, A., Matsuura, G., Sharma, S., Mau, M., Henderson, B., & Kolonel, L. (2009). Diabetes prevalence and body mass index differ by ethnicity: The multiethnic cohort. *Ethnicity and Disease*, *19*(1), 49–55.

Maskarinec, G. G., Look, M., Tolentino, K., Trask-Batti, M., Seto, T., de Silva, M., & Kaholokula, J. K. (2015). Patient perspectives on the Hula Empowering Lifestyle Adaptation Study: Benefits of dancing hula for cardiac rehabilitation. *Health Promotion Practice*, *16*(1), 109–114. doi:10.1177/1524839914527451

Mau, M. K., Grandinetti, A., Arakaki, R. F., Baker-Ladao, N. K, Chang, H. K., Curb, J. D., & Kinney E. K. (1997). The insulin resistance syndrome in Native Hawaiians. *Diabetes Care, 20*(9), 1376-1380.

Mau, M. K., Kaholokula, J. K., West, M. R., Leake, A., Efird, J. T., Rose, C., & Gomes, H. (2010). Translating diabetes prevention into Native Hawaiian and Pacific Islander communities: The PILI 'Ohana pilot project. *Progress in Community Health Partnerships: Research, Education, and Action, 4*(1), 7–16.

Mau, M. K., Sinclair, K., Saito, E. P., Baumhofer, K. N., & Kaholokula, J. K. (2009). Cardiometabolic health disparities in Native Hawaiians and other Pacific Islanders. *Epidemiological Review, 31,* 113-129.

Maunakea, A. K., Chepelev, I., Cui, K., & Zhao, K. (2013). Intragenic DNA methylation modulates alternative splicing by recruiting MeCP2 to promote exon recognition. *Cell Research*, *23*(11), 1256–1269. http://doi.org.eres.library.manoa.hawaii.edu/10.1038/cr.2013.110

Maunakea, A. K., Chepelev, I., & Zhao, K. (2010). Epigenome mapping in normal and disease states. *Circulation Research*, *107*(3), 327–339.

McEligot, A. J., McMullin, J., Pang, K., Bone, M., Winston, S., Ngewa, R., & Tanjasiri, S. P. (2010). Diet, psychosocial factors related to diet and exercise, and cardiometabolic conditions in Southern Californian Native Hawaiians. *Hawai'i Medical Journal*, *69*(5 Suppl. 2), 16–20.

Merrell, R. C., & Doarn, C. R. (2014). m-Health. *Telemedicine Journal and E-Health*, *20*, 99–101.

Mokuau, N., Braun, K. L, & Daniggelis, E. (2012). Building family capacity for Native Hawaiian women with breast cancer. *Health and Social Work*, *37*(4), 216-224.

Murray, C. J., Atkinson, C., Bhalla, K., Birbeck, G., Burstein, R., Chou, D., …Wulf, S. (2013). The state of U.S. health, 1990-2010: Burden of diseases, injuries, and risk factors. *JAMA*, *310*(6), 591–608. doi:10.1001/jama.2013.13805

Nakagawa, K., Ito, C., & King, S. L. (2017). Ethnic comparison of clinical characteristics and ischemic stroke subtypes among young adult stroke patients in Hawai'i. *Stroke, 48*(1), 24-29.

Nakagawa, K., Lim, E., Harvey, S., Miyamura, J., & Juarez, D. T. (2016). Racial/ethnic disparities in the association between preeclampsia risk factors and preeclampsia among women residing in Hawai'i. *Maternal and child health journal*, *20*(9), 1814–1824. doi:10.1007/s10995-016-1984-2

National Assembly on School-Based Health Care. (2011). *Benefits of school-based health centers.* Retrieved from https://livewell.marshall.edu/mutac/wp-content/uploads/2011/08/NASBHCadvocacy_factsheetbenefits.pdf

National Asthma Education and Prevention Program. (2007). *Expert panel report 3: Guidelines for the diagnosis and management of asthma.* Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK7232/

National Cancer Institute. (2016). *Cancer disparities.* Retrieved from https://www.cancer.gov/research/areas/disparities

National Center for Health Statistics. (2017). *National Health and Nutrition Examination Survey 2015-2016.* Retrieved from https://wwwn.cdc.gov/nchs/nhanes/continuousnhanes/overview.aspx?BeginYear=2015

National Consortium for Multicultural Education for Health Professionals. (2008). *Medical cultural competency legislation and regulation.* Retrieved from http://academic.udayton.edu/health/syllabi/Disparities/06HealthCareDisparities/Cultural%20Competency%20Laws.pdf

Native Hawaiian Health Research Consortium. (1985). *E ola mau: The Native Hawaiian health needs study.* Honolulu, HI: ALU LIKE, Inc.

Novotny, R., Oshiro, C. E. S., & Wilkens, L. R. (2013). Prevalence of childhood obesity among young multiethnic children from a health maintenance organization in Hawai'i. *Childhood Obesity, 9*(1), 35-42.

Novotny, R., Vijayadeva, V., Grove, J., Gittelson, J., Avila, J., Su, Y., & Murphy, S. (2012). Dietary intake among Native Hawaiian, Filipino, and White children and caregivers in Hawai'i. *Hawai'i Journal of Medicine & Public Health, 71*(12), 353.

Odom, S. K., Jackson, P., Derauf, D., Inada, M. K., & Aoki, A. H. (2019). Pilinahā: An indigenous framework for health. *Current Developments in Nutrition, 3*(Suppl. 2), 32-38. doi: 10.1093/cdn/nzz001

Office of Hawaiian Affairs. (2017). *Native Hawaiian health fact sheet 2017. Volume IV: Native Hawaiian health status.* Honolulu, HI.

Office of Minority Health. (2001). *National standards for culturally and linguistically appropriate services in health care.* Washington, DC: U.S. Government Printing Office. Retrieved from https://minorityhealth.hhs.gov/assets/pdf/checked/finalreport.pdf

Office of Minority Health. (2013). *National standards for Culturally and Linguistically Appropriate Services (CLAS) in health and health care* (2nd ed.). Washington, DC: U.S. Government Printing Office. Retrieved from https://www.thinkculturalhealth.hhs.gov/assets/pdfs/EnhancedNationalCLASStandards.pdf

Okihiro, M., Agustin, M., Garcia, B., Prothero, B. M., & Goebert, D. (2017). *Preliminary technical report: Wai'anae Coast Comprehensive Health Center needs assessment 2016 – Enhancing care, coordination and capacity across community sectors to improve asthma outcomes in high-risk children in Hawai'i.* Wai'anae, HI: Wai'anae Coast Comprehensive Health Center.

Omaye, Y. (2016, October 22). Facilities at Waianae campuses aid access, attendance. *Honolulu Star-Advertiser.* Retrieved from https://www.staradvertiser.com/2016/10/22/hawaii-news/facilities-at-waianae-schools-aid-access-and-attendance/

Oneha, M. F., Dodgson, J. E., DeCambra, M. H., Titcomb, C., Enos, R., & Morimoto-Ching, S. (2016). Connecting culturally and spiritually to healthy eating: A community assessment with Native Hawaiians. *Asian/Pacific Island Nursing Journal, 1*(3), 116.

Panapasa, S. V., Mau M. K., Williams, D. R., & McNally, J. W. (2010). Mortality patterns of Native Hawaiians across their lifespan: 1990–2000. *American Journal of Public Health, 100*(11), 2304-2310.

Pobutsky, A. M., Hirokawa, R., & Reyes-Salvail, F. (2003). Estimates of disability among ethnic groups in Hawai'i. *Californian Journal of Health Promotion*, *1*(Special Issue: Hawai'i), 65-82. Retrieved from http://health.hawaii.gov/brfss/files/2013/11/EstimateOfDisability.pdf

Polite, N. N., Adams-Campbell, L. L., Brawley, O. W., Bickell, N., Carethers, J. M., Flowers, C. R.., …Paskett, E. D. (2017). Charting the future of cancer health disparities research: A statement from American Association for Cancer Research, the American Cancer Society, the American Society of Clinical Oncology, and the National Cancer Institute. *Journal of Clinical Oncology, 35*(26), 3075-3082. doi:10.1200/JCO.2017.73.6546

Pukui, M. K. (1983). 'Ōlelo no'eau: Hawaiian proverbs & poetical sayings. Honolulu, HI: Bishop Museum Press.

Ray, C. (2011). *Pediatrician perceptions of the Patient-Centered Medical Home model* (Master's thesis). Retrieved from https://scholarscompass.vcu.edu/cgi/viewcontent.cgi?referer=https://scholar.google.com/&httpsredir=1&article=1210&context=etd

Rosenthal, E. L., Rush, C. H., & Allen, C. G. (2016). *Understanding scope and competencies: A contemporary look at the United States community health worker field.* Progress report of the Community Health Worker (CHW) Core Consensus Project. Retrieved from https://sph.uth.edu/dotAsset/28044e61-fb10-41a2-bf3b-07efa4fe56ae.pdf

Saad, M. F., Lillioja, S., Nyomba, B. L., Castillo, C., Ferraro, R., De Gregorio, M., …Bogardus, C. (1991). Racial differences in the relation between blood pressure and insulin resistance. *New England Journal of Medicine, 324*, 733-739. doi:10.1056/NEJM199103143241105

Saljoughian, M. (2016). Cardiometabolic syndrome: A global health issue. *U.S. Pharmacist, 41*(2), HS19-HS21.

Schempf, A. H., Mendola, P., Hamilton, B. E., Hayes, D. K., & Makuc, D. M. (2010). Perinatal outcomes for Asian, Native Hawaiian, and other Pacific Islander mothers of single and multiple race/ethnicity: California and Hawai'i, 2003-2005. *American Journal of Public Health*, *100*(5), 877-887.

Schwamm, L. H., Chumbler, N., Brown, E., Fonarow, G. C., Berube, D., Nystrom, K., …Tiner, A. C. (2017). Recommendations for the implementation of telehealth in cardiovascular and stroke care: A policy statement from the American Heart Association. *Circulation, 135*, e24-e44.

Schweitzer, R. J., Wills, T. A., Tam, E., Pagano, I., & Choi, K. (2017). E-cigarette use and asthma in a multiethnic sample of adolescents. *Preventive Medicine, 105*, 226-231. doi:10.1016/j.ypmed.2017.09.023

SEARCH for Diabetes in Youth. (n.d). *The SEARCH for diabetes in youth study.* Retrieved from https://www.searchfordiabetes.org/dspHome.cfm

Selbie, D., & Kippin, H. (2016, March 17). The journey to place based health. *Public health matters* [Blog]. Public Health England. Retrieved from https://publichealthmatters.blog.gov.uk/2016/03/17/the-journey-to-place-based-health/

Sentell, T. L., Ahn, H. J., Juarez, D. T., Tseng, C. W., Chen, J. J., Salvail, F. R., … Mau, M. L. (2013). Comparison of potentially preventable hospitalizations related to diabetes among Native Hawaiian, Chinese, Filipino, and Japanese elderly compared with whites, Hawai'i, December 2006-December 2010. *Preventing Chronic Disease*, *10*, E123. doi:10.5888/pcd10.120340

Sentell, T. L., Ahn, H. J., Miyamura, J., & Juarez, D. T. (2015). Cost burden of potentially preventable hospitalizations for cardiovascular disease and diabetes for Asian Americans, Pacific Islanders, and Whites in Hawai'i. *Journal of Health Care for the Poor and Underserved*, *26*(Suppl. 2), 63–82. doi:10.1353/hpu.2015.0068

Shen, J., Wilmot, K. A., Ghasemzadeh, N., Malloy, D. L., Burkman, G., Mekonnen, G., …Spurling, L. S. (2015). Mediterranean dietary patterns and cardiovascular health. *Annual Review of Nutrition, 35*, 425-449.

Shintani, T., Beckham, S., O'Connor, H. K., Hughes, C., & Sato, A. (1994). The Wai'anae Diet Program: A culturally sensitive, community-based obesity and clinical intervention program for the Native Hawaiian population. *Hawai'i Medical Journal, 53*, 136.

Sia, C., Tonniges, T. F., Osterhus, E., & Taba, S. (2004). History of the medical home concept. *Pediatrics, 113(5)*, 1473. Retrieved from http://pediatrics.aappublications.org/content/113/Supplement_4/1473.long

Siddiquil, F., Kurbasic, A., Lindblad, U., Nilsson, P. M., & Bennet, L. (2017). Effects of culturally adapted lifestyle intervention on cardio-metabolic outcomes: A randomized controlled trial in Iraqi immigrants to Sweden at high risk for Type 2 diabetes. *Metabolism Clinical and Experimental, 66,* 1-13.

Sinclair, K., Thompson, C., Makahi, E., Shea-Solatorio, C., Yoshimura, S., Townsend, C., & Kaholokula, J. K. (2013). Outcomes for a diabetes self-management intervention for Native Hawaiians and Pacific people: Partners in care. *Annals of Behavioral Medicine, 45*(1)*,* 24-32.

Smedley, B., & Amaro, H. (2016). Advancing the science and practice of place-based intervention. *American Journal of Public Health, 106*(2), 197.

Southcentral Foundation. (2017). *Progress report.* Retrieved from https://www.southcentralfoundation.com/wp-content/uploads/2017/01/Progress-Report_2016.pdf

Stages of change model. (n.d.). Retrieved from http://www.cpe.vt.edu/gttc/presentations/8eStagesofChange.pdf

Stapleton, M., Howard-Thompson, A., George, C., Hoover, R., & Self, T. (2011). Smoking and asthma. *Journal of the American Board of Family Medicine, 24*(3), 313-322*. Retrieved from* http://www.jabfm.org/content/24/3/313.full

Tachibana, F., Orr, J., Davis, J., Heisman, M., & Tam, E. K. (2019). *Association of physician-diagnosed asthma with race in 10-year old Hawai'i Island schoolchildren.* Paper presented at the American Thoracic Society International Conference, Dallas, TX.

Tam, E., Miike, R., Labrenz, S., Sutton, A. J., Elias, T., Davis, J., …Avol, E. (2016). Volcanic air pollution over the island of Hawai'i – Emissions, dispersal, and composition: Association with respiratory symptoms and lung function in Hawai'i Island school children. *Environment International 92-93 (216)*, 543-552.

Tomioka, M. S., Braun, K. L., Ah Cook, V., Compton, M., & Wertin, K. (2014). Improving behavioral and clinical indicators in Asians and Pacific Islanders with diabetes: Findings from a community clinic-based program. *Diabetes Research and Clinical Practice, 104*(2), 220-225.

Tomioka, M. S., Braun, K. L., Compton, M., & Tanoue, L. (2012). Adapting Stanford's chronic disease self-management program to Hawaii's multicultural population. *The Gerontologist, 52*(1), 121-132.

United States Department of Education. (2013). *Data display: Hawai'i. Identification of children with disabilities.* Retrieved from https://www2.ed.gov/fund/data/report/idea/partbspap/2013/hi-acc-stateprofile-11-12.pdf

United States Environmental Protection Agency. (2016). What climate change means for Hawai'i. Retrieved from https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-hi.pdf

University of Hawai'i at Mānoa Sea Grant College Program. (2014). *Climate change impacts in Hawai'i: A summary of climate change and its impacts to Hawaii's ecosystems and communities.* Retrieved from http://climateadaptation.hawaii.gov/wp-content/uploads/2015/11/ICAC-Handbook_16Sept2015.pdf

University of Hawai'i School of Nursing & Dental Hygiene. (2014). *Hawai'i keiki: Healthy and ready to learn.* Retrieved from http://www.nursing.hawaii.edu/hawaiikeiki

Van Sickle, D., Morgan, F., & Wright, A. L. (2003). Qualitative study of the use of traditional healing by asthmatic Navajo families. *American Indian and Alaska Native Mental Health Research, 11*(1)*,* 1-18.

Van Sickle, D., & Wright, A. L. (2001). Navajo perceptions of asthma and asthma medications: Clinical implications. *Pediatrics, 108*(1), E11-E18.

Whitbeck, L. B., Adams, G. W., Hoyt, D. R., & Chen, X. (2004). Conceptualizing and measuring historical trauma among American Indian people. *American Journal of Community Psychology, 33*(3-4), 119-130.

Williams, J. W., Jackson, G. L., & Powers, B. J. (2012). *The patient-centered medical home. Closing the quality gap: Revisiting the state of the science*. Agency for Health Care Research and Quality. Available from www.effectivehealth care.ahrc.gov/reports/final.cfm

Wills, T. A., Pagano, I., Williams, R. J., & Tam, E. K. (2019). E-cigarette use and respiratory disorder in an adult sample. *Drug and Alcohol Dependence, 194*, 363-370. doi:10.1016/j.drugalcdep.2018.10.004

Withy, K. (2015). *Annual report on findings from the Hawai'i physicians workforce assessment project.* University of Hawai'i System Annual Report*.* Retrieved on 23 August 2017 from https://www.hawaii.edu/offices/eaur/govrel/reports/2016/act18-sslh2009_2016_physician-workforce_annual-report.pdf

Wong, W., Anderson, K. M., Dankwa-Mullan, I., Simon, M. A., & Vega, W. A. (2012). *The patient-centered medical home: A path toward health equity?* Discussion paper, Institute of Medicine, Washington, DC. Retrieved on 20 July 2019 from http://nam.edu/wp-content/uploads/2015/06/PatientCenteredMedicalHome.pdf

Wu ,Y., Braun, K., Onaka, A .T., Horiuchi, B. Y., Tottori, C. J., & Wilkens, L. (2017). Life expectancies in Hawai'i: A multi-ethnic analysis of 2010 Life Tables. *Hawai'i Journal of Medicine and Public Health, 76*(1), 9–14.

Yoshimoto, D. K., Robertson, N. T., & Hayes, D. K. (2014). Insights in public health: The Hawai‘i Home Visiting Network – Evidence-based home visiting services in Hawai‘i. *Hawai‘i Journal of Medicine and Public Health, 73*(5), 155-160.

Young, T. L., D’Angelo, S. L., & Davis, J. (2001). Impact of a school-based health center on emergency department use by elementary school students. *Journal of School Health, 71*(5), 196-198.

Yuan, S., Karel, H., & Yuen, S. (2007). *Hawaii’s older adults: Demographic profile.* Honolulu, HI: University of Hawai‘i, Center on the Family. Retrieved from http://uhfamily.hawaii.edu/publications/brochures/OlderAdults_DemographicProfile.pdf



Papa Ola Lōkahi

894 Queen Street | Honolulu, HI 96813 • (808) 597-6550 • www.papaolalokahi.org