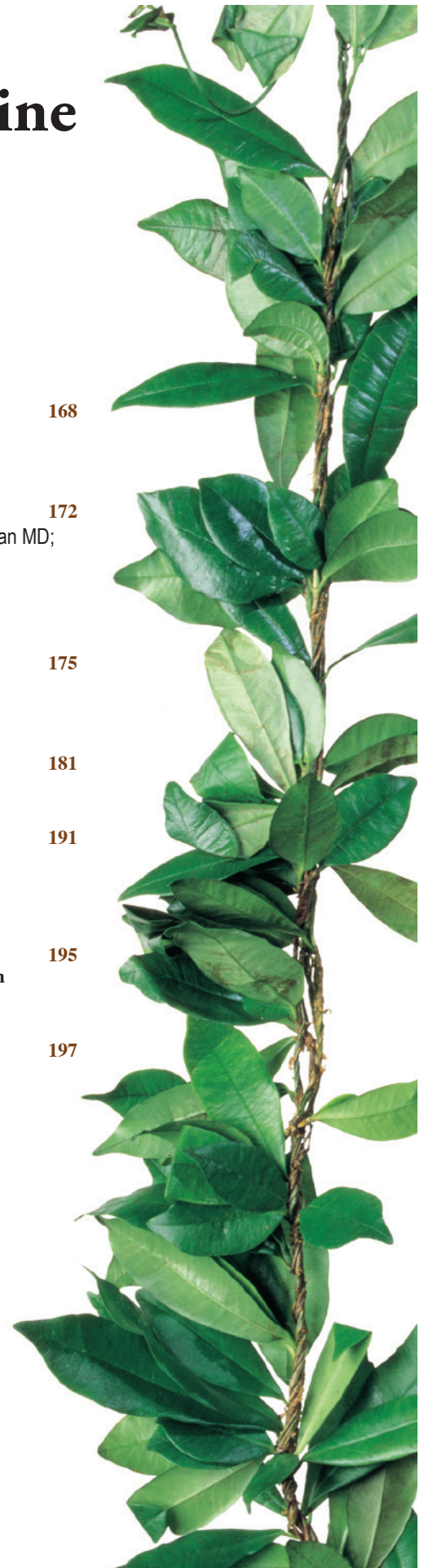


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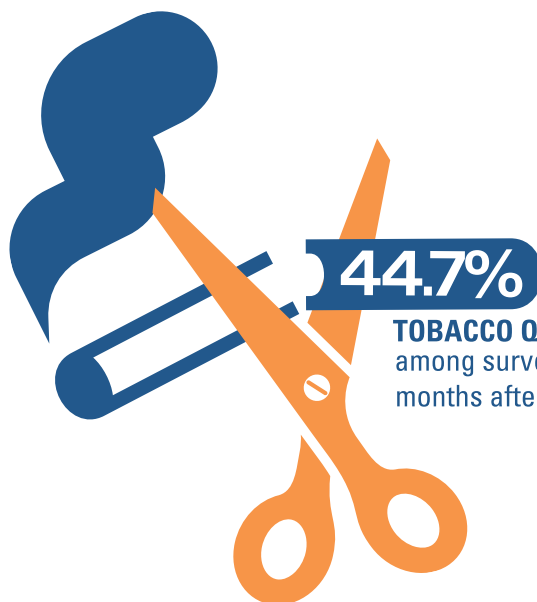
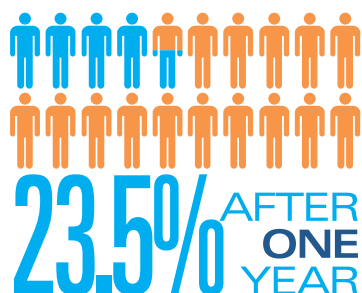
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A Descriptive Study of Marshallese and Chuukese Patients with Diabetes in Hawai'i

Candace Tan PharmD; Stacy Haumea MPH; Deborah Taira Juarez ScD;
and Charlotte Grimm APRN

Abstract

Diabetes is a growing epidemic in the United States with significant racial and ethnic health disparities among minorities. In Pacific Islanders, diabetes ranks as the fifth leading cause of death, higher than the national average. Despite this, little is known about diabetes in this population, and even less so in subpopulations such as Micronesians. To target these high-risk individuals, a federally qualified health center on Hawai'i Island started a multi-disciplinary diabetes care program for two Micronesian populations. This manuscript describes the characteristics of the Marshallese and Chuukese patients with diabetes enrolled in this program. Program enrollees had low socioeconomic status and poor health literacy, as well as high prevalence of co-morbidities commonly linked with diabetes. These findings support the data available on Micronesian populations and highlight the need to develop approaches that will improve health outcomes and bridge health disparities for these individuals.

Keywords

Diabetes, health disparities, Micronesians, Pacific Islanders, Chuukese, Marshallese

Introduction

More than 25 million people, 8.3% of the United States' population, have diabetes.¹ Diabetes is a major cause of both macrovascular and microvascular health complications, making it the seventh leading cause of death in the United States.¹ In the Asian American and Pacific Islander population, diabetes ranks even higher as the fifth leading cause of death.²

Racial and ethnic disparities in incidence, prevalence, and treatment of type 2 diabetes are a public health concern and challenge. Health disparities among Hispanics and African Americans have been well documented in the literature, but little information is known about Pacific Islanders, including Micronesians.³⁻⁶

Because of their small population size, Native Hawaiians and Pacific Islanders (NHPI) are typically grouped together for analysis; nevertheless, it is important to examine subpopulations independently as differences exist between rates of obesity, health status, and healthcare access.⁷ According to the 2010 Census, 1.2 million people, 0.4% of the United States population, identified as NHPI alone or in combination with one or more races. Although the percentage may be small, the NHPI cohort grew more than three times faster than the total United States population, 35% compared to 9.7%, between 2000 and 2010.⁸

Micronesians specifically are the newest and fastest growing group of immigrants to Hawai'i, with the number of immigrants in Hawai'i rising from just 229 in 1986 to 3,355 by 1997, with 60.9% of them living in poverty.⁹ As of 2006, it was estimated that 14,000 Micronesian immigrants lived in Hawai'i, with 15%

of them living on Hawai'i Island.¹⁰ Despite rapid growth, there is limited knowledge of health care and health disparities in NHPI as a whole and even less in its constituent populations.

The information that is available regarding NHPI reflects multiple health disparities and poor health status. Risk factors contributing to metabolic syndrome, including low activity levels, poor diet, tobacco use, and obesity, are high.¹¹⁻¹² This may contribute to a diabetes prevalence that is two to four times higher in NHPI than the general population, afflicting over 20,000 Native Hawaiians in the state.¹³⁻¹⁶ In addition, there are also intra-state health disparities with Hawai'i Island having a higher diabetes incidence than the overall state average.¹⁷ Micronesians suffer disproportionately from diabetes as well, partially due to high levels of obesity.¹⁸⁻²¹ Finally, NHPI are less likely to be aware of their chronic diseases, as well as less likely to be treated.¹⁵

Some efforts have been made to bridge these health disparities and improve quality of care for NHPI. For example, the PILI 'Ohana Pilot Project promoted weight loss in a targeted, culturally adapted approach in five NHPI communities and showed a statistically significant weight reduction after program completion.²²

Reducing disparities in this high-risk population may require focused programs and targeted interventions. There is little data on the socioeconomic and clinical characteristics of Micronesians with diabetes. Hence, the purpose of this study was to describe the characteristics of two Micronesian populations at a federally qualified health center (FQHC) on Hawai'i Island.

Methods

Study Population

Bay Clinic Inc. (BCI) nonprofit community health centers serve the health care needs of Hilo, Puna, and Ka'u on Hawai'i Island. BCI is the only FQHC and safety-net service provider for the communities located in East and South Hawai'i, serving a combined population of 86,156 people. Five clinics provide primary and preventive medical care for those who experience geographic, cultural, financial, and social barriers to healthcare services.

BCI provides healthcare to residents spanning 2,048 square miles of rural and remote geography. The entire area is federally designated as a Medically Underserved Area/Population (MUA/MUP), Dental Health Provider Shortage area, and Mental Health Provider Shortage area. Forty three percent of the service area's residents live below the federal poverty line with 1 in 3 receiving food stamps, and 2 in 5 on Temporary Assistance for Needy

Families (TANF). The regional unemployment rate is 12% with some areas reaching 16%, and the per capita income of \$13,265 is one of the lowest in the state. Within the patient population, 17% of adults and 12% of children are uninsured. The majority (58%) of BCI patients are Medicaid/QUEST beneficiaries; 10% are Medicare beneficiaries, 17% are uninsured and 15% are privately insured. The area hosts a large NHPI population, with 27% of the BCI patient population identifying with only NHPI ancestry.²³

In 2006, in response to the diabetes epidemic, BCI piloted the Bay Clinic Diabetic Project at their Hilo facility based on national standards for diabetes self-management education and support. The program had open enrollment, regardless of level of diabetes control. The Hilo BCI facility hosted two Diabetes Self-Management Education (DSME) programs, one for Chuukese (n=21) and one for Marshallese (n=36) patients. At the end of the trial period, participants showed significant improvements in measured health indicators including glycosylated hemoglobin (A1c) and blood pressure.²⁴

Data Collection

For patients who participated in the program, Marshallese and Chuukese patient data was collected retrospectively from patient charts and the electronic medical record (BCI transitioned from paper charts to electronic medical records during the data collection period).

Health Indicators

Baseline health information, such as number of chronic medication conditions, were collected through identification of all non-acute ICD-9 codes for the patient listed under their past medical history in the medical record.

Clinical health indicators included A1c, low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), triglycerides (TG), total cholesterol (TC), body mass index (BMI) and blood pressure (systolic and diastolic). Information was collected for the fourth quarter of 2010 prior to the integration of clinical pharmacist services. If no data was available during this period then the most recent data going backwards in time was considered baseline.

As this was a descriptive study, no statistical tests were performed. The study was approved as exempt by the University of Hawai'i Institutional Review Board.

Results

Demographic information for Marshallese and Chuukese patients in the Hilo BCI DSME program is summarized in Table 1. The mean age of Micronesian patients with diabetes was 56 years. Overall, 24% of the population completed grade school and 37% completed high school as their highest level of education. Household size tended to be larger for Chuukese, with 21% of Chuukese and 7% of Marshallese having households of 5 to 6 members. Income for 94% of the overall population was less than \$20,000 annually with 79% receiving Medicaid benefits.

Patient health characteristics from the year 2010 for the two groups are summarized in Table 2. The majority (81%) of the Chuukese population were obese, compared to 43% for the Marshallese population. Also, 14% of Chuukese were current smokers, compared to 3% of Marshallese. The study group on average took 4.4 medications with most of these medications targeted for diabetes and chronic disease states including hypertension, dyslipidemia, and other cardiovascular disease.

Table 3 summarizes clinical health indicators for the Micronesian population. The overall BMI average was 32.6. The average A1c was 8.8% (goal <7% for most individuals with diabetes), LDL cholesterol was 105.5 mg/dL, HDL cholesterol was 37.5 mg/dL, and triglycerides were 159 mg/dL.

Discussion

Programs specifically designed for populations with poor health and socioeconomic standing may improve health outcomes for these individuals. This study described the characteristics of participants enrolled in one such program developed for NHPI, specifically a Micronesian subpopulation with diabetes, and examined characteristics of those enrolled in the program. Current data on NHPI health status is limited, with even less information available for Micronesians. What information there is indicates that NHPI have poor health status disproportionate to national averages; data from this study supports this and

Table 1. Demographic Characteristics of Marshallese and Chuukese Patients with Diabetes.

	Overall (n=57)	Marshallese (n=36)	Chuukese (n=21)
Age [Mean (SD)]	56.8 (1.1)	56.0 (1.6)	58.1 (1.9)
Female (%)	44.6	42.9	47.6
Highest Education level (%)			
Some grade school	4.9	3.7	7.1
Grade school graduate	24.4	18.5	35.7
Some high school	14.6	22.2	0
High school graduate	36.6	33.3	42.9
Some college	4.9	7.4	0
College graduate	14.6	14.8	14.3
Income level (%)			
Less than \$20,000	93.8	93.6	94.4
\$20-39,000	4.2	3.2	5.6
\$40,000+	2.0	3.2	0
Household size (%)			
1-2	61.2	70.0	47.4
3-4	26.5	23.3	31.6
5-6	12.2	6.7	21.1
Type of coverage (%)			
Medicaid	78.6	65.7	100
Medicare	1.8	2.8	0
Medicaid and Medicare	5.3	8.3	0

Table 2. Health Characteristics of Marshallese and Chuukese Patients with Diabetes.			
	Overall (n=57)	Marshallese (n=36)	Chuukese (n=21)
Obese (BMI >30) (%)	57.1	42.9	81.0
Current smoker (%)	7.3	2.9	14.3
Former smoker (%)	21.8	20.6	23.8
Hypertension (%)	69.6	65.7	76.2
Dyslipidemia (%)	71.4	80.0	57.1
Coronary artery disease (%)	12.5	8.6	19.0
Stroke (%)	5.4	8.6	0
Condition count [Mean (SD)]	4.4 (0.3)	4.6 (0.3)	4.0 (0.6)
Number of medications (total)	4.4 (0.3)	4.5 (0.4)	4.3 (0.5)
Diabetes	1.5 (0.1)	1.5 (0.2)	1.4 (0.2)
Hypertension	1.0 (0.1)	0.9 (0.2)	1.1 (0.2)
Dyslipidemia	0.8 (0.1)	0.9 (0.1)	0.7 (0.1)
Diabetes medications (%)			
Metformin	69.1	65.7	75.0
Sulfonylurea	30.9	34.3	35.0
DPP4 Inhibitor	1.8	2.9	0
Insulin	30.9	31.4	30.0

Table 3. Clinical Health Indicators of Marshallese and Chuukese Patients with Diabetes.			
	Overall (n=57)	Marshallese (n=36)	Chuukese (n=21)
Weight [Mean Kg (SD)]	83.1 (2.6)	77.9 (3.2)	92.0 (3.5)
Body Mass Index (BMI)	32.6 (0.96)	30.7(1.1)	35.8(1.6)
A1c	8.8 (0.3)	9.1 (0.4)	8.3 (0.3)
LDL	105.5 (.48)	105.2 (6.0)	106.0 (8.2)
HDL	37.5 (0.9)	37.8 (1.3)	37.0 (1.3)
Total Cholesterol	172.6 (5.7)	175.7 (7.6)	167.5 (8.7)
Triglycerides	159.4 (15.5)	173.5 (22.7)	135.9 (16.3)
Systolic Blood Pressure	127.3 (2.7)	126.8 (3.7)	128.3 (3.8)
Diastolic Blood Pressure	76.4 (1.3)	77.2 (1.5)	74.9 (2.7)

further emphasizes the need to target these high-risk groups to improve health and quality of life.

Education level and household income are two common indicators used to evaluate socioeconomic standing, which is closely associated with health status.²⁵ The overall socioeconomic characteristics of the Marshallese and Chuukese enrolled in the DSME program were very similar. About a quarter of the population only completed grade school and a little more than a third completed high school in their home country. Compared to most recent data available regarding completion of grade school in the Pacific Islands, the rate of grade school completion in the study sample was low but this may be compensated for by the

higher rate of high school completion than typically expected. Access to high school education is a particular challenge in the Pacific Islands, with a distinct disadvantage and imbalance in Micronesia and the Marshall Islands. The quality of education is a challenge as well, with regional tests reflecting low reading, writing and basic numeracy skill mastery.²⁶ Therefore in spite of a trend towards higher education levels in the study population, health literacy as observed by program providers remained poor. In addition, most individuals were not fluent in English, which posed a significant barrier to care and required translation services for even basic communication between providers and educators and the patients.

The great majority of patients had an annual income of less than \$20,000, meeting the Hawai'i poverty threshold for any household greater than three individuals.²⁷ Income disparities for those meeting the federal poverty line was even starker for the study population at 94%, compared to the general BCI patient population at 43%. National data (2005-2009) support that morbidity and mortality, unhealthy behaviors, poor access to health care as well as poor quality of care increase with poor socioeconomic status.²⁵ The study data support available information regarding socioeconomic disparities in Pacific Islanders, marking an increased need for better health care and education in this population.

Health insurance coverage is another factor strongly associated with improved health outcomes.²⁵ The majority of those enrolled in the DSME program were insured through Medicaid. Despite high rates of insurance coverage, challenges to quality care still remained. Multiple factors were involved, including coverage cancellation for individuals who travelled out-of-country back to the Marshall or Chuuk Islands for extended periods and poor follow-up rates for others. Poor follow-up rates could possibly be attributed to multiple factors as well, including lack of access to transportation services and long travel distances to the clinic itself in this rural community.

On average, inclusive of diabetes, the study population had 4.4 chronic medical conditions. The obesity rate was higher in this diabetic cohort (57%), compared to state prevalence rate of 23.6%.²⁸ Such high obesity rates may be attributable to multiple factors including poor socioeconomic status, poor health literacy, and diet choices. Obesity not only increases the risk for diabetes, but also hypertension and dyslipidemia, both of which were highly prevalent in the study populations.²⁹

The two populations had similar A1c values with an average of 8.8%, indicating poor diabetes control. However the DSME program started in 2006; the data described reflected patient status in late 2010 and does not evaluate whether or not diabetes control improved since the initiation of the program.

Information from this study contributes to the limited available data on Micronesian populations, reflecting significant health and socioeconomic disparities compared to the general United States population. This high-risk population may receive the most benefit from targeted care programs like the BCI DSME program. Future directions include continued development of such programs and analyses of health indicator outcomes, includ-

ing morbidity and mortality among those receiving such care compared to those receiving standard diabetes care. Addressing health care challenges unique to this patient population, such as language barriers, physical access to care and differences in cultural perception of health and health care may improve outcomes as well.

Disclosure Statement

Stacy Haumea and Charlotte Grimm were employed by Bay Clinic Inc. but this study was not funded or sponsored by the organization. No other authors reported any financial disclosures.

Conflict of Interest

No potential conflicts of interest relevant to this article were reported.

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Congestive Heart Failure: A Case of Protein Misfolding

Chung-Eun Ha PhD; Nadhipuram V. Bhagavan PhD; Miki Loscalzo MT; Stephen K Chan MD; Huy V. Nguyen MD; Carlos N. Rios MD; and Stacey A.A. Honda MD, PhD

Abstract

This article describes an interesting case of a patient presenting with congestive heart failure found to have restrictive cardiomyopathy with initial laboratory evaluation showing hypogammaglobulinemia without a monoclonal band on serum and urine electrophoresis. This case highlights the clinically significant cardiac manifestation caused by protein misfolding, a defect in protein homeostasis. In addition, the utility of a relatively newer laboratory test, serum free light chains as well as the importance of clinical and pathophysiologic correlation is also discussed. We present a relatively uncommon cause of heart disease, cardiac amyloidosis in a patient with a systemic plasma cell dyscrasia, and multiple myeloma.

Keywords

congestive heart failure, cardiac amyloidosis, multiple myeloma, serum free light chains

Case History

A 65-year-old man presented to his primary care physician complaining of shortness of breath, dyspnea on exertion (DOE), and swelling of his legs and ankles. His past medical history included coronary artery disease, chronic obstructive pulmonary disease, congestive heart failure, and a history of prostate cancer surgically treated 10 years prior. He was referred to cardiology and underwent a thallium stress test which showed a decreased ejection fraction of 41% (Normal range 55-65%) and a cardiac catheterization which showed 90% ostial left anterior descending stenosis that was stented. During the course of a year he had repeat cardiac studies which showed ejection fraction of 50-55% with moderate left ventricular hypertrophy as well as a repeated elevated E/E' (early filling/early diastolic mitral annular velocity ratio) of 34 and 22 (Normal range <15%). Other findings on echocardiogram were moderate mitral regurgitation, mild tricuspid regurgitation, and pulmonary artery systolic pressure (PASP) 30 mmHg (Normal range <30 mmHg), left atrial end systolic diameter (LAESD) 4.0 (Normal range 2.0 - 4.0cm), left ventricular end diastolic diameter (LVEDD) 4.2 (Normal range 3.5-5.6 cm), and left ventricular end systolic diameter (LVESD) 2.9 (Normal range 2.0 - 4.0). EKG studies revealed low voltage. These findings were suggestive of diastolic dysfunction. Throughout this time he had no chest pain and no other EKG abnormalities. Subsequently, he developed worsening pleural effusion that was not responsive to diuresis and worsening of his DOE. Lab studies showed elevated serum brain natriuretic peptides (BNPs) in the 300-400 ng/L range (RI <100 ng/L) with normal alanine aminotransferase (ALT), and a normal calculated glomerular filtration rate (GFR) with creatinine ranging between 97.1 - 114.9 $\mu\text{mol/L}$ (RI 44.2-106.1 $\mu\text{mol/L}$). Based on the overall clinical findings the differential diagnosis of an infiltrative myocardial process causing a restrictive

cardiomyopathy was considered. A cardiac MRI was done to evaluate for constrictive or infiltrative disease. There was diffuse endocardial enhancement suggesting an infiltrative process.

A workup for cardiomyopathy was performed which included a serum protein electrophoresis (SPEL), and urine protein electrophoresis (UPEL). The SPEL was abnormal showing hypogammaglobulinemia thus prompting further evaluation including immunofixation electrophoresis (IFE), immunoglobulin levels, as well as serum free light chains. The serum IFE did not show any monoclonal immunoglobulin bands but the serum free kappa/lambda light chain quantitation showed an elevated kappa free light chain of 561.6 mg/L (RI 3.3 - 19.4 mg/L), a low lambda free light chains of 4.2 mg/L (RI 5.7 - 26.3) as well as a markedly elevated serum free kappa/lambda ratio of 134.67 (RI 0.26 to 1.65). Serum IgG, IgM, and IgA levels showed decreased values. Neither UPEL nor IFE revealed any monoclonal immunoglobulin. Concurrently, an abdominal fat pad biopsy was performed which showed a positive Congo red stain for amyloid. A bone marrow biopsy revealed more than 30% plasma cells expressing kappa light chain restriction (by immunohistochemical staining and flow cytometric analysis) as well as amyloid deposits. The patient declined autologous hematopoietic stem cell transplant and treatment for amyloidosis was initiated including bortezomib and dexamethasone. Initially, the patient improved clinically with decreased shortness of breath and DOE. However, despite treatment the patient gradually deteriorated clinically and he expired 6 months after being diagnosed with amyloidosis. Permission for an autopsy was not obtained.

Discussion

Restrictive cardiomyopathy is the least common form of cardiomyopathy and one of the causes is secondary infiltrative myocardial diseases.¹ In the United States, amyloidosis is the most common cause of restrictive cardiomyopathy.² Amyloidosis is a relatively rare systemic disease caused by deposition of misfolded protein in a variety of tissues and organs including the heart.³

Heart disease due to abnormalities of protein homeostasis involving misfolding (giving rise to fibril formation amyloidosis) portends a high degree of morbidity with poor prognosis. The misfolded proteins may arise within the myocardium or may be imported from external entities (eg, immunoglobulin light chains). The former category of misfolding consists of mutations in desmin or its chaperones.⁴ Accumulation of mutant proteins which have the potential to misfold is in part due to defects in intracellular proteolysis involving systems of

ubiquitin-proteasome and/or autophagy.⁵ Twenty seven precursor soluble proteins with organ infiltrative properties which have the potential to form proteolysis resistant extracellular insoluble β -fibril aggregates are known.⁶ The transformation of the precursor proteins to initiate amyloidogenesis may involve intrinsic β -pleated sheet secondary structure with excessive production, selective proteolysis and/or mutations.

In our patient, the initial serum protein electrophoresis showed hypogammaglobulinemia which prompted quantitation of immunoglobulins IgG, IgA, and IgM, serum immunofixation and urine studies. Interestingly, serum and urine protein electrophoresis and immunofixation revealed no evidence of a monoclonal gammopathy, however the serum free light chain ratio was markedly elevated. As this case demonstrates, the relatively new serum free light chain assay, while not determining monoclonality, has been shown to be a valuable addition to the work up of patients suspected of having a plasma cell dyscrasia such as amyloidosis.⁷ In the study by Katzmann, et al, a small percentage (2%) of patients with amyloid-light chain (AL) amyloidosis had only an elevated serum free light chain ratio with no monoclonal protein detected on serum and urine protein electrophoresis or IFE as in our case. In addition, a study by Drayson, et al, has shown that 68% of non-secretory multiple myeloma patients were found to have an abnormal serum free light chain ratio.⁸

There are primary and secondary causes of hypogammaglobulinemia. Secondary hypogammaglobulinemia can be caused by a number of conditions including diseases of immunoglobulin loss or impaired production, high stress, drug induced states, as well as certain malignancies.⁹ Diseases causing immunoglobulin loss include protein-losing enteropathies and chronic renal disease, and impaired production can be seen in certain malignancies such as chronic lymphocytic leukemia (CLL), lymphoma, and multiple myeloma. Drugs implicated in causing secondary hypogammaglobulinemia include anti-rheumatic drugs, systemic steroids, phenytoin, carbamazepine, as well as androgen replacement therapy. Obtaining a good history and clinical assessment of the patient can help direct appropriate laboratory studies. When no other clinical cause for hypogammaglobulinemia is found, primary hypogammaglobulinemia must be considered. In adults, the most common primary cause is common variable immune deficiency (CVID) and selective IgA deficiency.⁹ Laboratory evaluation includes immunoglobulin studies as well as evaluation of the lymphocyte immunophenotyping. Clinical presentation consists primarily of frequent recurrent respiratory tract infections. In this patient, the clinical history and initial lab findings were pivotal in directing further laboratory assessment related to our patient's cardiac findings of CHF with diastolic dysfunction, followed by MRI findings of an infiltrative process causing a restrictive cardiomyopathy. This case study describes misfolding of a circulating amyloidogenic immunoglobulin κ light chain which is targeted to myocardium, giving rise to an infiltrative cardiac amyloidosis.

This is a relatively rare disorder. The overall incidence of amyloidosis is approximately 0.5-1.3 per 100,000. Of all patients with amyloidosis approximately 80% is AL or primary systemic amyloidosis, the type in which cardiac deposition and manifestations are most commonly seen. In the US, there are between 2000-2500 cases of AL amyloidosis diagnosed annually.¹⁰ The diagnosis was established by characteristic findings obtained in EKG, echocardiogram, cardiac MRI, and elevated serum BNP followed by histologic studies of biopsy specimens obtained from abdominal fat pad and bone marrow. The bone marrow aspirate was subjected to flow-cytometry. All of these studies along with an elevated serum BNP level were consistent with the diagnosis of infiltrative amyloidosis cardiomyopathy due to κ -light chain amyloidosis.^{11,12,13} Serum and urine protein electrophoresis and immunofixation electrophoresis did not reveal the presence of any clearly discernible monoclonal band, which if present is considered as surrogate marker for the presence of a monoclonal immunoglobulin. Hypogammaglobulinemia and an abnormal serum free light chain ratio suggested amyloid or multiple myeloma (light chain, non-secretory, or oligosecretory) and the bone marrow studies showing 30-35% plasma cells confirmed the diagnosis of kappa AL with myeloma. Factors that may contribute to the absence of any detectable urinary κ -light chain include a very small quantity of monoclonal kappa secretion as well as the propensity of aggregation of the kappa light chains. The elevated serum free light chain ratio and clinical manifestations of an infiltrative cardiomyopathy are consistent with κ -light chain amyloidosis. Despite treatment for κ -light chain amyloidosis, the patient's cardiac function deteriorated and death occurred after 6 months of the initiation therapy.

This case highlights several educational observations which includes evaluating for causes of hypogammaglobulinemia, the value of serum free light chain assay, the importance of clinical pathologic correlation, as well as the interesting pathophysiologic mechanism of a defect in protein homeostasis leading to significant clinical manifestations. Amyloidosis is a diverse group of disorders of protein misfolding giving rise to β -sheet fibrils. A preferential cardiac organ targeting by amyloidogenic mutant λ -light chains has been previously reported.¹⁴

Conclusion

This case study describes a fatal heart disease caused by an abnormality in protein homeostasis resulting in protein misfolding, namely amyloidogenic κ -light chains targeted to cardiac tissue. The characteristic hypogammaglobulinemia and elevated serum free kappa/lambda light chain ratio despite the absence of Bence-Jones proteinuria along with clinical and histopathologic studies are consistent with a systemic plasma cell dyscrasia with infiltrative cardiac amyloidosis.

Conflict of Interest

None of the authors identify a conflict of interest.

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Is Healthcare Caring in Hawai‘i? Preliminary Results from a Health Assessment of Lesbian, Gay, Bisexual, Transgender, Questioning, and Intersex People in Four Counties

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Abstract

This paper presents findings from a statewide needs assessment of lesbian, gay, bisexual, transgender, questioning, and intersex (LGBTQI) people in Hawai‘i that relate to health status and health-related risk factors such as having health insurance coverage, having a regular doctor, experiencing sexual orientation (SO) or gender identity/expression (GI/E) discrimination in health/mental health care settings, and delaying care due to concerns about SO and GI/E discrimination in Hawai‘i, Honolulu, Kaua‘i, and Maui counties. Results suggest that LGBTQI people in these counties generally rated their self-assessed health as “very good” or “excellent,” but had slightly higher rates of smoking and less health insurance coverage than the general population of Hawai‘i. Many respondents reported challenges to their health, and negative experiences with healthcare. Unlike prior studies that have shown no difference or a rural disadvantage in care, compared to urban locations, Hawai‘i’s counties did not have a clear rural disadvantage. Honolulu and Kaua‘i Counties demonstrated better health indicators and lower percentages of people who had delayed care due to gender identity concerns. Findings suggest that health/mental health care providers should address potential bias in the workplace to be able to provide more culturally competent practice to LGBTQI people in Hawai‘i.

Individual prejudice, social stigma, and systemic discrimination have historically harmed the health and well-being of people identifying as lesbian, gay, bisexual, transgender, questioning, and intersex (LGBTQI).¹⁻⁴ These marginalizing factors produce barriers to optimal health care and potentiate disparate health outcomes among LGBTQI people. For example, in the Lambda Legal national survey, more than half of LGBTQI respondents (N=4916) experienced some form of discrimination in the healthcare system; such experiences were linked to delayed treatment seeking and associated with disparate cancer outcomes, use of alcohol, tobacco, and other drugs, and other poor health/mental health outcomes.¹⁻⁵ The extent of disparities encountered by LGBTQI people is not fully known due to variation among health organizations in collection of information on sexual orientation and gender identity.

Lack of culturally appropriate health and social services that are sensitive to sexual orientation and gender variance deter or delay access to essential healthcare and social services for LGBTQI populations, potentiating disparate health outcomes and uneven access to care.⁶⁻¹⁰ Experiences of sexual orientation or gender identity/expression discrimination can be further complicated by having other stigmatized identities. For example, experiences of discrimination are more likely to occur when racial/ethnic minority status is reported with transgender status,^{4,5,11} suggesting that racial/ethnic minority LGBTQI people may be at most risk for negative health outcomes. In addition, findings have been mixed in regard to geographic location,

with some research suggesting no differences between urban and rural locations while others have found that rural LGBTQI people are at a disadvantage in accessing culturally competent care.¹²⁻¹⁴

The paucity of empirically-derived knowledge has been problematic for developing or maintaining culturally appropriate services in Hawai‘i. The limited research available suggests similar health experiences in the continental United States, namely that LGBTQI people in Hawai‘i have been found to have high rates of smoking,^{11,15} to be at risk of HIV infection,^{6,16} and that transgender women have been found to have high rates of substance use and sexual risk-behaviors that put them at risk for sexually transmitted infections.^{6,11,16} To extend current national and local efforts on closing the gap in health outcomes and needs, and to identify the unique needs of LGBTQI people in Hawai‘i, the researchers analyzed data from a statewide needs assessment among LGBTQI persons and compared health-related variables across four counties. These counties included one county designated by the Census as urban (Honolulu County) and three counties that are designated by the Census as rural (Kaua‘i, Maui, and Hawai‘i Counties) to determine if there are rural/urban differences in the health and healthcare related experiences of LGBTQI people in Hawai‘i.

Methods

Based on collaboration with a variety of LGBTQI-serving groups in the state, and on the perceived need for a broad survey that covers a range of topics rather than one that focused on any one topic, a needs assessment was developed from 2012 to 2013. LGBTQI-serving community groups were instrumental in survey design and implementation, such as by selecting topic areas to be covered, reviewing proposed questions, helping finalize the completed survey instrument, and later recruiting potential participants. After receiving IRB approval from the University of Hawai‘i, data was collected as part of a statewide needs assessment of LGBTQI people in Hawai‘i that was open from June – August of 2013. In addition to demographic questions, identification of LGBT community needs, and questions related to experiences of discrimination and violence, the needs assessment asked health-related questions. Results from the entire needs assessment can be found online, but this report focuses on health-related variables in the needs assessment.¹⁷ Respondents were asked to rate their overall health among five categories (excellent, very good, good, fair, poor), use of tobacco products, whether or not they have a doctor they see

regularly, health insurance coverage and source, and types of chronic conditions. Experiences of sexual orientation (SO) and gender identity or expression (GI/E) discrimination in health/mental healthcare settings were measured by two questions asked twice, once in regard to sexual orientation and once in regard to GI/E: (1) “Have you ever been refused physical or mental health care because of your sexual orientation (gender identity/expression) in Hawai‘i?”, (2) “Have you ever been treated poorly while receiving physical or mental health care because of your sexual orientation (gender identity/expression) in Hawai‘i?” Two additional questions asked about choosing to delay health care seeking due to concerns about either sexual orientation or GI/E: “In Hawai‘i have you ever delayed getting help from social service or health providers due to your sexual orientation (gender identity/expression).”

A variety of recruitment methods were utilized, including (1) snowball sampling by asking key community contacts to refer likely participants, (2) emails sent through a LGBTQI-serving community agency’s listserv, (3) attendance at Pride events in Honolulu, Hilo, and Kaua‘i, and (4) use of social media websites related to LGBTQI services, functions, or events in Hawai‘i. Potential respondents were given the choice of either a paper survey or a card with a link to the online survey at venue-based recruitment sites, and all electronic recruitment through email and social media contained the survey link to the online survey. The three criteria for participation were (1) living in the State of Hawai‘i, (2) identifying as a sexual minority or transgender, and (3) being 18 years or older. Based on these multiple recruitment strategies, 731 people took the survey, however, 21 of those respondents did not meet the criteria and were dropped from the analysis (N = 710).

Due to the complexities of both SO and GI/E, items relevant to these domains included multiple choice items and related open-ended questions where respondents could self-select how they describe their SO or GI/E. For example, respondents were asked the sex coded on their birth certificate (male, female, or other) and then asked to indicate in their own words the term they preferred for describing their current gender identity. Participants were also asked how others perceive their gender identity—ranging from “man all of the time” to “female all of the time” while including options for androgynous or blended. People’s definitions of their own gender identity varied, but for ease of reporting, identities were collapsed into seven categories: (1) cisgender (biological sex is consistent with GI/E) woman, (2) gender nonconforming woman (eg, “butches,” “studs”), (3) transgender woman (including those who identify as *māhūwahine*, *fa’afafine*, etc), (4) transgender man (including *māhūkane*), (5) gender nonconforming man (men who identified as being feminine), (6) cisgender man, and (7) those who identified as androgynous (eg, genderqueer, blended). In regard to SO, when ambiguous terms such as “queer” were cited as primary identity, participants were recoded according to gender (for example, a woman who said she was “gay” was recoded into “lesbian/woman who has sex with women”) to avoid confusing gender and SO. People who identified as

cisgender and heterosexual with no same-sex attractions were dropped from the study, although some participants remained who identified as straight but responded that they were gender nonconforming/transgender, or that they had same sex attractions. No participants specifically self-identified as “intersex,” although a handful of respondents reported having disorders of sexual development, such as androgen insensitivity, and could be classified as intersex individuals by some medical definitions.

Results

The majority of people in the sample identified themselves as men (58.3%), of whom most were cisgender men, gender nonconforming men, and transgender men. Amongst the 40.7% who identified as women, most were cisgender women, followed by gender nonconforming women, and transgender women. One percent identified as androgynous. In regard to SO, the majority identified as gay men or men who have sex with men, followed by women who identified as lesbians or women who have sex with women, then bisexual/pansexual men and women. The age of respondents ranged from 18 to 83, with a mean of 42.8 (SD = 14.8). The percent of respondents (35.2%) who lived in rural counties (Maui, Kaua‘i, and Hawai‘i) closely matched the percent of people living in rural counties in the state population overall. When asked to identify primary racial/ethnic identity, a greater portion of the sample was White (53.4%) than in the overall population of Hawai‘i (26.1%),¹⁴ but otherwise had a diverse set of respondents that reflected the diversity of Hawai‘i, including: Native Hawaiian (12.0%), Japanese (6.6%), Mixed Race/Ethnicity (6.3%), Filipino (5%), Latino/Hispanic (4.0%), Mixed Asian Ethnicities (3.3%), Chinese (2.1%), Pacific Islander (1.4%), Black, (1.3%), Vietnamese, Jewish/Semitic, Samoan, and Korean (1% each), and other races/ethnicities (1.1%).

Health Status-related Variables by County

The majority of participants rated their overall health as “excellent” or “very good.” There were no statistically significant differences between the counties, suggesting that LGBTQI people across the islands share a similar level of overall health. When asked about specific health issues, 42.3% of respondents reported at least one type of chronic physical or mental health condition. This is similar to other reports about the percent of chronic conditions in the state’s general population.¹⁹ Statistically significant differences emerged between the counties ($\chi^2 = 7.87$, $P < .05$), with Honolulu County reporting the lowest percent of chronic conditions and Hawai‘i County reporting the highest. Overall, 18.4% of the sample reporting using tobacco products at least occasionally, with 9% who used regularly. No statistically significant differences emerged between the counties in overall tobacco use.

Barriers to Care

The majority of respondents reported that they had health insurance coverage, and that they received those benefits primarily from their employers (54.6%), followed by the government (17.1%). The percentage of reported not having health insur-

ance (11.1%) is almost twice the percent of people reported as uninsured by the annual Hawai'i Health Survey 2010, suggesting that LGBTQI people may have additional challenges to being insured compared to other residents of Hawai'i.¹⁹ When examining percentages of those lacking health insurance across the islands, there was a statistically significant difference ($\chi^2=9.01$, $P<.05$), with the highest percent of uninsured people in Maui and Hawai'i Counties, and the lowest percent in Kaua'i County. Overall, 27.4% of the sample reported that they did not have a doctor that they saw on a regular basis. No statistically significant difference between the counties emerged, however, the percentages of participants who reported that they do not have a regular medical provider was higher in each county than the percent among all adults in each county reported in the Hawai'i Behavioral Risk Factor Surveillance System (BRFSS: Kaua'i = 14.4%, Maui = 20.2%, Hawai'i = 19.8%, Honolulu = 13.6%).²⁰ To explain some of the challenges of finding a regular doctor, one straight *māhūwahine* said that her community's challenges included a lack of "medical access to hormone therapy and the lack of service providers willing to take on the transgender community as patients. HIV specialized doctors are usually the only ones willing to monitor and administer hormone replacement therapy to the transgender community" highlighting the unique challenges for transgender people seeking a doctor for general medical care, as well as transition-related care.

Discrimination in Healthcare and Other Social Services

Statewide 12.5% reported ever having been refused treatment or treated poorly in health care settings due to SO and 8.9% for GI/E. No significant discrimination differences emerged by county, although this may be due in part to the low number of respondents on Kaua'i who reported these experiences, thus resulting in a low cell size. In response to qualitative questions, respondents highlighted how even well-meaning doctors can still cause discomfort in the medical setting. For example, one cisgender gay man wrote:

"Doctors stereotype me. I recently went to a new doctor for a physical...Despite telling the doctor I am in a 21 year long monogamous relationship with another man, he insisted on checking me for a range of STDs and HIV. He didn't even address any of the concerns for which I went. I felt like the doctor was projecting his own misguided beliefs about gay men onto me...I left without proper medical care for the concerns I had...I doubt that straight couples are subjected to such disrespect of their monogamous relationships of 21 years."

Delaying Care

Percent of respondents who delayed seeking care because of concerns about treatment due to LGBTQI identity were even higher than those who had experienced discrimination in healthcare setting. There was a statistically significant difference in delaying care due to SO across the counties ($\chi^2=10.67$, $P<.01$), although this must be interpreted with caution due to low cell counts for Kaua'i. The relationship remains statistically

significant even when Kaua'i was dropped from the analysis. The lowest percent of delaying seeking health/mental health care due to SO was reported in Kaua'i County (3%), while Maui County reported the highest percent of people who delayed care (19%). There were no statistically significant differences in delaying care due to GI/E among the counties.

A genderqueer gay woman wrote about the negative impact of heterosexism in medical settings:

"Heterosexism appears to be the primary lens that most medical providers use to view their patients. It can be extremely embarrassing as a patient subjected to this and uncomfortable to correct a medical professional. For most of my adult life I didn't go to the doctors (especially gynecologist) due to the medical profession's heterosexist bias."

Discussion

These data indicate that while LGBTQI tend to self-rate their health positively overall, culturally competent healthcare access is of significant concern. Access issues that emerge include insurance coverage, having a consistent medical provider, and discrimination within the healthcare system. Consistent with prior findings of disparities between urban and rural LGBTQI people, rural counties tended to show lower percentages of health insurance coverage, higher percentages of chronic conditions, and higher percentages of people who delayed physical or mental health care due to concerns about their sexual orientation. Structural barriers, such as lack of a consistent medical care provider or health insurance, are cause for concern in overall population health. Receipt of insurance does not guarantee an established source of healthcare; however, it remains an important determinant of utilization. Uninsured persons have poorer health outcomes and are less likely to utilize preventive services.²¹ As noted, respondents in our assessment lack health insurance at almost twice the percentage rate of persons in Hawai'i overall, consistent with previous studies that indicate LGBTQI people are more likely to be uninsured than their heterosexual counterparts.²²⁻²⁴ Lack of insurance is associated with limited healthcare access, poor treatment outcomes, and premature mortality,²⁵⁻²⁸ particularly for medically vulnerable populations such as those with HIV, mental health issues, or cancer, among others.^{25,27,29,30} What is less clear in the data is why Kaua'i County had higher percentages of LGBTQI adults with health insurance compared to other rural counties, while the other two rural counties reported lower insurance coverage than urban Honolulu County.

In addition to challenges in health insurance coverage, this study uncovered the fact that a quarter of respondents report lacking a regular physician. This percentage is considerably higher than the 17.2% of persons who report not having a personal healthcare provider in the state overall.²⁷ Similar to findings about insurance coverage, the percentage of LGBTQI adults in Kaua'i County having a consistent doctor is comparable to all adults in that county, suggesting less disparity than in other counties, where the percentage of LGBTQI adults lacking a regular doctor was significantly higher than among all adults

in the respective counties.²⁰ Having a regular source of medical care is one of the most widely used indicators of access to healthcare.²⁶ Persons without a consistent medical provider are likely to experience less than optimal health outcome and lack longitudinal, comprehensive care.³¹ Taken together, the low percent who have a consistent medical care provider and high percent of uninsured suggest that LGBTQI people in Hawai‘i face barriers to care that may have significant impacts on their health and well-being, and that these barriers to care are experienced differently across counties.

Barriers unique to LGBTQI populations are SO- and GI/E-motivated discrimination in services, and concerns about accessing care due to fears of how health providers will handle SO or GI/E concerns. Approximately 15% of respondents report poor treatment and/or being denied services due to SO or GI/E. Almost 10% delayed seeking care for the same reasons. This is congruous with the emerging literature on stigma and discrimination as a barrier to health and social services among LGBTQI populations. Researchers have emphasized the perceived difficulty in getting care when wanted,³² difficulty accessing LGBTQI-affirmative practitioners,³³ and severe GI/E-bias in provision of services to transgender peoples.⁸ In this case, no differences in the percent of participants who experienced discrimination in services across counties emerged, although similar to other health indicators presented in this study, fewer LGBTQI adults in Kaua‘i reported these experiences compared to respondents in other counties. Similarly, when examining delaying care due to concerns about SO or GI/E, there were no statistically significant findings in regard to GI/E, but the counties differed in percent of participants who delayed care in each county. Again, Kaua‘i County reported the lowest percent of people who had delayed seeking care due to SO, while the other rural counties reported the highest percentage of those delaying care. However, the overall percent of people who identified that they delayed seeking care because of issues around their SO and/or GI/E are cause for concern. These findings suggest that there is still room for improvement among Hawai‘i’s health/mental health providers in developing culturally competent practice that contributes to the health and well-being of LGBTQI people in the state.

Limitations

Methodological limitations of this study must be considered when developing a response to the needs of LGBTQI people in Hawai‘i. Our findings are primarily descriptive and do not imply causality; rather, findings point to the imperative for further research on LGBTQI health outcomes and access to care in Hawai‘i. The disadvantage of aggregating diverse communities of LGBTQI people is the loss of specificity for each community and the possibility of overrepresentation from one or more of the populations. Future analyses that examine the different populations contained under the broad “LGBTQI” umbrella are being conducted to provide more specific findings in the state, while this study can only provide overarching findings between counties. This study did not utilize a probability sample and thus

not likely to be representative of diverse LGBTQI populations dwelling in Hawai‘i. In our study, White participants accounted for more than half of the sample and gender nonconforming or transgender participants made up less than 25% of respondents. Further research on the effect of discrimination on LGBTQI health as disaggregated populations in Hawai‘i is merited, along with research with improved recruitment methods such as popular opinion leader or respondent-driven sampling methods that have been shown to be effective in recruiting hard-to-reach populations. Due to sampling strategies that utilized snowball sampling started through LGBTQI-serving organizations, we are less likely to have accessed the most marginalized people within these LGBTQI communities and/or those who are less likely to be attached to LGBTQI organizations, thereby running the risk of under-reporting the social determinants of health, illness, and disease.

Conclusions

As the United States advances in development of patient-centered medical homes, health/mental health providers in Hawai‘i have a distinct opportunity to provide services that are experienced as caring by all people, regardless of a person’s SO and/or GI/E. Rather than having a clean rural vs urban divide in Hawai‘i, where rural counties have less access, lower levels of overall health, and more experiences of discrimination, results suggest that Kaua‘i County may be a model of healthcare delivery and cultural competence for other counties in Hawai‘i. Although urban Honolulu County may be perceived as having the most access and thus the higher probability of being able to find culturally competent providers, Kauai County emerged as the county with the fewest barriers to care, less discrimination, and lower percentages of people delaying care due to concerns about SO and GI/E. These results also highlight the need for a more culturally competent workforce and the need for training in cultural competence with LGBTQI populations, with particular attention paid to Maui and Hawai‘i Counties, although all counties have room for improvement. Although further research is needed to better uncover the relationships between these barriers to care and health outcomes, health providers in Hawai‘i should critically examine their practices to consider changes that will make their settings more welcoming and inclusive for LGBTQI people, and follow the recommendations of many health organizations, professional associations, and scholars to move toward culturally competent practice with LGBTQI people.^{8,34-36} To promote broad systemic change, training should be made available to all healthcare providers, ancillary, and administrative personnel. Providers should examine their biases and even their well-meaning communications that may be perceived by LGBTQI people as insensitive and function to further alienate LGBTQI people.

Conflict of Interest

None of the authors identify a conflict of interest.

Table 1. Sample Demographics by County					
	Rural Counties			Urban County	State of Hawai'i
	Kaua'i n = 45	Maui n = 78	Hawai'i n = 118	Honolulu n = 445	Total N = 710*
Mean Age (SD)	45.3 (14.4)	47.9 (14.2)	44.3 (15.1)	41.2 (14.8)	42.8 (14.8)
Gender Identity					
Cisgender Woman	13 (28.9%)	17 (21.8%)	28 (23.7%)	132 (29.7%)	27.5%
Gender Nonconforming Woman	4 (8.9%)	6 (7.7%)	11 (9.3%)	43 (9.7%)	9.0%
Trans Woman	2 (4.4%)	6 (7.7%)	2 (1.7%)	20 (4.5%)	4.2%
Trans Man	0 (0.0%)	2 (2.6%)	4 (3.4%)	11 (2.5%)	2.4%
Gender Nonconforming Man	5 (11.1%)	4 (5.1%)	8 (6.8%)	33 (7.4%)	7.3%
Cisgender Man	21 (46.7%)	42 (53.8%)	64 (54.2%)	201 (45.2%)	48.6%
Androgynous	0 (0.0%)	1 (1.3%)	1 (0.8%)	5 (1.1%)	1.0%
Sexual Orientation					
Lesbian/Woman who has Sex with Women	10 (22.2%)	19 (24.4%)	29 (24.6%)	111 (24.9%)	24.2%
Gay/Man who has Sex with Men	25 (55.6%)	40 (51.3%)	68 (57.6%)	205 (46.1%)	40.0%
Bi/Pansexual	7 (15.6%)	14 (17.9%)	14 (11.9%)	86 (19.3%)	17.6%
Asexual	0 (0.0%)	1 (1.3%)	1 (0.8%)	5 (1.1%)	1.0%
Straight	2 (4.4%)	3 (3.8%)	4 (3.4%)	21 (4.7%)	4.2%
Other	1 (2.2%)	1 (1.3%)	2 (1.7%)	17 (3.87%)	3.0%
Primary Race/Ethnicity					
White/Caucasian	28 (62.2%)	49 (63.6%)	70 (59.8%)	217 (49.3%)	53.4%
Native Hawaiian	6 (13.3%)	7 (9.1%)	16 (13.7%)	55 (12.5%)	12.0%
Japanese	1 (2.2%)	3 (3.9%)	4 (3.4%)	37 (8.4%)	6.9%
Mixed	1 (2.2%)	5 (6.5%)	3 (2.6%)	29 (6.6%)	6.3%
Filipino	4 (8.9%)	3 (3.9%)	4 (3.4%)	23 (5.2%)	5.0%
Latino/Hispanic	4 (8.9%)	2 (2.6%)	3 (2.6%)	19 (4.3%)	4.0%
Other	2 (4.5%)	13 (16.9%)	20 (17.1%)	89 (20.3%)	12.0%

* Counts from individual counties do not add to 710 because some respondents chose not to report their county.

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Table 2. Overall Self-reported Health Concerns by County						
	Rural Counties			Urban County	State of Hawai'i	P-value
	Kaua'i n = 45	Maui n = 78	Hawai'i n = 118	Honolulu n = 445	Total N = 710*	
Self-Assessed Health						
Excellent	10 (23%)	16 (21%)	24 (21%)	81 (19%)	19.5%	
Very Good	9 (21%)	33 (42%)	45 (40%)	189 (43%)	41.4%	
Good	19 (44%)	23 (30%)	34 (30%)	133 (30%)	30.8%	
Fair/Poor	5 (11%)	6 (8%)	11 (10%)	36 (8%)	8.3%	
Health Insurance						
No	3 (7%)	13 (17%)	19 (17%)	39 (9%)	11.1%	
Yes, from partner	2 (5%)	6 (8%)	8 (7%)	23 (5%)	5.7%	
Yes, from government	12 (27%)	13 (17%)	23 (20%)	72 (17%)	17.7%	
Yes, from employer	24 (55%)	40 (51%)	56 (49%)	247 (57%)	54.6%	
Yes, other source	3 (7%)	6 (8%)	8 (7%)	56 (13%)	10.9%	
Have a Regular Doctor						
Yes	17 (85%)	55 (75%)	76 (69%)	282 (72%)	72.6%	
Chronic Condition(s)**						
Yes	20 (47%)	36 (49%)	57 (52%)	166 (39%)	42.3%	< .05
Uses Tobacco Products						
Yes	4 (17%)	15 (20%)	24 (22%)	70 (17%)	18.4%	
Experienced Health Care Discrimination						
Sexual Orientation	3 (7%)	12 (17%)	17 (15%)	48 (12%)	12.5%	
Gender Identity or Expression	3 (8%)	10 (14%)	10 (9%)	33 (8%)	8.9%	
Delayed Care						
Sexual Orientation	1 (3%)	13 (19%)	11 (11%)	31 (8%)	8.5%	< .01
Gender Identity or Expression	3 (9%)	9 (14%)	9 (9%)	26 (7%)	7.1%	

*Counts from individual counties do not add to 710 because some respondents chose not to report their county.

**"Chronic conditions" was a yes/no variable based on participants reporting that they had HIV/AIDS, cancer, diabetes, a physical disability, a heart condition, STIs (such as herpes), arthritis, COPD/asthma, a chronic mental health condition, and "other". Participants who reported "other" reported digestive issues, chronic pain, high blood pressure, gonadal issues related to disorders of sexual development or hormone regulation/production issues, and high cholesterol.

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Adverse Childhood Experiences Among Hawai'i Adults: Findings from the 2010 Behavioral Risk Factor Survey

Dailin Ye PhD and Florentina Reyes-Salvail MSc

Abstract

The prevalence of adverse childhood experiences (ACEs) among Hawai'i adults and their impact on the health of affected individuals are unknown. Aiming to provide Hawai'i State baseline information on ACEs and their associations with health conditions and risk behaviors, the 2010 Hawai'i Behavioral Risk Factor Surveillance System (BRFSS) included the ACE module. Using 5,928 survey respondents who completed the module, demographic attributes were estimated and multivariate logistic regression analysis was performed to examine the association between ACEs and sixteen selected health indicators. In 2010, approximately 57.8% of Hawai'i adults reported experiencing at least one ACE. Native Hawaiians had the highest prevalence followed by Whites. Adults aged ≥ 65 years had the lowest prevalence on all ACEs. The prevalence of ACEs was inversely related to education and household income levels. Compared to those without ACEs, adults with ACEs had higher odds for a number of health conditions and risk behaviors. Moreover, as the number of ACEs increased, the odds for these health conditions and risk behaviors increased. Hawai'i adults with ACEs were more likely to report dissatisfaction with life compared to those without ACEs. Men were more likely to report having a family member in prison, while women were more likely to report experiencing sexual abuse. Recommendations include further research on the unbiased contributions of ACEs to diseases and risk behaviors, and the development of culturally-appropriate interventions to reduce the prevalence of ACEs in Hawai'i.

Keywords

Adverse childhood experiences, BRFSS, risk factors for chronic disease

Introduction

Adverse childhood experiences (ACEs) refer to a range of negative life experiences that a person may encounter during childhood. These include, but are not limited to, physical, verbal, or sexual abuse, as well as factors associated with familial dysfunction, such as growing up with a mentally ill, substance abusing, or incarcerated family member; parental separation/divorce; or witnessing domestic violence.^{1,2} Studies have shown that ACEs are common among adults. Kaiser Permanente, in collaboration with the Centers for Disease Control and Prevention (CDC), conducted an ACE study on over 17,000 adult members of a Health Maintenance Organization (HMO) between 1995 and 1997.³ This study found that approximately two-thirds of the participants had at least one ACE. In 2002, the Texas Behavioral Risk Factor Surveillance System (BRFSS) included the ACE survey questions derived from the Kaiser-CDC ACE study and found that 46% of Texan adults reported at least one ACE.⁴

Research suggests that ACEs may affect child development and are associated with a variety of behavioral and health problems later in life.^{3,5} ACEs have been linked to a number of medical conditions, such as autoimmune disease, frequent headaches, ischemic heart disease (IHD), liver disease, chronic obstructive pulmonary disease (COPD), and lung cancer.⁶⁻¹¹ People with

ACEs are at increased risk of smoking, alcohol or drug abuse, and obesity.¹²⁻¹⁹ ACEs are strongly associated with many indicators of poor mental health such as depression, anxiety, hallucinations, a history of suicide attempts, and an increased utilization of psychotropic medications.^{14,20-23} People with ACEs are more likely to engage in high risk sexual behaviors, which in turn contribute to an increased risk of teen pregnancy and sexually transmitted diseases.²⁴⁻²⁷ Moreover, the presence of ACEs is also associated with early initiation of smoking, substance abuse, and sexual activity.^{12,15,24,28} Finally, people with ACEs tend to be less educated, earn less, and are more likely to be unemployed; and, as a result, they also possess many social risk factors for poor health.^{4,29} In sum, research has unequivocally established a strong association between experiencing ACEs and multiple indicators of poor health; the greater the number of ACEs one reports, the poorer one's health.^{1,30}

ACEs have been recognized as important risk factors for adult behavioral and health problems. In 2006, ACE questions were incorporated into an optional module of the BRFSS questionnaire. The 2009 BRFSS ACE module consisted of eleven questions adapted from the Kaiser-CDC ACE study. Five states, (Arkansas, Louisiana, New Mexico, Tennessee, and Washington), included the ACE module in their 2009 BRFSS surveys. These population-based ACE surveys yielded results consistent with prior studies.^{3,4} The report published by CDC in 2010 concluded that approximately 59.4% of respondents in the five states reported one or more ACEs, and 8.7% reported five or more ACEs.² These findings confirmed that ACEs are common among adults. Furthermore, since ACEs are interrelated, exposure to one ACE substantially increases one's probability of exposure to another.^{1,31}

The prevalence of ACEs among Hawai'i adults and their impact on the behavior and health of affected individuals is unknown. The optional ACE module was included for the first time in the 2010 Hawai'i BRFSS survey to provide baseline information on the prevalence of ACEs in Hawai'i, and their associations with health conditions and risk behaviors.

Methods

The Hawai'i BRFSS, sponsored by CDC and implemented by the Hawai'i State Department of Health, is part of the nationwide BRFSS. The BRFSS is a telephone-based survey conducted by trained interviewers who use a standardized questionnaire and computer-assisted telephone interview system to collect data from a probability sample of non-institutionalized adults residing in Hawai'i in households with a landline telephones. The 2010 survey, which included the ACE module, had a response rate of 50%.

The 2010 ACE module consisted of 11 questions, which asked survey participants about events that happened before they were 18 years old (Table 1). Of the 6,552 participants who responded to the 2010 BRFSS survey, 5,928 (90.5%) answered all 11 ACE questions and were included in the analysis.

Questions 2 and 3 were collapsed into an alcohol and drug abuse category, as were questions 9, 10, and 11 into a sexual

abuse category. Therefore, the 11 questions yielded eight ACE categories.² In addition, survey completers who responded with either “Once” or “More than once” to questions 6-11 were collapsed into an “at least once” category. Thus, the analysis for these questions compared individuals who had never experienced these ACEs to those who had experienced them at least once. Using SAS version 9.3 and SUDAAN release 11.0.0,^{32,33}

Table 1. Groups and Categories of ACEs		
Groups and Categories	Questions	Possible Answers
Family dysfunction		
Family member with mental illness	1. Did you live with anyone who was depressed, mentally ill, or suicidal?	1=Yes, 2=No, 7=Don't know / Not sure, 9=Refused
Family member with substance abuse		
Drinking problem	2. Did you live with anyone who was a problem drinker or alcoholic?	1=Yes, 2=No, 7=Don't know / Not sure, 9=Refused
Drug abuse	3. Did you live with anyone who used illegal street drugs or who abused prescription medications?	1=Yes, 2=No, 7=Don't know / Not sure, 9=Refused
Family member in prison	4. Did you live with anyone who served time or was sentenced to serve time in a prison, jail, or other correctional facility?	1=Yes, 2=No, 7=Don't know / Not sure, 9=Refused
Parental separation or divorce	5. Were your parents separated or divorced?	1=Yes, 2=No, 3=Parents not married, 7=Don't know / Not sure, 9=Refused
Witnessing domestic violence	6. How often did your parents or adults in your home ever slap, hit, kick, punch or beat each other up?	1=Never, 2=Once, 3=More than once, 7=Don't know / Not sure, 9=Refused
Abuse		
Physical abuse	7. Before age 18, how often did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way? Do not include spanking.	1=Never, 2=Once, 3=More than once, 7=Don't know / Not sure, 9=Refused
Verbal abuse	8. How often did a parent or adult in your home ever swear at you, insult you, or put you down?	1=Never, 2=Once, 3=More than once, 7=Don't know / Not sure, 9=Refused
Sexual abuse		
Touched by someone	9. How often did anyone at least 5 years older than you or an adult, ever touch you sexually?	1=Never, 2=Once, 3=More than once, 7=Don't know / Not sure, 9=Refused
Made to touch someone	10. How often did anyone at least 5 years older than you or an adult, try to make you touch them sexually?	1=Never, 2=Once, 3=More than once, 7=Don't know / Not sure, 9=Refused
Forced to have sex	11. How often did anyone at least 5 years older than you or an adult, force you to have sex?	1=Never, 2=Once, 3=More than once, 7=Don't know / Not sure, 9=Refused

Table 2. Selected Health Indicators	
Physical health conditions	Heart attack (or myocardial infarction) Angina (or coronary heart disease) Stroke Chronic obstructive pulmonary disease (COPD) Diabetes
Mental health conditions	Lifetime anxiety Lifetime depression Current depression Frequent mental distress (FMD)
Risk behaviors	Current smoking Heavy alcohol consumption (heavy drinking) Binge drinking Physical inactivity
Self-reported general health	Fair or poor general health
Disability	Activity limitation due to health problems
Self-reported life satisfaction	Dissatisfied or very dissatisfied with life

stratification analysis was performed to assess the prevalence of eight ACEs among Hawai'i adults by selected demographic characteristics, including sex, age, ethnicity, education level, and annual household income level. Respondents' ethnicities were based on their answer to the question, "Which group best describes you?" Consistent with the State of Hawai'i's methodology for assigning race-ethnicity, part Native Hawaiians were included in the "Native Hawaiians" category. Age is known to be associated with many risk behaviors and health problems. The association between ACEs and sixteen selected health indicators (Table 2) was examined using multivariate logistic regression analysis, after adjusting for age (18-49, 50-64, and 65 years and older). These three age categories included imputed age for 42 survey respondents with unreported age; the imputation method was developed and validated by CDC, and provided as a calculated variable to the State of Hawai'i. All percentages reported are weighted to the adult population of the state (ages 18 years and older). For all comparative analyses, an alpha (α) of 0.05 was used for tests of significance.

Results

Prevalence of ACEs

Over half (57.8%) of Hawai'i adults reported at least one ACE, and 8.3% reported five or more ACEs (Figure 1). Among adults with one or more ACEs (524,583), only 8.4% reported experiencing ACE once. The prevalence of individual ACEs ranged from 7.1% to 35.0% (Figure 2). Men and women reported similar prevalence of one or more ACEs (Table 3). However, men were twice as likely as women to have a family member in prison (9.7% vs 4.5%), while women were nearly twice as likely to report having ever been sexually abused (13.1% vs 6.7%; Table 4). The prevalence of ACEs decreased with age, from 65.7% among 18-49 year olds to 37.7% among those aged 65 and older. Adults aged ≥ 65 years were also less likely to report multiple ACEs compared to adults at younger ages (Table 3). The prevalence of individual ACEs varied among ethnic groups, with Native Hawaiians having the highest rates in 4 of the 8 ACEs categories (Table 4). Native Hawaiians had the highest prevalence of ACEs overall (74.9%), followed by Whites (63.8 %) and Filipinos (52.0%; Table 3). Adults with lower education or annual household income levels reported more ACEs in almost every ACE category (Tables 3 and 4).

Association of ACEs with selected health indicators

The associations of ACEs with sixteen health indicators, including physical health conditions, mental health conditions, risk behaviors, disability, general health, as well as life satisfaction are shown as adjusted odds ratios (AOR) in Tables 5 and 6. When compared to those with no ACEs, adults with one or more ACEs had significantly higher odds for 11 out of the 16 poor health outcomes, including COPD, lifetime anxiety, lifetime depression, current depression, frequent mental distress (FMD), current smoking, heavy drinking, binge drinking, activity limitation (due to physical, mental or emotional problems), fair or poor general health, and general life dissatisfaction. As the number

of ACEs increased, the odds for these adverse health outcomes increased (Table 6). By ACE category, adults with a mentally ill household member, or parents separated/divorced, were more likely to report angina than those with no ACEs (Table 5), but there was no clear pattern by number of ACEs reported (Table 6). Similarly, the odds for heart attack were significant when four ACEs were reported.

Discussion

Consistent with the findings from the 2009 BRFSS surveys in the five states and by others,^{2,4} this study demonstrated that ACEs, including multiple ACEs, were common among Hawai'i adults. Gender differences have been reported on the prevalence of ACEs. Sexual abuse was the most common ACE to have gender differences, with women being more likely to report having suffered sexual abuse during their childhood than men.^{2,34} Gender differences in the prevalence of physical abuse have not been uniformly reported. While one study suggested that gender is not a risk factor for physical abuse,³⁴ another found that men were more likely to report experiencing physical abuse in childhood than women.³⁵ In Hawai'i, the prevalence of childhood physical abuse in men was significantly higher than that in women. Interestingly, Hawai'i men were twice as likely to report having lived with a family member in prison than women. Findings from the 2009 BRFSS surveys in five states did not demonstrate such a gender difference.²

Hawai'i adults who self-identified as Asian, including Filipinos, Japanese, and Chinese, tended to have lower prevalence of ACEs in most ACE categories compared to Native Hawaiians or Whites. Cultural influences may affect parenting practices and the occurrence of ACEs, as well as the perception and reporting of ACEs, which in turn, may explain the variation of ACE prevalence by ethnic groups. For instance, physical punishment, yelling, and shaming are common and acceptable ways for parents to discipline their children in some countries, including Philippines and China.³⁶⁻⁴¹ Descendants from these countries may not perceive such parenting practices as child abuse and consequently may not report them.³⁹⁻⁴¹ The fear of social stigma may cause some people to deny having experienced certain ACEs. In Chinese culture, maintaining social composure is very important, and openness about familial conflict or shameful events is generally frowned upon.^{42,43}

ACEs decrease with age, with a sharp drop among Hawai'i adults aged 65 years and older. In addition to having the lowest prevalence for all ACEs, adults aged ≥ 65 years were less likely to report multiple ACEs. These findings were similar to those reported by others and could be the result of premature death among adults age 65 years or older with multiple ACEs.^{1,2} In fact, one study showed that adults with six or more ACEs were 2.4 times more likely to die at age 65 years or younger, and they died nearly 20 years earlier on average than those without ACEs.²⁸ The low prevalence of ACEs for this age group could also be the result of recall bias secondary to memory decline associated with normal aging processes or changes in perception of one's past life experiences associated with aging.

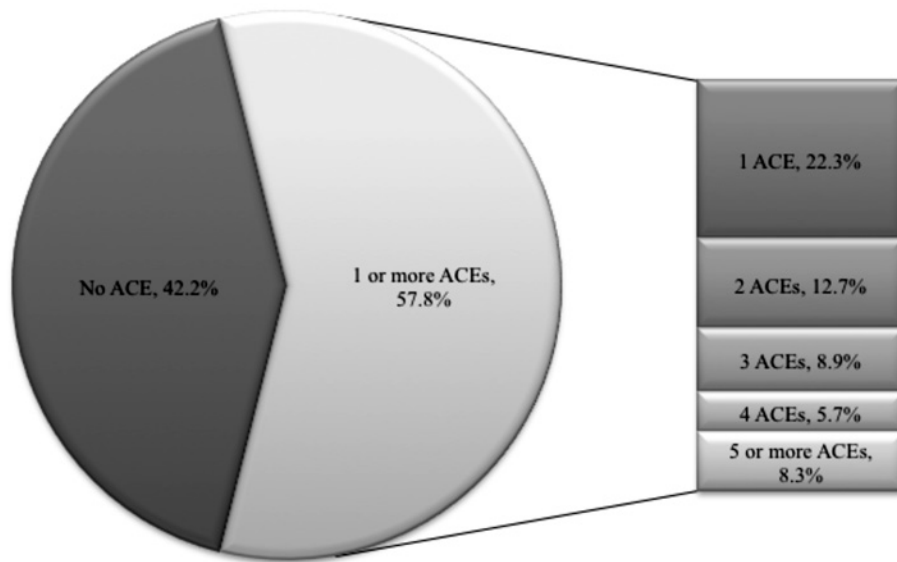


Figure 1. Percentage of Hawai'i Adults Aged ≥18 Years Reporting ACEs by Total ACEs and Number of ACEs.

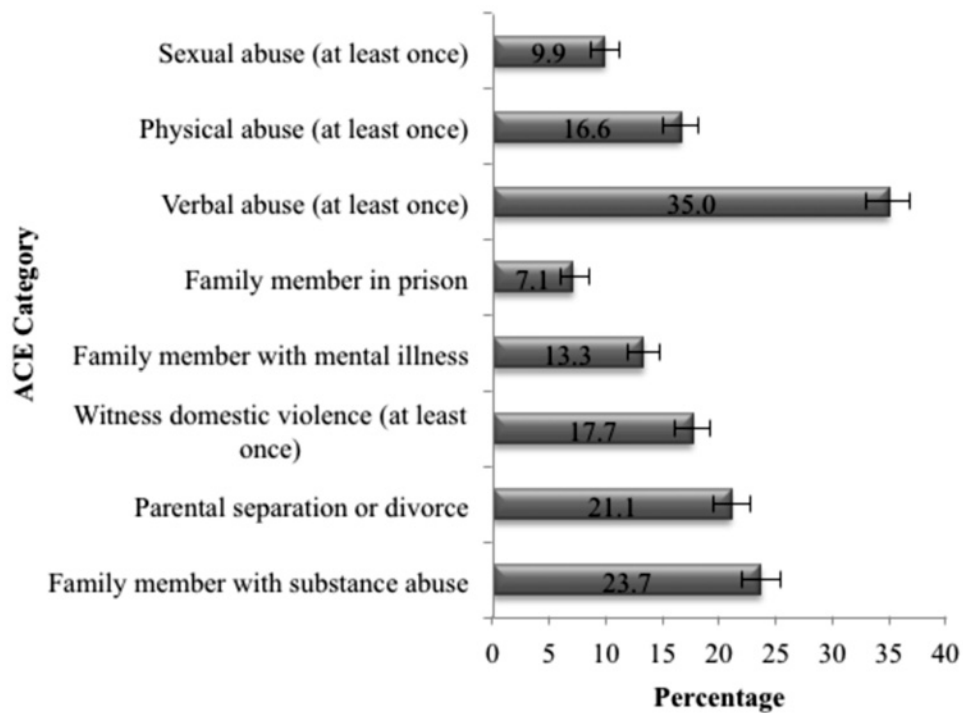


Figure 2. Percentage of Hawai'i Adults Aged ≥18 Years Reporting ACEs by ACE Category.

Table 3. Percentage of Adults Aged ≥18 Years Reporting Adverse Childhood Experiences (ACEs), by Number of ACEs Reported and Selected Demographic Characteristics, Hawai'i Behavioral Risk Factor Surveillance System, 2010

Demographic characteristics	Number of respondents included in the analysis N	no ACEs % (95% CI)	Overall prevalence One or more ACEs % (95% CI)	Number of ACEs (ACE score)				
				1 ACE % (95% CI)	2 ACEs % (95% CI)	3 ACEs % (95% CI)	4 ACEs % (95% CI)	≥5 ACEs % (95% CI)
Total	5928	42.2 (40.3-44.1)	57.8 (55.9-59.7)	22.3 (20.7-23.9)	12.7 (11.4-14.1)	8.9 (7.7-10.1)	5.7 (4.8-6.6)	8.3 (7.1-9.5)
Sex								
Men	2407	40.8 (38.0-43.8)	59.2 (56.2-62.0)	21.8 (19.4-24.3)	13.5 (11.5-15.7)	9.6 (7.9-11.7)	5.4 (4.2-7.0)	8.8 (7.1-11.0)
Women	3521	43.5 (41.1-45.9)	56.5 (54.1-58.9)	22.8 (20.7-24.9)	11.9 (10.4-13.7)	8.1 (6.9-9.6)	5.9 (4.9-7.2)	7.8 (6.5-9.3)
Age group (in years)								
18-49	1863	34.3 (31.5-37.3)	65.7 (62.7-68.5)	22.3 (19.9-25.0)	14.7 (12.6-17.0)	10.7 (9.0-12.7)	6.9 (5.5-8.5)	11.1 (9.2-13.3)
50-64	2088	44.2 (41.4-47.1)	55.8 (52.9-58.6)	23.4 (21.0-26.0)	12.1 (10.4-14.0)	7.5 (6.2-9.1)	5.8 (4.7-7.2)	7.0 (5.7-8.4)
≥65	1977	62.3 (59.5-65.0)	37.7 (35.0-40.5)	20.7 (18.3-23.2)	7.7 (6.4-9.3)	5.4 (4.3-6.7)	2.1 (1.4-3.1)	1.9 (1.3-2.9)
Ethnicity								
Native Hawaiian	687	25.1 (21.0-29.7)	74.9 (70.3-79.0)	22.4 (17.7-27.8)	14.3 (10.9-18.5)	13.2 (9.6-17.8)	10.7 (7.4-15.1)	14.5 (10.2-20.0)
White	2434	36.2 (33.5-39.0)	63.8 (61.0-66.5)	21.1 (18.8-23.5)	13.7 (11.8-15.8)	10.5 (8.9-12.5)	7.2 (5.8-8.9)	11.3 (9.6-13.3)
Filipino	690	48.0 (42.4-53.6)	52.0 (46.4-57.6)	21.2 (17.0-26.1)	14.0 (10.2-18.9)	6.6 (4.4-9.6)	4.6 (2.8-7.4)	5.7 (3.3-9.6)
Japanese	1407	55.2 (51.4-58.9)	44.8 (41.1-48.6)	25.7 (22.5-29.2)	10.4 (8.1-13.3)	4.8 (3.4-6.8)	1.4 (0.8-2.3)	2.5 (1.5-4.1)
Chinese	296	59.7 (52.2-66.9)	40.3 (33.1-47.8)	20.3 (15.1-26.6)	9.6 (6.0-15.0)	5.8 (2.7-12.2)	4.1 (1.8-8.9)	0.5 (0.1-2.2)
Others	414	32.2 (25.7-39.5)	67.8 (60.5-74.3)	20.6 (15.4-27.2)	12.8 (8.9-17.9)	13.5 (9.0-19.8)	7.5 (4.7-11.8)	13.4 (8.9-19.8)
Education								
High school or less	1837	38.6 (35.3-42.1)	61.4 (57.9-64.7)	19.9 (17.3-22.8)	12.6 (10.4-15.4)	10.7 (8.5-13.3)	6.0 (4.5-8.1)	12.1 (9.8-14.9)
Some college	1647	40.8 (37.2-44.4)	59.2 (55.6-62.8)	22.3 (19.3-25.6)	13.4 (11.0-16.2)	9.0 (7.1-11.3)	5.6 (4.3-7.3)	9.0 (6.8-11.8)
College and above	2440	46.4 (43.6-49.2)	53.6 (50.8-56.4)	24.4 (21.9-27.0)	12.2 (10.4-14.3)	7.2 (5.9-8.7)	5.4 (4.3-6.9)	4.4 (3.5-5.4)
Annual household income								
<\$35,000	1897	38.9 (35.4-42.5)	61.1 (57.5-64.6)	21.8 (18.7-25.2)	11.8 (9.4-14.6)	11.2 (8.9-14.0)	5.0 (3.8-6.6)	11.4 (8.9-14.4)
\$35,000-\$74,999	1883	42.4 (39.3-45.7)	57.6 (54.3-60.7)	20.6 (18.1-23.3)	13.4 (11.2-15.9)	9.5 (7.7-11.7)	6.6 (5.1-8.5)	7.5 (5.9-9.6)
≥\$75,000	1722	44.7 (41.5-48.0)	55.3 (52.0-58.5)	24.5 (21.8-27.5)	12.5 (10.5-14.8)	6.4 (5.2-8.0)	5.4 (4.1-7.1)	6.5 (5.1-8.3)
Unknown	426	42.8 (35.9-49.9)	57.2 (50.1-64.1)	21.6 (16.3-27.9)	14.2 (9.6-20.5)	8.2 (4.7-14.1)	5.8 (2.8-11.8)	7.5 (3.7-14.4)

CI=confidence interval.

ACEs have been linked to socioeconomic disadvantages in adulthood. A higher prevalence of ACEs has been observed among people with lower educational achievement, lower household income and those unable to work.⁴ Consistent with these findings, a higher prevalence of ACEs was observed among Hawai'i adults with less than a college education and among Hawai'i adults with household incomes less than \$75,000. Socially disparate groups were also more likely to have multiple ACEs. Previous studies have found that ACEs were associated with a number of health conditions. For instance, people with four or more ACEs have a higher odds for diabetes than those without ACEs.¹ There is a significant dose-response relationship between ACEs and IHD,^{1,8} with all but one ACE increasing the risk of IHD.⁸ People with four or more ACEs are more than twice as likely to have a stroke than those with none.¹ In contrast to the findings by others, this study found no relationship between having one ACE and experiencing a heart attack,

angina, stroke, or diabetes among Hawai'i adults. However, the presence of multiple ACEs was associated with increased odds of experiencing a heart attack or angina. COPD showed a strong relationship with ACEs, which was consistent with findings by others.¹

The literature has consistently linked ACEs to mental health problems in adulthood. People with a history of childhood physical abuse have significantly higher lifetime rates of anxiety disorders than those without such a history.¹⁴ ACEs have been strongly associated with lifetime depression and recent depression and in a significant dose-response manner.²⁰ Similarly, this study found that reports of lifetime anxiety, lifetime depression, and current depression were significantly higher among Hawai'i adults with ACEs than those without ACEs. Increasing numbers of ACEs were associated with increased odds of having these mental health conditions.

Table 4. Percentage of Adults Aged ≥18 Years Reporting Adverse Childhood Experiences (ACEs), by ACE Category and Selected Demographic Characteristics, Hawaii Behavioral Risk Factor Surveillance System, 2010

Demographic characteristics	Number of respondents included in the analysis	ACE category								
		Family member with mental illness % (95% CI)	Family member with substance abuse % (95% CI)	Family member in prison % (95% CI)	Parental separation or divorce % (95% CI)	Witness domestic violence % (95% CI)	Physical abuse % (95% CI)	Verbal abuse % (95% CI)	Sexual abuse % (95% CI)	
Total	N	5928	13.3 (12.0-14.7)	23.7 (22.1-25.4)	7.1 (6.0-8.4)	21.1 (19.5-22.7)	17.7 (16.2-19.3)	16.6 (15.1-18.2)	35.0 (33.1-36.9)	9.9 (8.8-11.2)
Sex										
Men	2407	12.8 (10.8-15.0)	25.4 (22.8-28.2)	9.7 (7.8-12.1)	20.9 (18.6-23.5)	17.7 (15.5-20.2)	18.2 (16.0-20.7)	37.0 (34.1-40.0)	6.7 (5.3-8.5)	
Women	3521	13.8 (12.2-15.7)	22.0 (20.1-24.1)	4.5 (3.5-5.8)	21.2 (19.2-23.4)	17.6 (15.8-19.7)	15.0 (13.2-17.0)	33.0 (30.7-35.4)	13.1 (11.5-14.9)	
Age group (years)										
18-49	1863	16.8 (14.7-19.3)	27.5 (24.8-30.3)	10.0 (8.2-12.3)	27.0 (24.5-29.8)	20.4 (18.0-23.0)	19.5 (17.2-22.1)	42.7 (39.7-45.8)	10.8 (9.0-12.9)	
50-64	2088	11.8 (10.3-13.6)	23.4 (21.1-25.9)	4.7 (3.5-6.2)	16.5 (14.6-18.6)	17.3 (15.2-19.5)	15.5 (13.7-17.5)	32.6 (30.0-35.2)	10.6 (9.1-12.4)	
≥65	1977	4.9 (3.9-6.2)	13.2 (11.4-15.2)	1.7 (1.0-2.7)	9.7 (8.0-11.7)	10.3 (8.7-12.2)	9.4 (7.8-11.3)	15.6 (13.7-17.7)	6.5 (5.3-8.0)	
Ethnicity										
Native Hawaiian	687	15.7 (11.7-20.7)	39.0 (33.3-45.0)	13.3 (9.1-18.9)	30.6 (25.5-36.2)	31.2 (25.9-37.0)	25.1 (20.0-31.0)	47.4 (41.6-53.3)	12.9 (9.3-17.5)	
White	2434	19.9 (17.6-22.3)	29.4 (26.8-32.1)	6.2 (4.8-8.0)	27.9 (25.3-30.7)	16.9 (14.9-19.1)	19.3 (17.2-21.7)	38.5 (35.7-41.3)	13.9 (12.1-15.9)	
Filipino	690	9.9 (6.7-14.2)	17.2 (13.4-21.8)	7.5 (4.9-11.3)	13.7 (10.2-18.2)	18.7 (14.5-23.8)	17.4 (13.4-22.3)	31.3 (26.1-37.0)	5.1 (3.1-8.1)	
Japanese	1407	6.8 (5.0-9.1)	11.8 (9.7-14.2)	2.1 (1.1-4.0)	10.3 (8.1-13.1)	10.0 (8.0-12.4)	7.2 (5.5-9.3)	27.0 (23.6-30.7)	4.7 (3.2-6.9)	
Chinese	296	5.1 (3.0-8.8)	11.1 (6.8-17.5)	2.0 (0.7-6.2)	8.9 (5.4-14.4)	11.3 (6.8-18.1)	7.5 (4.3-12.9)	27.0 (23.6-30.7)	4.7 (3.2-6.9)	
Others	414	15.7 (10.7-22.3)	32.5 (25.9-39.9)	16.0 (10.7-23.3)	32.3 (25.7-39.6)	22.8 (17.4-29.4)	23.3 (17.6-30.2)	39.7 (32.8-47.0)	16.1 (11.0-22.8)	
Education										
High school or less	1837	14.5 (11.9-17.6)	28.8 (25.5-32.3)	10.9 (8.6-13.8)	26.7 (23.5-30.1)	21.7 (18.8-24.9)	20.6 (17.8-23.7)	36.3 (32.8-39.9)	11.3 (9.0-14.1)	
Some college	1647	14.2 (11.7-17.0)	24.0 (21.0-27.3)	8.2 (6.0-11.2)	23.3 (20.2-26.6)	17.8 (15.0-21.0)	16.8 (13.9-20.1)	36.4 (32.8-40.1)	9.1 (7.3-11.3)	
College and above	2440	11.6 (10.0-13.4)	18.9 (16.9-21.2)	2.8 (1.9-4.1)	14.4 (12.5-16.5)	13.9 (12.1-16.0)	12.9 (11.2-14.8)	32.7 (30.0-35.5)	9.3 (8.0-10.9)	
Annual household income										
<\$35,000	1897	15.9 (13.1-19.2)	26.7 (23.4-30.2)	9.8 (7.6-12.7)	25.4 (22.1-29.0)	20.2 (17.2-23.6)	19.7 (16.8-22.9)	36.2 (32.5-40.1)	12.4 (9.8-15.5)	
\$35,000-\$74,999	1883	14.4 (12.2-17.0)	23.4 (20.7-26.3)	5.9 (4.2-8.1)	19.5 (17.0-22.3)	18.9 (16.4-21.7)	17.1 (14.7-20.0)	35.4 (32.2-38.7)	9.3 (7.7-11.3)	
≥\$75,000	1722	11.1 (9.3-13.2)	20.7 (18.3-23.4)	3.9 (2.8-5.5)	18.0 (15.6-20.6)	14.9 (12.8-17.3)	13.6 (11.5-16.0)	34.3 (31.3-37.5)	10.0 (8.2-12.1)	
Unknown	426	9.3 (5.4-15.5)	25.6 (19.0-33.6)	13.4 (8.0-21.7)	23.3 (17.5-30.3)	15.4 (10.3-22.4)	15.7 (10.4-23.0)	32.0 (25.1-39.7)	4.1 (2.5-6.9)	

CI=confidence interval.

Table 5. Association of ACEs with Health Conditions and Unhealthy Behaviors by ACE Category, Hawai'i Behavioral Risk Factor Surveillance System, 2010									
Health conditions or unhealthy behaviors	Number of respondents included in the analysis with health conditions or unhealthy behaviors N	ACE category ^a							
		Family member with mental illness	Family member with substance abuse	Family member in prison	Parental separation or divorce	Witness domestic violence	Physical abuse	Verbal abuse	Sexual abuse
		AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Physical health conditions									
Heart attack	265	1.8 (0.8-3.9)	1.7 (1.0-2.7)	2.7 (0.9-8.2)	1.1 (0.7-1.9)	1.6 (1.0-2.5)	1.6 (1.0-2.5)	1.3 (0.8-2.0)	1.5 (0.9-2.5)
Angina	225	2.1 (1.1-3.8)	1.5 (1.0-2.4)	1.1 (0.5-2.6)	2.0 (1.1-3.8)	1.6 (1.0-2.6)	1.7 (1.0-2.7)	1.5 (1.0-2.3)	1.6 (0.9-2.7)
Stroke	226	1.5 (0.8-2.8)	1.5 (0.9-2.4)	0.7 (0.3-1.8)	1.5 (0.9-2.5)	1.5 (0.9-2.5)	1.9 (1.2-3.1)	1.4 (0.9-2.1)	1.1 (0.6-1.9)
COPD	250	2.3 (1.4-3.6)	1.9 (1.2-2.8)	3.1 (1.6-6.1)	1.8 (1.1-2.8)	2.1 (1.4-3.3)	2.3 (1.5-3.5)	2.1 (1.4-3.2)	2.5 (1.6-4.0)
Diabetes	640	0.5 (0.4-0.8)	0.8 (0.6-1.1)	0.8 (0.4-1.5)	0.8 (0.6-1.2)	1.1 (0.7-1.5)	1.0 (0.7-1.4)	0.8 (0.6-1.1)	0.5 (0.3-0.9)
Mental health conditions									
Lifetime anxiety	570	7.7 (5.3-11.1)	4.4 (3.1-6.2)	4.5 (2.6-8.1)	3.7 (2.6-5.3)	3.5 (2.4-5.0)	4.8 (3.4-6.9)	4.1 (3.0-5.7)	7.4 (5.1-10.7)
Lifetime depression	649	11.3 (7.8-6.4)	5.1 (3.6-7.2)	5.9 (3.4-10.4)	4.0 (2.8-5.8)	4.2 (3.0-6.1)	5.9 (4.1-8.3)	4.7 (3.4-6.6)	9.2 (6.4-13.4)
Current depression	307	10.1 (6.6-5.5)	5.8 (3.9-8.6)	9.7 (5.4-17.4)	4.8 (3.1-7.5)	5.5 (3.6-8.4)	7.8 (5.0-12.0)	6.4 (4.4-9.4)	7.4 (4.8-11.5)
FMD	414	5.0 (3.3-7.5)	3.7 (2.6-5.4)	4.0 (2.2-7.1)	3.0 (2.0-4.6)	3.4 (2.2-5.1)	4.7 (3.2-7.0)	3.4 (2.3-4.8)	4.3 (2.8-6.8)
Unhealthy behaviors									
Current smoking	764	2.5 (1.8-3.5)	2.9 (2.2-3.8)	3.8 (2.4-5.9)	3.1 (2.3-4.1)	3.0 (2.2-4.0)	3.2 (2.4-4.3)	2.5 (2.0-3.3)	2.7 (1.9-3.8)
Heavy drinking	413	2.6 (1.6-4.2)	2.9 (1.9-4.2)	4.4 (2.4-8.1)	1.6 (1.1-2.4)	2.2 (1.5-3.4)	2.3 (1.5-3.5)	2.0 (1.4-3.0)	1.8 (1.0-3.1)
Binge drinking	807	2.0 (1.4-2.8)	2.2 (1.7-2.9)	2.8 (1.8-4.4)	1.5 (1.1-2.0)	1.8 (1.3-2.5)	1.6 (1.1-2.2)	1.8 (1.4-2.3)	1.5 (1.0-2.2)
Physical inactivity	1104	0.9 (0.6-1.2)	0.9 (0.7-1.1)	0.9 (0.6-1.4)	0.9 (0.7-1.2)	1.0 (0.7-1.3)	1.0 (0.7-1.3)	0.9 (0.7-1.2)	1.1 (0.8-1.6)
General health									
Fair or poor general health	950	1.9 (1.4-2.6)	1.5 (1.2-2.0)	2.8 (1.7-4.6)	1.5 (1.1-1.9)	1.6 (1.2-2.2)	3.2 (2.4-4.2)	1.7 (1.3-2.1)	1.9 (1.3-2.7)
Disability									
Activity limitation due to health problem	1221	3.8 (2.8-5.1)	2.8 (2.1-3.6)	3.4 (2.2-5.4)	2.4 (1.8-3.2)	2.6 (2.0-3.4)	2.0 (1.4-2.7)	2.8 (2.2-3.6)	4.3 (3.1-5.9)
Life satisfaction									
Dissatisfied or very dissatisfied life	213	8.6 (4.9-15.1)	5.7 (3.4-9.6)	10.7 (5.1-22.8)	4.4 (2.6-7.6)	4.0 (2.3-7.0)	6.5 (3.9-10.8)	5.2 (3.2-8.3)	5.6 (3.2-9.6)

AOR=adjusted odds ratio (odds ratio was adjusted for age group in years: 18-49, 50-64, and ≥65.)

CI=confidence interval.

COPD=Chronic Obstructive Pulmonary Disease.

FMD=frequent mental distress.

Bolded numbers indicate significant difference compared to referent.

^aReference group is individuals with no ACEs.

Table 6. Association of ACEs with Health Conditions and Unhealthy Behaviors by Number of ACEs Reported, Hawai'i Behavioral Risk Factor Surveillance System, 2010

Health conditions or unhealthy behaviors	Number of respondents included in the analysis with health conditions or unhealthy behaviors N	Number of ACEs (ACE score) ^a					
		Over all One or more ACEs	1 ACE (respondents reported 1 ACE)	2 ACEs (respondents reported 2 ACEs)	3 ACEs (respondents reported 3 ACEs)	4 ACEs (respondents reported 4 ACEs)	≥ 5 ACEs (respondents reported 5 or more ACEs)
		AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Physical health conditions							
Heart attack	265	1.2 (0.8-1.7)	0.7 (0.4-1.1)	1.5 (0.9-2.6)	0.8 (0.5-1.5)	3.3 (1.2-9.0)	2.1 (1.0-4.3)
Angina	225	1.4 (1.0-2.1)	1.0 (0.5-1.9)	1.8 (1.1-3.2)	1.3 (0.7-2.5)	1.7 (0.8-3.7)	2.7 (1.3-5.6)
Stroke	226	1.3 (0.9-1.9)	1.0 (0.6-1.7)	1.6 (0.9-2.9)	1.2 (0.6-2.5)	2.0 (0.9-4.5)	1.8 (0.9-3.5)
COPD	250	1.7 (1.2-2.4)	1.1 (0.6-2.2)	1.5 (0.9-2.6)	2.8 (1.6-4.6)	2.6 (1.3-5.1)	2.7 (1.5-4.8)
Diabetes	640	0.9 (0.7-1.2)	1.0 (0.8-1.4)	0.7 (0.4-1.0)	1.1 (0.6-1.8)	0.8 (0.4-1.4)	0.7 (0.4-1.2)
Mental health conditions							
Lifetime anxiety	570	3.4 (2.5-4.5)	1.8 (1.2-2.6)	3.3 (2.1-5.2)	3.2 (2.0-5.3)	6.8 (4.1-11.2)	7.1 (4.7-10.7)
Lifetime depression	649	4.0 (3.0-5.5)	2.0 (1.4-3.0)	4.2 (2.8-6.3)	4.6 (2.9-7.3)	6.5 (3.9-10.9)	9.1 (6.0-13.8)
Current depression	307	4.6 (3.2-6.6)	2.2 (1.4-3.6)	4.7 (2.7-8.2)	3.8 (2.1-6.8)	6.9 (3.7-12.9)	12.8 (8.0-20.6)
FMD	414	2.8 (2.0-3.9)	1.5 (0.9-2.3)	3.3 (2.0-5.3)	2.4 (1.3-4.6)	5.6 (3.2-9.8)	5.0 (3.2-8.0)
Unhealthy behaviors							
Current smoking	764	2.3 (1.8-2.9)	1.7 (1.2-2.3)	1.9 (1.3-2.7)	2.2 (1.5-3.3)	3.3 (2.1-5.2)	4.4 (3.0-6.4)
Heavy drinking	413	1.9 (1.3-2.7)	1.4 (0.9-2.1)	1.4 (0.9-2.3)	2.8 (1.6-4.9)	2.4 (1.2-4.8)	3.1 (1.8-5.2)
Binge drinking	807	1.7 (1.3-2.3)	1.6 (1.2-2.2)	1.1 (0.7-1.6)	2.2 (1.5-3.3)	2.3 (1.5-3.6)	2.0 (1.4-3.0)
Physical inactivity	1104	1.0 (0.8-1.2)	1.1 (0.9-1.5)	0.8 (0.6-1.2)	0.8 (0.6-1.2)	0.9 (0.6-1.4)	1.0 (0.6-1.4)
General health							
Fair or poor general health	950	1.5 (1.2-1.9)	1.2 (0.9-1.7)	1.6 (1.1-2.2)	1.9 (1.3-2.8)	1.4 (0.9-2.2)	2.3 (1.5-3.5)
Disability							
Activity limitation due to health problem	1221	2.3 (1.8-2.8)	1.7 (1.3-2.3)	2.0 (1.5-2.8)	2.5 (1.7-3.6)	3.3 (2.2-4.9)	4.6 (3.1-6.6)
Life satisfaction							
Dissatisfied or very dissatisfied life	213	4.5 (2.9-7.1)	2.9 (1.6-5.3)	3.8 (2.0-7.2)	6.6 (3.3-13.4)	5.0 (1.8-14.1)	8.8 (4.9-15.8)

AOR=adjusted odds ratio (odds ratio was adjusted for age group in years: 18-49, 50-64, and ≥65.)

CI=confidence interval

COPD=Chronic Obstructive Pulmonary Disease

FMD=frequent mental distress

Bolded numbers indicate significant difference compared to referent

^aReference group is individuals with no ACEs

Studies have found that ACEs are strongly associated with smoking.^{1,12,13} Compared to those without ACEs, people with multiple ACEs had a significantly increased risk for several smoking behaviors, including early smoking initiation, a history of smoking, current smoking, and heavy smoking.^{1,12,13} Similarly, this study found that ACEs were strongly associated with current smoking. As the number of ACEs increased, the risk for current smoking also increased.

This study also found that adults with ACEs were at an increased risk for heavy and binge drinking, compared to those with no ACEs; moreover, the corresponding AORs were significantly higher among those with three or more ACEs. One ACE study reported that people with four or more categories of ACEs had an increased risk for physical inactivity, compared to those with none.¹ This study failed to demonstrate a relationship between ACEs and physical inactivity among Hawai'i adults.

An overwhelming body of evidence demonstrates that people with ACEs are more likely to report poor general health compared to those without ACEs.^{4,30,44} In a study of the long-term health effects of physical, sexual, and emotional abuse during childhood in women, researchers found that abused women reported lower ratings of their overall health compared to those with no abuse history.³⁰ Their results showed that the greater the amount of childhood abuse, the poorer one's adult health. Another study also found a significant dose-response relationship between the number of ACEs and poor self-rated health.¹ Consistent with these, this study found that Hawai'i adults with ACEs were significantly more likely to report fair or poor general health, compared to those with no ACEs. In addition, adults with ACEs were at significantly higher odds for activity limitations due to health problems, compared to adults without ACEs. A higher number of ACEs significantly increased the odds for experiencing activity limitations. Furthermore, adults with ACEs were significantly more likely to report dissatisfied lives. The AOR for dissatisfaction increased as the number of ACEs reported increased.

Limitations

This study is subject to several limitations. First, the 2010 BRFSS survey was a random telephone survey of residential households with landlines. Therefore, adults who had no landline telephone access and people who were institutionalized were not represented in the sample. Second, severely impaired adults might have failed to participate or complete the survey, consequently affecting the estimates. Third, responses to BRFSS questions were a self-report of retrospective events, subject to recall bias, with no validation of the exposures. Fourth, due to the sensitivity of ACE topics, underreporting of exposures was a likely but immeasurable confounder. Fifth, some associations with ACEs may have been missed due to small sample size for some chronic conditions. Sixth, because ACE responses of "Once" and "More than once" were combined into an "at least once" category; this study failed to address the differential impact of more persistent experiences of ACEs, compared to one-time events. Nevertheless, fewer than 9% of adults reporting one or

more ACEs had only experienced one ACE. Because of these limitations, the prevalence of ACEs in this report may have underestimated the true prevalence of ACEs among Hawai'i adults. The findings of this study may not be generalizable to the other populations due to the state's diverse population. Additionally, because BRFSS is a cross-sectional survey, no causal relationships can be inferred from this study. The data here should be interpreted as associations only. Despite many potential confounders in the association between ACEs and health conditions, the odds ratios were only adjusted for age, as age was assessed to be the most impactful confounder. Additional variables were not adjusted for to maximize the power of the associations.

It is known that genetic makeup and lifestyle may play important roles in the development of diseases and contribute to certain behaviors among ethnic groups. However, the role of ACEs as a modifier in the development of diseases and risk behaviors among ethnic groups is unclear and beyond the scope of the BRFSS survey. Moreover, a number of studies have shown that some of the ACEs are culturally dependent.³⁷⁻⁴¹ Further research is warranted to clarify the specific roles of ACEs in the development of health problems and risk behaviors, so that appropriate prevention and intervention can be implemented. Also, given the diversity of the state's population, culturally appropriate approaches must be considered when implementing interventions to prevent ACEs.

Conclusion

Based on the results of the BRFSS 2010 survey, ACEs are common among Hawai'i adults. Having an ACE, and reporting multiple ACEs, is more prevalent among Native Hawaiians and Whites, younger age groups, those with less education and those with a lower annual household income. ACEs are strongly associated with a number of health conditions and risk behaviors, including COPD, lifetime anxiety, lifetime depression, current depression, FMD, activity limitation, sub-optimal general health, current smoking, heavy drinking, and binge drinking. A higher number of ACEs significantly increases the odds for having these health conditions and risk behaviors. No relationship exists between ACE scores and stroke, diabetes, and physical inactivity. Compared to those without ACEs, Hawai'i adults with ACEs were more likely to report being dissatisfied with their lives, with a strong relationship between the number of ACEs and life dissatisfaction. Given potential biases in reporting by age and ethnicity and recall bias, more longitudinal studies are needed to tease out the true contributions of ACEs to the development of diseases.

Disclaimer

The findings and conclusions in this manuscript are those of the authors and do not necessarily reflect the opinion of the Hawai'i State Department of Health and the Centers for Disease Control and Prevention.

Conflict of Interest

None of the authors identify a conflict of interest.

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MEDICAL SCHOOL HOTLINE

A History of the University of Hawai'i Postgraduate Medical Education Program at Okinawa Chubu Hospital, 1966-2012

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Abstract

The University of Hawai'i (UH) has been collaborating with Okinawa Prefectural Chubu Hospital for over 46 years. This collaboration started as a post-World War II effort to increase the physician workforce. At the initiation of the US Army and State Department, the University of Hawai'i was recruited, in cooperation with the government of the Ryukyus and USCAR, to initiate a US style postgraduate clinical training program. The Postgraduate Medical Training Program of University of Hawai'i at Okinawa Chubu Hospital introduced a style of training similar to that in the US by offering a rotating internship. The initial contract had UH establish and run the Postgraduate Medical Training Program of University of Hawai'i at Okinawa Central Hospital. After Okinawa's reversion to Japan, under a new contract, UH physicians participated as consultants by providing lectures at "grand rounds" and guidance to faculty, staff, and students. To date, 895 physicians have completed the University of Hawai'i Postgraduate Medical Training Program with 74 currently training. Approximately 662 (74%) of the trainees have remained in Okinawa Prefecture to practice medicine. As a result, the program has enhanced the physician workforce for the islands of Okinawa and neighbor archipelagos of Miyako and Yaeyama Islands.

Introduction

The war with Japan, culminating in June 1945 with the Battle of Okinawa, left devastating conditions for both the military and civilian populations. Under United States (US) control, initial efforts were made to set up medical facilities, to service the Allied forces, with few resources going to the civilian population. Healthcare resources were limited for the civilians, of whom 30% were either killed, wounded or injured.¹ The situation was exacerbated by a severe physician shortage. With very few Okinawan physicians remaining after the war, the public health environment faced a perilous future.² Only six out of the 21 Okinawan physicians drafted into the war remained in the Ryukyus Islands after the war. By 1946, additional physicians returned from military assignments, and increased the number of Okinawan physicians to 64 in the entire prefecture. In 1950, the number increased to 131 physicians, which was a ratio of approximately 18.7 physicians per 100,000.^{2,10}

The United States Civil Administration of the Ryukyus (USCAR) made great efforts to recruit Japanese medical students and physicians to return to serve in Okinawa. Programs to fund medical students through scholarships, recruit and train available physicians, and to build medical facilities were established. As part of this effort to increase physician presence, the US Army

and State Department contracted the East-West Center and the University of Hawai'i (UH) in 1966 to train physicians and ancillary medical personnel at the Okinawa Central Hospital (now known as the Okinawa Prefectural Chubu Hospital). In 1967,³ a postgraduate training program was created for new Japanese graduates. The training implemented a US style of teaching, which is different from the Japanese postgraduate medical education *ikyoku-kohza* system, or hierarchical structure of clinical departments. The program was named the Postgraduate Medical Training Program of the University of Hawai'i at Okinawa Central Hospital.⁴

The training program was funded by the US government and continued from 1967 through 1971. This funding terminated in 1971 when an agreement by the US Senate returned the administrative rights of the Ryukyus Islands and Daito Islands to Japan. Under the Japanese government, the Okinawa Prefecture administration as well as the hospital staff continued the US model of postgraduate training instituted by the UH consultants. In 1973, a new contract was signed between the Okinawa Prefecture and UH to continue the partnership at Okinawa Central Hospital. This contract was fully funded by the Japanese government in the first year and by the Okinawa Prefectural Government thereafter. Due to limited funding, the partnership changed to a consultant role.⁴

Post-WWII Okinawan Public Health

Because of Okinawa's strategic location, less than 400 miles from the Japanese main island, US commanding Generals planned for the islands to be used as a base for an invasion of the Japanese mainland; thus post-war management of the civil population of the Japanese mainland was the major concern. Careful and thorough preparations to improve the overall public health of the civilians were initiated.⁸

In the first two years after the war, there were virtually no hospitals, and very few clinics, medical facilities, or healthcare staff to treat the civilian population. Medical care was provided mostly by the US military with the assistance of local personnel, primarily directed to servicing military personnel. Civilians were initially moved to camps where they received food, water, shelter and medical care. Many had their first encounters

with medical service when US Army medics dusted them with DDT for lice and fleas.⁸ The first two hospitals, which offered civilian clinics, were constructed at Ginoza and Ishikawa. Two additional hospitals were constructed at Itoman and Nago. In 1946 the Okinawa Central Hospital was established in Koza. It became the focal point for medical care in Okinawa.²

Few physicians who left Okinawa during the war returned due to various reasons: lack of facilities for physicians to practice (limited hospitals); no incentive due to the post-war condition; US occupation; and lack of funding. All remaining Okinawan physicians were required to work as public servants under the “government-administered medical care policy.”¹⁴ Due to the shortage of healthcare workers, in 1945 USCAR enacted proclamation No. 9, “Public Health and Sanitation.” This defined “other healthcare workers” who were allowed to engage in medical activities. This included medical school dropouts, physician assistants, and those who had worked in medical facilities. Former Japanese army physicians were also allowed to work as “medical assistants.” Later, these physicians were allowed to provide medical care independently, with restrictions.²

To develop the local physician workforce, USCAR offered scholarships to study in mainland Japan and the United States.⁹ In 1949, the “Contract Medical Students Study Abroad Program” was enacted, which funded Okinawan medical students to study on mainland Japan. Many of these students later made significant contributions to the health care in Okinawa. USCAR also established training programs for nurses and medical technologies.

Postgraduate Medical Training Program of University of Hawai‘i at Okinawa Chubu Hospital

In 1964 the US Pacific Military Command was invited to survey the public health conditions of Okinawa. Outside of military

bases, the survey revealed poor sanitary conditions and the need to improve the civilian medical and public health services and facilities. The survey recommended the establishment of a medical training hospital, a medical library, and also suggested the need to build a medical school. At that time there were no medical education institutions in Okinawa and no formal post-graduate education programs for medical graduates in Japan.² In 1964, Okinawa Central Hospital was renovated to accommodate physician training.

At the initiation of the US Army and State Department, the University of Hawai‘i was recruited, in cooperation with the government of the Ryukyus and USCAR, to initiate a US style postgraduate clinical training program.

The initial contract signed in 1966 called for four physicians from the University of Hawai‘i to travel to Okinawa to conduct training for three month rotations. In 1967 a formal training program was started and the first program director, Dr. Neal L. Gault, was hired to initiate and direct the Postgraduate Medical Training Program of University of Hawai‘i at Okinawa Central Hospital. For this initiative, Dr. Gault was awarded the Supreme Award from the Japan Medical Association in 1969 for his activities in Okinawa, and in 1992 he received the Order of the Rising Sun, the third highest ranking medal by the Japanese government, for his contributions to Japan.³

As part of the initial contract, fourteen University of Hawai‘i faculty members specializing in internal medicine (3), surgery (2), and one each in pediatrics, anesthesia, obstetrics and gynecology, psychiatry, pathology, radiology, laboratory medicine, nursing and hospital administration were employed. To start, the program accommodated eight trainees, five from Okinawa and three from mainland Japan. At the insistence of USCAR, physician and nursing staff, technicians, and post-graduate trainees were also sent to the University of Hawai‘i to continue training abroad. The goal for these trainees was to further their medical education in the US style of training, and subsequently help teach trainees in the program.^{2,4}



Figure 1. Okinawa Chubu Hospital under construction, 1965

The Postgraduate Medical Training Program of University of Hawai'i at Okinawa Chubu Hospital introduced a style of training similar to that in the United States by offering a rotating internship. The US style training method focuses on clinical experiences in a range of areas, as detailed by the Institute for International Cooperation Japan International Cooperation Agency (2000). The following were the principles articulated.

- Wide ranges of clinical experiences are incorporated into the program. First-year trainees rotate among internal medicine, surgery, ob-gyn, and pediatric training. Specialty training occurs during the second year, however still involves primary care in many subspecialties.
- Trainees engage in diagnosis and treatment, whereby, supervisors observe and instruct.
- Trainees are involved in medical discussions, and medical decision-making at the bedside, emphasizing critical thinking and analytical capabilities.
- Training is conducted in clinical settings and emergency centers, thereby gaining experience in treating a wide range of patients.

Until 1971, the US Federal government via the University of Hawai'i, funded the program. However when Okinawa reverted to Japan, the US funds were no longer available. Due to the success of the program, and the urging of the hospital administration, the program was restored in 1972 with a contract funded by the Japanese government in the first year and by the Okinawa Prefectural Government thereafter.¹⁰

Current Status University of Hawai'i and Okinawa Collaboration

When the postgraduate training program began in 1967, all teaching faculty came from UH for three-month assignments,

with the director serving for two years. After Okinawa's reversion to Japan, under a new contract, UH physicians participated as consultants. The Okinawa Chubu Hospital's education committee guides the consultation topics, as well as the selection of consultants. Currently, UH-JABSOM continues to contribute to the University of Hawai'i Postgraduate Medical Education Program at Okinawa Chubu Hospital through the Visiting Faculty/Scholar Program, whereby specialist consultants visit the program for either a period of one-week program or three month rotation. Consulting faculty who are hired spend time at Okinawa Chubu Hospital by lecturing, conducting daily clinical rounds in the patient wards, and helping train the trainees in diagnosis, medical decision-making, and clinical skills.¹⁰

Today, the program includes approximately 90 resident physicians at Okinawa Chubu Hospital and 10-12 specialist consultants annually through UH-JABSOM. Since the inception of the program through 2011, 450 consultants and 162 faculty members have participated. In 1967, the program began with eight student trainees; as of 2011, the program accommodated 20-30 new trainees each year. This growth in the post-graduate program was due largely to the establishment of the Office of Global Health (OGH) at JABSOM in 1989. To date, 895 physicians have completed the University of Hawai'i Postgraduate Medical Training Program with 74 currently training.⁶ Approximately 662 (74%) of the trainees have remained in Okinawa Prefecture to practice medicine.⁴ As a result, the program has enhanced the physician workforce for the islands of Okinawa and neighbor archipelagos of Miyako and Yaeyama Islands.

In 2001 a new Okinawa Chubu Hospital was built adjacent to the former. It is a modern high tech facility which offers services in general and emergency medicine, as well as, over 15 specialties. The Okinawa Chubu Hospital has grown from 216 beds in 1967 to 550 in 2008. The number of physicians has grown from 12 in 1967 to 90 as of 2008. Over the years,



Figure 2. Okinawa Prefectural Chubu Hospital, 2001

the number of Okinawan physicians serving the prefecture has grown from six Okinawan physicians in 1945, to approximately 235 physicians per 100,000 in 2012.¹¹

Challenges

The training style at Okinawa Chubu Hospital differs from most medical schools in Japan. Trainees are responsible for patients under the guidance of clinical staff and participate actively in clinical discussions and decision-making.⁶ The training curriculum adopts the US style of training and can be considered comparable to US programs.

Recognizing the need for clinical skills training, in 2004 the Japanese government implemented a mandatory two-year postgraduate training clinical rotation after graduating from schools of medicine. However, currently most postgraduate training does not include direct patient care or bedside teaching. The emphasis is on acquisition of medical knowledge through case presentations, assigned learning topics, and chart reviews. There is minimal discussion and clinical assessment, diagnosis, or medical decision-making during medical student education, which have been identified as a deficit in the educational system. Japanese medical schools are not subject to any standardization; this includes post-graduate training, which is structured depending on the hospital and university.¹⁴ After the two years of post-graduate training, Japanese physicians are allowed to choose a specialty. The specialty certification in Japan does not follow a standard guideline or regulations and the completion of further formal training is not required.

Change in the Japanese medical education structure is imminent due to the Educational Commission for Foreign Medical Graduates (ECFMG) announcement that effective in 2023 physicians applying for ECFMG Certification will be required to graduate from a medical school that has been appropriately accredited by a formal process comparable to the Liaison Committee on Medical Education (LCME) (accrediting organization for U.S. medical schools), or that of the World Federation for Medical Education (WFME). ECFMG certification is needed to apply to U.S. residency. Currently Japanese medical schools are not accredited to standards similar to LCME or WFME.

Conclusion

For over 46 years the UH-JABSOM and Okinawa Chubu Hospital have partnered to successfully train physicians. The contract, signed in 1973, continues to be renewed biennially. From meager beginnings, the program today is highly regarded throughout Japan. Acceptance to the training program is competitive. Applications for the program come from Okinawa, mainland Japan, as well as international countries such as China. Resources for students include a comprehensive medical library and audiovisual center that is open 24 hours a day and accessible over the Internet. The library collection includes 79 English journals and 47 Japanese journals; in addition, electronic

access to health related search engines and database such as Pub Med, J Dream II, MD Consult, and the Cochrane library are available.⁶ The training, which is based on US standards and focuses on the trainees and their patients, has been successful. This program is ready to serve as a clinical model for the standards that Japanese medical education system will seek to meet ECFMG compliance.

Okinawa has had a difficult history with many challenges in providing healthcare to its people. Despite the devastation caused by war, and their relative socioeconomic disadvantage to the mainland Japan, Okinawans are currently known for their good health, and longevity. Okinawans have one of the highest prevalence of centenarians in Japan with low risk of age-associated diseases such as diabetes, heart disease and cancer.¹³ The UH-JABSOM will continue to collaborate and partner with Japan, as part of the school's mission to promote pan-pacific global health care and education. The Okinawa experiences will remain an example of overcoming challenges and adversities to care for the health and well-being of populations in need.

Conflict of Interest

None of the authors identify a conflict of interest.

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INSIGHTS IN PUBLIC HEALTH

Bridging the Research to Practice Gap to Prevent Maternal Stress and Depression

Elizabeth McFarlane PhD, MPH; Andy Kahili; and Jodi Aiu Johnson LCSW

Insights in Public Health is a monthly solicited column from the public health community and is coordinated by HJMPH Associate Editors Jay Maddock PhD from the Office of Public Health Studies at John A Burns School of Medicine and Donald Hayes MD, MPH from the Hawai'i Department of Health in collaboration with HJMPH Manuscript Editors Tonya Lowery St. John MPH and Ranjani Starr MPH from the Hawai'i Department of Health.

Achieving Healthy People 2020 goals to improve health and prevent disease requires the implementation of effective public health programs.¹ An issue often cited as impeding improvement in public health is the gap between what is known through science and research to improve health and healthcare outcomes and what is delivered in every day practice.² Several efforts have evolved to address this gap: among them are The National Institutes of Health's (NIH) Clinical and Translational Science Award (CTSA),³ The Centers for Disease Control and Prevention's (CDC) *The Guide to Community Preventive Services*,⁴ and the emergence of the fields of Public Health Systems and Services Research (PHSSR)⁵ and Dissemination and Implementation (D&I) Science.⁶

Despite the increased focus on translation of research to practice, challenges persist in the uptake of evidenced-based practice. Two challenges in particular are relevant to the prevention work presented in this paper. First, the evidence-base is scant in many areas of preventive public health.⁷ Where evidence is available, it may be for a population different than intended (eg, reducing stress in mothers of pre-term babies rather than all mothers) or be only partially related to the construct of focus (eg, parenting stress or job related stress rather than stress as a whole). Second, public health service delivery is often (and appropriately) set in community-based organizations (CBO). Yet, CBOs experience with and understanding of evidenced-based practice may differ substantially from their academic colleagues. CBOs may not have access to current research findings or the specialized training to readily interpret and utilize research findings. Additionally, CBOs may have limited resources to apply towards the implementation of evidenced-based programs such as staff training and monitoring to assure fidelity.

This paper describes a research to practice partnership among university-based researchers, two community-based organizations and the Maternal Child Health Branch of the Hawai'i Department of Health (HDOH) with additional funding from the O'Neill Foundation. The YWCA Hawai'i Island (YWCA) and Child and Family Services O'ahu (CFS) provide home visiting services to eligible families via contracts with the Department of Health. YWCA and CFS bring detailed knowledge of the resources that may be leveraged, and challenges experienced

within communities, that influence maternal stress and depression. They also bring an essential infrastructure for program delivery. The Department of Health with funding from the Health Services Resources Administration (HRSA) provides funding to build the infrastructure for evidence-based home visiting to promote and improve maternal and child health. The O'Neill Foundation's mission is to partner with nonprofits to improve the quality of life for families and communities. More specifically, the O'Neill Foundation wishes to address maternal trauma, anxiety, depression, and stress that may create an environment for children that negatively impacts their development, education, and health across the life course.⁸

The aims of the partnership are to:

- (1) identify and select an evidenced-based intervention to reduce stress and prevent depression in low-income women with children;
- (2) implement the intervention with fidelity and pilot test study measures;
- (3) test the intervention's effectiveness via a randomized control trial (RCT);
- (4) disseminate findings; and
- (5) identify the next topic for inquiry and investigation.

Aim one involved completing a literature review to identify evidenced-based interventions to address maternal stress and prevent depression. Literature searches were performed on the following databases: Cinahl, PsychInfo, PubMed, Sociological Abstracts and Web of Science using pre-determined search terms. Two exclusion rounds were conducted and the remaining articles were reviewed with a common template by a representative from each CBO and the academic institution. Article reviews were discussed on weekly conference calls. The strengths and limitations of each study were described and reviewers had time to ask questions to enhance their understanding of the content and merits of reviewed articles. Thus, the review process facilitated the selection of an appropriate intervention, Mothers and Babies (MB), to adopt and test in the local communities. The review process expanded the CBOs' capacity to conduct

literature reviews as a mechanism to inform future program and policy changes.

Mothers and Babies (MB) is a cognitive-behavioral group intervention developed for low-income and minority perinatal populations faced with multiple stressors.⁹ The MB Course integrates proven cognitive-behavioral methods for managing stress and reducing psychosocial symptoms.⁹ Women in the MB Course receive 6 two-hour intervention sessions delivered weekly in a group format by a mental health provider or home visiting staff member trained on the MB Course. Each session contains didactic instruction on core content, as well as activities and group discussion. The 6-week MB Course is divided into three modules: *Pleasant Activities, Thoughts, and Contact with Others*. Each module is covered in 2 sessions. The modules map onto core cognitive-behavioral approaches for the treatment and prevention of depression and stress reduction. Between group sessions, home visitors provide brief (approximately 5-10 minutes) 1-on-1 reinforcement of key content covered during group sessions.¹⁰

Aim two involved implementing the MB curriculum into current program operations. Two days of training was provided on the MB curriculum to CBO staff. The intervention was then integrated into standard home visiting services for a small group of 5-8 women at the YWCA Hawai'i Island and CFS O'ahu. Intervention sessions were videotaped and reviewed weekly to facilitate fidelity to the curriculum and address any challenges that may have emerged during the group sessions. The pilot test findings showed significant post intervention improvements in coping, and reduction in maternal depressive symptoms, and pilot study participants expressed enthusiasm for the MB curriculum. Combined, these findings supported our intention to move to the RCT phase of the project.

Aim three is underway. Power analyses and sample size calculations were completed. The intended sample size is 120 women. The study design includes data collection by trained interviewers at baseline, prior to randomization, and at 7-weeks and 6-months post intervention. CBO staff and research team members work closely together to introduce and describe the study to eligible women. Research team members complete the consent and randomization to services-as-usual or services-as-usual plus MB. Baseline data has been collected with 81 mothers using validated measures of key constructs such as stress, depression, coping, problem-solving and parent-child interaction. Measures were reviewed by the CBOs and DOH before inclusion in the study. To date, 6 cohorts of mothers have been recruited to and participated in the RCT and a 7th cohort is in recruitment. The RCT is scheduled for completion in December, 2014.

CBO engagement in the steps of the RCT not only enhances their capacity to ascertain the strengths and limitations of studies reported in the academic literature but also demystifies the research process by making transparent key values in

academic research and their relation to establishing evidence. The research to practice partnership increases CBO capacity for internal evaluation of program outcomes by strengthening the organization's use of valid measures and criteria for measuring program performance and outcomes.

Aims four and five are to be carried out collaboratively pending completion of the RCT. Optimally, dissemination of findings will involve all members of the partnership working together to analyze and interpret study findings, as well as select forums to share the outcomes. The final aim is to assess what questions remain related to program performance and effectiveness and to redirect the partnership activities to answer the newly identified questions.

In the research to practice partnership described here, each partner plays an important role in improving services and outcomes for low-income mothers and children. At the national and foundation level, funding toward training, technical assistance, program monitoring, quality improvement and research is needed. The Department of Health and the CBOs must carefully explore options and make data-informed decisions about adopting, adapting, and implementing innovations to prevent maternal stress and depression in low-income mothers. CBO's must continue to advocate for the populations they serve and researchers must apply appropriate study design and rigor to answer the questions that emerge through the partnership. Through this iterative process of inquiry and application public health delivery is expanded and refined to attain the goals of health equity and quality of life set out in Healthy People 2020.

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IT IS MORE ABOUT DOLLARS THAN SAVING LIVES.

Getting to a trauma center matters for patients who are gravely injured. Previous studies have shown that chances of survival are 25% better than in a general hospital. A Stanford research team looked at more than 4,500 trauma admissions at 636 hospitals around the United States, that are not designated trauma centers. Patients with health insurance were more likely to be kept rather than transferred to a trauma center. Who makes the decision to admit or transfer isn't clear, but the E. R. staff doesn't know (or care) about insurance. Hospital administrators often weigh-in on decisions to "dump" patients without insurance to a public hospital. This study would indicate that the same dynamic is at work, but in the opposite direction. It appears the cash register makes the decision.

THE CHAPPAQUIDDICK LAW RULES WHENEVER A COVER-UP SEEMS TEMPTING.

The federal government is setting a probe in motion against General Motors for a faulty ignition switch. The defect affected more than 1.6 million vehicles and has been tied to more than a dozen deaths. A spokesman for GM acknowledged that its employees knew about the problem for nearly a decade before it conducted a full recall. Moreover, the National Highway Traffic Safety Commission had been made aware also, but failed to follow up, citing insufficient evidence. The public was failed on two counts. Simultaneously, Toyota Motor Corp. is facing a criminal penalty of \$1.2 billion for misleading consumers about safety problems over a stuck accelerator pedal. The judgment is the largest to date against an automaker and took four years of investigation. What it means for consumers is that big business and even federal agencies cannot be trusted to act when necessary.

THE GENOME CANNOT BE DENIED.

Back in 1997 the body of a teenage girl was found by some hunters in a remote wild-life refuge near Racine, Wisconsin. The corpse had been beaten, sexually abused and suffocated with a plastic bag. She was thought to be a runaway and was listed as a Jane Doe until she was identified 15 months later. DNA specimen and partial fingerprints were found on the plastic bag and sent to the FBI and every state crime lab, yet no ID could be established. A recent misdemeanor arrest in Oklahoma got a fingerprint match, and a 36 year-old Illinois man was suspected. Police followed the suspect, waiting until he tossed his cigarette and grabbed the butt for DNA. The analysis proved conclusive, and the arrest was made. Watson and Crick strike another blow for justice. And yet more proof that smoking can be hazardous to your health.

SAD COFFEE IS CALLED DEPRESSO.

Caffeine is the seemingly benign drug of choice that keeps so many of us fueled for the challenges of the day. After some study, the American Psychiatric Association in the current mental disorder manual (DSM-5) includes both caffeine intoxication and withdrawal. They are both considered diagnoses when they impair a person's ability to function in daily life. Intoxication was included in the previous manual but withdrawal was not. The current manual is not without controversy. Professor Allen Francis, previous task force chairman, is a critic. "We shouldn't medicalize every aspect of life and turn everyone into a patient." Hey I'm with you, Professor.

GREEDY BIG PHARMA HAS HOOKED AMERICA.

Conventional medicine (enthusiastically encouraged by Big Pharma money) lives by the mantra if you have high cholesterol levels you should take a statin. Thanks to this line statins have become the most profitable class of medications on the market. Doctors have prescribed statins for countless patients with the warning that if they don't take a statin they are at risk for a heart attack. Yet research has shown: (1) there is no indication for taking a statin drug if you have not had a

cardiac event; (2) if you are a man and have had a cardiac event, the best the statin drugs can promise you is approximately a 1-5% reduction in preventing a non-fatal heart attack; (3) statin drugs have been around for 15 years, but have never been shown to prolong lives; (4) in women there are no solid studies that demonstrate that it is beneficial to take a statin for any purpose. The Cochrane Collaboration, an independent group that is not associated with Big Pharma stated, "Statin drugs do not have a proven net health benefit in primary prevention populations and thus when used in that setting do not represent good use of scarce health care resources."

SO THAT'S WHY WOMEN PUT SCENT BEHIND THEIR EARS.

Chances are that you have never wondered about earwax odor. Scientists at the Morell Chemical Senses Center in Philadelphia report that compared to other races, earwax of east Asian people contains significantly less amounts of odor-causing substances called volatile organic compounds. George Preti, an organic chemist at the research institute, said earwax odor can be used as a quick diagnostic tool for certain rare metabolic diseases. He is optimistic that the earwax of cancer patients might contain a telltale fragrance that could be detected by dogs. Scientists have long known that earwax of east Asians is dry and whitish whereas that of others is moist and yellowish-brown. The difference is due to a genetic mutation and scientists have found the very same mutation causes east Asians to have less underarm odor. Go figure.

"DOC IN THE BOX" HAPPY HOURS 6 - 8 PM

Set in drugstores, supermarkets and big box stores, walk-in retail health clinics staffed by nurse practitioners, are playing a bigger role in delivering health care. They are usually open seven days a week and evenings, and do not require an appointment. They accept more types of insurance than physicians and charge 30% to 40% less than pediatricians or family doctors for similar services. The American Academy of Pediatrics said they are detrimental to the concept of a "medical home" where patients have a personal physician who knows them well. After plateauing in recent years, the clinics are again expanding. Retailers are betting that the Affordable Care Act will bring longer waits at doctors' offices. CVS Caremark Corp. and Walgreen Co. expect to double their locations by 2017.

ADD POO-POURRI TO YOUR PHARMACY LIST. CLASSY PRODUCT - NOT!

The makers of a product called poo-pourri won a "coveted" award from USA Today as one of the five worst ads of 2013. Toilet users who are worried about smell are advised to spray Poo-Pourri on the commode pre use. The TV ad shows a British-accented woman sitting on the throne. She praises the product with the opening line "You would not believe the mother lode I just dropped."

ADDENDA

- Nearly 25% of American adults did not read a book in the past year, a percentage that has tripled since 1978.
- Old age is the most unexpected of all things that can happen to a man.
- In Miami everything is in the 80s, the temperatures, the ages, and the IQs.
- In India a man set the world's record for longest ear hair. Now that must be an ugly comb-over.
- We are all amateurs, it's just that some are more professional about it than others.

ALOHA AND KEEP THE FAITH *rt*s

(Editorial comment is strictly that of the writer.)

Biostatistical Guideline for HJM&PH

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

Percentages: Report percentages to one decimal place (eg, 26.7%) when sample size is ≥ 200 . For smaller samples (< 200), do not use decimal places (eg, 26%, not 26.7%), to avoid the appearance of a level of precision that is not present.

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

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

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

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

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

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

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

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

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

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

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

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

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

Descriptive tables: In tables that simply describe characteristics of 2 or more groups (eg, Table 1 of a clinical trial), report averages with standard deviations, not standard errors, when data are normally distributed. Report median (minimum, maximum) or median (25th, 75th percentile [interquartile range, or IQR]) when data are not normally distributed.

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

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

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

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2. Supplements must have educational value, be useful to HJMPH readership, and contain data not previously published to be considered for publication.
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4. Supplements should treat broad topics in an impartial, unbiased manner. Please prefer specific classes of drugs, rather than products, unless there are compelling reasons or unique properties of the drug (product) that justifies its treatment.
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YRBS 2013 Youth Risk Behavior Survey Results

BULLYING IN MIDDLE SCHOOL STUDENTS

44.6%
Have ever been bullied on school property

23.7%
Have ever been bullied electronically
(through e-mail, chat rooms,
instant messaging, we sites or texting)

8.4%
Skipped school in past 30 days because
they felt unsafe at school or on their way
to or from school



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Service and Value

MIEC takes pride in both. For over 30 years, MIEC has been steadfast in our protection of Hawaii physicians. With conscientious Underwriting, excellent Claims management and hands-on Loss Prevention services, we've partnered with policyholders to keep premiums low.

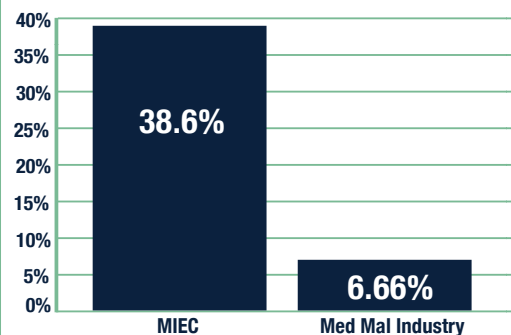
Added value:

- No profit motive and low overhead
- Local claims office in Honolulu
- 17.5 million in dividends* distributed in 2014

For more information or to apply:

- www.miec.com
- Call 800.227.4527
- Email questions to underwriting@miec.com

Average Dividend as % of Premiums
Past five Years



* (On premiums at \$1/3 million limits. Future dividends cannot be guaranteed.)

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Owned by the policyholders we protect.